Restoration Plan and Environmental Assessment for the Industri-Plex Superfund Site

Draft for Public Review

February 19, 2020

Prepared by:
Industri-Plex NRDAR Trustee Council
Commonwealth of Massachusetts
U.S. Fish and Wildlife Service
National Oceanic and Atmospheric Administration

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CONTENTS

List of Acronyms

Abt	Abt Associates
ACEC	Area of Critical Environmental Concern
BA&W	Bureau of Air & Waste Program
BFE	base flood elevation
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CWA	Clean Water Act
DCR	Department of Conservation & Recreation
DFG	Department of Fish and Game
DFW	Massachusetts Division of Fisheries and Wildlife
DMF	Division of Marine Fisheries
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EEA	Executive Office of Energy and Environmental Affairs [MassEEA]
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ENF	Environmental Notification Form
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
HSG	Hydrologic Soil Group
HWG	Horsley Witten Group
LOMR	Letter of Map Revision
M.G.L.	Massachusetts General Laws
MassDEP	Massachusetts Department of Environmental Protection
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MHC	Massachusetts Historical Commission
MVP	Municipal Vulnerability Preparedness
MWRA	Massachusetts Water Resources Authority
MyRWA	Mystic River Watershed Association
NEPA	National Environmental Policy Act
NHESP	Natural Heritage Endangered Species Program
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent

NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRDAR	Natural Resource Damage Assessment and Restoration
NRHP	National Register of Historic Places
O&M	operation and maintenance
ODS	Office of Dam Safety
OMB	Office of Management and Budget
ORW	Outstanding Resource Water
OSHA	Occupational Safety and Health Act
PAH	polycyclic aromatic hydrocarbon
PEIS	Programmatic Environmental Impact Statement
PEL	Probable Effect Level
PNF	Project Notification Form
RC	Restoration Center
RP	Restoration Plan
Site	Industri-Plex Superfund Site
SVOC	semi-volatile organic compound
SWMI	Sustainable Water Management Initiative
T&E	threatened and endangered
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WPA	Wetlands Protection Act
WQC	Water Quality Certificate

Executive Summary

On January 11, 2013, Bayer CropScience, Inc. and Pharmacia Corp. agreed to provide approximately $4.25 million to the natural resource Trustees in order to resolve their environmental liability for the Industri-Plex Superfund Site (the Site) located in Woburn, Massachusetts. Under the terms of the settlement, which was lodged with and approved by the U.S. District Court for the District of Massachusetts, the Trustees recovered their past costs and approximately $3.8 million for restoration (restoration planning, implementation, oversight, and monitoring) funding.

This Draft Restoration Plan and Environmental Assessment (RP/EA) presents alternatives considered by the natural resource trustee agencies and identifies the preferred alternative chosen by the trustee agencies to restore natural resources and natural resource services that were injured as a result of hazardous substance releases from the Site. The Draft RP/EA is being released for public review and comment in order to provide information to the public regarding the affected environment, the natural resource injuries at the Site, and the restoration actions proposed to compensate for these injuries.

The natural resource trustee agencies involved in developing this RP/EA are the Commonwealth of Massachusetts represented by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), the U.S. Department of Commerce represented by the National Oceanic and Atmospheric Administration, and the U.S. Department of the Interior (DOI) represented by the U.S. Fish and Wildlife Service. Within the Massachusetts EEA, the Massachusetts Department of Environmental Protection administers the Natural Resource Damage Assessment and Restoration (NRDAR) Program.

The Trustees solicited restoration project ideas from the public and considered all projects submitted through this process. Eligibility and evaluation criteria developed by the Trustees and based on the DOI factors enumerated in 43 CFR § 11.82 for natural resource damage assessment restoration projects guided the evaluation of alternatives. The ecological and socioeconomic setting of the affected environment includes the Mystic River Watershed and its communities. In addition, this document constitutes the EA for the proposed restoration of natural resources as defined under the National Environmental Policy Act [42 USC § 4321 et seq.] and addresses the potential impact of preferred restoration actions on the quality of the physical, biological, and cultural environment.

The Trustees identified and evaluated a variety of restoration alternatives, including a no-action alternative. The Trustees have developed a preferred restoration alternative that includes a mix of habitat restoration and public outreach components. Each of the projects in the preferred alternative has a strong nexus to the injured resources and will result in multiple significant benefits. Together, the projects will restore stream and wetland habitats in degraded areas, reconnect the floodplain to in-stream habitats, help connect fish to valuable upstream breeding and foraging habitats, and improve water quality. The projects will also provide exciting opportunities for public outreach and educational experiences in partnership with local schools, and improved active and passive recreation for community members.

The Trustees have grouped preferred projects into two tiers. Projects in the first tier are proposed to have top priority for funding (see Figure ES1). Trustees may consider funding projects in the second tier if funding remains after the first tier projects have been implemented.

Proposed Tier 1 Projects:

- Wetland and stream restoration at Shaker Glen Extension.
- Scalley Dam fishway design and construction.
- Riverine, floodplain, and riparian habitat restoration at Davidson Park ("HWG Option 2").
- Education and outreach activities to be incorporated into Tier 1 projects.

Proposed Tier 2 Projects:

- Horn Pond Brook and Aberjona River streambank and fish passage restoration.
- Habitat restoration at Mill and Judkins Ponds.
- Downstream fish passage restoration at Mystic Lakes Dam.

Non-Preferred Projects (not recommended for funding):

- Riverine, floodplain, and riparian habitat restoration at Davidson Park ("HWG Option 3").
- Improved water management in the Horn Pond and Horn Pond Brook tributary watershed to the Aberjona River.
- Freshwater mussel and clam study.
- Green infrastructure stormwater management to improve water quality.[1]

The proposed allocation of NRDAR funding across the projects is shown in Table ES1.

Table ES1. Summary of Projects in Alternative 1 (preferred action alternative)

Project Name	Proposed Funding Allocation	Proposed Partner
Tier 1 Projects		
Wetland and stream restoration at Shaker Glen Extension	$2,000,000	City of Woburn
Scalley Dam fishway design and construction	$1,000,000	City of Woburn
Riverine, floodplain, and riparian habitat restoration at Davidson Park (HWG Option 2)	$500,000–$600,000	Town of Winchester
Education and outreach activities to be incorporated into Tier 1 projects	$125,000	Mystic River Watershed Association (MyRWA)
Total proposed allocation across Tier 1	**$3,700,000**	
Tier 2 Projects		
Horn Pond Brook and Aberjona River streambank and fish passage restoration	Up to $110,000	MyRWA
Habitat restoration at Mill and Judkins Ponds	Up to $50,000	Town of Winchester
Downstream fish passage restoration at Mystic Lakes Dam	None	Massachusetts Department of Conservation & Recreation
Total proposed allocation across Tier 2	**To be determined – based on funding remaining after Tier 1**	

[1] While this project was not favored by Trustees as a standalone project (see Section 4.3.4), the Trustees will support the inclusion of green infrastructure into Tier 1 projects, as appropriate and feasible, to increase water infiltration and water quality in restoration project sites.

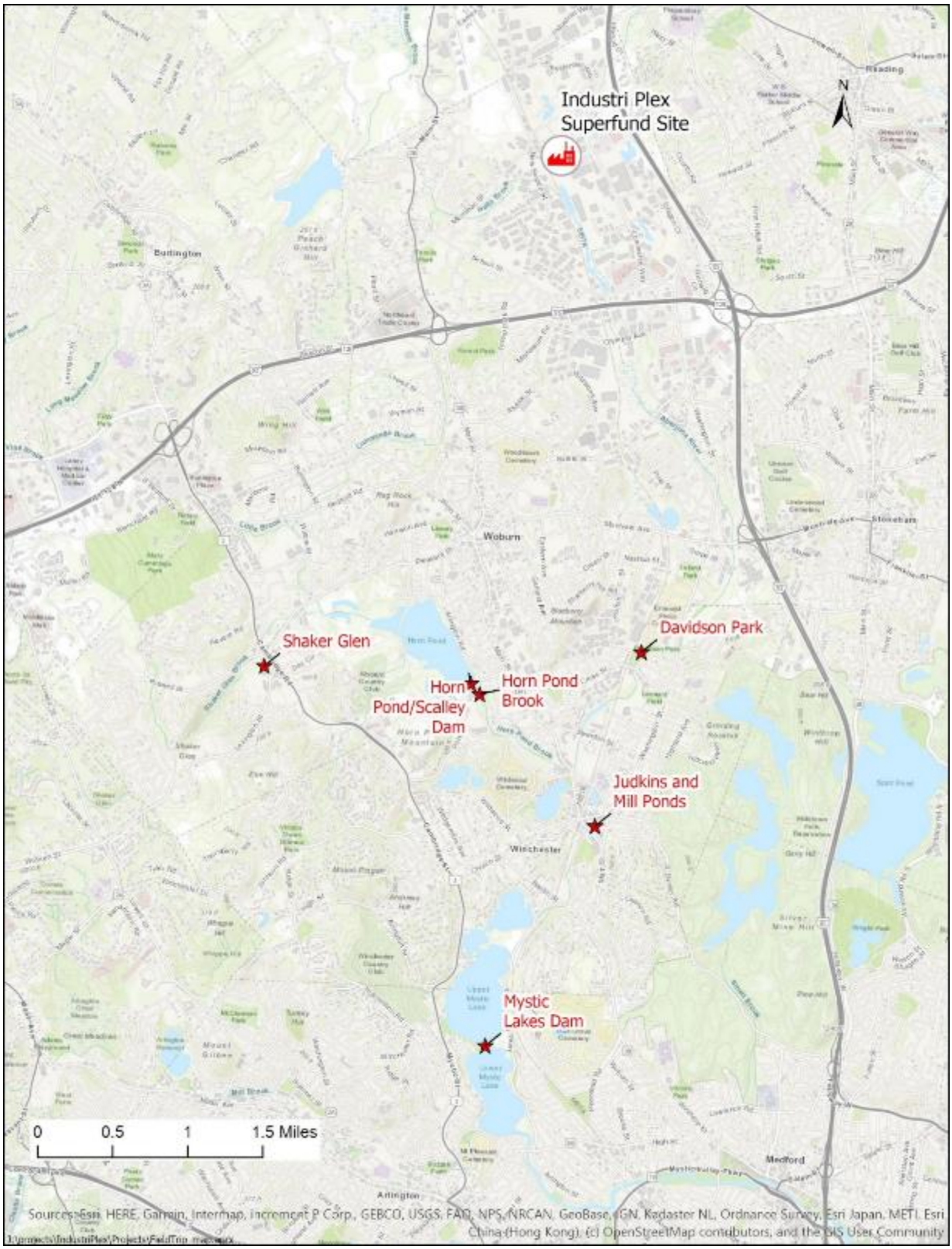


Figure ES1. Locations of Tier 1 and Tier 2 Projects (see Table 1).

1. Introduction to the Restoration Plan and Environmental Assessment

This Draft Restoration Plan/Environmental Assessment (RP/EA) sets out alternatives and identifies the preferred alternative to restore natural resources and natural resource services that were injured as a result of hazardous substance releases from the Industri-Plex Superfund Site (the Site) located in Woburn, Massachusetts. The Trustees have made this Draft RP/EA available for the public's review and comment. It provides information to the public regarding the affected environment, the natural resource injuries at the Site, and the restoration actions the Trustees propose to fund with settlement proceeds in order to address those injuries.

The natural resource trustee agencies involved in developing this RP/EA are the Commonwealth of Massachusetts represented by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), the U.S. Department of Commerce represented by the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of the Interior (DOI) represented by the U.S. Fish and Wildlife Service (USFWS). Within EEA, the Massachusetts Department of Environmental Protection (MassDEP) administers the Natural Resource Damage Assessment and Restoration (NRDAR) Program.

The organization of the document is as follows:

- The remainder of this section provides an overview of Trustee responsibilities and authorities, a summary of the Industri-Plex NRDAR settlement, a summary of natural resource injuries that resulted from the Site, the purpose and need for restoration, restoration goals, and coordination and scoping of restoration project alternatives.
- Section 2 describes the affected environment.
- Section 3 presents the criteria used to evaluate proposed restoration projects.
- Section 4 describes the restoration alternatives the Trustees considered, including the preferred alternative.
- Section 5 discusses project monitoring, performance, and adaptive management.
- Section 6 addresses the environmental and socioeconomic impacts of the different restoration alternatives.
- Section 7 describes key authorities with which proposed restoration actions must comply.
- Section 8 provides a brief conclusion.

1.1. Trustee Responsibilities and Authorities

When a release of hazardous substances or an oil spill occurs, federal, state, and tribal governments act on behalf of the public as trustees of natural resources under several authorities (see box).

NRDAR Authorities

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly known as Superfund (42 USC § 9601 et seq.)
- Clean Water Act (CWA) (33 USC § 1251 et seq.)
- Massachusetts Oil and Hazardous Material Release Prevention and Response Act (M.G.L. Chapter 21E).

Natural resources are defined under CERCLA to include "land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States any state or local government, any foreign government, [or] any Indian [T]ribe" [CERCLA § 101(16)]. Pursuant to CERCLA, designated federal and state agencies, federally recognized tribes, and foreign governments act as

trustees on behalf of the public to assess injuries and plan for restoration to compensate for those injuries. Trustees assess injuries to natural resources resulting from the release of hazardous substances and bring claims against responsible parties for monetary damages in order to compensate the public by restoring, replacing, or acquiring the equivalent of natural resources that have been injured. This process is known as NRDAR.

Under Section 107(f)(1) of CERCLA, monetary damages awarded through NRDAR settlements can only be used to restore, replace, or acquire the equivalent of natural resources injured, destroyed, or lost as a result of the release of hazardous substances. Section 111(i) of CERCLA requires federal and state trustees to develop a RP, and provide opportunities for public involvement in the development of the plan. This document describes the public involvement activities undertaken by the Trustees, including public review and comment opportunities associated with the development of this Draft RP/EA.

In addition, the 1969 National Environmental Policy Act [NEPA; 42 (USC § 4321 et seq.)] and its implementing regulations, 40 CFR Parts 1500–1508, require that federal agencies fully consider the environmental impacts of their proposed decisions and that such information is made available to the public. This document constitutes the EA for the proposed restoration of natural resources, to address the potential impact of proposed restoration actions on the quality of the physical, biological, and cultural environment. The Trustees integrated the CERCLA and NEPA processes in this Draft RP/EA, as recommended under 40 CFR § 1500.2(c).

After the Final RP/EA is completed, individual projects may be determined to trigger thresholds established under the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations [M.G.L. c.30, §§ 61–62H, and 301 CMR 11.00]. Any such projects will then proceed through a MEPA review prior to implementation. Likewise, some projects may require additional NEPA analysis once the details of the restoration project are further defined (e.g., after the completion of the feasibility/planning portion of the project). Any such additional NEPA analysis, if needed, will be completed prior to project implementation.

1.2. Summary of Industri-Plex NRDAR Settlement

On January 11, 2013, Bayer CropScience, Inc. and Pharmacia Corp. agreed to provide approximately $4.25 million to the Trustees in order to resolve their environmental liability for the Site. Under the terms of the settlement that was lodged with and approved by the U.S. District Court for the District of Massachusetts, the Trustees recovered their past costs and approximately $3.8 million for restoration (restoration planning, implementation, oversight, and monitoring) funding.

1.3. Summary of Natural Resource Injuries

The Site is a 250-acre industrial facility that operated from 1853 to 1969, producing pesticides, munitions, leather goods, and glue from animal carcasses that were a by-product of the tanning industry. The by-products of the manufacturing processes that were released on the site included phenol, benzene, toluene, arsenic, chromium, and animal carcasses (DOI, 2019). Benzene and toluene leached from the Site and contaminated groundwater; and arsenic, chromium, and lead contaminated nearby soils and sediments (DOI, 2019). The animal carcasses also emitted hydrogen sulfide gas, producing a noxious smell.

During the 1970s, when the Site was being developed for further industrial use, soil excavations uncovered and mixed the wastes and products that had accumulated for more than 130 years, aggravating the already ongoing contamination. In 1979, further development of the Site was ceased by regulators, and because of widespread contamination, the Site was listed on the National Priorities List (NPL) in 1983.

In 1989 and 2006, the U.S. Environmental Protection Agency (EPA) selected remedial actions for the Site, which were intended to address the threats to human health and the environment posed by the

hazardous substances released at and from the Site. Remedial actions that have been implemented or are ongoing include (1) design and installation of impermeable caps over approximately 105 acres of contaminated soils and sediments, (2) design and installation of an impermeable cap over an additional 5 acres of the "east hide pile" and a gas capture-and-treatment system to reduce noxious odors, (3) design and installation of an interim groundwater treatment system to treat a hot spot of contaminated water, and (4) development and implementation of institutional controls to restrict future land use to preserve the effectiveness of the remedy.

Portions of the Site have been redeveloped and are being used to support a new interstate highway interchange, a regional transportation center, and new local public roads (Brooks, 2006). Other portions of the Site were sold to private developers and now support a 200,000 square-foot retail center and a 900,000 square-foot office park and hotel complex (Brooks, 2006).

The Trustees determined that releases of hazardous substances at the Site caused injuries to an array of natural resources, including to sediment, surface water, floodplain soils, groundwater, and biological resources. Injuries to each of these resources are described briefly below:

- Sediment. Arsenic and chromium concentrations in sediment generally exceeded sediment quality guidelines (Ingersoll et al., 2000; MacDonald et al., 2000) throughout the injured areas. Arsenic was the most prevalent metal to exceed its criterion (EPA, 2006). The maximum detected arsenic concentration (4,550 mg/kg) was over 100 times higher than the Probable Effect Level (PEL), or the level above which adverse effects are expected to occur frequently. Sediment toxicity testing on benthic invertebrates confirmed both acute and chronic toxicity for invertebrates residing at the Site. Additionally, there is evidence that the community structure of benthic invertebrates has been impaired (Metcalf and Eddy, 2004a, 2004b). The sediment contamination represents a natural resource injury, as defined in the federal regulations for natural resource damage assessment [43 CFR §11.62(b)(v)], in that concentrations are sufficient to cause death or physiological malfunctions in biological resources exposed to such sediments.
- Surface water. Arsenic concentrations at some locations exceeded the National Recommended Water Quality Criteria Contaminant Maximum Concentration of 340 µg/L. High concentrations of dissolved arsenic (2,172 µg/L, 2,839 µg/L, and 5,043 µg/L) were detected in the deep surface water (Ford, 2004). The exceedance of federal regulatory water quality criteria is a surface water injury [43 CFR §11.62(a)(iii)].
- Floodplain soils. The majority of arsenic and chromium concentrations in floodplain soils exceeded the MassDEP Natural Soil Background reference criterion. Arsenic and chromium concentrations at some locations also exceed the EPA Ecological Soil Screening Level for wildlife. Soils along the Aberjona River contain arsenic concentrations that can affect earthworm survival (Meharg et al., 1998). Soil organisms would also be a source of contamination for wildlife (e.g., small mammals, American woodcock) that prey on them, as earthworms can bioconcentrate arsenic at nearly three times the soil concentration (Meharg et al., 1998). Hazardous substance concentrations in soils that result in impacts to soil invertebrate reproduction and survival meet the definition of geologic resources injury [43 CFR §11.62(e)(11)].
- Groundwater. The groundwater contains concentrations of arsenic and chromium exceeding Massachusetts Contingency Plan GW-3 groundwater quality standards [310 CMR 40.0974(2)]. The groundwater discharges toxic concentrations of contaminants, particularly arsenic, to surface waters that provide habitat for migratory fish and wildlife; and causes surface waters to exceed surface water quality standards. This condition meets the definition of groundwater injury [43 CFR §11.62(c)(iv)].
- Biological resources. Elevated concentrations of arsenic were detected in fish tissues, ranging from 2.2 to 16.0 mg/kg. Arsenic tissue concentrations within this range are associated with adverse effects

in bluegills (*Lepomis macrochirus*) (Gilderhus, 1966). Benthic invertebrate toxicity testing determined that exposure to pond and wetland sediments caused acute toxicity. Benthic community evaluations indicated strong impairment in ponds and wetlands on the Site. Toxicity results provided evidence of reduced benthic invertebrate growth and lower survival to benthic invertebrates exposed to sediment as far south as the Upper Forebay of the Mystic Lakes. The benthic community structure results showed that several stations had characteristics of a highly impaired benthic invertebrate community (e.g., low diversity, high numbers of pollution-tolerant species). The fish and wildlife species that commonly reside at the Site have been exposed to contaminants, either directly or indirectly. Aquatic species have been exposed to sediment and surface water with concentrations that exceed federally established standards (Ingersoll et al., 2000; 2006 National Recommended Water Quality Criteria). Riparian species have additionally been exposed through contact with contaminated soils. Wildlife exposure has occurred through incidental ingestion of contaminated media (e.g., sediment, water, soil) or through contaminated dietary material (e.g., plants, aquatic and soil invertebrates, fish). The food base for many fish and aquatic birds has also been reduced by contaminants, as surface water arsenic concentrations are within ranges that could cause adverse effects to freshwater algae, invertebrates, amphibians, and fish (Eisler, 1988).

In summary, biological resources have incurred injury [43 CFR §11.62(f)(1)(i)] as a result of being exposed to contaminated environmental media at the Site at concentrations that are sufficient to cause death, physiological malfunction, and other adverse effects. In addition, the ecological services provided to biological trust resources by the sediment, surface water, groundwater, floodplain soils, and lower trophic level biological resources have been degraded. This loss or diminution of ecological services is also a natural resource injury.

1.4. Purpose and Need for Restoration

As noted above, the Trustees determined that the hazardous substances released at the Site degraded water and sediment quality, and reduced habitat value for wildlife use. The water quality of riverine habitat downstream of the Site in the Aberjona River and its tributaries was also degraded, as was the water quality of downstream ponds and lakes. The Trustees recovered approximately $3.8 million to compensate for these injuries, and these funds must be used for restoration under CERCLA.

The proposed restoration actions in this draft RP/EA are needed to restore natural resources equivalent to those injured by releases of hazardous substances from the Site. Based on recommendations set forth in this Draft RP/EA and input from the public, the Trustees will select preferred restoration alternatives for funding.

1.5. Restoration Goals

The Trustees act on behalf of the public to utilize recovered NRDAR settlement funds to accomplish restoration projects that will compensate the public for injuries to natural resources, and their associated services. The Trustees select preferred restoration projects that will accomplish their goals, and their mandate under CERCLA, to restore, replace, or acquire the equivalent of the natural resources and their associated services that were injured or lost. In determining preferred restoration alternatives for the Site, the Trustees have placed primary emphasis on restoration projects closest to the location of injury and secondary emphasis on projects within the Mystic River Watershed but farther from the Site.

1.6. Coordination and Scoping

1.6.1 Trustee Council Organization and Activities

On December 6, 2017, the Secretary of the EEA, the Regional Director of the USFWS North Atlantic-Appalachian Region, and the Director of the Office of Response and Restoration of NOAA signed a Memorandum of Agreement to act on behalf of the public as federal and state Trustees for natural resources for the Industri-Plex NRDAR settlement. Within EEA, MassDEP administers the NRDAR Program.

Each Trustee designated one or more representatives to the Industri-Plex Trustee Council (Trustee Council). Current Trustee representatives are:

- MassDEP
- USFWS
- NOAA.

A trustee's role is to ensure that restoration will restore, replace, and/or acquire the equivalent natural resources affected by the release of hazardous substances at or from a site. MassDEP is designated as the lead administrative Trustee establishing and maintaining the administrative record, and coordinating the restoration planning and implementation process. The lead federal Trustee for NEPA documentation and review is the USFWS. NOAA is acting as a cooperating agency for NEPA compliance and may adopt the Final EA in accordance with 40 CFR § 1506.3 and its agency-specific NEPA procedures. Decisions regarding the use of Industri-Plex NRDAR settlement funds for restoration activities are made jointly based on unanimous agreement of the Trustees.

1.6.2 Summary of Public Involvement

During 2018, the Trustee Council met with citizens, community and environmental groups, local officials, and state and federal agencies to explain the restoration planning process and identify restoration projects that both address the natural resource injury and meet project selection criteria. Public involvement activities included:

- On July 23, 2018, the Trustee Council met with officials from the Town of Winchester; and on July 26, 2018, the council met with the City of Woburn. The Trustees provided information to local officials about the process of restoration project selection, including the criteria that would be used to prioritize projects. The Trustees also discussed potential project ideas with the city and town officials.
- On October 3, 2018, the Trustee Council hosted a formal public meeting in Woburn City Hall in Woburn, Massachusetts, to present an overview of the restoration planning process. The meeting was announced via public notice through the City of Woburn and the Town of Winchester. It was also promoted through the contact list of the Mystic River Initiative [co-chaired by EPA and the Mystic River Watershed Association (MyRWA)]. The Trustees also published Legal Notices in the *Woburn Advocate*, the *Woburn Daily Times Chronicle*, and the *Winchester Star*.

  The overview included information on goals and criteria that would guide the selection of restoration projects and major milestones, and opportunities for continued public involvement and input. The Trustees also clarified what types of projects would qualify for funding (i.e., those supporting the restoration of wetlands, ponds, rivers, and streams, or that would support specific species injured by the release of hazardous substances from the Site). This informational meeting kicked off public outreach to involve nearby communities and identify all opportunities for restoration at the earliest possible stage.

  Following the October 2018 meeting, the Trustee Council invited the public to submit natural resource restoration project ideas for Trustee Council consideration. These ideas were collected over a 90-day period using a Natural Resource Damage Assessment Restoration Project Information Sheet [Office of Management and Budget (OMB) Control #0648-0497]. Project proponents provided information about their organization; their proposed restoration activities; likely resource, habitat, and/or resource service benefits; the project's status; and possible partnerships. Respondents were encouraged to include additional information, such as maps and diagrams, as appropriate. Trustees received a total of 11 project ideas, addressing restoration in a variety of habitats (i.e., pond, stream, wetland, riparian, and upland habitats), public education and outreach, water management, and green

infrastructure installation. See Section 4 for a description of the projects submitted to and considered by the Trustees.

- In February 2019, EEA, acting on behalf of the Trustee Council, contracted with Abt Associates (Abt) and its subcontractor, Fuss & O'Neill Inc., to provide additional technical expertise for evaluating restoration project ideas. On May 6 and 7, 2019, this group conducted site visits to obtain updated information on the status of some projects.
- On March 4, 2020, the Trustee Council will hold a public meeting in Woburn, Massachusetts, to introduce this Draft RP/EA to the public and solicit public comment.

1.6.3 Public Notification

Under CERCLA and NEPA, the Trustees must notify the public of the availability of the Draft RP/EA. The Trustees will publish a notice of the availability of the Draft RP/EA in the *Woburn Advocate*, the *Woburn Daily Times Chronicle*, and the *Winchester Star.* Press releases will be issued to local and regional newspapers, and notification will be circulated to all towns and public meeting participants via email. The document will be made available for review at the Woburn Public Library and online at: https://www.mass.gov/service-details/natural-resource-damages-program-restoration-funds-massdep.

The public will have a 30-day period to review and comment on the Draft RP/EA. Whenever possible, comments should reference specific pages (or sections) in the Draft RP/EA. Comments, suggestions, or additional alternatives relating to the Draft RP/EA should be as detailed and specific as possible. Comments should be sent to the attention of Stephen Johnson at the following address:

Stephen Johnson
Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
205B Lowell Street
Wilmington, MA 01887;
or by e-mail to Stephen.Johnson@mass.gov.

The Trustees will review and consider all comments received prior to issuing a Final RP/EA. Summaries of all comments received by the Trustees, the Trustees' responses to comments, along with any clarifications and/or revisions of this document that the Trustees deem appropriate, will appear in the Final RP/EA.

1.6.4 Administrative Record

The administrative record contains the documents pertaining to the Industri-Plex NRDAR. The administrative record for the NRDAR case, including all restoration project ideas submitted to the Trustee Council, is housed at the MassDEP office, 205B Lowell Street, Wilmington, MA 01887.

2. Affected Environment

This section describes the ecological and socioeconomic environment in which the preferred restoration activities would be implemented. The purpose of this section is to summarize the current conditions in the Aberjona Watershed and provide a foundation for assessing the relative impacts of the restoration alternatives considered.

2.1. Industri-Plex Environment

The Site is located in Woburn, Massachusetts, in Middlesex County, but natural resource injuries resulting from releases of hazardous substances at and from the Site extended into parts of Winchester to the south as well. The Site lies within the Aberjona River watershed (see Figure 1), and the Aberjona River bisects the Site. The setting around the Site is highly urbanized, with dense housing and commercial areas along the river in both municipalities.

The Aberjona River is a tributary to the Mystic River, which drains approximately 69 square miles and flows through the greater Boston area. The Aberjona River flows into the Mystic Lakes, the outlet of which is recognized as the beginning of the Mystic River. Horn Pond Brook in Woburn, Mill Brook in Arlington, and Alewife Brook in Cambridge also contribute to flows of the Mystic River.

The Mystic River and its tributaries, including the Aberjona River, served as the epicenter of many activities that spurred the historic development of the greater Boston area (EPA, Undated; Knight, 2017). For example, early colonists used the Mystic River and its tributaries to catch fish for use as fertilizer, build boats, transport goods, and support manufacturing (MyRWA, Undated (a); Knight, 2017). Fish in the Aberjona River were also historically caught and used for local human consumption. The rivers in this watershed have continued to support transport industries through modern times.

While the Aberjona River watershed is highly urbanized, it supports a variety of habitats important to wildlife, including wetlands, rivers and streams, ponds, and riparian habitats. These habitats support fish, turtles, amphibians, and migratory birds, such as great blue herons, black ducks, and kingfishers.

However, a multitude of factors are contributing to the degradation of these natural habitats beyond those introduced through contamination at the Site, most of which stem directly from the historical development and industrial activities that have so strongly shaped the area. These include the direct loss of wetland and riparian habitats through development, the introduction of dams that restrict fish movement and degrade fish habitat, the decline of water quality through storm water runoff and sewer discharges, and the degradation of riverine habitat through channelization (Daley, 2013; Knight, 2017).

The contamination at and from the Site has directly affected the environment of the Aberjona River. As noted in Section 1.3, the Trustees determined that releases of hazardous substances at the Site caused injuries to an array of natural resources in and around the river, including to sediment, surface water, floodplain soils, and groundwater and biological resources. Contamination from the Site has also caused MassDEP to classify the Abjerjona River as impaired for aquatic life use (Carr, 2010), identifying the impairments through its efforts to comply with the CWA. Section 303(d) of the CWA mandates that states, territories, and authorized tribes identify water bodies that are not meeting water quality standards for designated uses, including to support fish and other aquatic life and recreational activities. The Aberjona River is also listed as impaired for recreational swimming and boating due to high levels of *Escherichia coli*, while nearby Upper Mystic Lake supports these activities (Carr, 2010). Many other nearby streams and ponds have not yet been assessed by the state for impairment and may be supportive of aquatic life or recreation.

Despite having impaired water quality (Carr, 2010), the Aberjona River provides access to important breeding habitat for river herring. The Aberjona watershed also supports a diverse array of habitats (e.g., ponds, streams, rivers, wetlands, forests) that are valuable to resident and migratory species.

However, habitats near the Site are generally not critical to supporting threatened or endangered species. For example, no areas are designated as Essential Fish Habitat (EFH; see https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat) within either Woburn or Winchester. And while the area contains forested habitat that could support one endangered species (i.e., the northern long-eared bat, *Myotis septentrionalis*; see: https://ecos.fws.gov/ipac/), the nearest habitat it has been found actively using relative to the Site is in the South Cedar Swamp in Reading, Massachusetts (see https://mass-eoeea.maps.arcgis.com/apps/Viewer/index.html?appid=de59364ebbb348a9b0de55f6febdfd52).

Although noxious fumes once emanated from the Site, the area currently supports good air quality. For example, Middlesex County is generally successful at meeting the National Ambient Air Quality Standards for ozone, having received a "B" grade for ozone pollution in the American Lung Association's annual State of the Air Report (American Lung Association, 2019), the highest grade of all the counties in the state. In fact, the county has met the standards for all criteria pollutants since 2014 (EPA, 2019).

While Massachusetts is not well-known for it, mining of non-metallic minerals such as clay, lime, marble, sand, and gravel does occur in the state (Secretary of the Commonwealth of Massachusetts, 2019). Small deposits of other materials (e.g., alum, graphite, mica, semi-precious stones) have also been occasionally mined (Secretary of the Commonwealth of Massachusetts, 2019). Although mining activities occur in Massachusetts, mining is not focused in the area within or near the towns of Woburn and Winchester.

The soils in Massachusetts vary with the topography of the state, with more mineral soils occurring in upland regions and more organic rich soils found in the lowlands (Secretary of the Commonwealth of Massachusetts, 2019). The most arable soil is found in the broad Connecticut Valley in the western central part of the state, where rich alluvial deposits are found (Secretary of the Commonwealth of Massachusetts, 2019). However, the towns of Woburn and Winchester are highly urbanized and thus do not support farming or industries directly tied to soil resources. Key dynamics affecting soils in the areas near the Site include compaction from development, and soil erosion into nearby water bodies due to stream channelization and high surface runoff from impervious surfaces.

There is a range of important cultural resources in Winchester and Woburn. As noted above, the area supported manufacturing, boat building, transport, and other activities that were central to the development of the greater Boston area. Both Winchester and Woburn have taken actions that will help preserve the character of these historic municipalities, and many cultural resources have been registered in the National Register of Historic Places (NRHP). More specifically, five areas in Winchester are designated as Historic Districts in the NRHP:

- Everett Avenue – Sheffield Road Historic District
- Firth-Glengarry Historic District
- Wedgemere Historic District
- Wildwood Cemetery
- Winchester Historic District.

The Winchester Historic District encompasses Mill Pond and abuts Judkins Pond, both of which are sites included in a proposed project. In addition to these historic districts, multiple sites are registered on the NRHP, but none are located within or in close proximity to proposed project sites. Similarly, in Woburn, numerous historical sites are registered, but none are located within or in close proximity to proposed project areas.

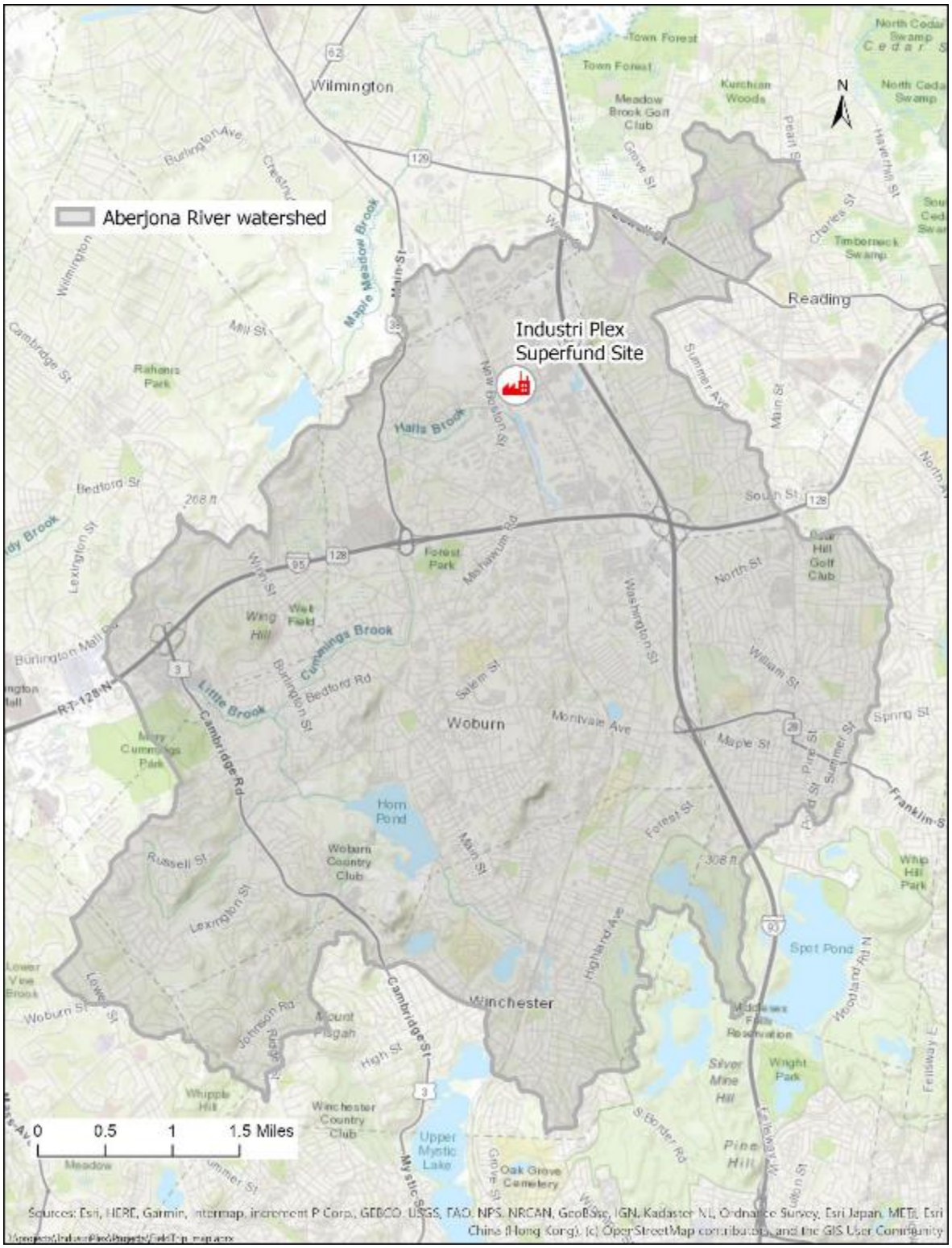


Figure 1. The Industri-Plex Site and its Location within the Aberjona River Watershed

2.2. Socioeconomic Environment

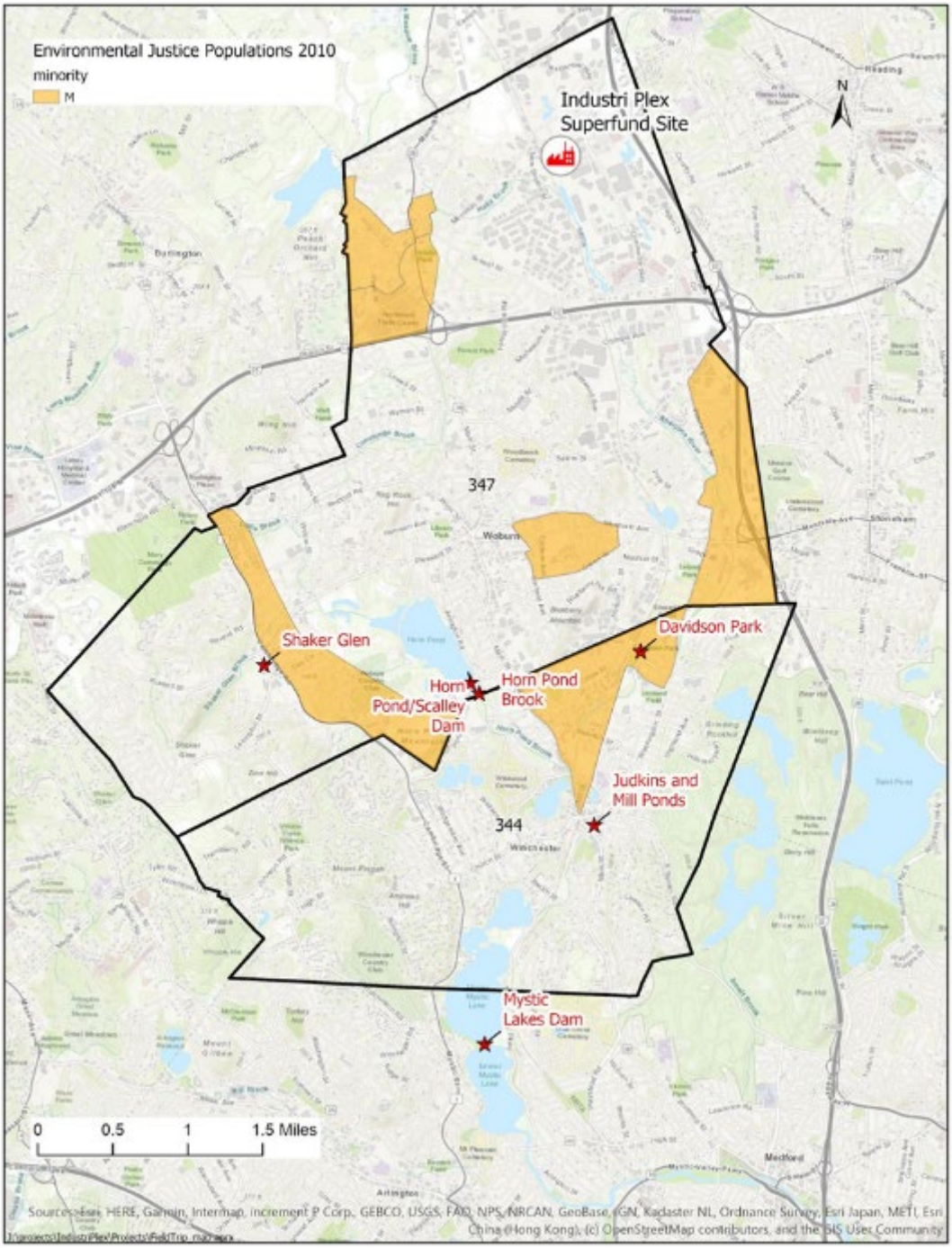
The Aberjona River watershed falls primarily within Woburn and Winchester in Middlesex County, with the majority of the watershed falling within Woburn.

Woburn is approximately nine miles north of Boston and is 12.9 square miles in area. As of the 2010 U.S. Census, the population was estimated as 38,120, but the 2018 population was estimated to be 40,397 (Census Bureau, Undated), with a small annual growth rate of 0.7% [DataUSA, Undated (b)]. The area is already densely populated, so future growth is likely to be modest. The median age of the population is 40.4 [DataUSA, Undated (b)]. The population is 82.7% White, 6.9% Asian, and 6.2% Black or African American [Census Bureau, Undated (b)]. The median household income is $83,304, and there is a 5.98% poverty rate, well below the national average of 12% [DataUSA, Undated (b); Census Bureau, 2018). There is significant heterogeneity among the census tracts in median income, with one tract reporting $62,083 and another $110,402 (DataUSA, Undated (b)].

Winchester is approximately eight miles north of Boston and is 6.3 square miles in area. In 2010, the U.S. Census estimated the population at 21,374 [Census Bureau, Undated (a)], and the current population is estimated at 22,579 [DataUSA, Undated (a)]. The population is 83.2% White, 12.5% Asian, and 0.7% Black or African American [Census Bureau, Undated (a)]. The median household income is $152,196, and there is a 2.29% poverty rate [DataUSA, Undated (a)]. As with Woburn, income varies among census tracts, with one reporting a median income of $102,000 and another $196,000 [DataUSA, Undated (a)].

According to the Commonwealth of Massachusetts, both Woburn and Winchester include Environmental Justice (EJ) communities (Massachusetts Office of Administration and Finance, Undated; see Figure 2). In Massachusetts, EJ communities are determined by the following criteria:

- Households earn 65% or less of the statewide household median income
- 25% or more of the residents are minority
- 25% or more of the residents are foreign-born
- 25% or more of the residents lack English-language proficiency.



Source: https://www.mass.gov/info-details/environmental-justice-communities-in-massachusetts.

Figure 2. EJ Communities in Woburn and Winchester, Massachusetts. Preferred restoration project locations are shown for reference (see Section 4.1).

3. Restoration Evaluation Criteria

While CERCLA requires that restoration activities restore, rehabilitate, replace, or acquire the equivalent of the resources and services that were injured or lost, the statute does not prescribe criteria to be used by the Trustees to determine which restoration projects are preferred. The natural resource Trustees have discretion in identifying and selecting preferred restoration projects. DOI NRDAR regulations set forth factors to be considered in the evaluation and selection of preferred restoration projects (Section 3.1; DOI NRDAR Regulatory Evaluation Criteria from 43 CFR § 11.82). With these factors as a guide, the Trustees developed Eligibility Criteria to determine if projects met minimum standards for acceptability (Section 3.2). Projects that met these eligibility criteria were then evaluated against the project evaluation criteria (Section 3.3), using a qualitative assessment of project strengths for each criterion. These qualitative assessments are provided in the project descriptions presented in Section 4.

3.1. Regulatory Criteria Set Forth in DOI NRDAR Regulations

DOI NRDAR regulations identify factors to be considered in the evaluation and selection of preferred alternatives (43 CFR § 11.82):

- Technical feasibility
- The relationship of the expected costs of the proposed actions to the expected benefits from the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources
- Cost-effectiveness
- Results of any actual or planned response actions
- Potential for additional injury resulting from the proposed actions, including long-term and indirect impacts to the injured resources or other resources
- Natural recovery period
- Ability of the resources to recover with or without alternative actions
- Potential effects of the action on human health and safety
- Consistency with relevant federal, state, and tribal policies
- Compliance with applicable federal, state, and tribal laws.

The Trustee Council incorporated the 10 factors described above into its Eligibility and Evaluation Criteria. The Trustee Council was solely responsible for determining whether proposed restoration project ideas met these criteria.

3.2. Eligibility Criteria Developed by the Trustees

Projects must have met the following Eligibility Criteria in order to be further considered and evaluated by the Trustees using the Evaluation Criteria. If any project did not meet the Eligibility Criteria, it was not given further consideration by the Trustees. A project's demonstrated consistency with the Eligibility Criteria does not guarantee that it will be funded but merely establishes that the Trustees may consider the project for possible funding. Conversely, rejection of a proposed project based on these criteria means that the Trustees will not allocate NRDAR funds for that project, even though the proposed project may yield a restoration benefit to injured natural resources.

Project eligibility criteria included the following.

1. A proposed project will not be considered eligible for Trustee consideration unless it:
   - Restores, rehabilitates, replaces and/or acquires the equivalent of natural resources and/or natural resource services that were injured by the release of hazardous substances from the Site,
   - Is located in or benefits resources in the Aberjona River watershed within the Mystic River watershed,
   - Is protective of health and safety, and
   - Is consistent with federal, state, or local laws, regulations, or policies.
2. A proposed project will not be considered eligible for Trustee consideration if it:
   - Includes an action or actions that are presently required under other federal, state, or local law,
   - Restores natural resources and/or services solely outside of the Aberjona River watershed, or
   - Interferes with or would be undone or negatively affected by remedial work by EPA or pursuant to M.G.L. Chapter 21E.

3.3. Evaluation Criteria Utilized by the Trustees to Select Preferred Projects

The following Evaluation Criteria were developed and applied by the Trustees to prioritize eligible restoration projects through a qualitative assessment of their value and feasibility. In Section 4, the Trustees briefly describe how each project was evaluated against these criteria.

High Importance (2 criteria)

Criteria related to a project's focus

1. Geographic proximity of the project to the injured resources (i.e., within the Aberjona River watershed)
2. Extent to which the project restores, replaces, or acquires the equivalent of the same or similar resources or services that were injured.

Moderate Importance (11 criteria)

Criteria related to a project's benefits

1. Magnitude of project benefits to natural resources
2. Extent to which the project provides benefits to multiple species, or natural resources or services
3. Ability of the project to yield sustained and comprehensive benefits over time with little maintenance or management
4. Extent to which project actions are consistent with state, regional, or local policies and plans (e.g., the Massachusetts State Wildlife Action Plan, Municipal Vulnerability Plans, Open Space Plans, Master Plans)
5. Likelihood of sustained and active stewardship of the project after its completion
6. Extent to which the project will enhance the public's relationship to natural resources
7. Extent to which the project avoids adverse effects to the environment, and is protective of public health and the environment
8. Extent to which a project's expected costs are commensurate with its benefits
9. Comparative cost-effectiveness of the project if two or more proposed projects provide the same or a similar level of benefits

10. Extent to which the project accelerates natural resource recovery
11. Extent to which the project avoids causing additional injury to natural resources in the area.

Supplemental Criteria (12 criteria)
Criteria related to project's implementation

1. Technical feasibility of the proposed project
2. Administrative and management capacity of the project's proponent
3. Whether the site on which the project will occur is publicly owned or on private property with a willing private owner and access easements secured
4. Technical soundness of the proposed project approach
5. Whether the project will result in tangible and specific ecological and/or socioeconomic benefits that are identifiable and measurable
6. Extent of likely community involvement
7. Inclusion of public outreach in the design and implementation of the project
8. Extent to which the project is implementation-oriented (as compared to general support and operation-oriented)
9. Implementation readiness of the project (i.e., the extent to which the project has substantially completed the design and permitting phase and/or has a definitive plan for completion)
10. Extent to which the project demonstrates that appropriate legal, financial, and operational mechanisms are in place to conduct operation and maintenance (O&M) to ensure sustained public use benefits
11. Extent to which the project is able to leverage additional resources (e.g., matching funds, in-kind resources)
12. Extent to which the project demonstrates that the combination of requested funding and leveraged resources will be adequate to complete the work proposed.

4. Restoration Alternatives

The Trustees considered a broad set of potential restoration alternatives for this RP/EA, including a "no-action" or "natural recovery" alternative. The proposed alternative identified by the Trustees is a suite of restoration projects that cumulatively aim to compensate for injuries to natural resources resulting from the release of hazardous substances at and from the Site.

This section presents a summary of alternatives (Section 4.1) and then describes the preferred action alternative (Section 4.2), a non-preferred action alternative (Section 4.3), the no-action/natural recovery alternative (Section 4.4), and the projects that were considered but not carried forward for evaluation (Section 4.5). Within Sections 4.2 and 4.3, the Trustees include detailed descriptions of the projects in each alternative as well as a discussion of the environmental and socioeconomic consequences associated with individual projects. Each project description also includes a discussion of how the project was rated under the Trustee Evaluation Criteria presented in Section 3.3. A complete discussion of the overall environmental and socioeconomic impacts of each alternative can be found in Section 5.

4.1. Summary of Alternatives

4.1.1 Alternative 1 (Preferred Action Alternative)

The preferred alternative is that which the Trustees believe would best compensate the public for injuries to natural resources resulting from releases of hazardous substances at or from the Site. This alternative consists of a suite of projects that benefit each of the major categories of injured natural resources (Table 1). Within the preferred alternative, Tier 1 projects have first priority for funding. If funding remains after completing the Tier 1 projects, the Trustees will consider funding the Tier 2 projects up to the proposed funding allocation amount. Proposed allocations to individual Tier 1 projects are estimates based on current cost projections and may shift after final project designs are developed. See Figure 3 for Tier 1 and Tier 2 project locations.

Table 1. Summary of Projects in Alternative 1 (preferred action alternative)

Project Name	Proposed Funding Allocation	Proposed Partner
Tier 1 Projects		
Wetland and stream restoration at Shaker Glen Extension	$2,000,000	City of Woburn
Scalley Dam fishway design and construction	$1,000,000	City of Woburn
Riverine, floodplain, and riparian habitat restoration at Davidson Park (HWG Option 2)	$500,000–$600,000	Town of Winchester
Education and outreach activities to be incorporated into Tier 1 projects	$125,000	MyRWA
Total proposed allocation across Tier 1	**$3,700,000**	
Tier 2 Projects		
Downstream fish passage restoration at Mystic Lakes Dam	None	Massachusetts Department of Conservation & Recreation (DRC)
Horn Pond Brook and Aberjona River streambank and fish passage restoration	$Up to $110,000	MyRWA
Habitat restoration at Mill and Judkins ponds	Up to $50,000	Town of Winchester
Total proposed allocation across Tier 2	**To be determined – based on funding remaining after Tier 1**	

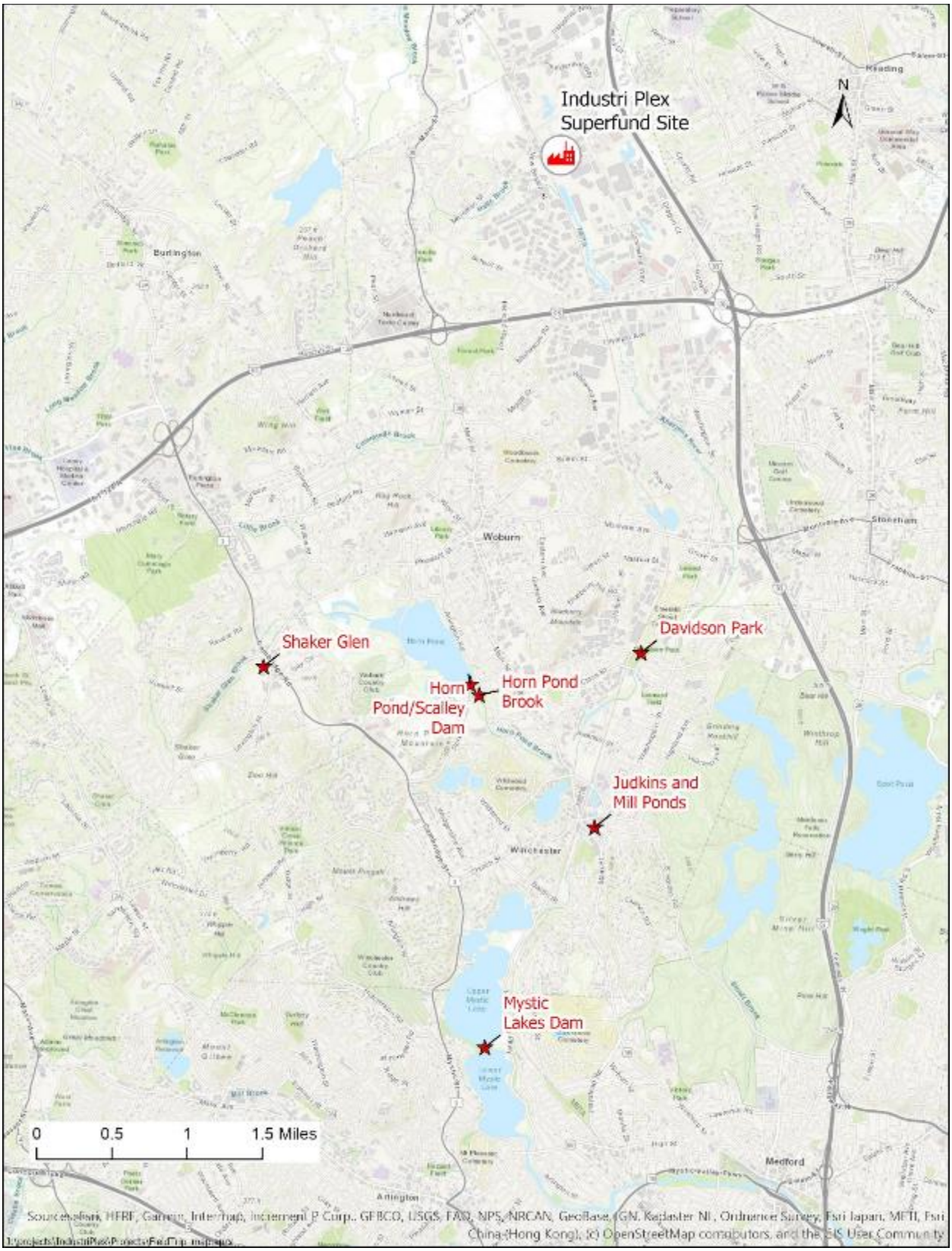


Figure 3. Locations of Tier 1 and Tier 2 Projects (see Table 1)

4.1.2 Alternative 2 (Non-Preferred Action Alternative)

The Trustees received restoration project ideas in response to their request for project submittals. The project ideas that best met the evaluation criteria were included in Alternative 1 (preferred action alternative). Other eligible project ideas were not selected for funding because they ranked lower using the evaluation criteria compared to the projects included in the proposed alternative. The projects that make up the non-preferred action alternative are described and evaluated in Section 4.3. The Trustees chose projects for funding that best fit their criteria and that could be accomplished with the funding available to them. A recommendation for no funding should not be viewed as a judgment on the overall environmental or educational value of a project idea.

In some cases, the Trustees took some elements from a project idea that was not recommended for funding (i.e., green infrastructure) and incorporated them into a project that is proposed to receive funding. A summary of the project ideas not recommended for funding is provided in Table 2.

Table 2. Summary of Projects in Alternative 2 (non-preferred action alternative)

Project Name	Proposed Partner
Non-Preferred Projects	
Riverine, floodplain, and riparian habitat restoration at Davidson Park ("HWG Option 3")	Town of Winchester
Improved water management in the Horn Pond and Horn Pond Brook tributary watershed to the Aberjona River	MyRWA
Freshwater mussel and clam study	Winchester Conservation Commission
Green infrastructure stormwater management to improve water quality	MyRWA

4.1.3 Alternative 3 (No-Action/Natural Recovery Alternative)

A no-action alternative is required to be considered under NEPA [40 CFR § 1502.14(d)] and under CERCLA NRDAR regulations [43 CFR § 11.82(c)(2)]. This alternative is described further in Section 4.4.

4.2. Alternative 1 – Preferred Action Alternative

The proposed alternative includes a suite of projects that improve aquatic and wetland habitats, improve water quality, and benefit wildlife that use riverine and wetland habitats.

4.2.1 Shaker Glen Extension Wetland and Stream Restoration (Tier 1)

Restoration Objective

The goal of this project is to restore the ecological functions of the Shaker Glen Extension by restoring the stream to its original channel and restoring wetland and floodplain habitats. These actions would support native species and improve the water quality of hydraulically connected waterbodies including the Aberjona River, the Mystic River, and Horn Pond. Additional project components would improve water quality in Shaker Glen Brook by filtering runoff (thereby improving habitat for aquatic life), improve habitat connectivity by linking existing conservation areas, and provide interpretation and educational opportunities for the public regarding migrating fish and the Aberjona River watershed.

Project Location

The project site is located on the "Shaker Glen Extension," a 12-acre parcel of land along Shaker Glen Brook, southwest of the intersection of Russell Street and Route 3/Cambridge Road, and abutting the northeast end of the existing 19.6-acre Shaker Glen conservation area (Figure 4). The intersection of Russell Street and Route 3/Cambridge Road forms the Four Corners business highway zone. Surrounding the remaining portions of the Shaker Glen conservation area is a combination of suburban residential and open-space uses.

Image credit: Google Earth.

Figure 4. Map of Woburn Showing the Project Site (highlighted in yellow) Relative to Surrounding Streets. The existing Shaker Glen Conservation Area abuts the highlighted parcel and extends south and southwest along Shaker Glen Brook.

A portion of the site was previously developed as a bowling alley. Historical aerial photographs and topographic maps indicate the bowling alley was constructed between 1955 and 1963, and the Shaker Glen Brook was moved and straightened in multiple phases between 1938 and 1963. The bowling alley was demolished in the 1970s, leaving structural remnants on the site. The parcel was identified for protection in the 2005 *Woburn Vision 2020 Community Development Plan* as a location to provide better parking and access to the Shaker Glen conservation area.

Project Description

The structural remnants of a former bowling alley that was demolished in the 1970s currently degrade the natural wildlife and wetland habitats of the parcel, which abuts the existing 19.6-acre Shaker Glen conservation area. The Shaker Glen Extension includes Shaker Glen Brook, a tributary to Fowle Brook, which has been affected by rerouting and channelization, and suffers from poor water quality and sedimentation issues.

Photo taken by Fuss & O'Neill at Shaker Glen Extension on May 7, 2019.

Figure 5. Shaker Glen Extension Site, Showing the Former Parking Lot (left photograph) and Structural Remnants from Previous Demolition Activities on the Site (right photograph)

The proposed project consists of the following major elements:

- Purchase and permanent protection of the property by the city, which is a prerequisite for Trustee funding of the following restoration activities:
  - Removal of approximately 40,000 square feet of existing structural remnants, including the foundation of the bowling alley and broken pavement.
  - Reconstruction of the original stream channel and related in-stream habitat restoration.
  - Design and construction of approximately 75,000 square feet of wetland habitat, which will help reconnect Shaker Glen Brook to its historical floodplain.
  - Design and construction of a 20,000 square foot stormwater treatment system at the northern edge of the site to treat stormwater runoff from Russell Street before it enters Shaker Glen Brook.
  - Design and construction of a berm to redirect runoff toward the proposed stormwater treatment system.
  - Installation of native plants to allow for revegetation of the site.
  - Design and replacement of an existing 60-inch stream culvert constructed of reinforced concrete pipe with a 10-foot by 6-foot box culvert designed to pass the 100-year flood.
  - Design and construction of educational areas to communicate with visitors about the purpose of the project and the importance of fish migration to watershed health.

The project would be overseen by the City of Woburn and implemented by a firm that specializes in ecological restoration. The MyRWA would assist in promoting post-construction stewardship of the site as well, as educating the public about the restoration project and process.

Expected Benefits and Timeframe of Benefits

The removal of structural remnants and broken pavement would immediately accelerate natural revegetation of the site, allowing faster recovery of habitat. Natural revegetation of the former building site would improve habitat for both terrestrial and aquatic wildlife by providing food and shelter. Biological resources that may benefit include birds, insects, reptiles, amphibians, and mammals. Benefits would be realized as the site revegetates and would continue to increase until the forest matures. At that

point, these benefits would be expected to continue in perpetuity, assuming that the town acquires and protects the property in perpetuity via a legal instrument, such as a Conservation Restriction.

Stream restoration and wetland creation are anticipated to expand aquatic habitat, improve water quality, and increase flood resiliency. These benefits will be enhanced following the mitigation of downstream barriers to fish passage, particularly at the Scalley Dam, where the City of Woburn is proposing fishway improvements to increase the number of herring entering Horn Pond. Habitat benefits for resident and migratory aquatic species would be expected to last as long as the site remains undeveloped and in good ecological condition, and fish passage is maintained at downstream barriers.

Restoration of the site would result in improvements in habitat connectivity across the landscape immediately following restoration. The site is immediately adjacent to the existing Shaker Glen conservation area, which is linked by wooded corridors to the Battle Road Woodland Area, the Quail Run Conservation Area, Mary Cummings Park, and Whispering Hill Park to the north; the Horn Pond Recreation Area to the east; and the Whipple Hill conservation area and Arlington's Great Meadow to the south. As forest habitat grows and matures at the Shaker Glen Extension, these linkages would be strengthened and would be maintained as long as these forested areas remain intact.

The proposed stormwater treatment system, berm, and culvert redesign would provide flood resiliency and water-quality benefits to the Shaker Glen Brook stream corridor and areas downstream once construction has been completed and contributing areas have been stabilized. Stormwater management structures such as the one proposed that detain stormwater to reduce peak flows and filter out pollutants should not receive water from disturbed areas; all areas disturbed by construction should be stabilized before allowing runoff into the stormwater treatment system to prevent sediment from entering it and causing it to fail. Water quality benefits would be expected to continue as long as pretreatment practices and the stormwater treatment system itself are maintained. The importance of maintenance should be emphasized, as the most common reason for failure of stormwater treatment systems is lack of maintenance.

Educational benefits would be provided to the public through interpretive displays, live talks and tours of the site, and coordination with local schools following construction (see Section 4.2.4).

Brief Overview of Maintenance and Monitoring

Maintenance plans would be developed as part of the project planning phase to ensure that good stewardship of the site would enable the project benefits to be maintained. More specifically, the Trustees propose to set aside 10% of project funding to support site monitoring to enable adaptive management (e.g., stormwater management structure performance, vegetation establishment, invasive species cover, wildlife utilization of restored habitat; see Section 5 for more details).

Probability of Success

The success of the project depends on the factors included in Table 3.

Table 3. Success Factors for Shaker Glen Extension Project

Factor	Impact on Success
Land acquisition	The city is currently negotiating with the current landowners and expects to acquire the property in 2020.
Presence of debris and potential site contamination	Debris and pavement must be removed to restore the site. The current subsurface conditions, as they pertain to the presence of hazardous materials, are unknown. The potential for asbestos to be present in the structural remnants of the bowling alley is also unknown. These conditions should be evaluated to the extent that they may increase estimated project costs and would be impacted by site restoration activities (e.g., removal of existing fill materials).

Factor	Impact on Success
Constructed wetland design	The City Engineer stated during the site walk on May 7, 2019, that groundwater level monitoring results indicate that the water table is high enough at the site to make wetland creation feasible. The presence of wetlands at the southern end of the site supports this conclusion.
Stormwater treatment design	The proposed stormwater management structure would reduce stormwater runoff and pollutant loads to Shaker Glen Brook, which is a tributary to Fowle Brook and Horn Pond, thereby providing water quality benefits to the pond, Horn Pond Brook, and Shaker Glen Brook. The degree of water quality improvements provided by the project is unclear. Stormwater management structures must be maintained to continue providing water-quality benefits; maintenance should be assigned to a single city department and staff should be trained in the specific maintenance needs of the selected stormwater management structure.
Invasive species removal	Multiple invasive plant species are present on the site. Special precautions must be taken during plant or soil removal to protect native species, and prevent the spread of invasive species to new sites.
Investment in educational components	The degree of educational benefit will depend on the magnitude of the investment into educational materials and programs. Educational signage will provide some benefits but these would be enhanced by live programming such as nature walks and interactive opportunities. The construction of a walking path to Reeves Elementary School will facilitate access to the site, but educational benefits for local youth could be enhanced by coordinating with the school to incorporate environmental lessons into school curricula. The MyRWA would contribute to project design, which would provide consistency in educational elements at conservation areas and fish passage facilities throughout the Aberjona River watershed.

Environmental and Socioeconomic Consequences

The environmental review of this project pursuant to NEPA is provided in Section 6. Some relevant site-specific potential environmental consequences of the proposed project include:

- Existing wildlife habitat could be impacted during removal of the structural remnants from the site.
- Disturbance of the site may result in rapid expansion of invasive species as well as native species. An invasive species management plan would be required to control the spread of invasive species and a planting plan may be needed to supplement the spread of native plant species.

Potential social and economic consequences of the proposed project include:

- Increased visitation to the site, resulting in overcrowding and safety concerns. Additional parking may be needed to handle an increase in the number of visitors.

Additional review of potential environmental and socioeconomic consequences of the project would occur through the local permitting process and environmental review pursuant to MEPA, as applicable. The project would incorporate measures to avoid, minimize, or mitigate adverse environmental impacts.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 4). Additional information on these requirements can be found in Appendix A.

Table 4. Anticipated Regulatory Submittals, Reviews, and Permits for Shaker Glen Extension Project

Review/Permit	Agency
Environmental Notification Form (ENF)	MEPA Office
Wetlands Protection Act (WPA) Notice of Intent (NOI) and Order of Conditions	City of Woburn Conservation Commission and MassDEP
CWA Section 404 General Permit	U.S. Army Corps of Engineers (USACE)
401 Water Quality Certificate (WQC)	MassDEP
Federal Endangered Species Act (ESA) Project Review	USFWS
Project Notification Form (PNF) and Section 106 Historic Review	Massachusetts Historical Commission (MHC)
National Pollutant Discharge Elimination System (NPDES) Permit	EPA
Non-Traditional Work Practice Removal	MassDEP Bureau of Air & Waste Program (BA&W)
Immediate Response Action	MassDEP Bureau of Waste Site Cleanup

Project Status: Funding and Implementation

The City of Woburn is currently in negotiation with the landowner and anticipates acquiring the land in 2020. Conceptual designs have been prepared by the city's consultant and the city is actively seeking additional grants to help fund portions of the project.

Estimated Costs

Preliminary cost estimates for the project range from $1,500,000 to $2,000,000, depending on the approach and methods selected for removal of the structural remnants from the site and the wetland creation design. Additional grant funding is being sought by the city to supplement the requested NRDAR funds.

The City of Woburn is a participant in the Municipal Vulnerability Preparedness (MVP) Program, which provides grant funding to Massachusetts municipalities to begin the process of planning for climate change resiliency and implementing priority projects. Portions of the proposed project are consistent with the goals of the MVP Program and may be eligible for an MVP Action Grant. MVP Action Grants can be awarded in amounts up to $2,000,000, though grant amounts awarded are more typically in the range of $10,000–$500,000. MVP Action Grants do not require a match but are more likely to be awarded if supplemental funding is available, making this project a good candidate for cost-sharing.

Trustee Evaluation and Proposed Allocation

Overall, the Trustees evaluated this project favorably based on their established evaluation criteria (Table 5 and Appendix A) because of its strong nexus to the injured resources, and the large number and magnitude of benefits from the project. The project will restore stream and wetland habitats, and help reconnect the floodplain in an area that is currently highly degraded. The project also provides exciting opportunities for public outreach, educational experiences in partnership with local schools, and passive recreation. The project is proposed as a Tier 1 project with an allocation of approximately $2 million that will be refined based on design estimates and the availability of other funding sources; as noted above, 10% of the funding provided by the Trustees is proposed to be used to support site maintenance, monitoring, and adaptive management (see Section 5 for more information about monitoring).

Table 5. Evaluation of Shaker Glen Extension: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project is located in the Aberjona River watershed, approximately four miles from the Site.
Relationship to injured resources	The Site has degraded wetland, river, and pond habitats in the Aberjona River watershed, including habitats that support diadromous fish. This project provides wetland and floodplain habitats, and benefits diadromous fish by improving water quality in Shaker Glen Brook, a tributary to Horn Pond.
Benefit Criteria	
Magnitude of benefits	Addresses a demonstrated need for restoring wetland habitat at Shaker Glen and improving water quality in Shaker Glen Brook, which will provide benefits to Horn Pond Brook, an important habitat for migratory fish. Current habitat conditions are very poor, so the restoration will provide a significant ecological uplift and improve climate resiliency.
Multiple benefits	The project provides multiple benefits to the watershed, including stream and wetland habitat, birds, water quality, and migratory fish such as the American eel. The project is in the headwaters of Horn Pond, so improvements to water quality will benefit herring. Herring serve as a key food resource for other wildlife, including raptors and predatory fish in the Gulf of Maine that consume river herring. There will also be opportunities to engage the public at Shaker Glen in outreach, education, and recreation activities (e.g., hiking, bird watching).
Sustainability of benefits	The project will result in long-term benefits to wetland, riparian, and aquatic resources by protecting and restoring natural habitats. However, the project will require some ongoing maintenance to enable project benefits to be maintained.
Stewardship	Project partners, including the City of Woburn and the MyRWA, are committed to and capable of undertaking the stewardship activities after project implementation that will enable project benefits to continue for the long-term.
Enhancement of public's relationship with natural resources	The project will strongly enhance the public's ability to use, enjoy, or benefit from the Aberjona River watershed by restoring wetland habitat, improving water quality, and benefiting fish habitat in a highly visible location. The project is adjacent to and would connect with the existing Shaker Glen Conservation Area, affording opportunities for the public to experience restored stream and wetland habitats.
Avoidance of adverse impacts	The project is viewed as having little potential for adverse impacts to the environment or public health and safety, although the Trustees acknowledge a potential for invasive species to spread following site disturbance.
Relationship of expected costs to expected benefits	The project has a high ratio of expected benefits to expected costs, because the project will provide wetland habitat and improve water quality in an area that is currently highly degraded.
Natural recovery period	The project will provide restoration benefits to natural resources and/or services soon after construction, when water quality improves and conditions suitable for wetland development occur. Full benefits will take some time as the wetland vegetation matures. These benefits will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and losses in perpetuity for other resources.
Avoidance of additional injury	The project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities.

Criteria	Evaluation Summary
Implementation Criteria	
Technical/technological feasibility	The project will employ well-known and accepted techniques to restore wetlands, improve stormwater management, and replace/repair culverts.
Administrative and management capability	The project will be managed and administered by the City of Woburn, which has the capability to successfully oversee infrastructure projects. The city will engage a qualified firm experienced in stream and floodplain habitat restoration. The educational aspects of the project will be managed and administered by the MyRWA, which has a successful track record with similar educational projects in the Mystic River Watershed.
Site ownership	The City of Woburn is negotiating with the current landowner and expects to acquire the property in 2020. The city will need to protect the property in perpetuity (e.g., deed restriction or other conservation mechanism); and perform all due-diligence activities, including a title search, and an environmental site assessment and appraisal, in accordance with state policies.
Measurable results	The project has a high likelihood of delivering tangible and measurable results. The project will require a robust pre- and post-implementation monitoring plan to quantify wetland benefits.
Community involvement	The project integrates public involvement through educational efforts, which will be ongoing.
Public outreach	The project integrates public education and outreach through the incorporation of the MyRWA into the project team.

The Trustees evaluated the Shaker Glen Extension project as "marginal to acceptable" for the criteria listed in Table 6.

Table 6. Evaluation of Shaker Glen Extension: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans because improving habitat in tributaries to Horn Pond contributes to the goals of increasing migratory fish populations. The project is also broadly consistent with the 2005 *Woburn Vision 2020 Community Development* Plan, which identified the project parcel for preservation, though as a location to provide improved access to the Shaker Glen conservation area. The project will also support regional efforts to mitigate storm-related flooding (e.g., the Winchester Flood Mitigation Program).
Soundness of approach	The approach of restoring a wetland in an area currently filled with dirt and rubble is technically challenging. Although the hydrology is expected to support wetlands, there is a risk that the area will not fully support wetland vegetation and will be dominated by invasive species. Involvement of experienced restoration practitioners would be an important asset in designing a successful wetland restoration project.
Implementation-oriented	The project is currently at the conceptual stage and still requires engineering, design, and permitting work.
Project implementation readiness	The project is seen as having a marginal-to-acceptable level of implementation readiness because the engineering and permitting work has not yet been completed. The town has not yet acquired the property.
O&M needs	The project is seen as having relatively high O&M needs because it will need ongoing maintenance to retain the benefits of the stormwater management system and to control invasive species.
Leveraging of additional resources	The project has the potential to leverage additional resources through the state's MVP grant program.
Level of funding and resources needed for project implementation	The project has a relatively high need for funding because it is complex and will require engineering, design, and permitting work before implementation.

The project was not rated as below marginal for any evaluation criteria.

4.2.2 Scalley Dam Fishway Design and Construction (Tier 1)

Restoration Objective

The main restoration objective is to improve fish passage along the Horn Pond Brook watershed of the Aberjona River watershed. The main project goal is to install a fishway that will allow fish to migrate from Horn Pond Brook into Horn Pond (past the Scalley Dam), and thereby increase river herring reproductive success upstream of the existing dam. The project will also benefit American eel by allowing them to reach foraging habitat. Additional project components would improve water quality in Horn Pond by filtering runoff (thereby improving habitat for migrating and spawning fish), and provide interpretation and educational opportunities for the public regarding migrating fish and the Aberjona River watershed.

Project Location

The project site is located at the outlet of Horn Pond in the City of Woburn, immediately upstream of the Lake Avenue crossing over Horn Pond Brook, and immediately adjacent to the Horn Pond Boat Launch and parking area. Scalley Dam controls flow at the outlet of the pond, and a bypass channel constructed of riprap is located northeast of the dam spillway. The existing bypass channel serves as an auxiliary spillway and also allows some fish passage past the dam. The City of Woburn owns and operates Scalley Dam. The dam is located adjacent to the Horn Pond Boat Launch, which is a heavily used public area with a parking lot, picnic area, and restrooms. The surrounding area consists mainly of single- and multi-family residential properties. Figure 6 shows Scalley Dam and its surroundings.

Image credit: Google Earth.

Figure 6. Map of Scalley Dam and Nearby Landmarks

Project Description

Fish passage from Horn Pond Brook to Horn Pond is impeded by Scalley Pond Dam and an existing bypass channel that is not optimized for fish passage. The current bypass is steep and lined with angular riprap (Figure 7). Fish have been observed in large numbers immediately downstream of the bypass channel and dam spillway, apparently unable to ascend the channel and enter Horn Pond. Dead river herring were observed below the dam and in the rocks within the bypass channel by the Trustees on May 5, 2017 (Figure 7); the fish had apparently died attempting to ascend the bypass. MyRWA estimates that only 25,000 fish entered Horn Pond via the bypass in 2018, despite the fact that 109,000 fish passed through the fish ladder at Center Falls Dam in Winchester in 2018, approximately 1.5 miles downstream. Given these data, Scalley Dam appears to be the next major barrier restricting fish passage in the Aberjona River watershed.

The City of Woburn proposes to construct a new fishway on the site. The fishway would likely be sited west of Scalley Dam, opposite the existing bypass channel. The primary target species for the new fishway are anadromous alewife, blueback herring, and the American eel. The design for the site may incorporate a camera and viewing area for the public to view migrating fish, and a bioswale or rain garden at the adjacent parking lot to reduce the discharge of stormwater runoff and associated pollutants into Horn Pond.

Photographs taken by Fuss & O'Neill at Scalley Dam on May 7, 2019.

Figure 7. Scalley Dam and Riprap Bypass Channel (left photograph) and Dead Herring Pulled from the Discharge Area at the Base of the Scalley Dam Spillway and Bypass Channel (right photograph)

The proposed project consists of the following major elements:

- Design and construction of a new fishway at the outlet of Horn Pond, probably to the west of Scalley Dam. Several fishway design alternatives are under consideration, including (1) a nature-like roughened channel, (2) a nature-like pool and weir fishway, and (3) a Denil fish ladder (Table 7).
- The project includes a feasibility study to evaluate alternative approaches to a roughened channel.

Table 7. Design Alternatives for the Scalley Dam Fishway Project

Design Alternative	Description	Location/Public Access
1: Nature-Like Roughened Channel	Approximately 400-foot-long channel with a fixed slope of 2%. A turning pool with 0.09% slope would be provided at the approximate mid-point of the channel. A guidance wall/barrier would be constructed to guide fish to the entrance rather than the spillway flow. Likely the best option to facilitate fish passage.	West of spillway Proximity to parking lot and picnic area would facilitate visitor access to view migrating fish
2: Nature-Like Pool and Weir Fishway	Approximately 180-foot-long channel with 15-foot pools divided by weirs with a 0.75-foot drop. This alternative has been proposed with a slope of approximately 5%. Pools provide resting areas for fish between weirs. A guidance wall/barrier would be constructed to guide fish to the entrance rather than the spillway flow. Good option to facilitate fish passage.	West of spillway Proximity to parking lot and picnic area would facilitate visitor access to view migrating fish
3: Denil Fish Ladder	A technical fishway design consisting of a chute with 24 angled baffles placed at regular intervals to assist fish with ascending the fishway. This design is the steepest at 12.5% but would have a length of only 80 feet. A guidance wall/barrier would be constructed to guide fish to the entrance rather than the spillway flow. Lowest footprint but potentially the least likely to facilitate fish passage, particularly for American eels.	East of spillway, in location of existing bypass channel Location could limit visitor access to view migrating fish

- If feasible, construction of a viewing station for camera recording and public observation of migrating fish.
- Construction of electrical and instrumentation conduits to the dam to facilitate monitoring and support fish-viewing stations for the public.
- Construction of a 14-foot-wide gravel road to facilitate maintenance of the new fishway and dam.
- Design and installation of a bioswale/rain garden at the northern edge of the public parking area at Horn Pond, to filter runoff from the parking lot and reduce stormwater pollutant loads to Horn Pond, thereby improving water quality in the pond and brook.
- Installation of educational components to communicate with visitors the purpose of the project and the importance of fish migration to watershed health. The educational components have not yet been specified.
- If feasible, construction of a viewing station for camera recording and public observation of migrating fish.

The project would be overseen, implemented (in conjunction with a qualified construction firm), and maintained by the City of Woburn. Herring passage would be monitored by MyRWA.

Expected Benefits and Timeframe of Benefits

Data collected by MyRWA and MA Wildlife indicate that the Mystic River herring run is one of the largest in Massachusetts. The City of Woburn estimates that an improved fishway would eventually allow up to 500,000 herring to enter Horn Pond, compared to an estimated 25,000 fish that passed the dam in 2018. Increases in fish migration success would be anticipated in the first migration season following fishway construction (contingent on passage success at downstream barriers, including Center Falls Dam, which passed approximately 109,000 fish in 2018). These increases in migration success would continue as the populations of migratory fishes continue to rebound in response to improved reproductive success, and increased numbers of out-migrating fish that would return to their natal streams each year.

Opening this habitat is important, as recent research has shown that fish in the Upper Mystic Lake are growing slowly relative to other lakes due to density-dependent factors (too many fish and not enough habitat and food resources; Matt Devine, PhD candidate, UMass Amherst, personal communication). Therefore, in order to allow herring recovery to continue in the Mystic River Watershed, additional habitat must be opened up upstream. Horn Pond, a 102-acre water body, would open up substantial spawning habitat for anadromous fish in the area. Eventually, the rate of increase of the population would plateau as the watershed reaches its carrying capacity and habitat quality, and the passability of downstream barriers become the limiting factors. However, providing access to Horn Pond and its tributaries may provide impetus for additional habitat restoration and access even higher in the watershed.

In addition to the primary benefit of fish passage, other ecological benefits may result from this project as well. Freshwater mussel distribution may improve with fish passage improvements, particularly for some threatened or endangered species of mussels that parasitize herring during their life cycle (Galbraith et al., 2018). Improved passage and greater access to a larger habitat network for herring would therefore allow mussel larvae produced by existing freshwater populations to be transported to new locations in the Aberjona River watershed, which could allow establishment of new colonies. As mussels are filter feeders, water quality may also be yet another benefit of improved fish passage. However, the timeframe and the probability of success for mussel population increases and subsequent water quality improvements are uncertain.

Other native species that would benefit from the project as a result of a more abundant food source include species that consume herring in freshwater ecosystems (e.g., herons, gulls, cormorants, osprey, eagles, river otters, foxes, raccoons) and in marine ecosystems (e.g., striped bass, tuna, cod, marine mammals).

The proposed bioswale/rain garden would provide water-quality benefits once it is completed and following stabilization of contributing areas. Water-quality benefits would be expected to continue as long as the bioswale/rain garden and any associated pretreatment are maintained regularly. The importance of maintenance should be emphasized as the most common reason for failure of stormwater management structures is a lack of maintenance.

Educational benefits would be commensurate with investment in viewing platforms (including camera recording and live viewing), interpretive displays, and live talks and tours of the site following construction. Educational benefits would begin once the proposed facilities are completed and opened to the public.

Recreational fishing in Horn Pond and its tributaries may improve with increased migration of fish upstream past Scalley Dam. Public benefits would also include improved wildlife viewing experiences, as species that prey on herring become more abundant in the ecosystem.

Maintenance and Monitoring

The City of Woburn intends to develop an O&M Manual for the site, including O&M associated with the fishway and viewing station, dam, parking lot, and bioswale/rain garden. Common maintenance items for the fishway may include monitoring for sediment and debris buildup in the fishway, and monitoring water levels in the pond to ensure that the fishway receives adequate flow to allow migration. If Alternative 3 (the Denil fish ladder) is selected, weirs will need to be maintained and occasionally replaced. MyRWA would be responsible for monitoring river herring passage at the site for five years after project implementation.

Probability of Success

The success of the project depends on the factors list in Table 8.

Table 8. Success Factors for Scalley Dam Fishway Project

Factor	Impact on Success
Proper fishway design	The success of fishways such as fish ladders relies on a good engineering design that is appropriate for the site. The information submitted by the City of Woburn for this project indicates that the city is in contact with fish passage experts from the Massachusetts Division of Marine Fisheries (DMF) and the USFWS, which have provided input on the design of the fishway. The city plans to coordinate with DMF, USFWS, and NOAA to incorporate best practices into the design. The city is also working with a team of fluvial geomorphologists to arrive at a stable design that is tailored to site conditions. MyRWA estimates that 25,000 herring entered Horn Pond via the existing bypass channel in 2018. An improved fishway would likely increase that number. In addition to providing a new fishway, the design should incorporate elements to reduce or eliminate flow through the existing bypass channel and limit the flow over the dam spillway during the migratory periods of river herring, shad, and eel in order to allow for proper attraction flow to the fishway.
Monitoring fishway for passage success	The City of Woburn is in contact with MyRWA, which is in support of the project and would conduct monitoring of river herring. Monitoring can allow the owner of the fish ladder to observe any issues arising with the fishway once built and address fish passage issues as they arise using an adaptive management approach.
Fish passage past downstream barriers (i.e., Center Falls Dam, Mystic Lakes Dam)	Recent improvements have been made to fishways at Upper Mystic Lake in Medford (2012) and at Center Falls Dam in Winchester (2017). MyRWA estimated that approximately 600,000 fish migrated through the fish ladder at the Mystic Lakes Dam in 2018 and that 109,000 fish migrated upstream through the fish ladder at the Center Falls Dam in Winchester, Massachusetts, in 2018.
Habitat quality in Horn Pond	Habitat quality within Horn Pond will determine herring reproductive success in the pond once they migrate past Scalley Dam.
Maintenance of the Bioswale/ Rain Garden	Proper maintenance of the proposed bioswale/rain garden is critical for its success, as the most common reason for failure of stormwater management structures is a lack of maintenance. Plantings should be selected for ease of maintenance.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the project include:

- Removal of approximately 1–10 trees would likely be required at the site, depending on the final configuration of the fishway. All of the trees are located within 120 feet of the shoreline of the pond and/or Horn Pond Brook. Loss of these trees could increase water temperatures in Horn Pond Brook.
- Disturbance of the site has the potential to harm Horn Pond and/or Horn Pond Brook via the introduction of sediment and other pollutants if best practices are not used during project construction.
- The site is located partly within the 100-year floodplain and entirely within the 500-year Federal Emergency Management Agency (FEMA) floodplain, and the ends of the fishway would be located within the regulatory floodway. While it is theoretically possible that changes in flow could affect flooding, the Trustees will ensure that the project is designed to avoid any increase in base flood elevation (BFE, the water elevation during the 100-year flood).
- The site is not located within a mapped Priority or Estimated Habitat of Rare Species, as designated by the Natural Heritage Endangered Species Program (NHESP).

Potential socioeconomic consequences of the project include:

- Depending on the design of the site, up to 6,000 square feet of open space, currently used for picnicking, may be affected. However, the City of Woburn plans to offset potential impacts by incorporating an improved picnic area into the site as an amenity. The quality of the experience of visitors to the site is also expected to be improved because of their ability to view fish during migration.
- Increased numbers of visitors to the site during the spring (May and June) and fall (mid-August to mid-October) fish migration may potentially result in increased traffic and greater demand for parking and restroom use. The existing parking lot is already heavily utilized by local residents.

The potential environmental and socioeconomic consequences of the project would be evaluated through the local, state, and federal permitting process and environmental reviews pursuant to NEPA and MEPA, as applicable. The project would incorporate measures to avoid, minimize, or mitigate adverse environmental impacts, including:

- Consideration of tree planting as part of the site design, primarily to shade the proposed fishway to keep water temperatures in a range appropriate for fish. Trees would also provide shade for visitors.
- Following stormwater best management practices (BMPs), including protecting the bioswale/rain garden from sediment resulting from construction disturbances. The bioswale should not receive runoff until areas disturbed by construction are stabilized.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 9). Additional information on these requirements can be found in Appendix A.

Table 9. Anticipated Regulatory Submittals, Reviews, and Permits for Scalley Dam Fishway Project

Review/Permit	Agency
ENF	MEPA Office
Chapter 253 Dam Safety Permit	DCR Office of Dam Safety (ODS)
WPA NOI and Order of Conditions	City of Woburn Conservation Commission and MassDEP
CWA Section 404 General Permit	USACE
401 WQC	MassDEP
Federal ESA Project Review	USFWS
Fishway Permit	Massachusetts DMF
PNF and Section 106 Historic Review	MHC
NPDES Permit	EPA
Letter of Map Revision (LOMR)	FEMA

Project Status: Funding and Implementation

Following a 2018 site visit by the City of Woburn, the Massachusetts DMF, and USFWS, alternative fishway design concepts were developed for the site.

Additional grant funding is being sought by the city to supplement the requested NRDAR funds. The City of Woburn has submitted a MVP Action Grant application to the Massachusetts EEA to request funding for the construction of the proposed bioswale/rain garden at the parking lot.

Estimated Costs

Preliminary cost estimates for the project range from $522,300 to $1,186,800, depending on the alternative selected (see Table 10 for a more detailed description of each alternative). A feasibility study to evaluate different options is included in the overall project costs. These cost estimates appear appropriate for the project scale.

Table 10. Preliminary Cost Estimates Based on Opinions of Cost

Fishway Design Alternative	Key Items and Activities Included	Preliminary Cost Estimate*
Alternative 1: Nature-Like Roughened Channel	Design, permitting, administration, excavation, reinforced concrete, coffer dam and dewatering, and vegetation planting.	$1,186,800
Alternative 2: Nature-Like Pool and Weir Fishway	Design, permitting, administration, excavation, concrete, riprap, and coffer dam and dewatering.	$846,400
Alternative 2: Denil Fish Ladder	Design, permitting, administration, excavation, reinforced concrete, timber stop logs and baffles, and coffer dam and dewatering.	$522,300

* Includes a 25% contingency.

Trustee Evaluation and Proposed Allocation

Overall, the project was evaluated favorably and is proposed as a Tier 1 project, with a total Tier 1 allocation of $1 million.

The Trustees evaluated this project favorably based on their established evaluation criteria (Table 11) because of its strong nexus to the injured resources and the large number and magnitude of benefits from the project. Of critical importance is the opportunity to promote and expand healthy fish migration to the Mystic River Watershed. The Scalley Dam represents the next important upstream constriction to full fish migration. Eliminating this constriction and providing access to additional areas of upstream habitat will allow herring and eel populations to continue to grow in the Mystic River Watershed. The project partners – the City of Woburn and MyRWA – have demonstrated commitment to ongoing stewardship and support for the project.

Table 11. Evaluation of Scalley Dam Fishway: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	The project is located in the Aberjona River watershed, approximately 3 miles from the Site.
Relationship to injured resources	The Site has degraded wetland, river, and lake habitats in the Aberjona River watershed, including habitats that support diadromous fish. This project benefits diadromous fish by increasing fish passage into Horn Pond. The project also provides secondary benefits to habitat quality through stormwater management.
Benefit Criteria	
Magnitude of benefits	The project addresses a demonstrated need for improved fish passage at the Scalley Dam, maximizing benefits to diadromous fish migration (including American eels), and allowing access to 102 acres of spawning habitat for river herring. This project capitalizes on the extensive investments in diadromous fish restoration in the Mystic River watershed that have already led to significant increases in herring return numbers.
Multiple benefits	The project provides multiple benefits to the watershed because herring and eels serve as a key food resource for other wildlife, including raptors and predatory fish in the Gulf of Maine that consume river herring. Additional benefits may occur through the promotion of freshwater mussel distribution and water-quality benefits, as well as providing benefits to commercial and recreational fisheries and improving climate resiliency. The project will benefit American eel, which are used for striped bass bait and harvested for human consumption.
Sustainability of benefits	The project will result in long-term benefits to the herring population through providing increased fish passage. However, the project will require ongoing maintenance and management to ensure the fish passage channel is functioning properly, monitoring occurs, and the stormwater treatment system is maintained.
Stewardship	Project partners, including the City of Woburn and MyRWA are committed to and capable of undertaking the stewardship activities after project implementation that will enable project benefits to continue for the long-term.
Enhancement of public's relationship with natural resources	The project will strongly enhance the public's ability to use, enjoy, or benefit from the Aberjona River watershed by providing public viewing platforms for fish migration and promoting place-based education programs and citizen science. The project site is a highly visible and active public recreational area that will offer a unique opportunity to view river herring and increase public awareness of fish migration.
Avoidance of adverse impacts	The project is viewed as having little potential for adverse impacts to the environment or public health and safety.
Relationship of expected costs to expected benefits	The project has a high ratio of expected benefits to expected costs because the project will enable access by herring to a large area of upstream habitat above the Scalley Dam. These benefits can be obtained through the relatively modest cost of fishway construction.
Natural recovery period	The project will provide restoration benefits to natural resources and/or services as soon as the fishway is constructed and fish can access Horn Pond. This will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	The project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities.

Criteria	Evaluation Summary
Implementation Criteria	
Technical/technological feasibility	The project will employ well-known and accepted techniques to achieve the objective of fish passage, incorporating the advice and guidance of state experts.
Administrative and management capability	The project will be managed and administered by the City of Woburn, which has the capability to successfully oversee infrastructure projects. The city will engage a qualified firm experienced in fishway and rain garden design and construction. Educational aspects of the project will be managed and administered by MyRWA, which similarly has a successful track record of similar educational projects at other fish passage projects in the Mystic River Watershed.
Site ownership	The City of Woburn already owns and controls the site, so the restoration will occur at a publicly owned site without access concerns.
Soundness of approach	The approach has a high likelihood of success for meeting milestones, with a small degree of risk associated with the potential increase in BFE, which would involve additional mitigation and agency coordination.
Measurable results	The project has an outstanding likelihood of delivering tangible and measurable results because the quantification of herring numbers passing into Horn Pond via the fishway is an integral part of the project. The project will build on successful herring counts occurring in the Mystic Lakes.
Community involvement	The project integrates public involvement through science-based monitoring, which will be ongoing.
Public outreach	The project integrates public education and outreach through incorporation of MyRWA into the project team.
Implementation-oriented	The project budget has a high ratio of funding dedicated to implementation activities, such as the construction of the fishway, compared to general support and operation.

The Trustees evaluated this project as "marginal to acceptable" for the criteria listed in Table 12.

Table 12. Evaluation of Scalley Dam Fishway: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Benefit Criteria	
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans because of support for improving herring populations at multiple levels.
Implementation Criteria	
Project implementation readiness	The project is seen as having a marginal-to-acceptable level of implementation readiness because the engineering and permitting work has not yet been completed.
O&M needs	The project is seen as having relatively high O&M needs because the fishway and the stormwater management aspects of the project need ongoing maintenance.
Leveraging of additional resources	The project provides some leveraging of additional resources – including leveraging the herring benefits already created by downstream projects – but the NRDAR will provide the majority of the funding.
Level of funding and resources needed for project implementation	The project has a relatively high need for funding because of the need for engineering, design, and construction.

The project was not rated as below marginal for any evaluation criteria.

4.2.3 Riverine, Floodplain, and Riparian Habitat Restoration at Davidson Park ("HWG Option 2") (Tier 1)

Restoration Objective

The goal of this project is to restore the ecological, aesthetic, and recreational value of the Aberjona River corridor within Davidson Park, which is owned by the Town of Winchester. The Trustee Council proposes to restore a more natural river channel and floodplain environment river channel in a currently shallow, stagnant portion of the river (this stagnant area is often referred to as a "pond"). The Trustees also propose to remove invasive plants along the river and daylight a tributary to the Aberjona River to improve fish passage and aquatic habitat.

Project Location

Davidson Park occupies a 9.6-acre parcel in the Town of Winchester located north of Cross Street and bounded between train tracks to the west and residential buildings along Brookside Avenue to the east (Figure 8). A cemetery and healthcare complex border the site to the north.

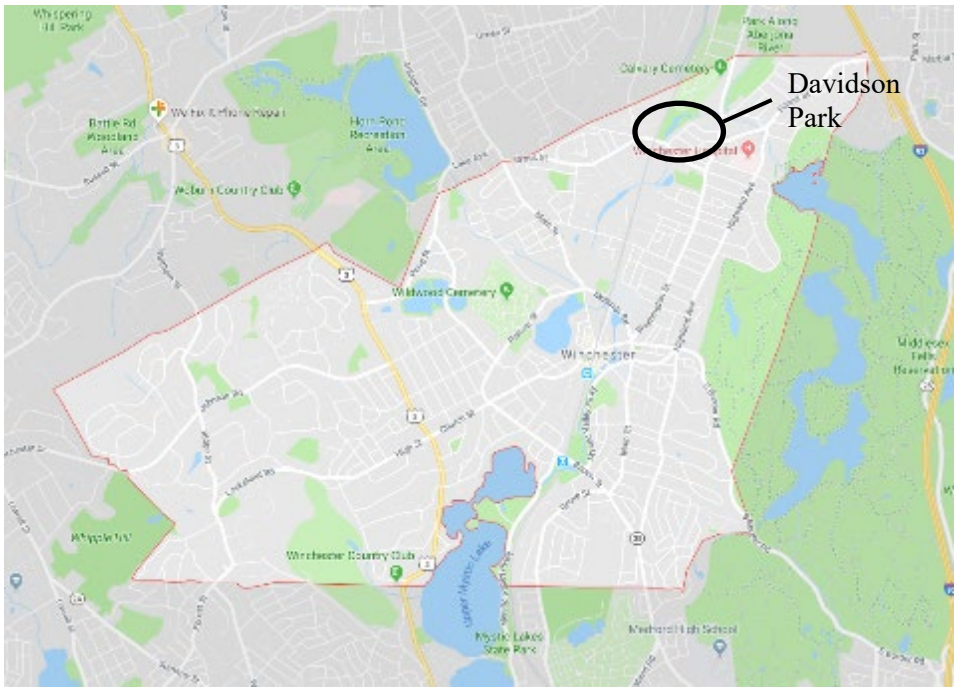


Image Source: Google Maps.

Figure 8. Map of the Town of Winchester Showing Davidson Park (circled)

The Greenway, a shared-use path linking the three municipalities of Winchester, Woburn, and Stoneham along the Aberjona River, enters the site near the healthcare complex at the northeast end of the site and follows the west bank of the Aberjona River through the park, exiting at Cross Street. A footpath enters the park at the south end of the Washington Street Bridge and follows the opposite bank of the river. Within the park, a sewer line crosses the Greenway and the Aberjona River approximately 500 feet west of Washington Street, and continues southeast along the east shore of the River, exiting Davidson Park at the southwest end of the park (Figure 9).

Aerial imagery source: Google Earth.

Figure 9. Map of the Northeast End of Davidson Park, Showing the Greenway and the Area of Erosion along the Opposite Bank of the Aberjona River

Davidson Park was created during the 1930s as a waterway improvement project. Over the past three decades, however, the portion of the Aberjona River that flows through Davidson Park has been compromised by severe sedimentation and bank erosion. Maintenance of the waterway in the 1990s widened the channel of the river substantially, which reduced its ability to transport sediment. This resulted in a braided system, which resulted in the creation and growth of a large "island" and "pond" in what was once a free-flowing river channel (Figure 10). The accumulation of sediments has decreased water depths and flow velocities in the channel, impaired water quality, increased water temperatures, and adversely impacted wildlife habitat. While the stagnant area of the river is referred to as a pond, it is too shallow to support pond-based recreation (e.g., boating). The pond, however, is an aesthetic amenity that some locals appreciate and the open water in the area does attract limited, temporary use by some migratory waterfowl, despite the low quality of the wetland and aquatic habitat in the pond.

Figure 10. Sediment Accumulation at Davidson Park from Aerial Photographs from the Early 1990s (left panel), Early 2000s (middle panel), and 2013–2014 (right panel)

A tributary to the Aberjona River originates at the outlet of Whittemore Pond in the City of Woburn and flows south, closely following the Lowell Line of the Massachusetts Bay Transportation Authority Commuter Rail, crossing under the rail line twice before entering a buried reach approximately 1,000 feet long beneath Tighe Logistics Group (Figure 11). Further south, the tributary crosses under the rail line once more before entering a buried section approximately 100-feet-long that joins the Aberjona River at the downstream end of the "Old Pond" (approximately 200 feet upstream of Cross Road) via a 24-inch pipe perched approximately 9 inches above the normal water surface level of the Aberjona River.

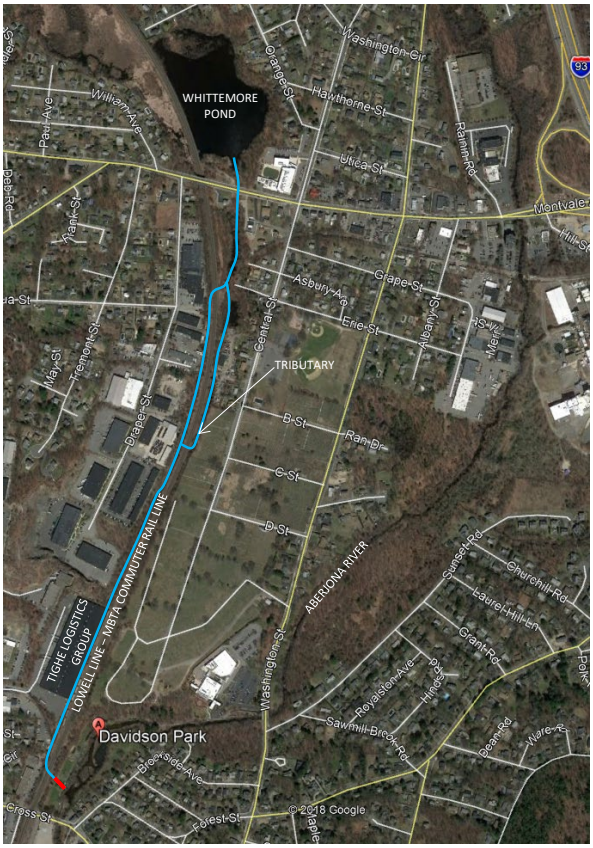


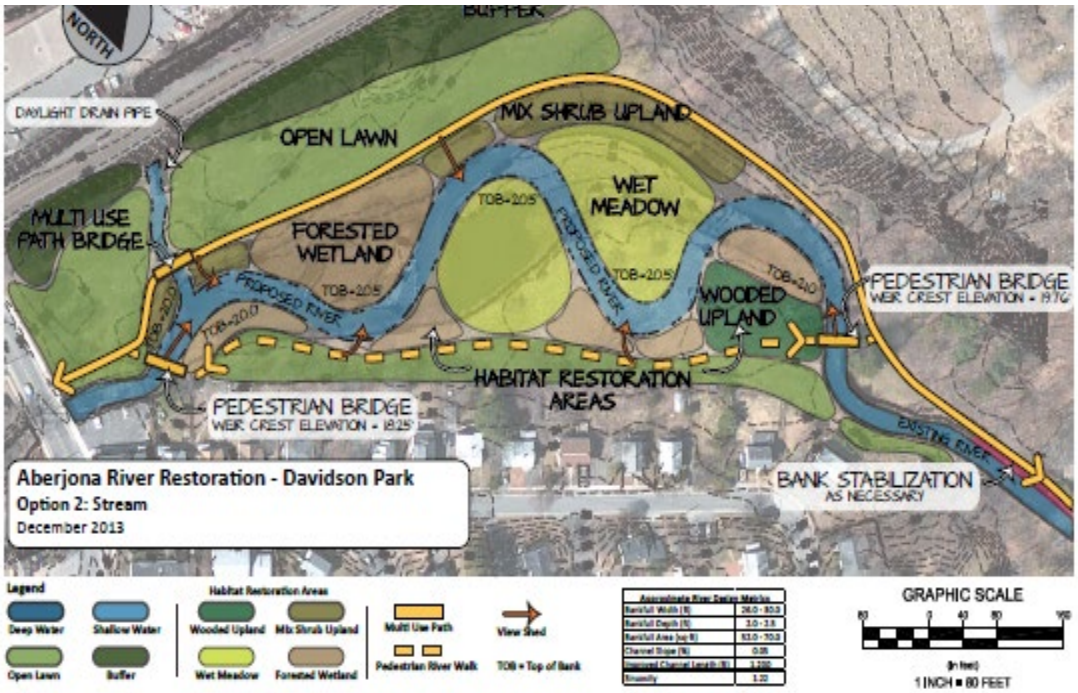
Figure 11. Tributary Location from Whittemore Pond to Davidson Park. The portion of the tributary proposed to be daylighted is highlighted in red near the bottom of the figure.

Project Description

In 2012, in response to growing concerns over the deteriorating conditions at Davidson Park, the city funded a $75,000 project to develop preliminary designs for restoration and rehabilitation of the park. Woburn selected the HWG to complete the scope of work, including an existing conditions assessment, a habitat and invasive species characterization, a screening-level sediment sampling and analysis, a preliminary engineering and alternatives analysis, and outreach. The project described here and supported by the Trustees includes the stream restoration alternative originally developed as "Option 2" by HWG (Figure 12), as well as additional ecological enhancement options. This project eliminates the existing pond and converts a portion of the park to a more natural riverine floodplain environment.

This project includes a proposal to daylight the 100-foot buried portion of the tributary noted in Figure 11 to facilitate fish passage into the tributary system and upstream to Whittemore Pond. The primary target species for the new hydraulic connection include anadromous alewife and blueback herring, known collectively as river herring, as well as American eel.

This project also includes a proposal to stabilize the south bank of the Aberjona River, where the bank is eroding and cutting into the footpath. (The north bank of the Aberjona River that supports the Greenway path was stabilized in 2018 with live stakes on the riverbank and stone riprap along the toe of the bank.)



Source: HWG, 2014.

Figure 12. Conceptual Drawing of Aberjona River Restoration at Davidson Park – Option 2

Finally, this project includes a proposal to preserve and enhance the native species diversity at Davidson Park through the removal of existing invasive species and replacement with native species. Invasive plant species found at the site include:

- Japanese knotweed (*Fallopia japonica*; formerly *Polygonum cuspidatum*)
- Purple loosestrife (*Lythrum salicaria*)
- Oriental bittersweet (*Celastrus orbiculatus*)
- Norway maple (*Acer platanoides*)
- Japanese barberry (*Berberis thunbergii*)
- European buckthorn (*Frangula alnus*)
- Multiflora rose (*Rosa multiflora*)
- Honeysuckle (*Lonicera* spp.)
- Garlic mustard (*Alliaria petiolata*)
- Common reed (Phragmites australis).

Poison ivy (*Toxicodendron radicans*), a native species, is also present at the site, primarily along the riverbanks. This species threatens native plant assemblages by "strangling" large trees. It is also a threat to human health and safety via the oils produced by the plant, which can cause a severe skin rash when encountered.

Potential key elements of the project include:

- Dredging of some accumulated sediments from the existing pond area.
- Construction of a restored river channel through the existing pond and some of the existing lawn area.
- Restoration of riverbank and buffer area habitat.
- Grading to provide a bankfull bench or low floodplain shelf to accommodate lower-elevation flood events.
- Daylighting a 100-foot culverted section of an Aberjona River tributary to encourage fish migration and wildlife recolonization.
- Design and construction of a shared-use bridge, having a footprint of approximately 10 feet by 10 feet to reconnect the Greenway over the daylighted portion of the tributary.
- Localized riverbank stabilization, potentially including installation of live stakes, including willow species and red-twig dogwood, to stabilize the eroding river bank near the footpath.
- Selective removal of invasive plant species along the banks of the Aberjona River, with a preference for the use of mechanical removal methods (e.g., cutting, pulling, grubbing, covering) rather than chemical (i.e., herbicides) or biological (i.e., insects or domestic grazing animals) to minimize potential water quality impacts, due to the proximity of invasive species to the water's edge.
- Replacement of removed invasive species with native plants in some areas and open turf in other areas.
- Creation of "view-sheds" within the park.
- Construction of a new pedestrian river walk with wildlife viewing areas, including cutting vegetation on the south side of the Aberjona River to provide more space for the path and allow for ongoing maintenance of the path with mowing equipment.
- Establishment of a vegetated riparian buffer.

(Note: Budget constraints may not allow all of these elements to be included in the current project.)

A maintenance plan would be developed to uphold the ecological value of these actions.

Expected Benefits and Timeframe of Benefits

The removal of contaminated sediment will immediately accelerate natural restoration of the site, allowing faster recovery of habitat along the river. Natural rehabilitation of the site will improve habitat for both terrestrial and aquatic wildlife by providing a food source and shelter. Biological resources that may benefit include fish, birds, insects, reptiles, amphibians, and mammals. As noted above, while there is some limited, temporary use of the "pond" area by a small number of migratory waterfowl that will be removed, the Trustees anticipate that the replacement of this low-quality habitat with a well-functioning river and floodplain will result in net benefits to birds and other wildlife. Benefits will come immediately as the site revegetates, and will continue to increase as vegetation matures and continues to stabilize the river. Riverine species would benefit from restoration of the Aberjona River through the park.

Daylighting the first 100 feet of the culverted tributary would provide additional habitat for herring within the park. It may also allow migrating fish access to areas upstream, including Whittemore Pond. However, the extent of aquatic passage benefits of the project would be limited by other existing upstream barriers, including the 1,000-foot buried section of the stream upstream of the site and channelized reaches of the tributary with no riparian buffer. While the proposed daylighting project would improve aquatic passage in the immediate vicinity of the project site within a year or two of project

completion, restoration of migratory fish runs to the larger tributary system would be limited unless the entire tributary, including reaches upstream of the project site, is restored in a more holistic manner.

The live stakes should take root and begin slowing erosion within one to two growing seasons, and should maintain a stable river bank and footpath thereafter, barring further disturbance. Natural river bank stabilization of the site will improve habitat for wildlife by providing a source of food and shelter, removing a source of sediment to the river, and shading the stream. Cutting of vegetation on the south side of the footpath will provide more space for the path but will require ongoing vegetation maintenance.

An additional benefit of the proposed aquatic passage restoration is the reduction of attraction flow at the tributary's confluence with the Aberjona River. Restoring the daylighted stream to a more natural channel width and eliminating the 9-inch drop into the Aberjona River would likely reduce the unnatural velocity and turbulence cues that currently draw fish to this tributary; instead, fish would be more likely to continue migrating up the mainstem of the Aberjona River to more suitable spawning habitat. This potential benefit to migratory populations should become apparent within the first spawning season. Other native species that would benefit from the project as a result of a more abundant food source include species that consume herring in freshwater ecosystems (e.g., herons, gulls, cormorants, osprey, eagles, river otters, foxes, raccoons).

The removal of invasive plant species would initially improve conditions for native plants at the park. A combined approach is needed to ensure long-term success for the control of invasive plant species. The recommended approach involves invasive species removal, planting of native species, and monitoring of the site, which would gradually allow the site to begin recovery within one to two growing seasons. Repeated rounds of invasive species removal and native plantings would likely be required to deplete the seedbed of invasive species, increase native seedbeds, and maintain native species in the long-term. Open space such as lawn and areas where native plants are installed at a lower density may be more vulnerable to reestablishment of invasive species.

Natural revegetation of the site would improve habitat for both terrestrial and aquatic wildlife upon establishment of native plantings by providing a food source and shelter, and by improving water quality in the Aberjona River (through runoff filtration and through shading of the water by taller plant species). Biological resources that may benefit include birds, insects, reptiles, amphibians, and mammals. These benefits can be expected to continue as long as the site is maintained to be free of invasive species and native vegetation remains in good health.

Additional benefits of the proposed project include improved landscape aesthetics as well as recreational and wildlife-viewing opportunities. These benefits would be realized soon after project completion and site stabilization, and would continue as long as native plant assemblages are maintained on the site in good health.

The replacement of the pedestrian footbridge at the upstream end of the park and the construction of the new pedestrian riverwalk also will improve recreational opportunities, including opportunities for exercise and wildlife viewing, immediately upon project completion. Benefits will continue as long as the park is maintained.

Brief Overview of Maintenance and Monitoring

Details on planned maintenance are not currently available.

Probability of Success

The success of the project depends on the factors included in Table 13.

Table 13. Success Factors for Davidson Park Project

Factor	Impact on Success
Potential sediment contamination	Sediment samples collected between 1995 and 2013 indicate that the primary contaminants of concern are metals, particularly arsenic, cadmium, lead, and nickel. Polycyclic aromatic hydrocarbons (PAHs) and semi-volatile organic compounds (SVOCs) have also been found in some samples. These contaminants are most likely to be found in deep sediments within the pond and on the riverbanks, and will limit the disposal options for any excavated soils. This factor does not rule out any restoration project(s) but should be taken into account in project planning and cost estimates.
River restoration design	A more sinuous planform would allow dispersal of energy throughout the course of the river through the park, and would create more diverse and valuable riverine and riparian habitats.
Daylighting design	The site should be designed to include: • A naturalized channel shape and dimensions based on peak-flow return interval data, to reduce constriction of the channel • Elimination of the 9-inch perched outlet to the Aberjona River (tributary should enter the river at grade if possible) • Natural channel substrate • An adequate riparian to prevent head cutting up the tributary, which could result in a perched outlet at the culvert under the railroad, or undermining of the railroad bed.
Monitoring for passage success	Monitoring would allow the town to observe any issues arising at the tributary once constructed and to address fish passage issues as they arise using an adaptive management approach.
Selection of appropriate live stake plantings	Native, fast-growing species should be selected. The town has proposed to use native plants, including willow and red-twig dogwood, as live stakes.
Proper maintenance of live stake plantings after installation	Regular maintenance of plantings and removal of invasive plants would be required to maintain benefits, but may disturb wildlife. Staff maintaining plantings will need knowledge of planting types, species-specific maintenance, and identification and control of invasive species.
Flows and erosive force in the river channel	These benefits may be reduced if live stakes are insufficient to stabilize the southern riverbank if flow velocities are too high. In this case, the live stakes may need to be supplemented with restoration of the riverbed and bank to a more natural and shear-resistant channel form (preferred method), and/or soil-filled stone armor at the toe of the bank.
Invasive species removal	Multiple invasive plant species are present on the site. Special precautions must be taken during plant or soil removal to protect native species and prevent the spread of invasive species to new sites.
Invasive species control	Repeated removals of invasive species will be required to control populations. Proper disposal of certain invasive species is important to prevent their establishment in new locations.
Preparation of an invasive species management plan	An integrated invasive species management plan should be developed prior to project implementation in order to prioritize sites within the park for initial invasive species removal and native plantings; and to promote responsible, systematic, and effective methods of invasive species control for long-term success. The plan should incorporate methods for adaptive management based on monitoring of the site following initial invasive species removal and native species planting.
Invasive species removal methods	Appropriate methods for invasive species removal should be selected based on the type and location of invasive plants. Due to the proximity of invasive species to the water's edge, the use of mechanical removal methods (e.g., cutting, pulling, grubbing, covering) rather than chemical (i.e., herbicides) or biological (i.e., insects or domestic grazing animals) are recommended to minimize potential water-quality impacts. Special precautions must be taken during plant or soil removal to prevent erosion, protect native species, and prevent the spread of invasive species to new sites. Proper disposal of certain invasive species is important to prevent their establishment in new locations.

Factor	Impact on Success
Native plant species choice and planting plan	Native species should be selected by an expert in native plantings based on site conditions and project goals. Species should be planted at an appropriate density to maximize wildlife habitat benefits and to outcompete invasive species. Other project elements that will be affected by plant species, location, and density include: • Water quality benefits – wider and denser riparian buffers of native vegetation will provide greater benefits to water quality through runoff filtration, sediment stabilization, and shading of the river. • Viewshed – areas with better views of the river should be strategically interspersed with thick stands of native vegetation to maintain the benefits of both.
Monitoring and maintenance of site after initial phase	Regular maintenance of plantings and removal of invasive plants would be required to maintain benefits. Staff maintaining plantings will need knowledge of planting types, species-specific maintenance, and identification and control of invasive species. Maintenance of lawn areas by mowing will help maintain viewsheds but may make control of invasive species more difficult by creating edge conditions at the boundary between the lawn and native plantings that are more conducive to (re)establishment of invasive species.
Project partnerships	The Winchester Conservation Commission and the Friends of Davidson Park have been briefed about the project, including the Trustees' reasoning for support of this option. The town hopes to pursue additional funding sources in support of this project.
Implementation of related projects	Project planning should consider possible impacts and phasing of other related projects, as well as possible opportunities for cost savings and enhanced benefits through coordination of projects.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the proposed project include:

- Disruption of the island and wetland habitats currently forming through natural processes in the park will affect the ongoing habitat succession occurring within the pond area and temporarily reduce the diversity of habitat types in the park.
- Removal of brush may result in some loss of existing wildlife habitat. New plantings should replace this habitat and expand it if possible.
- Disturbance of the site and particularly disruption of soils along the banks of the Aberjona River have the potential to impact the water quality of the river via the introduction of sediment and other pollutants. Implementation of a sediment and erosion control plan during the project will help to minimize this risk.
- Altering the stream location may result in active migration of the channel if the channel is not designed using best practices in stream design and geomorphology. An experienced fluvial geomorphologist would be an important asset in designing a stable stream and floodplain restoration project in this highly constrained urban project site.
- Disruption of soils along the banks of the Aberjona River while removing invasive plants and installing native plants may result in the introduction of sediment and other pollutants to the river during construction. Implementation of a sediment and erosion control plan during the project will help to minimize this risk.
- Replacement of invasive vegetation along the riverbanks with lawn would result in loss of riparian cover and habitat. Areas that currently provide a riparian buffer should remain and not be replaced with mowed lawn.

The site is not located within mapped Priority or Estimated Habitat of Rare Species as designated by the NHESP.

Potential socioeconomic impacts of the proposed project include:

- Temporary disruption of nearby residents due to construction traffic and noise.
- Loss of a modest amount of open space over the buried portion of the tributary. The project also requires the design and construction of a bikeway bridge (10 feet by 10 feet in area).
- Temporary disruption of the Tri-Community Greenway (Greenway) during construction. The portion of the Greenway over the buried stream will need to be permanently replaced with a bridge, but may have to be closed or routed over a temporary bridge during construction.

Short-term, construction-related impacts could be mitigated through efficient project planning to minimize the construction duration and through the implementation of construction-phase BMPs such as erosion and sediment controls. Long-term impacts on residents could be mitigated by planting a buffer of native trees and other vegetation along the eastern edge of the park to restrict public views and access into private backyards, and through consideration of alternative onsite or offsite parking options.

The potential environmental and socioeconomic consequences of the project would be evaluated through the local permitting process and environmental review pursuant to NEPA and MEPA, as applicable. The project should incorporate measures to avoid, minimize, or mitigate adverse environmental impacts.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 14). Additional information on these requirements can be found in Appendix A.

Table 14. Anticipated Regulatory Submittals, Reviews, and Permits for Davidson Park Project

Review/Permit	Agency
ENF	MEPA Office
WPA NOI and Order of Conditions	Town of Winchester Conservation Commission and MassDEP
401 WQC	MassDEP
CWA Section 404 General Permit	USACE
PNF and Section 106 Historic Review	MHC
NPDES	EPA
LOMR	FEMA

Project Status: Funding and Implementation

The Town is currently considering design options for the Aberjona River Restoration project, including the configuration of the river through Davidson Park. The removal of invasive species is part of the larger overall restoration project for Davidson Park. Bank stabilization has been initiated informally through the planting of live stakes, but this aspect of the project was not included in the conceptual design phase for restoration at Davidson Park.

Estimated Costs

The Town is requesting $2 million ($250,000 for design and permitting; $1,750,000 for construction) based on cost estimates prepared by HWG, an appropriate amount given the scale of work proposed. These costs include tributary daylighting, bank stabilization, and invasive species management.

Trustee Evaluation and Proposed Allocation

Overall, the project was evaluated favorably and is proposed as a Tier 1 project. The Trustees are currently allocating $250,000 for design and permitting. After design and permitting is complete, Trustees may allocate more funding to the project (up to $350,000 more) if its design continues to be evaluated highly by Trustees.

The Trustees evaluated this project favorably based on their established evaluation criteria (Table 15) because of its proximity and nexus to the injured resources and the ability to enhance the public's relationship with natural resources. Although the Trustees do not have sufficient funding to support the full implementation construction costs of this project, the funding provided by the NRDAR can complete the design and permitting of the project, enabling the Town of Winchester to better access other sources of future funding. More specifically the Town is currently completing their MVP plan, which will make it eligible for Action Grants through the MVP Program in future years.

Table 15. Evaluation of Davidson Park Restoration: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project restores the Aberjona River mainstem and floodplain, approximately two miles from the Site.
Relationship to injured resources	The Site has degraded wetland, river, and lake habitats in the Aberjona River watershed, including habitat in Davidson Park impacted by contaminated sediments. This project benefits wetland, river, and riparian habitat, as well as providing secondary benefits to habitat quality through stormwater management.
Benefit Criteria	
Magnitude of benefits	The project addresses a demonstrated need for improved riparian, wetland, floodplain and in-stream habitat at Davidson Park, providing benefits to a variety of fish and wildlife species. It provides benefits to fish passage by daylighting of the tributary to the Aberjona River and by replacing the degraded pond with a restored Aberjona River channel that will benefit fish passage. This project capitalizes on the extensive investments in diadromous fish restoration in the Mystic River watershed that have already led to significant increases in herring return numbers in the Aberjona River.
Multiple benefits	The project provides multiple benefits to riparian, wetland, and in-stream habitat and the multiple species that use these interconnected habitats, and it will also improve ecosystem climate resiliency. In addition, herring serve as a key food resource for other wildlife, including raptors and predatory fish in the Gulf of Maine that consume river herring. Additional benefits may occur through improving water quality from removal of contaminated sediments and stormwater management.
Enhancement of public's relationship with natural resources	Project will strongly enhance the public's ability to use, enjoy, or benefit from the Aberjona River by developing a natural environment within the park, protecting the footpath from erosion, developing viewsheds for wildlife viewing, replacing the greenway bridge where the tributary is daylighted, and promoting place-based education programs. The project site is a highly visible and active public recreational area that will offer a unique opportunity to understand river restoration.
Natural recovery period	Project will provide restoration benefits to natural resources and/or services soon after the habitat restoration is accomplished and the new channel is constructed. Benefits from daylighting the tributary will occur immediately. These benefits will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Implementation Criteria	
Site ownership	The Town of Winchester already owns and controls the site, so the restoration will occur at a publicly-owned site without access concerns.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria:

Table 16. Evaluation of Davidson Park Restoration: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Sustainability of benefits	The project has the potential to provide long-term benefits to the riparian, wetland, and in-stream habitat at Davidson Park. However, the project will require some ongoing maintenance and management to ensure the habitats are maintained and invasive species remain controlled.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, region, and local policies and plans because improving habitat in the Aberjona River contributes to goals of increasing migratory fish populations. The project also is consistent with the 2010 Winchester Master Plan, which calls for renewing and revitalizing its parks, parkways, waterways and recreational areas to promote environmental quality and sustainability.
Stewardship	The Town of Winchester has expressed its commitment to undertaking the stewardship activities after project implementation that will enable project benefits to continue for the long-term.
Avoidance of adverse impacts	The project has some potential for adverse impacts because of the need to remove contaminated sediments to restore the Aberjona River channel through the current ponded area. The risk of these impacts will be minimized with BMPs and proper disposal of contaminated sediments.
Relationship of expected costs to expected benefits	Project has a high ratio of expected benefits to expected costs, because the project will benefit multiple habitat types in Davidson Park, including benefits to habitat used by multiple species (e.g., fish, birds, amphibians, reptiles). Also, the Trustee investment in design and permitting will enable other funds to be leveraged to complete the construction.
Avoidance of additional injury	Project has a limited potential to result in additional injury to injured resources because of the possibility of remobilizing contaminants during the sediment removal and construction process. This possibility will be minimized with BMPs and proper disposal of contaminated sediments.
Implementation Criteria	
Technical/technological feasibility	Project will require excellent design and construction techniques to ensure that the restoration of the Aberjona River channel through the current ponded area is stable and successful.
Administrative and management capability	The project will be managed and administered by the Town of Winchester, which may have limited experience with complex restoration projects including the removal of contaminated sediments. However, the town will engage a qualified firm experienced in stream and floodplain habitat restoration and in handling potentially contaminated sediments and soils. The educational aspects of the project will be managed and administered by the MyRWA, which has a successful track record of educational projects in the Mystic River Watershed.
Soundness of approach	The approach of reconstructing a stream channel through a previously flooded area is technically challenging and involves some degree of risk. Altering the stream location may result in active migration of the channel if the channel is not designed using best practices in stream planform design and geomorphology. An experienced fluvial geomorphologist would be an important asset in designing a stable stream and floodplain restoration project in this highly constrained urban project site.
Measurable results	Some aspects of the project will readily provide measurable results, including the area of habitat restored and the decrease in invasive species. Other aspects of the project, such as increased habitat benefits from the restored river channel, may be more difficult to measure without an extensive monitoring effort.

Criteria	Evaluation Summary
Community involvement	Community input will be elicited during the design and implementation of the project. Community members may also be engaged to monitor and control invasive species.
Public outreach	The project will integrate public education and outreach into the project plans and design to ensure that public input has been received about the design and that key benefits are understood.
Implementation-oriented	The project will invest in planning and permitting for the project, to enable future implementation. A lack of detailed project plans can often serve as an obstacle to implementation. The current budget allocated by the Trustees will not cover all implementation costs.
Project implementation readiness	Project seen as having a marginal to acceptable level of implementation readiness because the engineering and permitting work has not yet been completed. The funding by the Trustees is intended to increase the implementation readiness of the project.
O&M needs	Project seen as having relatively high O&M needs because the project will need ongoing maintenance.

The project was rated as below marginal for these criteria:

- Leveraging of additional resources
  - The project currently does not leverage additional resources to assist with the implementation. By funding the design and permitting work, the Trustees hope that the Town of Winchester will be able to leverage the additional resources needed for project completion.
- Level of funding and resources needed for project implementation
  - The project has a relatively high need for funding because of the need for engineering, design, and construction, including the costs of some contaminated sediment disposal.

Overall, the Trustees found that the strengths of the benefits to be provided by the proposed restoration work in Davidson Park outweighed the concerns for these limited number of criteria.

4.2.4 Education and Outreach Activities to Be Incorporated into Tier 1 Projects (Tier 1)

Restoration Objective

The project objective is to educate the public regarding watershed restoration and fish passage and to extend an ongoing herring monitoring effort in the Mystic River Watershed to one of the Trustee's Tier I restoration project sites (i.e., the Scalley Dam fishway project). This project will help educate the public regarding the NRDAR Settlement and its funded projects and help secure support for environmental restoration projects. It will also leverage the ongoing successful herring monitoring and public outreach already being conducted by MyRWA.

Project Location

Educational efforts will be integrated with the Tier 1 restoration projects, including: Shaker Glen, Scalley Dam at Horn Pond, and Davidson Park. The surrounding area consists mainly of single-family and multi-family residential properties, some of which are located in minority EJ communities. More than 10 schools are located within three miles of the project sites. Education and project outreach will also be conducted through booths at local events, in-classroom experiences, and online.

Project Description

The Mystic River watershed herring migration occurs in a densely populated region, which provides significant potential for public education regarding fish passage and other aspects of watershed restoration. MyRWA has proposed a suite of educational measures that would support public education and encourage public participation in citizen science efforts.

The proposed project will:

- Design and install informational signage at Shaker Glen, Davidson Park, and Scalley Dam to educate visitors about watershed restoration, herring migration, operation of the fishways, and fish counting methods implemented at the dams.
- Implement an in-person monitoring program to monitor fish passage at Scalley Dam into Horn Pond that will provide fish count data to the Massachusetts DMF.
- Implement a video monitoring program at Scalley Dam. The program would be modeled on the video monitoring program in place at Mystic Lakes Dam, a citizen science effort where volunteers help count fish in video clips from the video monitoring system via their own computers.
- Develop and implement formal education for local school groups and informal education for out-of-school groups.
- Develop materials for public education including press, social media posts, and signage. Topics will include the importance of river herring; the importance of removing barriers to fish passage; the role of wetlands in the ecosystem; and the impact of human behavior on connectivity, clean water, and habitat connectivity.

The project would be implemented and maintained by MyRWA.

Expected Benefits and Timeframe of Benefits

The proposed project will not have direct environmental benefits, but could have multiple indirect benefits for the Tier 1 ecological restoration projects preferred for funding by the Trustees.

Educational benefits would be commensurate with investment in viewing platforms (including camera recording and live viewing), interpretive displays, formal educational programs such as in-school classes, and informal educational programs such as live talks and tours of the fishway facilities. Educational benefits would begin once the proposed facilities are completed and opened to the public but most programs (except for perhaps interpretive signage) would require continuous investment in order to maintain public awareness and engagement.

In turn, public engagement in local restoration efforts and citizen science programs encourages public buy-in to local projects and can supply valuable scientific data at a low cost that might otherwise be difficult to afford. In the long run, this may lead to more successful ecological restoration efforts, as new barrier removal and habitat restoration projects are more likely to be accepted and supported by the community.

Maintenance and Monitoring

The MyRWA would bear the responsibility of maintaining and monitoring the educational program for five years. Monitoring of fish passage at the Scalley Dam would gradually be delegated to citizen scientists, replicating a successful program already in place at the Mystic Lakes Dam.

Probability of Success

The probability of success of the project depends on the following factors (Table 17):

Table 17. Success Factors for Education and Outreach Project

Factor	Impact on Success
Fish passage past dams at the project sites	Successful fish passage is needed at project sites to make an educational program meaningful. Fishways for upstream migration have been installed at the Mystic Lakes Dam and the Center Falls Dam. In 2017 and 2018 approximately 600,000 herring passed through the fishway at Mystic Lakes Dam and in 2018 approximately 109,020 river herring passed through the fishway at Center Falls Dam. Herring have been observed at the toe of Scalley Dam and attempting to ascend the bypass channel at the dam, which allowed an estimated 25,000 river herring to pass upstream into Horn Pond in 2018. A fishway has been proposed at Scalley Dam under the NRDAR program to improve fish passage into Horn Pond.
Public opinion/engagement	The MyRWA has successfully coordinated multiple long and short-term volunteer efforts, including maintaining a group of 50 regular water quality sampling volunteers and a group of 150 volunteer river herring monitors.
Partnerships with local government, schools, and community groups	The MyRWA has partnered successfully in the past with the following organizations: EPA, local municipalities including Winchester and Woburn, and Massachusetts DMF. The City of Woburn and the DMF are listed as project partners in the project proposal. The MyRWA has also led many community education campaigns and multiple long- and short-term volunteer efforts, including maintaining a group of 50 regular water quality sampling volunteers and a group of 150 volunteer river herring monitors.

Environmental and Socioeconomic Consequences

Trustees expect negligible adverse environmental and socioeconomic impacts from the outreach and education activities included in this project. Rather, the environment may benefit from the project increasing community understanding and appreciation of the area's natural resources, which may generate support for future conservation and restoration projects.

Expected Permitting Requirements

No permitting requirements are anticipated for this project.

Project Status: Funding and Implementation

The MyRWA has established a suggested list of deliverables and timeline for completion of these deliverables.

A group of Winchester residents has begun designing interpretive signage for one of the installation sites, and collaborating with the Winchester Conservation Commission, Town's Design Review Committee, and the former Town Manager to develop additional signage.

Estimated Costs

The preliminary cost estimate for the project was $50,000 per year for four years at a wider range of sites (not solely for Trustee Tier I project sites), for a total of $200,000 from 2021–2024. This estimate includes community education, an in-classroom and field experience for youth, an online counting platform for counting fish from video monitoring, public education materials (press, social media, signage), and development of an in-person counting program staffed by volunteers.

Trustee Evaluation and Proposed Allocation

Overall, the Trustees evaluated this project favorably based on their established evaluation criteria (Table 18) because of the importance of outreach and education in order to increase likelihood of restoration success, sustain restoration benefits, and promote ongoing stewardship of restored natural

resources. The project also includes an extension of an ongoing program that monitors fish passage to Scalley Dam, a Tier I restoration project site.

Because of limited funding and the fact that the project can leverage ongoing monitoring efforts in the region, the Trustees propose a scaled-back effort compared to the initial request of MyRWA and propose an allocation of $25,000 per year for five years, for a total of $125,000.

Table 18. Evaluation of Education and Outreach Project: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project is located in the Aberjona River watershed at the locations of the other Tier 1 projects, approximately two to four miles from the Site.
Benefit Criteria	
Stewardship	The project will promote stewardship by engaging the public in educational and monitoring efforts associated with the restoration projects.
Enhancement of public's relationship with natural resources	The project will strongly enhance the public's ability to use, enjoy, or benefit from the Aberjona River watershed by promoting place-based education programs and citizen science.
Avoidance of adverse impacts	The project is viewed as having little potential for adverse impacts to the environment or public health and safety.
Implementation Criteria	
Technical/technological feasibility	Project will employ well-known and accepted educational techniques that have already been employed by MyRWA in other locations.
Administrative and management capability	The project will be managed and administered by the MyRWA, which has a successful track record of similar educational projects at fish passage projects in the Mystic River Watershed.
Site ownership	The educational efforts will take place at publicly-owned sites without access concerns.
Soundness of approach	The approach has a high likelihood of success for meeting educational and outreach goals, given the previous success for similar efforts.
Community involvement	The project integrates public involvement through the science-based monitoring and educational efforts.
Public outreach	The project is focused on public outreach.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria (Table 19):

Table 19. Evaluation of Education and Outreach Project: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	This project provides indirect benefits to injured resources by educating the public to increase the likelihood of restoration success and long-term support for restoration.
Benefit Criteria	
Magnitude of benefits	Provides important indirect benefits across a population of community members and youth. Individuals who engage in the citizen science efforts will likely have a greater degree of educational benefit than individuals who receive information through a one-time program or "tabling" effort at a community event.
Multiple benefits	The educational benefits of the project will extend across multiple resources, including the importance of herring migration, wetland restoration, and water quality.
Sustainability of benefits	Sustainability of benefits will depend on future sources of funding to provide on-going community outreach and education.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, region, and local policies and plans because the project contributes indirectly to broader fish passage, water quality, and educational goals.
Relationship of expected costs to expected benefits	Because the project provides indirect benefits, it is viewed as having a lower ratio of expected benefits to expected costs compared to direct restoration efforts.
Natural recovery period	The educational benefits of the project are tied to the natural recovery period of the Tier 1 restoration projects as the public is likely to become more engaged as it sees the success of the restoration efforts.
Avoidance of additional injury	Project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities for signage.
Implementation Criteria	
Measurable results	Although the number of individuals reached through education efforts can be evaluated, determining the indirect benefits of educational projects on public engagement and stewardship is difficult to assess.
Implementation-oriented	The project is not oriented toward direct restoration implementation activities. However, the increase in public awareness of the benefits of fish passage and watershed restoration projects may help elicit future support for such projects.
Project implementation readiness	The MyRWA may need to engage in additional planning efforts to ensure that the planned activities meet the available budget.
O&M needs	The project requires an ongoing investment in the monitoring and education activities to ensure their success over the five years.
Leveraging of additional resources	The project will leverage the experience of MyRWA in conducting similar monitoring and education activities in other locations.
Level of funding and resources needed	The available funding for this project does not fully match the original planned effort. The original effort may need to be scaled back to match the available budget unless additional funding is obtained from another source.

The project was not rated as below marginal for any evaluation criteria.

4.2.5 Horn Pond Brook and Aberjona River Streambank and Fish Passage Restoration (Tier 2)

Restoration Objective

The main restoration objective is to improve fish passage along Horn Pond Brook, to increase river herring reproductive success within the Aberjona River watershed. Additional project components would reduce erosion and promote a native and diverse riparian habitat (thereby improving habitat for migrating and spawning fish and other wildlife).

Project Location

Horn Pond Brook is approximately one mile long and flows from the outlet of Horn Pond to the inlet of Wedge Pond, crossing the Woburn/Winchester municipal line near a recreational field called Well Field (Figure 13). The Brook parallels the Greenway as it flows south and is adjacent to the Greenway for approximately 0.35 miles immediately upstream of Wedge Pond. Horn Pond Brook is a major migration path for migratory fish, specifically river herring. The surrounding area consists mainly of single-family and multi-family residential properties.

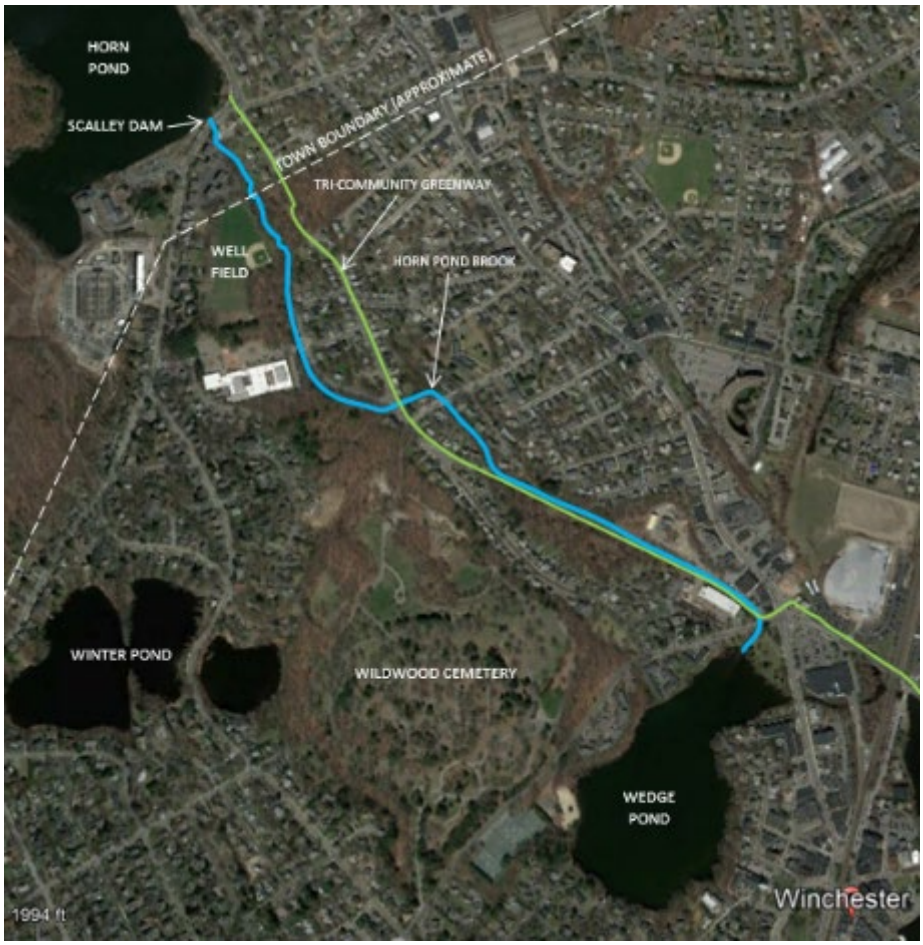


Image Source: Google Earth.

Figure 13. Map of Horn Pond Brook

The project site also encompasses the Aberjona River upstream of Skillings field to the Washington Street Park (Figure 14).

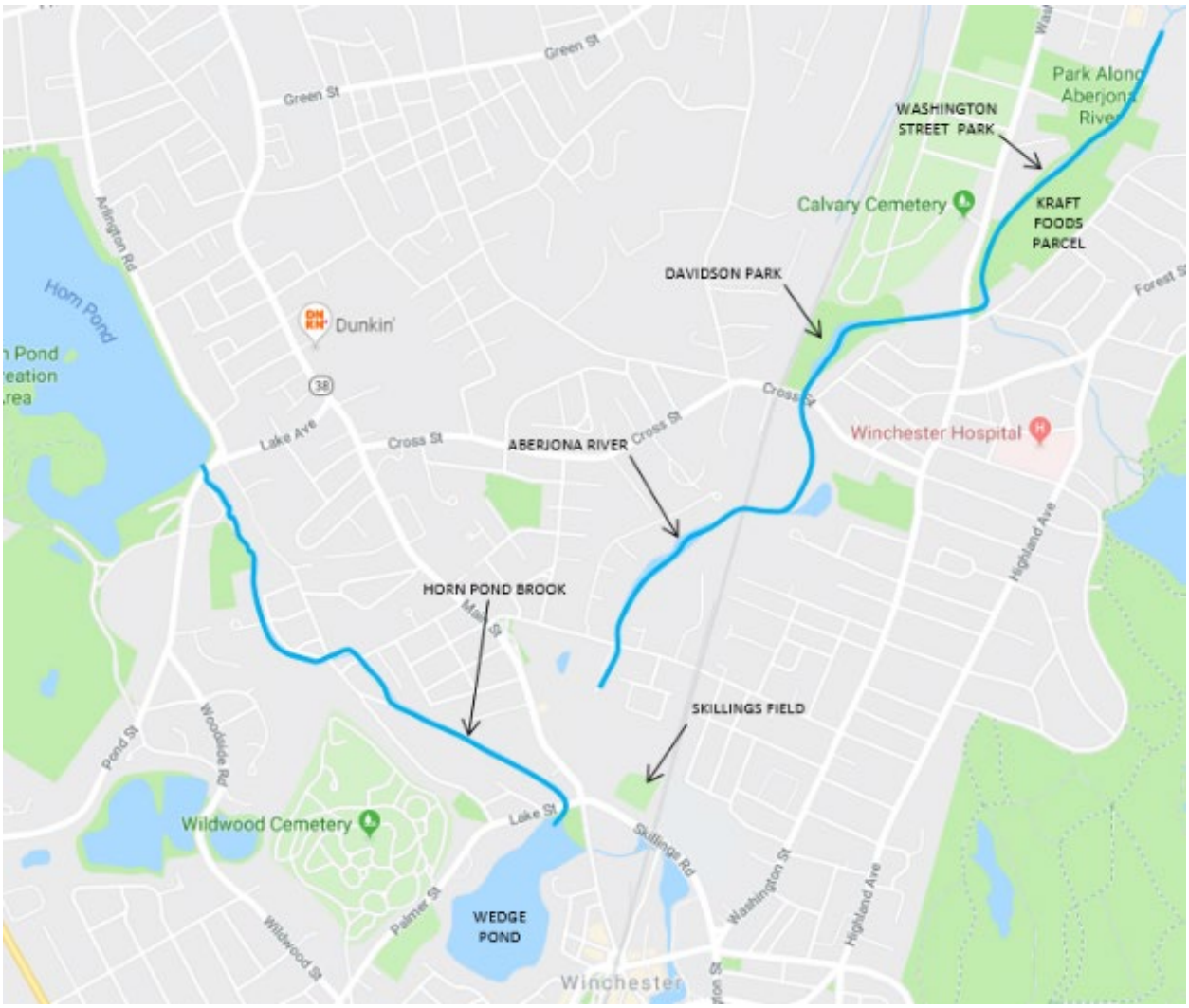


Image Source: Google Maps.

Figure 14. Project Extent along Horn Pond Brook and Aberjona River, Shown as Blue Lines on the Map

Project Description

Although Horn Pond Brook and the Aberjona River currently provide partial fish passage (as evidenced by the presence of river herring at the base of Scalley Dam on Horn Pond and in Davidson Park during the spring migration season), at least two small structures have been identified in Horn Pond Brook and two additional small structures have been identified in the Aberjona River that may impede fish passage, especially during low flow periods (Figure 15). Improvements to these structures to eliminate the fish passage barriers may provide improvements to fish passage for a relatively low cost.

Photos taken by Fuss & O'Neill May 7, 2019.

Figure 15. In-Stream Obstruction on Horn Pond Brook along the Greenway (left image) and the Aberjona River at Washington Park (right image)

MyRWA proposes the following project elements:

- Identify sites along Horn Pond Brook and Aberjona River that are impacted by lack of native vegetation and shade.
- Identify sites along Horn Pond Brook and Aberjona River where banks and undercut are susceptible to erosion.
- Identity invasive species Horn Pond Brook to be removed.
- Identify sites along Horn Pond Brook and Aberjona River that are disconnected during low flow conditions.
- Develop and implement low-cost restoration plans to reduce erosion, promote connectivity, replace invasive species with native species, and promote stewardship.

The primary target species for the restored brook are the anadromous alewife and blueback herring, known collectively as river herring.

The project would be implemented by the MyRWA.

Expected Benefits and Timeframe of Benefits

Although the Mystic River Watershed and its tributaries are important migration pathways for river herring, American eels and other migratory fish, any increase in the number of fish making it past the barriers in this portion of the system may be moderate, as the barriers already identified are relatively small and already allow large numbers of fish to pass during the upstream migration (as evidenced by the river herring observed in the upper reaches of Horn Pond Brook and the Aberjona River). The main benefit to fish passage may instead be in reduced effort for those fish that make it into this part of the watershed, rather than an increase in fish migrating, by mitigating impacts from small barriers already identified and through improved habitat conditions. Decreasing the energetic cost for these fish to make the journey upstream may improve their reproduction rates when they reach their spawning ground.

Freshwater mussel distribution may also improve with fish passage improvements, particularly for some threatened or endangered species that parasitize herring during their life cycle. Improved passage and greater access to a larger habitat network for herring would allow mussel larvae produced by existing freshwater populations to be transported to new locations in the Aberjona River watershed, which could

allow establishment of new colonies. As mussels are filter feeders, water quality may also be another secondary benefit of improved fish passage. However, the timeframe and probability of success for mussel population increases and subsequent water quality improvements is unclear.

Other native species that would benefit from the project, as the result of a more abundant food source, include species that consume herring in freshwater ecosystems (e.g., herons, gulls, cormorants, osprey, eagles, river otters, foxes, raccoons) and in marine ecosystems (e.g., striped bass, tuna, cod, and marine mammals). Recreational fishing in Horn Pond and its tributaries may improve with increased survival of fish migrating upstream through Horn Pond Brook.

The proposed erosion control and native planting would provide water quality benefits within one to two growing seasons following completion and stabilization of contributing areas. Water quality benefits would include reduced stormwater runoff and water temperatures as long as the native vegetation is not disturbed. The increase in native floral diversity would also benefit birds and other wildlife by improving feeding, roosting, and breeding habitat. Aesthetic benefits would also become apparent within one to two growing seasons, as native vegetation fills in.

Maintenance and Monitoring

The MyRWA already performs monitoring at the Scalley Dam bypass channel at Horn Pond Dam and at the Mystic Lakes Dam in the Town of Medford.

Probability of Success

The probability of project success depends on the following factors (Table 20):

Table 20. Success Factors for the Horn Pond Brook Project

Factor	Impact on Success
Severity of existing barriers in this portion of the stream	The number of fish successfully migrating through the project area(s) may not significantly increase, as the barriers identified by the MyRWA through previous stream walks are relatively small. However, reducing the energetic cost of migration past these small barriers may have long term benefits for fish reproductive success in the watershed.
Fish passage past downstream barriers (i.e., Center Falls Dam, Mystic Lakes Dam)	Recent improvements have been made to fishways at Upper Mystic Lake in Medford (2012) and at Center Falls Dam in Winchester (2017). The Center Falls Dam is the first barrier to fish passage downstream of the project area. The MyRWA estimated that 109,000 fish migrated upstream through the fish ladder at the Center Falls Dam in Winchester, MA in 2018.
Invasive species removal methods	Multiple invasive plant species are present on the site. Special precautions must be taken place during plant or soil removal to protect existing native species and prevent the spread of invasive species to new sites.
Invasive species control	Invasive species control may require repeated removals. Proper disposal of certain invasive species is important to prevent their establishment in new locations.
Selection of native plantings	Native species should be selected by an expert in native plantings based on site conditions and project goals. Species should be planted at an appropriate density to maximize wildlife habitat benefits and to outcompete invasive species.
Proper maintenance of plantings after installation	Regular maintenance of plantings and removal of invasive plants would be required to maintain benefits, but may disturb wildlife. Staff maintaining plantings will need knowledge of planting types, species-specific maintenance, and identification and control of invasive species.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the project include:

- Disturbance of the site has the potential to harm Horn Pond Brook, the Aberjona River, and/or Wedge Pond via the introduction of sediment and other pollutants if best practices are not used during project construction.
- Removal of brush may result in some loss of existing wildlife habitat. New plantings should replace this habitat and expand it if possible.

The site is not located within a mapped Priority or Estimated Habitat of Rare Species as designated by the NHESP.

Potential socioeconomic consequences of the project include:

- Temporary disruption of nearby residents due to construction traffic and noise.
- Temporary disruption of the Greenway during construction.
- The site is located partly within the 100-year floodplain and entirely within the 500-year FEMA floodplain, and the brook would be located within the regulatory floodway. While changes in in-stream grading could theoretically affect the BFE, Trustees would not fund the project if it would have this effect.

The potential environmental and socioeconomic consequences of the project would be evaluated through the local, state, and federal permitting process and environmental reviews pursuant to NEPA and MEPA, as applicable. The project would incorporate measures to avoid, minimize, or mitigate adverse environmental impacts.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 21). Additional information on these requirements can be found in Appendix A.

Table 21. Anticipated Regulatory Submittals, Reviews, and Permits for Horn Pond Brook Project

Review/Permit	Agency
ENF	MEPA Office
WPA NOI and Order of Conditions	Winchester and Woburn Conservation Commissions and MassDEP
401 WQC	MassDEP
CWA Section 404 General Permit	USACE
Federal ESA Project Review	USFWS
PNF and Section 106 Historic Review	MHC
NPDES Permit	EPA
LOMR	FEMA

Project Status: Funding and Implementation

Preliminary identification of potential projects has been conducted by MyRWA.

Estimated Costs

Based on the identification of MyRWA has requested $150,000 for the project. This amount would likely be sufficient for the stream assessment, project design, and permitting, but additional funding would likely be needed for project implementation.

Trustee Evaluation and Proposed Allocation

Overall, the Trustees evaluated this project favorably based on their established evaluation criteria (Table 22) because of its proximity to the injured resources. The project is proposed as a Tier 2 project. If funding remains after completion of the Tier 1 projects, this project could receive funding in the future to cover project costs not covered by a MVP grant.

Table 22. Evaluation of Horn Pond Brook Streambank and Fish Passage Restoration: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project improves fish habitat and fish passage in Horn Pond Brook and on the Aberjona River, approximately 3.5 miles from the Site.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria:

Table 23. Evaluation of Mystic Lakes Dam Restoration: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	The Site has degraded wetland, river, and lake habitats in the Aberjona River watershed, including habitats that support diadromous fish. This project provides minor benefits to diadromous fish by removing small fish passage impediments and improving habitat.
Benefit Criteria	
Magnitude of benefits	Addresses minor improvements to herring habitat and fish passage, potentially decreasing the energetic costs of upstream migration.
Multiple benefits	The project is primarily focused on improving upstream herring fish passage. Secondary benefits are provided to other wildlife, including raptors and predatory fish in the Gulf of Maine that consume river herring.
Sustainability of benefits	Sustainability of benefits for the riparian habitat improvements will depend on ongoing maintenance and management to ensure invasive species do not return.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, region, and local policies and plans because the project contributes to the goal of increasing migratory fish populations by decreasing the energetic cost of upstream migration.
Stewardship	The entity or entities responsible for stewardship have not yet been identified.
Enhancement of public's relationship with natural resources	There would be no direct educational aspects at the specific small project sites, but the project would continue overall to the public's relationship with herring migration.
Avoidance of adverse impacts	The project could have minor potential for adverse impacts associated with the control of invasive species and the soil disturbance involved with those control efforts.
Relationship of expected costs to expected benefits	Project has a lower ratio of expected benefits to expected costs, because the benefits are expected to be minor for herring populations and other species.

Criteria	Evaluation Summary
Natural recovery period	Project will provide restoration benefits as soon as the fish passage improvements are made. Benefits from native species may take time as the vegetation becomes established. These benefits will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	Project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities.
Implementation Criteria	
Technical/technological feasibility	Project will require appropriate knowledge and techniques for invasive species removal and planting of native species, as well as for removal of the small fish migration barriers.
Administrative and management capability	The project will be managed and administered by MyRWA which has managed multiple projects in the watershed.
Site ownership	Site ownership may be complex, involving multiple public and private owners. Access concerns will need to be addressed.
Soundness of approach	The general approach of improving habitat and removing small barriers is sound, but may result in minor population improvements.
Measurable results	Herring counts are done in nearby locations. It may be difficult to attribute increases in herring counts to this specific project, given the various factors that affect populations.
Community involvement	The project is not designed for community involvement in the restoration work itself, although the public is expected to benefit from the overall improvements to herring populations.
Public outreach	The project does not currently integrate public education and outreach into the project plans and design.
Implementation-oriented	The project is oriented toward implementation; planning efforts will likely be minimal.
Project implementation readiness	The project is not yet ready for implementation because site ownership determination, project plans, and permitting are not yet completed.
O&M needs	The project will require ongoing O&M to ensure that invasive species do not return.
Leveraging of additional resources	The project leverages the expertise and capacity of MyRWA and the additional resources of an MVP grant.
Level of funding and resources needed for project implementation	The project has secured partial funding through an MVP grant to the City of Woburn. More specifically, all design and pre-construction sampling has been funded; however, funding is needed for permitting and project implementation.

Overall, the Trustees found that this project meets the evaluation criteria and would benefit injured resources. However, because this project would provide minor benefits, the Trustees have evaluated this as a Tier 2 project that would receive funding if available.

4.2.6 Habitat Restoration at Mill and Judkins Ponds (Tier 2)

Restoration Objective

The goal of this project is to improve aquatic and riparian habitat by planting native plants along the shores of Mill Pond and Judkins Pond in Winchester, MA. The plantings would provide cover and food for wildlife, filter runoff discharging to the ponds, and shade the edges of the ponds to reduce water temperatures for ecological benefit. In some places, the native plantings would replace invasive plantings. This project would restore/enhance the important landscape features at these sites that have been degraded due to the disruption of natural processes. The plantings would be installed per the Landscape Master Plan for Mill and Judkins Ponds (Riemenschneider and Bourque, 2015).

Project Location

The project site consists of Mill and Judkins Ponds and their shorelines. Judkins Pond is located on the edge of the downtown area and its surroundings are not heavily landscaped. The pond is home to one or more introduced species of swans. Mill Pond is located approximately 500 feet south and downstream of Judkins Pond near the heart of downtown Winchester and immediately adjacent to the Winchester Town Hall, and the surrounding areas are highly landscaped. Historically, the original landscape plan for Mill Pond and the downtown area was designed by a well-known landscape designer to create an attractive urban center. The ponds are mainly aesthetic features with no known recreational or water supply use.

The Center Falls Dam is located at the outlet of Mill Pond and passed approximately 190,000 fish in 2018. The Tri-Community Bikeway runs along the eastern shore of Judkins Pond and crosses the Aberjona River at Mt. Vernon Street before continuing downstream along the western shore of Mill Pond.

A map showing Mill and Judkins Ponds and other local landmarks is provided in Figure 16.

Project Description

The pond shorelines have become overgrown by invasive species that adversely impact riparian habitat and aesthetics. The pond shorelines are eroding in multiple locations and do not support high-value wildlife habitat, and views of prominent buildings have been obscured by trees and brush. The Town of Winchester proposes to continue implementation of the current Landscape Master Plan, which specifies the number and locations of native plantings to be installed around each pond.

The proposed project consists of the following major elements:

- Plant native species on the shores of Mill and Judkins Ponds and along the Aberjona River between the ponds and downstream of Center Falls Dam in accordance with the Landscape Master Plan. In general, the following actions would be taken to make room for and support native plantings:
  - Select then clear and prune native evergreens and birch, and plant birch.
  - Clear plants which block views and plant these spaces with low growing shrubs.
  - Plant native herbaceous wetland plants along water's edge.
  - Plant large native shrubs and groundcover for erosion control.
  - Select then clear invasive species (leaving native species), and plant these now-open areas with native shrubs.
  - Trim existing shrubs to the height of adjacent fences where applicable.
  - Plant floral edges, perennial and groundcover edges, native shrubs, and/or flowering shrubs.

The project will be implemented and maintained by the Town of Winchester.

Image credit: Google Earth.

Figure 16. Map of Winchester Town Center, Showing Mill and Judkins Ponds and Local Landmarks

Expected Benefits and Timeframe of Benefits

The Town of Winchester considers the Aberjona River corridor to be an important recreational, natural, and cultural element of the Winchester Center Historic District, which is listed in the NRHP. The Landscape Master Plan is intended to support the recreational, natural, and cultural resource values of the historic district. The proposed riparian plantings would implement a key element of the Landscape Master Plan, thereby providing aesthetic, environmental, cultural, and socioeconomic benefits.

The ecological habitat benefits of the riparian plantings would be somewhat limited as the available planting area is restricted by its location in the middle of a developed urban center and its proximity to managed landscapes that include lawn and non-native plantings with frequent human activity. However, the Landscape Master Plan has been developed with ecological and water quality benefits in mind: invasive species removal, natural erosion control, and installation of native plants are emphasized. The

removal of trees and brush blocking views of buildings will allow their replacement with lower shrubs and plantings that provide aesthetic as well as erosion control and habitat benefits. These benefits would be realized upon completion and stabilization of the project and would continue as long as the site is maintained with plantings in good health and free of invasive species.

Brief Overview of Maintenance and Monitoring

The Town of Winchester would be responsible for maintaining the site.

Probability of Success

The success of the project depends on the following factors (Table 24):

Table 24. Success Factors for Mill and Judkins Ponds Project

Factor	Impact on Success
Selection of appropriate plantings	A landscape master plan has been prepared by a licensed landscape architect and lists specific species to be used in each location. The plan should be reviewed to determine if conditions have changed and if plant selections are still appropriate based on current conditions.
Proper maintenance of plantings after installation	Regular maintenance of plantings and removal of invasive plants would be required to maintain benefits, but may disturb wildlife. Staff maintaining plantings will need knowledge of planting types, species-specific maintenance, and identification and control of invasive species.
Invasive species control	Invasive species control may require repeated removals of invasive species to control populations. Proper disposal of certain invasive species is important to prevent their establishment in new locations.
Water quality improvements	While the native plantings will provide some filtration of runoff, the buffering and filtration capacity provided by the plantings will be limited by the space available around existing infrastructure and by the desire within the Town to balance plant density and ecological value with aesthetic concerns. In addition, while taller plantings could help shade a portion of the channel between Mill and Judkins Ponds, plantings on the shoreline will not be able to shade the center of either pond, where water temperatures will remain elevated.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the project include:

- Disruption of soils along the banks of the Aberjona River and the ponds while removing invasive plants and installing native plants may result in the introduction of sediment and other pollutants to the river during construction. Implementation of a sediment and erosion control plan during the project will help to minimize this risk.
- Removal of brush may result in some loss of existing wildlife habitat. New plantings should replace this habitat and expand it if possible.

The site is not located within a mapped Priority or Estimated Habitat of Rare Species as designated by the NHESP.

The potential environmental and socioeconomic consequences of the project would be evaluated through the local permitting process and environmental review pursuant to NEPA. The project would incorporate measures to avoid, minimize, or mitigate adverse environmental impacts.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 25). Additional information on these requirements can be found in Appendix A.

Table 25. Anticipated Regulatory Submittals, Reviews, and Permits for Mill and Judkins Ponds Project

Review/Permit	Agency
WPA NOI and Order of Conditions	Town of Winchester Conservation Commission and MassDEP

Project Status: Funding and Implementation

The Landscape Master Plan was completed in 2015. The Town received an economic development grant from the state in spring 2018 and implemented a portion of the plantings around Mill Pond. No plantings have been installed at Judkins Pond. Construction-level plans have not yet been developed for the remaining portions of the work.

Estimated Costs

The Town of Winchester estimates that the total project cost will be approximately $400,000, including design and construction fees. The Town has already implemented some of the Landscape Master Plan and is considering a phased approach based on funding availability.

Trustee Evaluation and Proposed Allocation

Overall, the Trustees evaluated this project favorably based on their established evaluation criteria (Table 26) because of its proximity to the injured resources. The project is proposed as a Tier 2 project. If funding remains after completion of the Tier 1 projects, this project could receive up to $50,000 funding to cover project costs focused on native plant restoration.

Table 26. Evaluation of Habitat Restoration at Mill and Judkins Ponds: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project improves riparian habitat at Mill and Judkins Ponds, along the Aberjona River corridor, approximately 3.5 miles from the Site.
Implementation Criteria	
Site ownership	The project sites are owned by the Town of Winchester and present no access concerns for conducting the restoration work.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria (Table 27):

Table 27. Evaluation of Habitat Restoration at Mill and Judkins Ponds: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	This project provides minor benefits to riparian habitat along the Aberjona River corridor, by improving native plantings and riparian cover at Mill and Judkins Ponds.
Benefit Criteria	
Magnitude of benefits	Addresses minor improvements to riparian habitat, potentially decreasing pond temperatures by providing increased shading near the shoreline.
Multiple benefits	The project is primarily focused on providing recreational and cultural benefits to this Winchester Center Historic District, as well as ecological and water quality benefits through native plantings.
Sustainability of benefits	Sustainability of benefits for the riparian habitat improvements will depend on a high level of ongoing maintenance and management by the Town of Winchester to ensure invasive species do not return.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans because the project contributes to the Town of Winchester's Landscape Master Plan and provides some benefits to water quality for migratory fish populations.
Stewardship	The Town of Winchester would be responsible for stewardship.
Enhancement of Public's Relationship with Natural Resources	Because the ponds are adjacent to the well-used Tri-Community Bikeway and located in and near the town center, there would be a high potential for enhancing the public's relationship with the restored native habitat along the ponds.
Avoidance of adverse impacts	The project could have minor potential for adverse impacts associated with the control of invasive species and the soil disturbance involved with those control efforts.
Relationship of expected costs to expected benefits	Project has a lower ratio of expected benefits to expected costs, because the ecological and water quality benefits of the project are expected to be minor.
Natural recovery period	Benefits from native species may take time to establish as the vegetation becomes established. These benefits will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	Project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities.
Implementation Criteria	
Technical/technological feasibility	Project will require appropriate knowledge and techniques for invasive species removal and planting of native species.
Administrative and management capability	The project will be managed and administered by the Town of Winchester which has the capacity to maintain its open space and recreational areas.
Soundness of approach	The general approach of removing invasive species and planting native species is sound, but may result in minor habitat and water quality benefits.
Measurable results	Although the area benefited by native species can be quantified, the benefits of this habitat restoration on fish or other wildlife would be difficult to quantify.
Community involvement	The project is not designed for community involvement in the restoration work itself, although the public is expected to benefit from the overall improvements to habitat quality near the ponds.
Public outreach	The project does not currently integrate public education and outreach into the project plans and design.
Implementation-oriented	The project is oriented toward implementation of the existing Landscape Master Plan.
Project implementation readiness	The project is ready for implementation after construction-level designs are completed.
O&M needs	The project will require a high level of ongoing O&M to ensure that invasive species do not return.

The project was rated as below marginal for these criteria:

- Leveraging of additional resources
  - The project currently does not leverage additional resources to assist with the implementation. By potentially funding a limited portion of the project, the Trustees hope that the Town of Winchester will be able to leverage the additional resources needed for project completion.
- Level of funding and resources needed for project implementation
  - The project has a relatively high need for funding because of the extent of invasive species removal.

Overall, the Trustees found that the strengths of the benefits to be provided by the proposed restoration work in Mill and Judkins Ponds outweighed the concerns for these limited number of criteria. However, because this project would provide only minor benefits to injured resources, the Trustees have evaluated this as a Tier 2 project that would receive up to $50,000 in funding if available.

4.2.7 Downstream Fish Passage Restoration at Mystic Lakes Dam (Tier 2)

Restoration Objective

The primary goal of this project is to reduce herring mortality that occurs during downstream migration through the Mystic Lakes Dam by evaluating and implementing improvements to downstream passage at the Mystic Lakes Dam. Additional project components will provide interpretation and educational opportunities for the public regarding migrating fish and the Aberjona and Mystic River Watershed.

Project Location

The project site is the Mystic Lakes Dam,[2] which is located on the border of the City of Medford and the Town of Arlington and that divides the Upper and Lower Mystic Lakes (Figure 17). The dam is owned and operated by the Massachusetts DCR as a flood control dam, while the crest also serves as the public entrance to the Medford Boat Club. Both the Upper and Lower Mystic Lakes are used for recreation, including boating, fishing, and birdwatching. The Aberjona River is a tributary to Upper Mystic Lake, while the lower Mystic Lake drains into the Mystic River.

The Mystic Lakes Dam consists of an earthen embankment with four bays with fixed concrete ogee weirs[3] set into the primary spillway. The fifth bay of the primary spillway contains an adjustable gate, which is typically set lower than the fixed bays to convey flow into a plunge pool at the base of the gate. The plunge pool then discharges into a low flow pilot channel set into the spillway apron. The low-flow channel extends from the base of the adjustable gate along the left retaining wall and discharges to Lower Mystic Lake, thereby facilitating fish passage.

Fish passage facilities for aquatic species migrating upstream include an eel pass and a Denil fish ladder located on the left side of the primary spillway.

Mystic Lakes State Park is located at the eastern end of the dam and together with additional parks and open space forms a green belt extending from the Aberjona River along the eastern shore of the Upper and Lower Mystic Lakes that continues along the Mystic River. The Mystic Lakes State Park is located along the eastern shoreline of the Mystic Lakes. The surrounding area consists mainly of single-family residential properties.

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[2] This dam is also referred to as the Upper Mystic Lake Dam, National Inventory of Dams #MA00769.

[3] An ogee weir is a curved spillway at the base of a dam, used to provide a high efficiency of water discharge downstream of the dam.

Project Description

In collaboration with the Massachusetts DMF, DCR implemented repairs and fish passage improvements at the Mystic Lakes Dam in 2011. New fish passage facilities included the Denil fish ladder, eel pass, and downstream fish passage channel. While the upstream fish passage facilities are considered a success by state agencies (allowing the number of river herring moving into the Upper Lake to steadily increase to over 600,000 fish between 2011 and 2017), high levels of fish mortality during downstream passage have raised concerns among agencies and the public. A July 26, 2018 letter from the Massachusetts Department of Fish and Game (DFG) to DCR notes two design features that were not anticipated during planning and are resulting in herring mortality:

1. The low-flow channel set into the primary spillway, which was intended to allow downstream fish passage, is smaller than optimal and has no containment walls to prevent water and fish from spilling over the sides of the low flow channel onto the spillway apron. Once on the apron, water depth becomes too shallow for fish to swim, and it is difficult for fish to escape the apron and reenter the water.
2. The four fixed bays at the dam crest were designed too low to prevent flow from overtopping the weirs when the pond is at the target normal pool level. As a result, water frequently overtops these weirs when the water level is set at its normal pool level. The problem is exacerbated by the long fetch of the pond (the distance over which wind may blow to create waves), which causes wave action and increased water levels at the dam.

Image credit: Google Maps.

Figure 17. Map of Mystic Lakes Dam in Relation to Other Dams in the Aberjona River Watershed

The result of the overtopping of the fixed weirs and the low-flow channel is that fish become stranded on the spillway apron, where they become vulnerable to predation by seagulls, osprey, and eagles, and to asphyxiation. As a temporary measure, DCR has been placing sandbags on the fixed weirs and on the spillway along the edge of the low-flow channel to prevent water from spilling over onto the spillway apron. This solution is reported by DFG to work well during low to average flows, but a permanent solution is needed.

DCR proposes to improve the hydraulic features of the dam, including the low-flow channel and fixed ogee weirs. The primary target species for the new fishway are the diadromous alewife and blueback herring, known collectively as river herring.

Photo taken by Fuss & O'Neill at Mystic Lakes Dam on May 7, 2019.

Figure 18. Mystic Lake Dam and Shallow Flow onto Spillway (right image) and Sandbags Used a Temporary Solution to Promote Fish Passage (left image)

The proposed project will:

- Design improvements to the existing downstream migration channel plunge pool by modifying the dimensions to increase pool depth.
- Design and construct a barrier wall along the edge of the low-flow channel on the spillway to consolidate flows and fish in the channel.
- Implement improvement to the Denil fishway exit designed by DQ Engineering under contract with DMF, including the addition of fishway weirs at the exit to influence headpond level.
- Design and implement structural modifications or seasonal operations to limit flow spillage over the four fixed crest ogee weirs during the fish migration period.
- Develop interpretive displays, conduct guided tours of the site, and coordinate tours with local schools, all of which will be designed to help educate the public about migratory fish and how to support their populations in the Mystic River watershed.

The project will be implemented by DCR and DMF. An O&M Manual is to be revisited by both parties after the incorporation of dam improvements and experience gained from fishway and dam operations since 2012.

Expected Benefits and Timeframe of Benefits

Reductions in migratory fish mortality are anticipated in the first migration season following dam improvements and would generally continue as long as beneficial operating conditions are maintained at the primary spillway. However, the potential increases in out-migrating fish populations should be projected through the expected lifespan of the primary spillway, based on all proposed fish passage improvements in the system (including habitat improvements in the Aberjona and fish passage improvements at the Scalley Dam and other barriers in the system). Underestimating the future size of the fish run that must be conveyed through Mystic Lakes Dam could result in a recurrence of fish mortality events at the Mystic Lakes Dam spillway within 5–50 years.

Increases in the populations of migratory fishes would be expected within 3–5 years in response to increased survival during downstream migration (independent of other factors), which would allow more fish the opportunity to return to their natal streams each year. Eventually the rate of increase of the population would plateau as the watershed reaches its carrying capacity and maximum habitat quality.

Other native species that would benefit from the project, as the result of a more abundant food source, include species that consume herring in freshwater ecosystems (herons, gulls, cormorants, osprey, eagles, river otters, foxes, raccoons) and in marine ecosystems (striped bass, tuna, and cod). The benefits to marine fisheries may be considered especially important as these species have faced multiple threats and support recreational and commercial fishing.

Educational benefits will increase commensurate with investment in interpretive displays, live talks and tours of the site, and coordination with local schools following construction. Since the fish ladder is hidden from view and is accessed via multiple locked gates, signage at the parking lot will be important to communicate the overall importance of the site to fish passage and local wildlife; however live talks and tours and/or live video may have a greater educational impact by making the hidden portions of the system visible.

Brief Overview of Maintenance and Monitoring

River herring monitoring has been integrated in an existing O&M Manual from the previous dam reconstruction project. This existing manual would be revisited by DCR and DMF.

Probability of Success

The probability of success is high. However, the ultimate success of the project depends on the following factors (Table 28):

Table 28. Success Factors for Mystic Lakes Dam Project

Factor	Impact on Success
Proper fishway design	The success of fishways such as fish ladders relies on good engineering design that is appropriate for the site. The project application indicates that DCR is in contact with fish passage experts from the Massachusetts DMF who have provided input on the design of the fishway. DCR plans to coordinate with DMF to incorporate best practices into the design. There is already a proposed plan prepared by DQ Engineering to improve the Denil fishway, incorporating suggestions by DMF. The use of sandbags as a temporary measure to direct and contain flow through the downstream fishway has also allowed staff from DCR and DMF to understand the dimensions of permanent structures that will be needed to facilitate downstream passage.
Presence of fish species requiring downstream passage facilities	The Massachusetts DFG estimates that over 600,000 herring entered the Upper Mystic Lake via the existing dam hydraulic structures in 2017, indicating that there is a sizeable migratory population that would use the redesigned fishway for downstream migration.
Monitoring fishway for passage success	DCR is in contact with the MyRWA, who are in support of the project and would assist with monitoring of river herring. Monitoring can allow the owner of the fish ladder to observe any issues arising with the fishway once built and to address fish passage issues as they arise using an adaptive management approach.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the site include:

- Increased number of visitors to the site, potentially resulting in increased crowds, demand for parking, and heavier traffic. The existing parking lot is already moderately utilized by local residents.
- Disturbance of the site has the potential to harm Upper and Lower Mystic Lakes via the introduction of sediment and other pollutants if best practices are not used during project construction.

The site is not located within a mapped Priority or Estimated Habitat of Rare Species as designated by the NHESP, or an Area of Critical Environmental Concern (ACEC).

Potential social and economic consequences of the site include:

- Increased visitation to the site, resulting in overcrowding and safety concerns in a parking lot that may need to be redeveloped for increased occupancy.

The impacts listed above may be avoided or mediated by careful project design.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits are anticipated to be required for this project (Table 29). Additional information on these requirements can be found in Appendix A.

Table 29. Anticipated Regulatory Submittals, Reviews, and Permits for Mystic Lakes Dam Project

Review/Permit	Agency
ENF	MEPA Office
Chapter 253 Dam Safety Permit	DCR ODS
WPA NOI and Order of Conditions	City of Medford Conservation Commission, Town of Arlington Conservation Commission, DRC and MassDEP
401 WQC	MassDEP
CWA Section 404 General Permit	USACE
Federal ESA Project Review	USFWS
Fishway Permit	Massachusetts DMF

Project Status: Funding and Implementation

Conceptual designs have been prepared by the DMF engineering consultant and DCR is actively seeking additional grants to help fund portions of the project.

Estimated Costs

Preliminary cost estimates for the project have not been provided.

Trustee Evaluation and Proposed Allocation

Overall, the Trustees evaluated this project favorably based on their established evaluation criteria (Table 30) because of its proximity and nexus to the injured resources. The project is proposed as a Tier 2 project. However, the Trustees are not currently planning to allocate funding to this project, based on the understanding that DMF and DCR are already planning to implement the project. If the project has a funding shortfall and funding is available after completion of the Tier 1 projects, the project could receive funding in the future.

Table 30. Evaluation of Mystic Lakes Dam Restoration: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	The Site has degraded wetland, river, and lake habitats in the Aberjona River watershed, including habitats that support diadromous fish. This project benefits diadromous fish by decreasing mortality of herring during downstream passage.
Benefit Criteria	
Sustainability of benefits	The project will result in long-term benefits to the herring population through providing decreased mortality during downstream passage. However, the project will require ongoing maintenance and management to ensure the modifications are performing as expected.
Avoidance of adverse impacts	The project is viewed as having little potential for adverse impacts to the environment or public health and safety.
Natural recovery period	Project will provide restoration benefits as soon as the improvements are made and herring and other fish can better survive downstream passage through the dam. This will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	Project is not expected to result in additional injury to injured resources. Minimal short-term impacts to injured and other resources may occur during construction activities.
Implementation Criteria	
Administrative and management capability	The project will be managed and administered by DCR which operates the Mystic Lakes Dam.
Site ownership	DCR already controls the site, so the restoration will occur at a publicly-owned site without access concerns for undertaking the restoration.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria:

Table 31. Evaluation of Mystic Lakes Dam Restoration: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project improves downstream fish passage on the Aberjona River, approximately 5.5 miles from the Site.
Benefit Criteria	
Magnitude of benefits	Addresses a demonstrated need to decrease herring mortality at the Mystic Lakes Dam.
Multiple benefits	The project is primarily focused on decreasing herring mortality. Secondary benefits are provided to other wildlife, including raptors and predatory fish in the Gulf of Maine that consume river herring.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans because the project contributes to the goal of increasing migratory fish populations by decreasing downstream mortality.
Stewardship	DCR needs to continue to undertake monitoring and adaptive management after project implementation to ensure that modifications are performing as expected.
Enhancement of public's relationship with natural resources	Because the public cannot directly access the dam, enhancement of the public's relationship with natural resources would need to come from signage in the parking lot or other forms of outreach.
Relationship of expected costs to expected benefits	Project has a good ratio of expected benefits to expected costs, because the modifications are not expected to be overly costly and would provide long-term benefits for herring populations.

Criteria	Evaluation Summary
Implementation Criteria	
Technical/technological feasibility	Project will require proper design and construction to correct the downstream passage problems from the current dam and fishway designs.
Soundness of approach	The approach of improving downstream passage will require experienced engineers and fishery biologists to ensure a sound approach to the project.
Measurable results	Herring counts are typically done during upstream passage. Improvements to downstream passage may rely on anecdotal observations of reduced mortality.
Community involvement	The project is not designed for community involvement in the restoration work itself, although the public is expected to benefit from the overall improvements to herring populations.
Public outreach	The project does not currently integrate public education and outreach into the project plans and design.
Implementation-oriented; project implementation readiness	The project will require engineering and design work before implementation.
O&M needs	The project will require O&M to ensure that downstream fish passage is occurring as expected.
Leveraging of additional resources	The project is expected to be implemented by DCR and has not involved leveraging of additional resources.
Level of funding and resources needed for project implementation	The project is expected to be implemented by DCR and therefore the Trustees have not dedicated funding toward this project at this time.

Overall, the Trustees found that this project meets the evaluation criteria and would benefit injured resources. However, because the project is expected to be implemented by DCR, the Trustees have not dedicated funding to this effort.

4.3. Alternative 2 – Non-Preferred Action Alternative

4.3.1 Riverine, Floodplain, and Riparian Habitat Restoration at Davidson Park ("HWG Option 3")

Restoration Objective

The goal of this project is to restore the ecological and aesthetic and recreational value of the Aberjona River corridor within Davidson Park by restoring a portion of the park to a more natural riverine environment while also maintaining an area of shallow open water, similar to the existing "pond". In addition, similar to the Riverine, Floodplain, and Riparian Habitat Restoration at Davidson Park ("HWG Option 2") (Tier 1), this project would remove invasive plants, and daylight a tributary to the Aberjona River to improve fish passage and aquatic habitat.

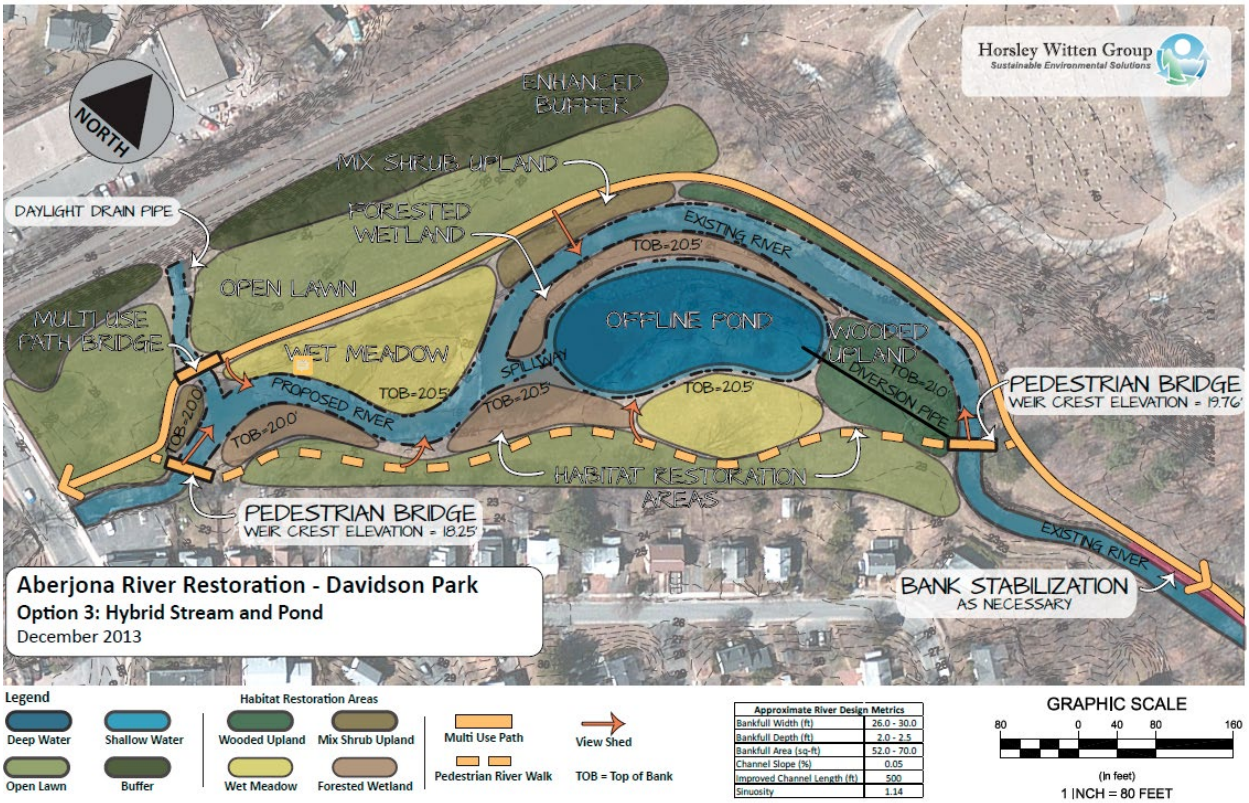
Project Location

The location for this project is the same as for Riverine, Floodplain, and Riparian Habitat Restoration at Davidson Park ("HWG Option 2") (Tier 1), as described in Section 4.2.3.

Project Description

This project includes the hybrid stream and pond restoration alternative originally developed as "Option 3" by HWG (Figure 19), as well as additional ecological enhancement options. This project includes construction of a restored river channel through a portion of the existing pond area. This design would eliminate the majority of the existing pond but includes construction of a new pond that is offline from the main river channel. Both the existing and the newly created pond would be too shallow and small to support recreation (e.g., boating) and would provide primarily scenic value to park visitors and neighbors. Other elements of the project are the same as described in Section 4.2.3, including a proposal to daylight the 100-foot buried portion of the tributary, stabilize the south bank of the Aberjona River, remove existing invasive species and replace with native species, and construct a new pedestrian river walk with wildlife viewing areas. Throughout the project, public input would be solicited about the

design, and the public would be educated about key environmental benefits of the project during outreach. As noted in Section 4.2.3, budget constraints will likely not allow all of these elements to be included in the current project.



Source: HWG, 2014.

Figure 19. Conceptual drawing of Aberjona River Restoration at Davidson Park – Option 3

Expected Benefits and Timeframe of Benefits

In general, the types of expected benefits and the timeframe of benefits would be similar to that noted in Section 4.2.3, particularly for the construction of the restored river channel, daylighting of the culverted tributary, and removal of invasive species. However, the offline pond would provide fewer benefits to natural resources because construction of the pond would limit the area of buffer habitat around the restored stream channel and provide fewer options to restore a more natural, sinuous river channel.

Brief Overview of Maintenance and Monitoring

Details on planned maintenance are not currently available.

Probability of Success

The success of the project is similar to that described in Section 4.2.3, with the exception of sediment contamination, river restoration design, and likelihood of securing permits as noted below (Table 32). The project will also require more future maintenance than the "Option 2" project described in Section 4.2.3.

Table 32. Success Factors for Davidson Park Project ("Option 3")

Factor	Impact on Success
Potential sediment contamination	As noted in Section 4.2.3, contaminated sediments will need to be removed as part of the restoration. The volume of dredging and off-site disposal of sediments would be greater for this option ("Option 3") than for the Trustee-preferred option ("Option 2").
River restoration design	The construction of a pond in the park will limit the sinuosity that can be incorporated into the river and will limit the available space within which the river can meander inside the bounds of the park. The design will also limited the amount of space available for riparian vegetation buffers.

Environmental and Socioeconomic Consequences

In addition to the environmental and socioeconomic consequences noted for the Option 2 project in Section 4.2.3, additional consequences for this project option include:

- Creation of the pond may constrain the design options for a stable stream channel through the park.
- Pond development would increase the attractiveness of the site for geese, causing environmental and recreational concerns associated with excessive goose droppings.

Expected Permitting Requirements

The types of permits required for Option 3 of this project are the same as those noted for the Option 2 project in Section 4.2.3. However, the likelihood of obtaining the necessary state and federal permits would be lower because the pond would be constructed within an area of existing wetlands, resulting in a loss of existing wetland habitat.

Project Status: Funding and Implementation

The Town is currently considering design options for the Aberjona River Restoration project, including the configuration of the river through Davidson Park. The removal of invasive species is part of the larger overall restoration project for Davidson Park. The bank stabilization project has not yet been initiated; it was not included in the conceptual design phase for restoration at Davidson Park.

Estimated Costs

The Town is requesting $2 million ($250,000 for design and permitting; $1,750,000 for construction) based on cost estimates prepared by HWG, an appropriate amount given the scale of work proposed. These costs include tributary daylighting, bank stabilization, and invasive species management. At the 10% design level, there was no difference in cost estimate between Option 3 and Option 2 for this project.

Trustee Evaluation and Proposed Allocation

Overall, the project was not evaluated favorably compared to the Option 2 version of this project (Table 33, Table 34). The Trustees are not proposing to allocate funding to this option.

Table 33. Evaluation of Davidson Park Restoration (HWG Option 3): Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Project restores the Aberjona River mainstem and floodplain, approximately two miles from the Site.
Relationship to injured resources	The Site has degraded wetland, river, and lake habitats in the Aberjona River watershed, including habitat in Davidson Park impacted by contaminated sediments. This project benefits wetland, river, and riparian habitat, as well as providing secondary benefits to habitat quality through stormwater management.
Benefit Criteria	
Enhancement of public's relationship with natural resources	Project will enhance the public's ability to use, enjoy, or benefit from the Aberjona River by developing a natural environment within the park, protecting the footpath from erosion, developing viewsheds for wildlife viewing, replacing the greenway bridge where the tributary is daylighted, and promoting place-based education programs. The project site is a highly visible and active public recreational area that will offer a unique opportunity to understand river restoration. However, while the pond provides aesthetic benefits to some users of the park, it will limit the ecological benefits of the river restoration.
Implementation Criteria	
Site ownership	The Town of Winchester already owns and controls the site, so the restoration will occur at a publicly-owned site without access concerns.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria:

Table 34. Evaluation of Davidson Park Restoration (HWG Option 3): Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Benefit Criteria	
Magnitude of benefits	This project provides benefits to fish passage by daylighting of the tributary to the Aberjona River and by developing a restored Aberjona River channel that will benefit fish passage. However, the inclusion of a pond feature, while providing some aesthetic benefits to users of the park, limits the ecological benefits of this project by constraining the channel design.
Multiple benefits	The project provides multiple benefits to riparian, wetland, and in-stream habitat and the multiple species that use these interconnected habitats.
Consistency with relevant federal, state, regional, or local policies and plans	Project seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans because improving habitat in the Aberjona River contributes to goals of increasing migratory fish populations.
Stewardship	The Town of Winchester has expressed its commitment to undertaking the stewardship activities after project implementation that will enable project benefits to continue for the long-term. These stewardship activities will be increased because of the ongoing maintenance that the pond feature will require.
Avoidance of adverse impacts	The project has potential for adverse impacts because of the need to remove additional contaminated sediments to restore the Aberjona River channel through the current ponded area and create the new pond. The project also has the potential to adversely impact existing wetlands.
Relationship of expected costs to expected benefits	The project has a lower ratio of expected benefits to expected costs, because the overall ecological benefits of the project will be diminished by inclusion of the artificial pond habitat.

Criteria	Evaluation Summary
Natural recovery period	The natural recovery period of this project will be slower because of the greater difficulties of restoring the river channel. Benefits from daylighting the tributary will occur immediately. These benefits will occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	Project has additional potential to result in additional injury to injured resources because of the greater possibility of remobilizing contaminants during the sediment removal and construction process for the river channel and the pond. This possibility will be minimized with BMPs and proper disposal of contaminated sediments.
Implementation Criteria	
Technical/technological feasibility	The technical feasibility of the project is lower because of the challenge of creating the river channel in an area constrained by the artificial pond habitat. The feasibility of creating a self-sustainable pond habitat is low.
Administrative and management capability	The project will be managed and administered by the Town of Winchester, which may have limited experience with complex restoration projects including the removal of contaminated sediments. The educational aspects of the project will be managed and administered by the MyRWA, which has a successful track record of educational projects in the Mystic River Watershed.
Soundness of approach	The approach of reconstructing a stream channel through a previously flooded area and including an artificial pond into the design is technically challenging and involves some degree of risk. Constraining the stream location may decrease the likelihood of a successful stable stream restoration project.
Measurable results	Some aspects of the project will readily provide measurable results, including the area of habitat restored and the decrease in invasive species. Other aspects of the project, such as habitat benefits from the restored river channel and the artificial pond, may be more difficult to measure without an extensive monitoring effort.
Community involvement	The project is not designed for a high level of community involvement in the restoration work itself, although the public is expected to gain a high degree of benefit from the recreational improvements that will be part of the project.
Public outreach	The project integrates some public education and outreach into the project plans and design.
Implementation-oriented	The project will invest in planning and permitting efforts to enable future implementation. A lack of detailed project plans can often serve as an obstacle to implementation.
Project implementation readiness	Project has a slightly greater readiness for implementation because the immediate public approval may be higher for Option 3 which includes the familiar pond option.

The project was rated as below marginal for these criteria:

- Sustainability of benefits
  - Because the pond will require on-going maintenance and the stream channel may be less stable, the sustainability of the benefits under Option 3 is seen as below marginal.
- O&M needs
  - As noted above, the ongoing O&M needs for Option 3 are expected to be high, resulting in a poor evaluation for this criterion.
- Leveraging of additional resources
  - The project currently does not leverage additional resources to assist with design, permitting, and implementation. Level of funding and resources needed for project implementation
  - The project has a relatively high need for funding because of the need for engineering, design, and construction, including the costs of some contaminated sediment disposal.

Overall, the Trustees found that Option 3 for this project had substantially greater weaknesses and fewer strengths compared to Option 2 for this project, leading to a recommendation of non-preferred for this Option.

4.3.2 Improved Water Management in the Horn Pond and Horn Pond Brook Tributary Watershed to the Aberjona River

Restoration Objective

The goal of this project is to conduct a regional analysis to find ways to reduce water management impacts to local water bodies important for fish habitat. Specifically, the project has the objective of improved management of water withdrawals to help reduce the impacts on stream flow that impair river herring habitat during critical spawning and migration periods in the Horn Pond and Horn Pond Brook tributary watershed.

Project Location

The project involves a partnership between the MyRWA, the City of Woburn, and the Town of Winchester to perform an evaluation of water management alternatives to improve stream flow, improve water quality and restore habitat within the watersheds contributing to Horn Pond, Horn Pond Brook, Wedge Pond, the Aberjona River and ultimately the Mystic River.

Project Description

The MyRWA proposes to collaborate with the City of Woburn and the Town of Winchester to address stream flow issues by minimizing the use of the local groundwater aquifer. The project would identify optimal pumping limits for public and private wells, including the use of drinking water from the Massachusetts Water Resources Authority (MWRA), to help sustain appropriate stream flow.

The proposed project consists of the following major elements:

- Evaluate water management alternatives to improve stream flow, water quality, and aquatic habitat within the watershed including Horn Pond, Wedge Pond, and Winter Pond. Alternatives to be assessed include:
  - Minimizing withdrawals from the local aquifer by optimizing pumping from public and private water supply wells and optimizing use of water supplied by the MWRA.
  - Methods to reduce the flow of stormwater into the wastewater treatment system (which reduces groundwater resources).
  - Water conservation strategies.

The project scope is based on the framework of the Sustainable Water Management Initiative (SWMI), which was developed by EEA, MassDEP, DFG, and DCR. The foundation of the framework is U.S. Geological Survey (USGS) peer-reviewed literature, which noted a significant negative association between aquatic health and both groundwater withdrawals and impervious cover.

The project would be implemented by MyRWA in collaboration with the City of Woburn and the Town of Winchester.

Expected Benefits and Timeframe of Benefits

The water management plan may take up to a year to develop once funded. Although this project only covers development of the water management plan, eventual project benefits from implementation of water management actions would include increases in groundwater recharge, improvements in local wetland hydrology, and increased base flows in regional waterways (including Horn Pond, though the effect may not be easily observed).

Brief Overview of Maintenance and Monitoring

Development of the water management plan itself will not require maintenance or monitoring.

Probability of Success

The success of the project depends on the following factors (Table 35):

Table 35. Success Factors for Improved Water Management Project

Factor	Impact on Success
Data availability	The project will depend on collecting and preparing relevant data, including water supply assessment data such as monthly withdrawal volumes, current and proposed water conservation activities, planned strategies for reducing inflow and infiltration, groundwater levels, and relevant pumping tests.
Appropriate use of modeling and analytical tools	Analysis requires estimating current impacts from pumping on groundwater recharge and streamflow, estimating benefits of currently planned water saving strategies, using modeling tools to quantify benefits from conservation opportunities, evaluating scenarios for limiting streamflow and pumping impacts on Horn Pond and Horn Pond Brook, and evaluating scenarios for improving recharge to groundwater and improving water quality to Horn Pond, Wedge Pond, and the Aberjona River.

Environmental and Socioeconomic Consequences

Because the water management study is a planning-level effort, there are no potential environmental or socioeconomic consequences of the proposed project. As such, this alternative is not included in the Section 6.2 “Impacts of the Proposed Alternatives” discussion.

Expected Permitting Requirements

Assuming that the water management study is only a desktop effort with no field data collection, no permitting requirements would apply to the project.

Project Status: Funding and Implementation

MyRWA has outlined a scope of work for the water management study in collaboration with both municipalities and has identified a consultant (HWG) to conduct the analysis work.

Estimated Costs

The total amount requested is approximately $90,000 for the Water Management Analysis. The City of Woburn and the Town of Winchester have committed staff time towards the projects.

Trustee Evaluation and Proposed Allocation

Overall, the project was not evaluated favorably compared to other proposed restoration projects (Table 36, Table 37.) The Trustees are not proposing to allocate funding to this project.

Table 36. Evaluation of Improved Water Management in the Horn Pond and Horn Pond Brook Tributary Watershed to the Aberjona River: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Water management plan focuses on the Horn Pond and Horn Pond Brook tributary watershed to the Aberjona River, within an approximately 3.5 mile radius from the Site.
Implementation Criteria	
Site ownership	The City of Woburn and Town of Winchester have access to the data needed to complete the water management plan. Site ownership will not impede this planning-level project.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria:

Table 37. Evaluation of Improved Water Management in the Horn Pond and Horn Pond Brook tributary watershed to the Aberjona River: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	The project has an indirect relationship to injured resources by developing a study that could lead to improved water management and better habitat for migratory fish.
Benefit Criteria	
Magnitude of benefits	This project provides a small magnitude of benefits because the water management plan may not lead to actions that improve streamflow and water quality and restore habitat.
Multiple benefits	The project has the potential to provide multiple benefits to riparian, aquatic, and in-stream habitat if the planning study leads to actions to improve water management.
Sustainability of benefits	Once the water management plan is developed, the information will be available to influence future water management actions in a more sustainable direction.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans for water conservation.
Stewardship	The project will require stewardship from the Town of Winchester and City of Woburn to implement actions recommended in the water management plan.
Enhancement of public's relationship with natural resources	Project will provide indirect enhancements to the public's ability to use, enjoy, or benefit from natural resources in the Horn Pond and Horn Pond Brook tributary watershed if the water management plan leads to habitat improvements.
Avoidance of adverse impacts	The project has minimal potential for adverse impacts during the planning phase.
Relationship of expected costs to expected benefits	The project has a low ratio of expected benefits to expected costs, because the development of the water management plan itself will not lead to ecological improvements.
Natural recovery period	The natural recovery period of this project will be slower because the water management plan would need to lead to actions before habitat recovery occurs.
Avoidance of additional injury	The project has minimal potential to result in additional injury to injured resources.
Implementation Criteria	
Technical/technological feasibility	The technical feasibility of developing the water management plan itself is high; the feasibility of implementing actions from the plan may be lower if there is public opposition to the conservation measures.
Administrative and management Capability	The project will be managed and administered by the MyRWA, in coordination with the City of Woburn and Town of Winchester. These entities all have the capacity to support a planning effort.
Soundness of approach	The approach of developing a water management plan to prioritize future potential conservation actions may result in uncertain to negligible benefits to injured resources.

Criteria	Evaluation Summary
Measurable results	The plan will quantify potential water conservation benefits of different actions. Measurable benefits to natural resources will only occur after the implementation phase.
Community involvement	The project is not designed for community involvement during the development of the water management plan. Implementation of some conservation actions may require community involvement.
Public outreach	The project does not directly integrate public education and outreach into the project plan.
Implementation-oriented	The project will invest in planning to enable future implementation of conservation projects but is not directly implementation-oriented.
Project implementation readiness	The project is ready for development of the water management plan but not yet for implementation of conservation projects.
O&M needs	The plan would not have O&M needs. Actions resulting from the plan could have needs for ongoing O&M.
Leveraging of additional resources	The project would be able to leverage knowledge and information from the City of Woburn and Town of Winchester.
Level of funding and resources needed for project implementation	The funding needed for plan development is reasonable; additional funding would be needed for project implementation.

The Trustees found that this project had greater weaknesses and fewer strengths compared to other potential project options. Specifically, the Trustees were concerned that development of a water management plan provides uncertain to negligible benefits with only an indirect nexus to injured resources.

4.3.3 Freshwater Mussel and Clam Study

Restoration Objective

The goal of this project is to explore and implement the seeding of shellfish, specifically freshwater mollusks (mussels), along the Aberjona River to increase the native population.

Project Location

The project site is located along the Aberjona River from the Mystic Lakes to the Winchester/Woburn line (Figure 20).

The Mystic River watershed hosts one of the largest river herring runs in Massachusetts. Freshwater mussel larvae are dependent on fish migration for sustenance and transport to new habitats in the watersheds they inhabit. Freshwater mussel populations have significantly declined due to poor water quality and construction of barriers to fish passage.

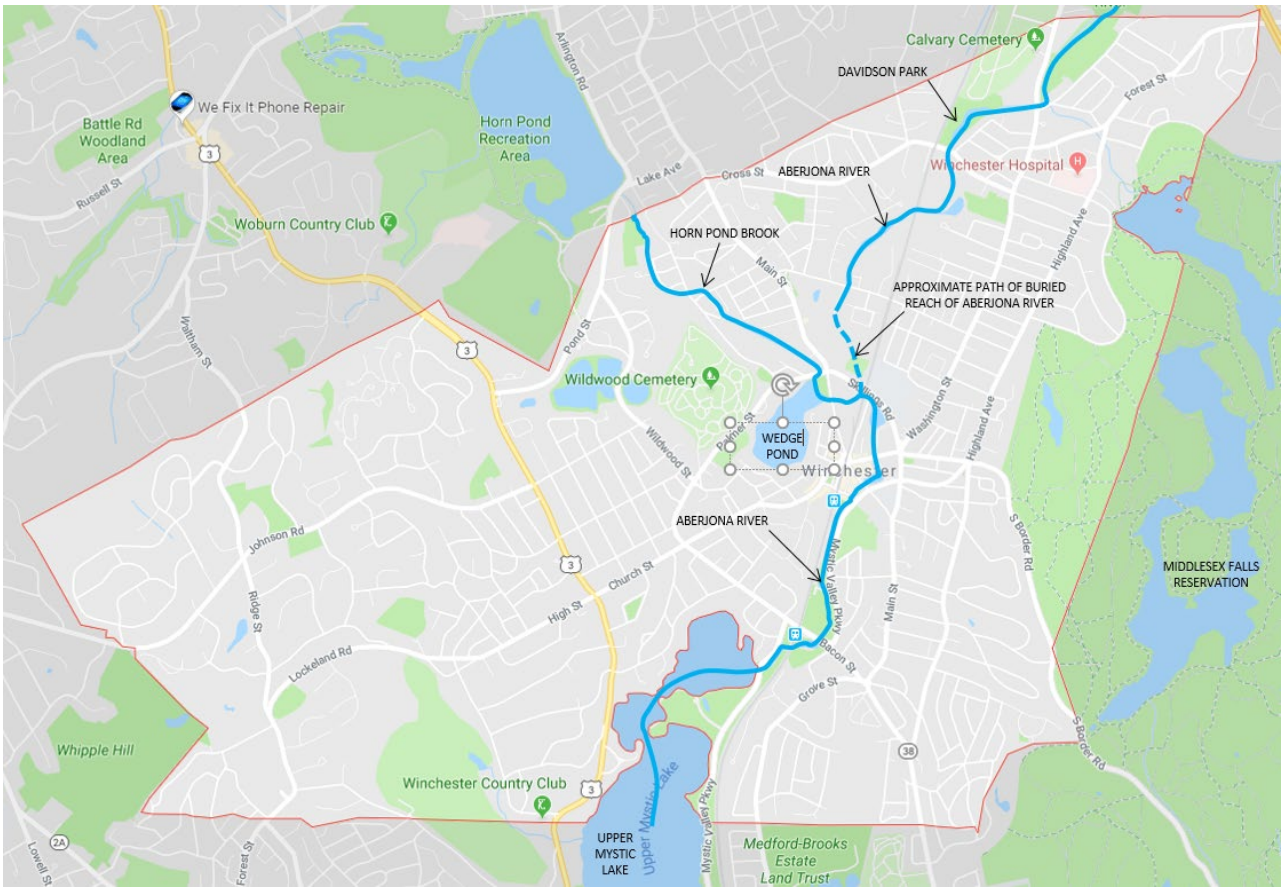


Image credit: Google Maps.

Figure 20. The Aberjona River and Horn Pond Brook (a major tributary) within the Town of Winchester. Streams are shown as blue lines overlaid on the map.

The Winchester Conservation Commission proposes to evaluate if conditions in the Aberjona River system would provide suitable habitat to restore freshwater mollusks. This study would involve documenting the following information:

- Whether freshwater mollusks have been surveyed appropriately.
- Whether water quality will support freshwater mollusk restoration.
- Whether there exists a viable host fish population to support freshwater mollusk restoration.
- Why mollusks may be absent.
- The best method to initiate a mollusk restoration effort.

The study will be implemented by a consultant selected by the Winchester Conservation Commission.

Expected Benefits and Timeframe of Benefits

As of September 2019, six out of 12 freshwater mussel species are protected under the Massachusetts Endangered Species Act (MESA), and one of these (the dwarf wedgemussel (*Alasmidonta heterodon)*) is considered federally endangered. Implementation of a mussel seeding project could potentially lead to the restoration of one of these species. Alewife floater (*Anodonta implicata)* has also been identified as existing in the Mystic Lakes; although not rare, these populations may also benefit from freshwater mussel restoration.

An increased native shellfish population is expected to improve water quality in the watershed by removing nutrients, excessive algae, and other pollutants from the water column. In addition, mussels serve as an important food source for native wildlife, including herons, otter, and muskrats.

However, the timeframe and probability of success for mussel population increases and subsequent benefits to water quality and the food chain is unclear. Dr. Peter Hazelton, aquatic ecologist with the Massachusetts Division of Fisheries and Wildlife (DFW) NHESP, has stated in communications with the project proponents that he does not believe a mussel restoration project would be feasible or warranted in the Aberjona River system and that a comprehensive survey of the river by qualified malacologists should be conducted before pursuing the project further (this is consistent with the proposed project). Further, he has stated that mussel restoration would likely not be cost-effective in the Aberjona River until water quality issues have been addressed.

Brief Overview of Maintenance and Monitoring

As the proposed project is a study, maintenance and monitoring are not required for this phase of the project. Maintenance and monitoring would be required if the project goes to implementation.

Probability of Success

The success of the restoration depends on the following factors (Table 38):

Table 38. Success Factors for the Freshwater Mussel and Clam Study

Factor	Impact on Success
Habitat conditions (especially water quality)	Habitat conditions in the Aberjona River watershed will determine the viability of restoring freshwater mussel populations.
Fish migration success	As freshwater mussels parasitize migratory fish (often river herring) during their larval stage, healthy runs of migrating fish are required to support mussel populations in the watershed. The Mystic River herring run is one of the largest herring runs in Massachusetts, and additional projects have been completed or have been proposed to further improve fish passage and increase migratory and reproductive success in river herring.
Support from project partners	Collaboration with project partners such as the Massachusetts DFW NHESP, UMass Amherst, the Richard Cronin Aquatic Research Center, the Boston Malacological Society, MyRWA, and other project partners will be necessary to complete a useful survey and to plan and implement future project phases. The NHESP is not in support of the implementation phase for this project without a thorough investigation of the mussel community in the river and water quality conditions that would affect mussel persistence. Winter Pond is mapped as a NHESP Priority Habitat of Rare Species; implementation of this project would require consideration of this habitat.

Environmental and Socioeconomic Consequences

As a study only, there would be minimal environmental or socioeconomic consequences of the project. If the project moved forward to an implementation stage involving introduced shellfish, potential environmental consequences of the project include:

- The introduction of purchased ‘stocked’ shellfish may disrupt local aquatic habitats.
- Introduced shellfish may introduce parasites, diseases, and/or invasive species to the watershed.
- The genetics of introduced mussels may interfere with genetics of mussels currently in the river.

Due to these concerns, the NHESP will not support this project without a thorough investigation of the mussel community in the river and water quality conditions that would affect mussel persistence.

Expected Permitting Requirements
No permitting requirements would pertain to the study. Regulatory submittals, reviews, and permits would be anticipated to be required for future implementation phases of this project.

Project Status: Funding and Implementation
The Town is in contact with the Boston Malacological Society and the Massachusetts DFW NHESP.

Estimated Costs
The Massachusetts DFW NHESP estimates that an assessment of the mussels currently in the river could be conducted for $20,000–$40,000.

The following cost estimates have been provided to the Winchester Conservation Commission by the NHESP for future implementation project phases (not included within this proposal):

- Annual broodstock collection over four years, genetic management, and project planning: $100,000.
- Monitoring restored populations for five years: $100,000–$250,000.

Overall, the total project (including implementation) is expected to cost $350,000–$500,000 over five years.

Trustee Evaluation and Proposed Allocation
Overall, the project was not evaluated favorably compared to other proposed restoration projects (Table 39, Table 40). The Trustees are not proposing to allocate funding to this project.

Table 39. Evaluation of Freshwater Mussel and Clam Study: Criteria Evaluated as Good to Outstanding

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Freshwater mussel and clam study focuses on the Aberjona River watershed, between approximately three to five miles from the Site.

The Trustees evaluated this project as "marginal to acceptable" for the following criteria (Table 40):

Table 40. Evaluation of Freshwater Mussel and Clam Study: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Relationship to injured resources	The project has an indirect relationship to injured resources by developing a study that could lead to improved populations of freshwater mussels and clams.
Benefit Criteria	
Magnitude of benefits	This project provides a small magnitude of benefits because the freshwater mussel and clam study may not lead to actions that improve populations in the Aberjona River watershed.
Multiple benefits	The project has a minor potential to provide multiple benefits to riparian, aquatic, and in-stream habitat if the freshwater mussel and clam study leads to actions to improve shellfish populations, which then improve water quality.
Sustainability of benefits	The sustainability of benefits from the freshwater mussel and clam study is low unless successful restoration actions can be undertaken.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans that promote mussel restoration together with herring restoration.

Criteria	Evaluation Summary
Enhancement of public's relationship with natural resources	The study itself will provide little enhancement of the public's relationships with natural resources; the public could benefit from improved shellfish populations that improve water quality and serve as a food source for other wildlife.
Avoidance of adverse impacts	The project has minimal potential for adverse impacts during the study phase.
Relationship of expected costs to expected benefits	The project has a low ratio of expected benefits to expected costs, because the development of the freshwater mussel and clam study on its own will not lead to ecological improvements.
Natural recovery period	The natural recovery period of this project will be slow because the freshwater mussel and clam study needs to be implemented before any restoration actions occur.
Avoidance of additional injury	The project has minimal potential to result in additional injury to injured resources.
Implementation Criteria	
Technical/technological feasibility	The technical feasibility of the freshwater mussel and clam study is high, but the feasibility of implementing subsequent restoration actions may be low, particularly if water quality in the Aberjona River is not supportive of freshwater shellfish.
Administrative and management capability	The capacity of the Town of Winchester Conservation Commission to carry out the freshwater mussel and clam study is high; however, the capability of managing subsequent complex restoration projects may be low.
Site ownership	Site ownership will not impede this planning-level project; however, site ownership could pose difficulties for implementation actions.
Soundness of approach	The approach of developing a freshwater mussel and clam study to identify future freshwater shellfish restoration actions may result in uncertain to negligible benefits to injured resources.
Measurable results	The study will identify potential options and limitations to freshwater shellfish restoration in the Aberjona River watershed. Measurable benefits to natural resources will only occur after the implementation phase, if that occurs.
Community involvement	The project is not designed for community involvement during the development of the freshwater mussel and clam study. Implementation of some restoration actions may require community involvement.
Public outreach	The project does not directly integrate public education and outreach into the project plan.
Implementation-oriented	The project will invest in development of a study to enable future implementation of restoration projects, but is not directly implementation-oriented.
Project implementation readiness	The project is ready for development of the freshwater mussel and clam study but not yet for implementation of subsequent restoration projects.
O&M needs	The study itself would not have O&M needs. Actions resulting from the plan could have needs for ongoing O&M.
Leveraging of additional resources	The project does not currently have additional resources for leveraging.

The project was rated as below marginal for this criterion:

- Level of funding and resources needed for project implementation
  - The project has a relatively high need for funding after the study is developed because of the challenges associated with freshwater shellfish restoration.

The Trustees found that this project had greater weaknesses and fewer strengths compared to other potential project options. Specifically, the Trustees were concerned that implementation of the study would not lead to direct benefits or increases in freshwater mussel populations. In addition, the likelihood of success of any subsequent direct actions to benefit freshwater mussel populations is unclear. Water quality issues in the Aberjona River may not be supportive of freshwater mussels and clams at this time.

4.3.4 Green Infrastructure Stormwater Management to Improve Water Quality

Restoration Objective

The aim of this project is to improve water quality in the Aberjona River watershed, particularly areas draining to Horn Pond, Wedge Pond, and Winter Pond. Objectives are to reduce stormwater runoff and nutrient pollution into these water bodies and improve aquatic habitat by installing green infrastructure stormwater management.

Project Location

The project involves developing green stormwater infrastructure at three ponds: Horn Pond in the City of Woburn and Wedge and Winter Ponds in the Town of Winchester. Each pond has different amenities and services (Table 41).

Table 41. Amenities, Services, and Other Characteristics of Ponds Proposed for Water Quality Improvements through Green Stormwater Infrastructure

Pond	Amenities, Services, and Other Characteristics
Horn Pond	• Public water supply, listed as an Outstanding Resource Water (ORW) • Boat launch • Picnic area • Improved fish passage proposed as separate NRDAR restoration project
Wedge Pond	• Public beach at Borggaard Park • Algal blooms have historically resulted in closures of the public beach to protect public health • Close proximity of inlet and outlet at north end of pond (approximately 400 feet apart) limits circulation in the pond. A sediment delta periodically forms in this area
Winter Pond	• Friends of Winter Pond community group supports restoration of Winter Pond • Stormwater and groundwater are inputs to the pond

As proposed, the project would primarily benefit tributaries to the lower Aberjona River as well as the mainstem of the Aberjona River downstream of Wedge Pond.

Project Description

The MyRWA has documented the negative impacts associated with impervious cover in the Aberjona River watershed, including reduced recharge of the groundwater aquifer, low flow stream conditions, elevated phosphorous levels, low dissolved oxygen levels, and cyanobacteria blooms. According to calculations performed by MyRWA in collaboration with HWG for the Mystic River watershed (which includes the Aberjona River watershed), approximately 80% of phosphorus that enters surface water bodies in the watershed originates from stormwater.

MyRWA proposes to collaborate with the City of Woburn and the Town of Winchester to address these issues by promoting stormwater mitigation in the watershed communities. This project would evaluate and identify beneficial locations for green infrastructure within the watershed to improve water quality and aquatic habitat.

The proposed project consists of the following major element:

- Site, design, and implementation of green infrastructure solutions (referring generally to stormwater management structures) to improve water quality. This would include mapping the attributes of the applicable sites and prioritizing sites that would also benefit aquatic habitats.

The project scope is based on the framework of the SWMI, which was developed by the EEA, MassDEP, DFG, and DCR. The foundation of the framework is USGS peer-reviewed literature, which noted a

significant negative association between aquatic health and impervious cover. This project was proposed to be conducted in conjunction with the Water Management Plan (see Section 4.3.2).

The project would be implemented by MyRWA in collaboration with the City of Woburn and the Town of Winchester. MyRWA and its partner communities would monitor the practices in order to adapt designs for future restoration projects in the watershed.

Expected Benefits and Timeframe of Benefits

Green infrastructure would provide flood resiliency, aquatic habitat, and water quality benefits (including reduction of nutrient pollution) to the Aberjona River corridor and areas downstream once construction has been completed and contributing areas have been stabilized (as a best practice, stormwater management structures should not receive water from disturbed areas; all areas disturbed by construction should be stabilized before allowing runoff into the structure to prevent sediment from entering the structure and causing the structure to fail). Water quality benefits would be expected to continue as long as the green infrastructure practices are maintained. The importance of maintenance should be emphasized, as the most common reason for failure of stormwater management structures is lack of maintenance.

In addition to environmental benefits, green infrastructure can provide social, economic, and community benefits including increased public recreation opportunities, public health benefits, increased property values, and job creation.

The benefits of green infrastructure are cumulative as practices are implemented throughout the watershed. Green infrastructure practices are designed to capture, treat, and infiltrate stormwater near its source before it can enter conventional drainage systems. Continued investment in green infrastructure is necessary throughout the watershed, including regular maintenance of installed practices, to have measurable and sustainable benefits to water quality and aquatic habitat in Horn Pond, Wedge Pond, and Winter Pond.

Brief Overview of Maintenance and Monitoring

MyRWA will collaborate with the City of Woburn and the Town of Winchester to monitor practices that are implemented in order to adapt designs for future restoration projects in the watershed. Details regarding planned maintenance are not currently available.

Probability of Success

The success of the project depends on the following factors (Table 42):

Table 42. Success Factors for the Green Infrastructure Project

Factor	Impact on Success
Stormwater treatment design – land use, topography, etc.	Although a goal of the project is to develop replicable projects that can be installed at multiple watershed in the Areas of Interest, the designs will have to be adapted on a project-by-project basis to account for site-specific factors, including but not limited to available space; historical, current, and future land use; and site topography.
Availability of municipal sites for green infrastructure implementation	Municipal and other publicly-owned sites are generally better suited for rapid implementation of stormwater management structures, as acquisition of land or an easement from a private owner is not required. Implementation of projects on municipal land can also provide opportunities for high-visibility installations that demonstrate project benefits, where municipally-owned land is highly visible to the public.

Factor	Impact on Success
Soil infiltration capacity	The feasibility of stormwater infiltration management structures depends on the infiltration capacity of the underlying soils. Sites with highly permeable soils, such as those classified as Hydrologic Soil Groups (HSGs) A and B, are generally most suitable for stormwater infiltration practices, while HSG C and D soils are less suitable for infiltration practices. A brief review of data from the USGS Web Soil Survey tool indicates that HSG A and B soils are relatively prevalent in the region and that stormwater infiltration practices may be feasible in some locations within the project area.
Monitoring and adaptive management	Monitoring and maintenance of practices that are implemented will be necessary to maintain the practices in good shape, address problems as they arise, and inform and adapt designs for future restoration projects. Proper maintenance of green infrastructure practices is critical for success, as the most common reason for failure of stormwater management structures is lack of maintenance. Plantings should be selected for ease of maintenance.
Continuing investment in green infrastructure	The benefits of green infrastructure are cumulative as practices are implemented throughout the watershed. Green infrastructure practices are designed to capture, treat, and infiltrate stormwater near its source before it can enter conventional drainage systems. Continued investment in green infrastructure is necessary throughout the watershed, including regular maintenance of installed practices, to have measurable and sustainable benefits to water quality and aquatic habitat in Horn Pond, Wedge Pond, and Winter Pond.

Environmental and Socioeconomic Consequences

Potential environmental consequences of the proposed project include:

- Disruption of soils within the watershed may result in sediment releases to local waterways during construction of green infrastructure practices. Implementation of a sediment and erosion control plan during project construction would help to minimize this risk.

Potential socioeconomic consequences of the project include:

- Potential loss of open space to accommodate green infrastructure practices.
- Temporary disruption of nearby residents due to construction traffic and noise.

The potential environmental and socioeconomic consequences of the project would be evaluated through the local permitting process and environmental review pursuant to NEPA and MEPA, as applicable. The project would incorporate measures to avoid, minimize, or mitigate adverse environmental impacts.

Expected Permitting Requirements

The following regulatory submittals, reviews, and permits may be required for implementation of green infrastructure within the project area (Table 43). Actual permitting requirements would be dictated by project type and location and other site-specific factors. Additional information on these requirements can be found in Appendix A.

Table 43. Anticipated Regulatory Submittals, Reviews, and Permits for the Green Infrastructure Project

Review/Permit	Agency
ENF	MEPA Office
WPA NOI and Order of Conditions	Town of Winchester Conservation Commission, City of Woburn Conservation Commission, and MassDEP
401 WQC	MassDEP
MESA	DFW NHESP
Federal ESA Project Review	USFWS
PNF and Section 106 Historic Review	MHC
NPDES Permit	EPA

Project Status: Funding and Implementation

MyRWA has outlined a scope of work for the green infrastructure elements in collaboration with both municipalities and has identified a consultant (HWG) to conduct the design work.

Estimated Costs

The total amount requested is approximately $500,000 for Green Infrastructure siting, design, and construction. The cost of a single green infrastructure installation can range from the tens of thousands of dollars to hundreds of thousands of dollars depending on the practice selected, the scale of the practice, and constructability/site conditions.

The City of Woburn and the Town of Winchester have committed staff time toward these future projects. The MyRWA reports that it has already committed an unspecified amount of 319 Nonpoint Source Grant funding to implement green infrastructure in the Aberjona River watershed. In addition, the Town of Winchester is in the process of implementing a stormwater utility fee that would provide dedicated funding for future green infrastructure efforts.

Trustee Evaluation and Proposed Allocation

Overall, the project was not evaluated favorably compared to other proposed restoration projects (see Table 36 and Table 37). The Trustees are not proposing to allocate funding to this project at the proposed locations. None of the criteria were evaluated as good to outstanding. However, recognizing the natural resource benefits of green infrastructure installation, the Trustees will support the integration of its installation into Tier I project sites as appropriate and feasible. As a standalone option, the Trustees evaluated this project as "marginal to acceptable" for the following criteria (Table 44):

Table 44. Evaluation of Green Infrastructure Stormwater Management to Improve Water Quality: Criteria Evaluated as Marginal to Acceptable

Criteria	Evaluation Summary
Focus Criteria	
Proximity to injured resources	Green infrastructure activities include Winter Pond, Wedge Pond, and Horn Pond, within approximately four miles from the Site.
Relationship to injured resources	The project has an indirect relationship to injured resources by developing stormwater treatment projects that could lead to improved water quality and better habitat for migratory fish. Stormwater treatment projects can also improve groundwater recharge.
Benefit Criteria	
Magnitude of benefits	This project provides a relatively small magnitude of benefits because the scale of stormwater treatment needed to provide significant water quality benefits may be greater than what this project has proposed.
Multiple benefits	The project has a limited potential to provide multiple benefits to riparian, aquatic, and in-stream habitat because of likely minor improvements to overall water quality.

Criteria	Evaluation Summary
Sustainability of benefits	Sustainability of benefits requires ongoing maintenance of the stormwater infrastructure.
Consistency with relevant federal, state, regional, or local policies and plans	The project is seen as having acceptable consistency with relevant federal, state, regional, and local policies and plans for water conservation.
Stewardship	The project will require stewardship from the Town of Winchester and City of Woburn to maintain the stormwater infrastructure developed through the project.
Enhancement of public's relationship with natural resources	Project will provide indirect enhancements to the public's ability to use, enjoy, or benefit from natural resources in the targeted ponds if the green infrastructure projects lead to improved water quality for natural resources and recreation.
Avoidance of adverse impacts	The project has a minor potential for adverse impacts during the construction phase.
Relationship of expected costs to expected benefits	The project has a low ratio of expected benefits to expected costs, because the green infrastructure improvements can be expensive and only benefit a small area.
Natural recovery period	The natural recovery period of this project will depend on the green infrastructure improvements leading to water quality benefits that then result in a benefit to habitat and resources. This is likely to occur in advance of the "natural recovery period" for injured resources, estimated as 2034 for some resources and in perpetuity losses for other resources.
Avoidance of additional injury	The project has minimal potential to result in additional injury to injured resources.
Implementation Criteria	
Technical/technological feasibility	The technical feasibility of developing the green infrastructure improvements is high, although some site-specific conditions (such as soils with low permeability) can impose challenges.
Administrative and management capability	The project will be managed and administered by the MyRWA, in coordination with the City of Woburn and Town of Winchester. These entities all have the capacity to implement a green infrastructure effort.
Site ownership	The infrastructure improvements would be targeted for areas owned by the City of Woburn and the Town of Winchester to avoid any challenges with site ownership.
Soundness of approach	The approach of developing green infrastructure to benefit water quality may result in uncertain to negligible benefits to injured resources.
Measurable results	Measuring water quality benefits is feasible; measuring the resulting benefits to natural resources from water quality improvements may be difficult to assess.
Community involvement	The project could have some level of community involvement, particularly for development of green infrastructure at popular recreational areas.
Public outreach	The project would have public outreach associated with the development of green infrastructure at popular recreational areas.
Implementation-oriented	The project budget is oriented toward implementation of green infrastructure improvements, although planning and prioritization will need to occur first.
Project implementation readiness	The project will require planning and prioritization before implementation of green infrastructure improvements can proceed.
O&M needs	The project will have ongoing needs for O&M to keep the green infrastructure working properly.
Leveraging of additional resources	The project would be able to leverage additional financial resources from the City of Woburn and Town of Winchester.
Level of funding and resources needed for project implementation	The funding needed for large-scale improvements to water quality is greater than what could be accomplished with this proposed project.

Overall, the Trustees found that this project had greater weaknesses and fewer strengths compared to other potential project options. Specifically, the Trustees were concerned that the benefits to injured resources from the green infrastructure improvements at the proposed three ponds would be limited in size and scope. Although the Trustees are not recommending this project for funding, the Trustees are interested in supporting the integration of green infrastructure elements into Tier 1 preferred projects as appropriate and feasible. The Trustees will work with the proponents of the preferred Tier 1 projects to assess whether and how green infrastructure design elements could be incorporated into those projects.

4.4. Alternative 3 – No-Action/Natural Recovery (Non-Preferred)

The selection of this alternative by the Trustees would mean that no actions would be taken by the Trustees to restore injured natural resources. Existing natural resource losses would continue to occur, and any further restoration of natural resources and services injured by the release of hazardous materials would instead occur through natural recovery alone. No actions to assist with the recovery and restoration of natural resources would be taken beyond those remedial actions that have occurred on-site to remove contaminants. This alternative also provides no economic benefits to the population in Woburn or Winchester, the Aberjona River watershed, and surrounding areas.

Additionally, the "no-action" alternative would not use the available $3.8 million in NRDAR settlement funds for restoration, which is mandated through CERCLA, making this a non-viable alternative.

This alternative may be used as a benchmark to evaluate the comparative benefit of other actions. Because no action is taken, this alternative also has no cost.

4.5. Comparison of Alternatives – NRDAR Evaluation

The Trustees considered each alternative within the context of the evaluation criteria described in Section 3.

Together, the combination of the four Tier 1 projects into Alternative 1 (the preferred alternative) will restore riparian, wetland, and in-stream habitat, including promoting fish passage. These projects will benefit a wide range of resources including migratory fish (e.g., American eel, alewife, blueback herring), benthic macroinvertebrates, amphibians, reptiles, birds and mammals, as well as providing outreach, education, and improved recreation to local communities. The projects collectively benefit water quality and habitat conditions in the Aberjona River watershed that was heavily impacted by releases of hazardous substances from the Site. The combination of projects benefits water quality; provides additional wetland, floodplain, and riparian habitat; and restores fish passage all in the same watershed, providing a cumulative benefit to resources in this area. If one or more Tier 2 projects are able to funded, they provide similar benefits to habitat, water quality, and fish passage, increasing the benefit of the preferred alternative further.

The projects in Alternative 2 (non-preferred alternative) would also provide benefits to riparian, wetland, and in-stream habitats, but these benefits would be more limited compared to the benefits from Alternative 1. The Alternative 2 projects provide some benefits to riverine, floodplain, and riparian habitats at Davidson Park, but the benefits from this non-preferred design option are more limited compared to the preferred option that creates a more natural river channel and eliminates the artificial pond. The Improved Water Management project and the Freshwater Mussel and Clam Study provide only indirect benefits to injured resources, as they would not directly implement on-the-ground restoration. Similarly, the Green Infrastructure Stormwater Management project would provide limited benefits to injured resources at the proposed locations, although these techniques are valuable and have been incorporated into the Tier 1 project sites.

As described above, Alternative 3 (no-action/natural recovery) does not provide benefits to injured resources.

A comparison of alternatives is presented in Table 45.

Table 45. Comparison of Criteria among Alternatives

Criteria	Alternative 1 (preferred)	Alternative 2 (non-preferred)	Alternative 3 (no-action/natural recovery)
Focus Criteria			
Proximity to injured resources	All projects restore resources in the Aberjona River watershed, two to five miles from the Site.	All projects restore resources in the Aberjona River watershed, two to five miles from the Site.	N/A (no projects proposed)
Relationship to injured resources	Projects benefit wetland, in-stream, and riparian habitat, as well as providing secondary benefits to habitat quality through stormwater management.	Projects provide more limited benefits to wetland, river, and riparian habitat. Creation of the pond habitat at Davidson Park will also degrade wetlands.	No benefits provided to injured resources
Benefit Criteria			
Magnitude of benefits	Projects provide significant benefits to wetland, in-stream, and riparian habitats, through restoring habitats, improving water quality, and improving fish passage.	Projects provide limited benefits, with more projects focused on studies instead of implementation.	No benefits provided to injured resources
Multiple benefits	Projects provide multiple benefits to wetland, in-stream, and riparian habitats and the multiple species that use these interconnected habitats including diadromous fish and the species that rely on diadromous fish. They also provide outreach, education, and improved recreation to local communities.	Projects provide multiple benefits to habitats and species that use those habitats (particularly at Davidson Park), but do not provide the improved fish passage benefits and stream restoration benefits of the preferred alternative. They also provide outreach, education, and improved recreation to local communities.	No benefits provided to injured resources
Sustainability of benefits	Tier 1 projects all have a high level of sustainability of benefits, with the restoration projects providing permanent benefits to resources. Tier 2 projects have a lower level of sustainability with projects requiring a higher degree of on-going maintenance.	Projects have a marginal to acceptable level of sustainability, with projects requiring additional implementation or maintenance for benefits to be sustained.	No benefits provided to injured resources
Consistency with relevant federal, state, regional, or local policies and plans	Projects seen as having a high level of consistency with relevant policies and plans because the projects collectively focus on a healthier watershed and restored migratory fish populations, which are key federal, state, regional, and local goals.	Project seen as having acceptable consistency with policies and plans, although a focus on studies instead of implementation limits achieving stated agency goals.	No action is not consistent with policies and plans focused on improving the quality of the environment

Criteria	Alternative 1 (preferred)	Alternative 2 (non-preferred)	Alternative 3 (no-action/natural recovery)
Stewardship	Tier 1 projects all have an acceptable to good potential for ongoing stewardship to maintain the benefits of the projects, with project proponents committed to long-term success. Tier 2 projects have marginal to acceptable evaluations for stewardship potential.	Projects have marginal to acceptable evaluations for stewardship, particularly for the studies which will need dedicated proponents to move recommendations to the implementation phase.	N/A
Enhancement of public's relationship with natural resources	Projects will enhance the public's ability to use, enjoy, or benefit from the Aberjona River watershed by restoring natural resources, enhancing recreational opportunities, and promoting place-based education.	Projects provide a lower degree of enhancement for the public because the public will not engage in the proposed studies.	No enhancement of the public's relationship with natural resources will occur.
Avoidance of adverse impacts	Tier 1 projects have a high likelihood of avoiding adverse impacts except for Davidson Park, which will need to remove contaminated sediments to restore the Aberjona River channel. Tier 2 projects have a slightly higher risk of adverse impacts because of the soil disturbance associated with invasive species control.	Projects have a higher likelihood of adverse impacts because of the need to remove additional contaminated sediments in the Davidson Park HWG Option 3 alternative.	Adverse impacts to injured resources will continue under a no-action/natural recovery scenario.
Relationship of expected costs to expected benefits	Projects overall have a high ratio of expected benefits to expected costs because of the multiple benefits provided by the on-the-ground restoration projects.	Projects overall have a lower ratio of expected benefits to expected costs because the studies do not lead directly to resource benefits.	Although this alternative has no cost, it also provides no benefits.
Natural recovery period	Projects have a reasonably fast natural recovery period, particularly for improvements to water quality and fish passage which will occur quickly after project completion.	Projects have a slower natural recovery period compared to Alternative 1. Recovery of resources for the Davidson Park option will be slower because of the greater difficulties of restoring the river channel. Benefits from the studies will require a subsequent implementation phase to occur.	Natural recovery will not be accelerated because no actions will be taken.
Avoidance of additional injury	Tier 1 projects have a high likelihood of avoiding additional injuries to natural resources, except for the need to remove contaminated sediments to restore the Aberjona River channel. Tier 2 projects have a slightly higher risk of additional injury because of the soil disturbance associated with invasive species control.	Projects have a higher likelihood of resulting in additional injury because of the need to remove additional contaminated sediments in the Davidson Park Option 3 alternative.	No additional injury to natural resources will occur.

Criteria	Alternative 1 (preferred)	Alternative 2 (non-preferred)	Alternative 3 (no-action/natural recovery)
Implementation Criteria			
Technical/technological feasibility	Tier 1 projects have a high technical/technological feasibility and rely on proven restoration techniques. Tier 2 projects are seen as having lower but still adequate feasibility.	Projects have a lower technical feasibility, including at Davidson Park where the technical feasibility of the project is lower because of the challenge of creating the river channel in an area constrained by the artificial pond habitat, as well as the studies, which may not result in actions.	N/A
Administrative and management capability	Project proponents, including the City of Woburn, Town of Winchester, and MyRWA have the administrative and management capabilities to carry out the projects.	Project proponents, including the Town of Winchester and MyRWA have the administrative and management capabilities to carry out the projects. The capability of managing any subsequent actions that come out of the Freshwater and Clam Mussel study is seen as marginal.	N/A
Soundness of approach	Restoration approaches, particularly for Tier 1 projects, are viewed as sound and consistent with best practices for restoration.	Restoration approaches are generally viewed as sound, except for the clam and mussel study which is viewed unfavorably by the DFW NHESP.	N/A
Measurable results	Projects have a high potential for providing measurable results, particularly at Scalley Dam where fish passage will be counted.	Some aspects of the projects will readily provide measurable results; assessing results of the studies may be more difficult.	N/A
Community involvement	Projects include the potential for a high level of community involvement, particularly at Scalley Dam where citizen scientists will be engaged in counting fish.	Projects have a lower degree of potential for community involvement, particularly for the study projects.	N/A
Public outreach	Public education and outreach will be integrated into each of the Tier 1 projects.	Projects have a low level of public education and outreach potential.	N/A
Implementation-oriented	Projects are generally oriented toward implementation, although some investments in planning and permitting will need to be made.	Projects include studies that are less oriented toward implementation.	N/A
Project implementation readiness	Projects do not have a high level of readiness for implementation, with the exception of the proposed education project.	Projects do not have a high level of readiness for implementation.	N/A
O&M needs	Projects have an acceptable level of O&M needs, except for the proposed Davidson Park and Mill and Judkins Ponds projects which have a higher level of need.	Projects have a higher level of O&M needs, particularly the Davidson Park Option 3 project which is viewed as having an unacceptably high level of O&M needs.	N/A

Criteria	Alternative 1 (preferred)	Alternative 2 (non-preferred)	Alternative 3 (no-action/natural recovery)
Leveraging of additional resources	Projects seen as having a good level of leveraging, except for the proposed Davidson Park and Mill and Judkins Ponds projects which have a low level of leveraging.	Projects seen as having a good level of leveraging, except for the proposed Davidson Park project which has a low level of leveraging.	N/A
Level of funding and resources needed for project implementation	Projects seen as having an acceptable level of funding need, except for the proposed Davidson Park and Mill and Judkins Ponds projects which have a higher relative need for funding and resources compared to their benefits.	Projects seen as having an acceptable level of funding need, except for the proposed Davidson Park and Mussel and Clam study projects which have a higher relative need for funding and resources compared to their benefits.	N/A

4.6. Projects Considered but Not Evaluated

In addition to the projects evaluated above, two projects were considered by the Trustees but did not meet the required eligibility criteria for Trustee funding. Thus, these projects were not carried forward for evaluation.

4.6.1 Land Conservation and Streambank Restoration at the Former Kraft Foods Parcel

Restoration Objective

The goal of this project is to protect the ecological functions of an undeveloped portion of the former Kraft Foods site located in the Town of Winchester through a conservation restriction or through acquisition of the parcel by the Town. Additional project components would improve water quality of the Aberjona River through streambank stabilization and restoration (thereby also improving habitat for aquatic life), flood storage, and stormwater management.

Project Location

The project site is a 16.4-acre, undeveloped parcel of land located in the northeast corner of the Town of Winchester (Figure 21). The parcel is bounded by the east bank of the Aberjona River, Sunset Road, and the town boundary between Woburn and Winchester. The parcel is currently undeveloped open space and is comprised primarily of uplands, with approximately 1.5 acres of wetland resource areas located in the northern portion of the parcel. The site is also located fully within the 100-year floodplain. The land previously served as a wellhead protection zone for the cooling water wells associated with the Kraft Foods facility. Surrounding the parcel is a combination of suburban residential and open space uses. The site is also located northeast and upstream of Davidson Park along the Aberjona River.

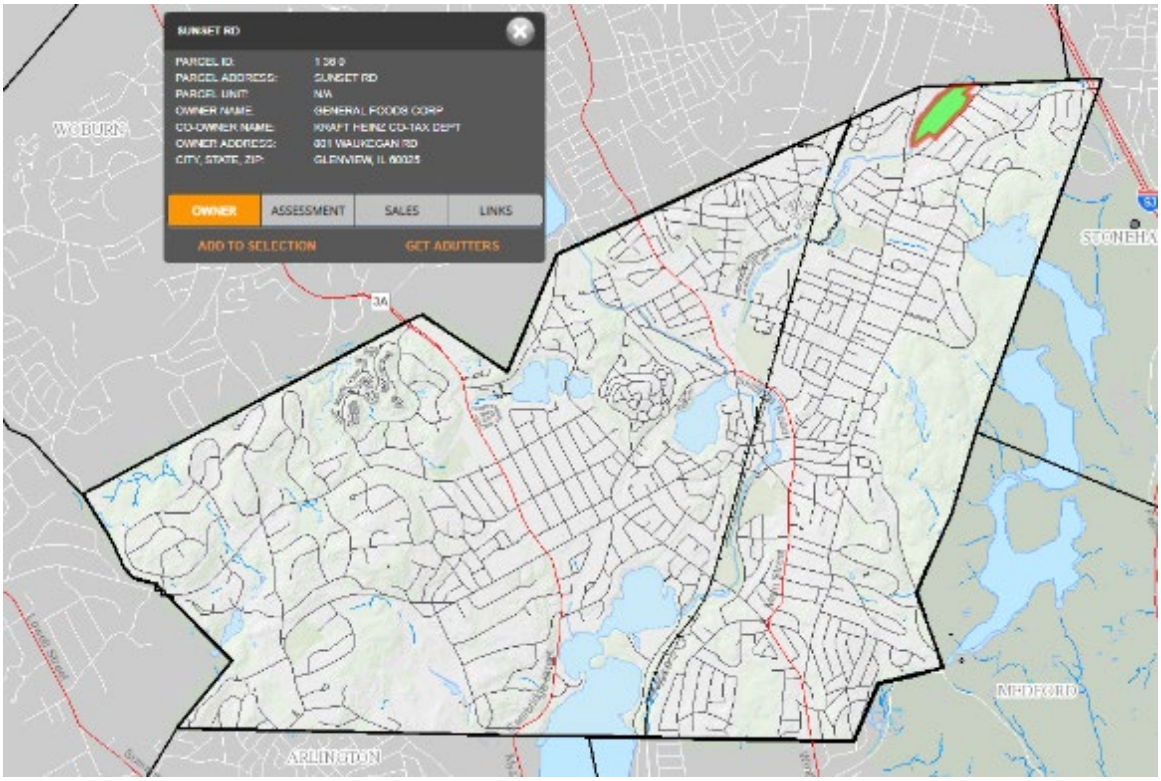


Image source: Town of Winchester Geographic Information System.

Figure 21. The Town of Winchester, Showing the 16.4-Acre Project Site (green with pink boundary) in the Northeast Corner of the Town

The 16.4-acre parcel is part of the larger 77-acre former site of the Kraft Foods Corporation, which owned and operated a manufacturing plant in Woburn on the border with Winchester until closing the plant in 2016. The 77-acre parcel straddles the Woburn-Winchester line, with 16.4 acres forming a single parcel in Winchester. The portion of the 77-acre property located in Woburn is slated for development. The developer has stated that they currently do not plan to develop the 16.4-acre parcel in Winchester.

Washington Park, owned by the Town of Winchester, is located across the Aberjona River from the 16.4-acre parcel.

Project Description

In October 2018, an ENF was submitted to the Executive Office of EEA as part of the proposed redevelopment of the 77-acre Kraft Foods Parcel (EEA No. 15923, Montvale Commons). The redevelopment plan for the Kraft Foods Parcel does not include development activities on the 16.4-acre Winchester parcel.

The Town of Winchester proposes to work with the site owners to protect the Winchester parcel in perpetuity for flood storage, stormwater management, and water quality purposes. Methods of permanent protection proposed by the Town include acquisition of the parcel or placement of a conservation restriction on the parcel to prevent future development on the site.

The Town would also like to evaluate and implement streambank stabilization and restoration measures in Washington Park. The proposed restoration measures are intended to reduce ongoing erosion and sedimentation along this stretch of river and downstream, as well as address potential increases in erosion and sedimentation resulting from future development.

The proposed project will:

- Acquire the 16.4-acre Kraft Foods parcel or work with the site owners to place a conservation restriction on the property to prevent future development.
- Evaluate and implement streambank stabilization (installing plants and natural materials such as rootwads to prevent erosion of the bank; use of natural materials and living plants should be used instead of riprap where possible) and restoration measures along the Town-owned sections of the Aberjona River that parallel the former Kraft Foods property in Winchester.

The project would be implemented by the Town of Winchester, possibly in collaboration with the site owners.

Trustee Evaluation and Proposed Allocation

The Trustees have determined that this proposed project does not meet the required eligibility criteria for Trustee funding. Thus, no funding will be allocated to this project. Specifically, the project failed to meet the following eligibility criteria:

- Does the project interfere with or be undone or negatively impacted by remedial work conducted by EPA or pursuant to M.G.L Chapter 21E?
  - The Trustees determined that this project could be undone or negatively impacted by remedial work. Specifically, the proposed project area is included within the Site tracked by the MassDEP Waste Site Cleanup Release Tracking Number 3-0034191, which is the former Kraft Atlantic Gelatin Factory. An Immediate Response Action is ongoing at that Site.
- Is the proposed project, or any portion of the proposed project, an action that is presently required under federal, state, or local law?
  - The Trustees determined that preservation of the land is already recommended through the MEPA process. Specifically, the Draft Environmental Impact Review Certificate (Theoharides, 2019) for MEPA Project # 15923 Montvale Commons/The Vale redevelopment, states that "…areas outside of limit of work along the Aberjona River and in the southwest portion of the site within the Town of Winchester will be preserved as natural woodland/wetland areas and will maintain flood storage capacity. The DEIR indicates the Proponent will continue to evaluate measures to preserve land."

4.6.2 Aberjona River Old Fence Removal

Restoration Objective

The goal of this project is to improve safety, site aesthetics, and habitat connectivity on the east bank of the Aberjona River. Secondary objectives include invasive species removal and bank restoration and stabilization.

Project Location

The project site is located along the Greenway between Cross Street and Leonard Pond/Leonard Field (Figure 22). The Greenway is a shared-use path linking the municipalities of Winchester, Woburn, and Stoneham along the Aberjona River. South of Leonard Pond the Greenway passes the Muraco Elementary School. The area surrounding the project site consists mainly of residential housing and public open space.

At the project site, a derelict six-foot-high chain-link fence runs along the riverbank between the Aberjona River and the Greenway for approximately 400 to 500 feet.

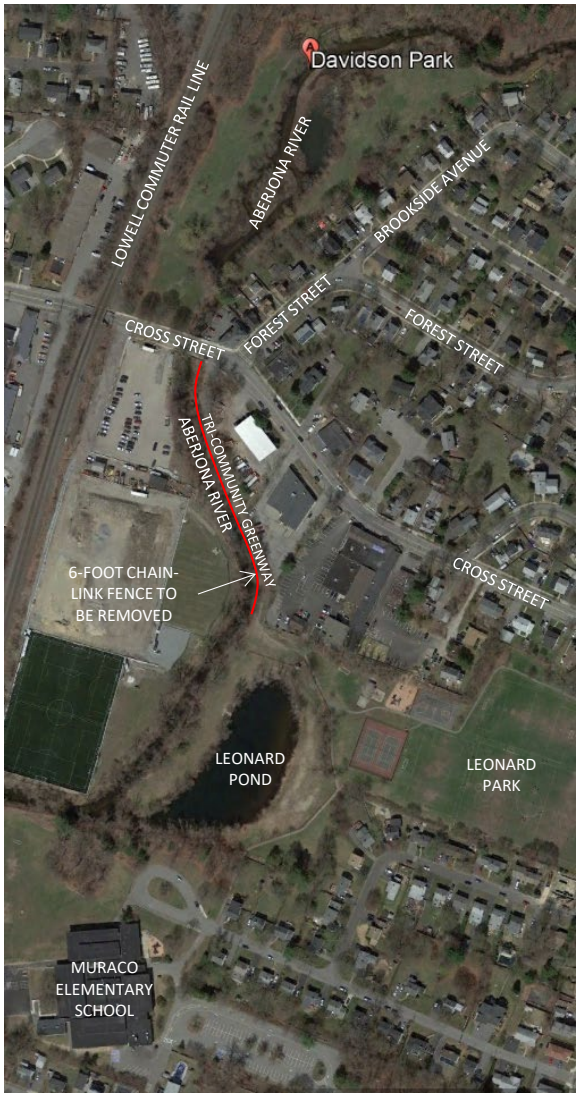
Project Description

The existing fence is in poor condition, with sections missing, leaning, or fallen into the Aberjona River. Portions of the river bank appear to be eroded and unstable, contributing to the instability of the fence. Invasive bittersweet and debris have become entangled in the fence.

The proposed project consists of the following major elements:

- Removal of the existing fence along a 400 to 500-foot section of the Greenway.
- Removal of invasive bittersweet, which has become entangled in the fence.
- Replacing the existing fencing with a three-foot tall fence set further back from the river bank (closer to the Greenway). Wildlife movement should be considered when selecting the type of replacement fencing.
- Planting of native vegetation along the river, including live tree stakes to stabilize the river bank.

The project would be implemented by the Town of Winchester.



Imagery source: Google Earth.

Figure 22. Map of Aberjona River Old Fence Removal Project Site

Trustee Evaluation and Proposed Allocation

The Trustees have determined that this proposed project does not meet the required eligibility criteria for Trustee funding. Thus, no funding will be allocated to this project. Specifically, the project failed to meet the following eligibility criterion:

- Does the proposed project restore, rehabilitate, replace and/or acquire the equivalent of natural resources and/or natural resource services that were injured by the release of hazardous substances from the Site?

The Trustees determined that the current fence does not represent a significant barrier to wildlife movement and thus its removal does not meet the definition of Restoration or Rehabilitation in 43 CFR § 11.14(ll).

5. Monitoring Program, Performance Criteria, and Adaptive Management

The goal of the Trustees is to develop natural resource restoration projects that restore natural resources injured by releases from the Site. To determine if this goal has been met, the Trustees are committed to developing a monitoring program to assess the success of the funded restoration projects. Implementation and effectiveness will be monitored to ensure that projects are implemented as designed and to determine restoration success over time. The Trustees will ensure that detailed monitoring plans are developed for each project as part of the project design phase.

5.1. Measuring/Evaluating Restoration Progress

Effectiveness monitoring can be used to measure and evaluate restoration progress over time. Because the preferred Tier 1 and Tier 2 restoration projects include multiple project elements, monitoring guidelines are described here by activity, instead of by project.

- Wetland and riparian restoration
  - Suggested monitoring parameters for evaluating the success of wetland and riparian restoration over time include both structural and functional parameters. For example, project proponents may evaluate the area of hydric (wetland) soils, vegetation survival, vegetation percent cover, and vegetation species composition. Project proponents may also look for evidence of restoration challenges that could require correction, such as visible erosion at a riparian site or significant areas of ponded water at a wetland site. Monitoring these parameters on an annual basis for a minimum of five years post-construction allows the project proponent and the Trustees to assess whether native habitat conditions are being successfully restored. Ideally, monitoring parameters would also be assessed before restoration occurs and at reference sites to allow a better understanding of restoration project performance in the context of other factors, such as drought or storms, that can affect biological activities. In addition, project proponents may want to periodically evaluate wildlife use of a restored site, through bird, reptile, or amphibian surveys; conducting baseline surveys prior to restoration will be critical to understanding changes in wildlife use of a restored area.
- Fish passage restoration
  - Suggested monitoring parameters for restoration of fish passage focus on counting migrating fish at specific locations, such as the Scalley Dam. As described in Section 4.2.4, monitoring of fish passage is proposed to include an in-person monitoring program to provide fish count data, as well as a video monitoring program, where volunteers help count fish in video clips from the video monitoring system via their own computers.

5.2. Performance Standards and Criteria

Key monitoring parameters should have performance standards and criteria developed that can allow tracking of progress toward goals over time. For example, a project proponent may establish a goal of at least 80% vegetation cover, with fewer than 5% invasive species cover. These performance standards and criteria should be based on conditions at reference sites and be established when the monitoring plan is developed. Some monitoring parameters, such as wildlife surveys, may be established to provide information about wildlife use but may not be connected to specific performance standards.

5.3. Adaptive Management

The need for adaptive management and corrective actions to projects would be determined by evaluating the success of the project over time, comparing the monitoring data to the specified performance criteria. For example, a corrective action could include additional control of invasive species or replanting of native species if survival is poor.

6. Environmental and Socioeconomic Impacts of Restoration Alternatives

As noted in Section 1, this document constitutes the EA for the proposed restoration of natural resources, to address the potential impact of proposed restoration actions on the quality of the physical, biological, and cultural environment. The Trustees integrated the CERCLA and NEPA processes in this Draft RP/EA, as recommended under 40 CFR § 1500.2(c).

6.1. Requirements for NEPA Analysis and Trustee Approach

Actions undertaken by federal trustees to restore natural resources or services under CERCLA and other federal laws are subject to NEPA, 42 USC § 4321 *et seq.*, and the regulations at 40 CFR §§1500 through 1508. NEPA and its implementing regulations outline the responsibilities of federal agencies when preparing environmental documentation. In general, federal agencies contemplating implementation of a major federal action must produce an Environmental Impact Statement (EIS) if the action is expected to have significant impacts on the quality of the human environment. When it is uncertain whether the proposed action is likely to have significant impacts, federal agencies prepare an EA to evaluate the need for an EIS. If the EA demonstrates that the proposed action will not significantly impact the quality of the human environment, the agencies issue a Finding of No Significant Impact (FONSI), which satisfies the requirements of NEPA, and no EIS is required.

This Draft RP/EA complies with NEPA by: (1) describing the purpose and need for restoration (Section 1.4), (2) addressing public participation for this process (Section 1.6), (3) summarizing the affected environment (Section 2), (4) identifying and describing restoration alternative actions (Section 4), and (5) analyzing environmental consequences (Section 4, Section 6).

In 2015, the NOAA Restoration Center (RC) developed the "Programmatic Environmental Impact Statement for habitat restoration activities implemented throughout the coastal United States" (hereafter referred to as the "RC PEIS") (NOAA, 2017). NOAA RC developed the PEIS to evaluate coastal habitat restoration activities funded or implemented through its existing programs. The Record of Decision for the RC PEIS was signed July 20, 2015. In compliance with NEPA, the USFWS documented their adoption of the RC PEIS with a Record of Decision, signed August 20, 2019 (84 Fed. Reg. 45515). The RC PEIS (Sections 2.2 and 4.5) includes an evaluation of typical impacts for a suite of restoration activities that are inclusive of the proposed project types included in Alternatives 1 and 2 of this RP/EA, including:

- Fish Passage
- Wetland Restoration
- Freshwater Stream Restoration
- Fish, Wildlife, and Vegetation Management
- Road Upgrading and Decommissioning
- Signage and Access Management
- Implementation and Effectiveness Monitoring
- Environmental Education Classes, Programs, Centers, Partnerships, and Materials
- Planning, Feasibility Studies, Design Engineering, and Permitting.

To avoid duplication of effort and streamline the NEPA analysis in this RP/EA, the Trustees are using the RC PEIS and incorporating by reference all of the relevant impacts analyses covered in the RC PEIS. For

the benefit of the reader, these impacts are briefly summarized below in Section 6.2. However, the full analysis is incorporated by reference.

6.2. Impacts of the Proposed Alternatives

6.2.1 Fish Passage: Dam and Culvert Replacement

According to the RC PEIS (Section 4.5.2.3.1), the impacts of Fish Passage: Dam and Culvert Removal, Modification or Replacement, include the following:

> *In general, dam and culvert removal, modification, or replacement projects typically implemented by the NOAA RC produce short-term adverse ecological impacts and considerations, but the long-term ecological benefits – improved water quality, sediment transport, and native resident and migratory species recovery – demonstrate that removal of these barriers could be an effective long-term and beneficial river restoration tool (Bednarek 2001).*
>
> *Barrier removals may include indirect and direct, short-term, minor, moderate, or major adverse impacts on* ***geology and soils, water resources, air quality, and living coastal and marine resources*** *and EFH [essential fish habitat], both localized to the project site and beyond the project site. They may also have direct, long-term, impacts to* ***land use and recreation****. Indirect and direct, short-term, minor, and moderate adverse impacts to* ***threatened and endangered species*** *may include effects from handling, noise, turbidity, contaminants, changes to hydraulics and local hydrology, additional habitat quality/quantity, and displacement. . .*
>
> *However, indirect and direct, long-term, moderate, and major benefits to threatened and endangered species, as well as to other resources, may result as well. . . .Many dam and culvert removal, modification, or replacement projects result in a long-term change to* ***cultural and historic resources****.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Design and replacement of an existing culvert with a larger box culvert.
- Mystic Lakes Dam: Design improvements to the existing downstream migration channel; design and implement structural modifications or seasonal operations to limit flow spillage over the four fixed crest ogee weirs during the fish migration period.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.2 Fish Passage: Technical and Nature-like Fishways

According to the RC PEIS (Section 4.5.2.3.2), the impacts of Fish Passage: Technical and Nature-like Fishways, include the following:

> *Fishway projects result in some adverse impacts, but the long-term ecological benefits to native resident and migratory species make this an effective habitat restoration tool. During construction direct, short-term, localized, minor to moderate, adverse impacts to* ***geology and soils*** *may result, including soil compaction, temporary grading, and increased erosion. These impacts would occur due to the use of heavy machinery, construction equipment, and the movement of restoration practitioners throughout the project site during construction of access roads, staging areas, and/or the fishway itself.* ***Water and air resources*** *may also be affected during construction with direct, short-term, minor to moderate, adverse impacts expected to water and air quality. Due to the*

> *introduction of fine sediment to the water column during construction, water turbidity would increase at the project site, and may extend beyond the project site, depending on the degree of attenuation. Also, as is the case during any construction activity, an accidental contaminant spill (e.g., fuel, oil, grease, hydraulic fluid) may have short-term, direct adverse impacts on water quality.*
>
> *During construction, fishway projects could result in direct and indirect, short- to long-term, minor to moderate adverse impacts to* ***living coastal and marine resources****, and* ***threatened and endangered species****, which are localized or extend beyond the project site. Most directly, these projects may temporarily displace aquatic organisms from the immediate project area because construction may require the use of a coffer dam or other method used to exclude aquatic organisms. . .*
>
> *Fishway projects result in direct and indirect, long-term, minor to major benefits to* ***living coastal and marine resources*** *and* ***threatened and endangered species*** *that extend beyond the project site. Fishways are generally constructed and/or modified in order to increase fish escapement rates. Therefore, it is expected that fishway projects will increase the amount of habitat available to desirable aquatic organisms for growth, survival, and reproduction, while decreasing the likelihood that migratory individuals will deplete their energy reserves prior to reaching their preferred habitat. . .*
>
> *Fishway projects could also result in direct, long-term, localized, minor to major adverse impacts to* ***cultural and historic resources****…. Land use and recreation may be temporarily disturbed, as people not associated with the project will be unable to access the project site during construction…. Fishway projects may also result in direct and indirect, short- and long-term, minor beneficial impacts to* ***socioeconomic resources****, as we would expect a varying number of jobs to be created and a beneficial impact on the local economy to result from the funding spent on project construction.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Scalley Dam: Design and construction of a new fishway at the outlet of Horn Pond.
- Mystic Lakes Dams: Implement improvement to the Denil fishway exit.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.3 Wetland Restoration: Levee and Culvert Removal, Modification, and Set-back

According to the RC PEIS (Section 4.5.2.11.1), the impacts of Wetland Restoration: Levee and Culvert Removal, Modification, and Set-back, include the following:

> *The removal and/or modification of levees, dikes, culverts, and similar infrastructure would cause direct and indirect, short-term, localized, minor adverse impacts on* ***geology and soils, water, air, living coastal and marine resources and EFH, and threatened and endangered species*** *during the construction phase of the project. These impacts also apply to the construction of new or replacement levees (set-back levees) as part of the overall project. The use of heavy machinery and construction equipment is the primary cause of the direct, adverse impacts associated with this activity, which may include soil compaction, emissions from heavy equipment, removal or crushing of understory vegetation, increased soil erosion in the immediate area of construction operations, and unintentional introduction of non-native, potentially invasive, species.*

> *These restoration activities would provide direct and indirect benefits to* ***geology and soils, water, living coastal and marine resources and EFH, and threatened and endangered species****. These projects result in benefits to riparian, stream and river channel habitats, and shoreline habitats. . . Restoration of natural hydrology would aid in the development of vegetated communities that provide vital rearing, feeding, and refuge habitat for fish and benthic communities and wildlife species. This technique is beneficial for anadromous fish that need connected coastal waterways and rivers with unaltered hydrology for passage during migration events, as well as for estuarine fish species that benefit from increased habitat area. . .*
>
> ***Cultural and historic resources and land use*** *could experience indirect, long-term, minor adverse impacts resulting from levee modification or removal. The land use in the floodplain, including any potential culturally sensitive areas, would change as the water resources in the floodplain changed. Because land use would stabilize in the floodplain over time, the impact would be minor.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Design and construction of a berm to redirect runoff toward the proposed stormwater treatment system.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.4 Wetland Restoration: Wetland Restoration and Shoreline Stabilization Techniques

According to the RC PEIS (Section 4.5.2.11.2), the impacts of Wetland Restoration: Wetland Restoration and Shoreline Stabilization Techniques, include the following:

> *Potential impacts from wetland restoration activities described in Section 2.2.2.11 – fringing marsh and shoreline restoration, sediment removal, and sediment/materials placement – generally consist of the more acute impacts caused by the use of heavy equipment on site followed by lasting benefits. Consequently, these techniques are grouped together in the analysis of impacts.*
>
> *Construction impacts from sediment removal, materials placement, and shoreline stabilization activities are similar, and would cause direct and indirect, short-term, localized, minor adverse impacts on* ***geology and soils, water, living coastal and marine resources and EFH, and threatened and endangered species*** *during the implementation phase of the projects.*
>
> *Potential impacts to* ***air quality*** *could include direct, short-term, minor adverse impacts to air quality during construction or other on-the-ground activities. . .*
>
> *Impacts to* ***living coastal and marine resources, EFH, and threatened and endangered species*** *may include effects from handling, noise, turbidity, contaminants, changes to hydrology, and displacement (see Section 4.7 for more details). . .*
>
> *These restoration activities may impact vegetation on the project site or nearby. Impacts to vegetation should be minimal, as the most frequently removed mature plants would not be native to the site or would be invasive species. . .*
>
> *Increased water turbidity and temporary decreases in water quality may result from sediment removal, materials placement, and shoreline stabilization activities, which may in turn impact living resources in the area. . .*

> *After construction, these projects would result in direct and indirect long-term or permanent, moderate to major beneficial impacts* ***to geology and soils, water, living coastal and marine resources and EFH, and threatened and endangered species****, and minor beneficial impacts related to socioeconomic resources as a result of increased tourism opportunities that could result from an improved resource.*
>
> *Sediment removal, materials placement, and shoreline stabilization activities would result in beneficial impacts by restoring or creating wetland and/or shallow-water habitats that provide areas for feeding and shelter for fish, as well as nutrient cycling and carbon sequestration and storage capacity. Changes in* ***land use*** *would be permanent if uplands were converted to wetlands. In general, increases in wetlands are beneficial impacts, due to the historic loss of wetland habitat.*
>
> *Minor adverse impacts to* ***cultural and historic resources*** *may occur during wetland restoration, when historic structures are present within a project site. . .*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Removal of structural remnants; design and construction of wetland habitat; design and construction of stormwater treatment system.
- Shaker Glen and Scalley Dam: Green infrastructure improvements for storm water management.
- Green Infrastructure improvements for stormwater management at Horn Pond, Wedge Pond, and Winter pond.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.5 Wetland Restoration: Wetland Planting

According to the RC PEIS (Section 4.5.2.11.3), the impacts of Wetland Restoration: Wetland Planting, include the following:

> *Wetland planting may occur as a separate restoration activity or in combination with other restoration types described in this document. Planting may cause short-term, direct adverse impacts to* ***living coastal and marine resources*** *when existing vegetation is trampled during the donor harvest or planting process. Planting is generally short-term in duration, lasting days to weeks, but the length of time between the restoration efforts that prepare a site for planting and when planting is begun may be several months, as planting cannot be completed outside the local growing season. . .*
>
> *Minor adverse impacts to* ***cultural and historic resources*** *may occur during wetland restoration, when historic structures are present within a project site.*
>
> *Long-term, moderate beneficial impacts to* ***water resources, living coastal and marine resources and threatened and endangered species*** *would occur due to the erosion reduction and increased shelter provided by wetland plants. . . Wetland planting activities would result in beneficial impacts by restoring or creating wetland and/or shallow-water habitats that provide areas for feeding and shelter for fish, as well as nutrient cycling and carbon sequestration and storage capacity. Changes in* ***land use*** *would be similar to those described above in Section 4.5.2.11.2. Minor beneficial impacts related to socioeconomic resources may result from increased tourism opportunities that could develop around an improved resource.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Installation of native plants.
- Mill and Judkins Ponds: Plant native species
- Davidson Park (HWG Option 2 and Option 3): Installation of native plants in riparian wetlands.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.6 Freshwater Stream Restoration: Channel Restoration

According to the RC PEIS (Section 4.5.2.5.1), the impacts of Freshwater Stream Restoration: Channel Restoration, include the following:

> *Construction activities related to restoration of in-stream channel and off-channel habitat can cause direct and indirect, short- and long-term, minor and moderate, localized, beneficial and adverse impacts.* ***Geology and soils*** *and* ***water resources*** *would receive direct, short-term, minor adverse impacts due to a temporary increase in turbidity and exposure of bare stream banks as a result of the restoration activity. Channel and in-stream restoration can involve the use of heavy equipment, which could disturb soil and the channel beds. Exposure of bare soil can cause erosion, and channel bed disturbances can cause stream turbidity. . .*
>
> *Direct, long-term, moderate beneficial impacts (including increased bank stability, water oxygenation and in-stream wood retention, diverse winter rearing habitat, and increased pool depth for aquatic resources) would likely be the predominant result from this restoration activity. Potential impacts to* ***air quality*** *could include direct, short-term, minor adverse impacts to air quality during construction or other on-the-ground activities. . .*
>
> *In-stream and off-channel restoration would cause direct and indirect, short- and long-term, minor and moderate, beneficial and adverse impacts to* ***living coastal and marine resources and EFH*** *and* ***threatened and endangered species****. . .*
>
> *In-stream channel restoration could have direct, minor, short- and long-term adverse impacts on* ***cultural and historic resources*** *if unknown sites are disturbed during construction. . .*
>
> *This restoration activity will also have direct, short- and long-term, minor and moderate adverse and beneficial impacts to* ***land use and recreation*** *because increases in recreational opportunity will likely occur in the project area and beyond in the larger river system in the long term; however, short-term use may be curtailed during construction activities. . . [I]n-stream restoration activities can result in indirect short and long-term, minor and moderate beneficial impacts to* ***socioeconomics****.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Reconstruction of the original stream channel and related in-stream habitat restoration.
- Scalley Dam: Design and installation of a bioswale/rain garden.
- Davidson Park (HWG Option 2 and Option 3): Dredging of accumulated sediments, conversion of existing pond to natural riverine floodplain environment, construction of a restored river channel.
- Davidson Park (HWG Option 3): Construction of an offline pond.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.7 Freshwater Stream Restoration: Bank Restoration and Erosion Reduction

According to the RC PEIS (Section 4.5.2.5.2), the impacts of Freshwater Stream Restoration: Bank Restoration and Erosion Reduction, include the following:

> *Bank restoration and erosion reduction activities would cause direct and indirect, short-term, minor adverse impacts on* ***geology and soils, water, air quality, living coastal and marine resources and EFH,*** *and* ***threatened and endangered species*** *during the on-the-ground implementation phase. Impacts to threatened and endangered species may include effects from handling, noise, turbidity, contaminant exposure, altered hydrology, additional habitat quality/quantity, displacement, and mortality (see Section 4.7 for more details). . . By protecting erodible or unstable soils, bank restoration and erosion reduction would result in indirect, long-term, minor and moderate beneficial impacts to* ***water*** *quality and benthic habitat in wetlands, water bodies, and other sensitive riparian or coastal habitats where erosion is a problem beyond the project site. . .*
>
> *Bank restoration and erosion reduction activities could cause indirect, long-term, minor impacts on* ***cultural and historic resources*** *and* ***land use*** *either localized to or beyond the project site. The land use would change from its presently managed or otherwise cultural/ historic condition to a vegetated, more natural condition at each proposed project site. . .*
>
> *This restoration activity will also have direct, short- and long-term, minor and moderate, adverse and beneficial impacts to* ***land use and recreation*** *because increases in recreational opportunity will likely occur in the project area and beyond in the larger river system in the long term; however, short-term use may be curtailed during construction activities. Increased fishing pressure may occur in the short and long term. Channel restoration activities are widely implemented through the use of volunteers and conservation corps groups, and are a source of local employment and job training in many rural areas. As such, in-stream restoration activities can result in indirect short and long-term, minor and moderate beneficial impacts to* ***socioeconomics****.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen and Scalley Dam: Green infrastructure improvements for storm water management.
- Davidson Park (HWG Option 2 and Option 3): Localized riverbank stabilization and restoration of riverbank and buffer area habitat.
- Horn Pond Brook: Stream bank restoration to reduce erosion.
- Green infrastructure improvements for stormwater management at Horn Pond, Wedge Pond, and Winter pond.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.8 Fish, Wildlife, and Vegetation Management: Invasive Species Control

According to the RC PEIS (Section 4.5.2.4.1), the impacts of Fish, Wildlife, and Vegetation Management: Invasive Species Control include the following:

> *The impacts of invasive species removal ultimately benefit the immediate ecosystem by allowing native species the chance to re-establish. . .Generally, invasive species removal activities may cause direct, short-term, localized, minor adverse impacts to the affected area from mechanical or human activities. For terrestrial and aquatic invasive plant removal, direct adverse impacts to* ***geology and soils*** *may include compaction, whereas impacts to in-water substrate and* ***water resources*** *may include ephemeral sedimentation, turbidity, or other water quality impacts. However, long-term moderate to major beneficial impacts to* ***geology and soils, water resources, coastal and marine resources, and EFH*** *and* ***threatened and endangered species*** *would result as non-native species are replaced by diverse native plant and animal communities.*
>
> *Herbicide use for removal of invasive plant species could cause direct, short-term, moderate, adverse impacts to* ***geology and soils, water, air, living coastal and marine resources and EFH, threatened and endangered species,*** *and* ***land use and recreation****. These impacts would result from the potential for lethal effects on soil biota and the short-term loss of shading and habitat for prey species provided by the invasive plant. . .*
>
> *Once the target species has been appreciably diminished or extirpated from the management area, habitat restoration and long-term monitoring are critical to mitigate further harm to native species. Whether or not an area can recover naturally (i.e., by allowing desirable populations to recover without taking further action) depends upon a number of ecological and site-specific factors. However, restoration is often necessary to avoid the replacement of one invasive species with another or to prevent soil erosion or other problems associated with the absence of biological materials through such activities as emergency soil stabilization, replanting, and monitoring. . .*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Shaker Glen: Invasive species control.
- Davidson Park (HWG Options 2 and Option 3): Invasive species control.
- Horn Pond Brook: Replace invasive species with native species.
- Mill and Judkins Ponds: Selectively clear invasive species.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.9 Planning, Feasibility Studies, Design Engineering, and Permitting

According to the RC PEIS (Section 4.5.1.1), the impacts of Planning, Feasibility Studies, Design Engineering, and Permitting, include the following:

> *The completion of project planning, feasibility studies, design engineering studies, and permitting activities would cause indirect, long-term, beneficial impacts to the affected environment. These activities would support the continued implementation of the most successful projects and therefore result in effective and efficient habitat restoration. Some feasibility studies would cause direct, short-term, minor impacts through associated fieldwork, including drilling into* ***soil*** *or sediment with an augur, drill rig, or other tools to remove surface, subsurface, or core samples. These impacts would be very minor and localized to the project site given how small such areas are in relation to an overall project area. Similar short-term impacts to* ***living coastal and marine resources and***

> ***EFH, and threatened and endangered species*** *may include effects from handling, noise, and displacement (see Section 4.7 for more details).*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- All projects will have planning and permitting activities. Some of the projects will also have feasibility studies and design engineering studies.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.10 Implementation and Effectiveness Monitoring

According to the RC PEIS (Section 4.5.1.2), the impacts of Implementation and Effectiveness Monitoring, include the following:

> *The environmental consequences of the initial implementation of restoration monitoring could cause direct and indirect, short-term, minor, localized, adverse impacts. Impacts to* ***threatened and endangered species*** *may include effects from handling, noise, turbidity, displacement and mortality (see Section 4.7 for more details). These impacts would result from activities associated with in-water or on-site observation or experimentation, such as the use of equipment for sampling or monitoring of organisms (see also Section 4.5.1.3 – Fish and Wildlife Monitoring below). Although these adverse impacts may occur, the monitoring products would result in indirect, long-term, minor to major beneficial impacts that extend beyond the project site. The benefits would allow future restoration proposals to be planned with better information and implemented more effectively by using the most successful methods, materials, or equipment for achieving the goal of restoration.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- All projects are required to have implementation and effectiveness monitoring.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.11 Fish and Wildlife Monitoring

According to the RC PEIS (Section 4.5.1.3), the impacts of Fish and Wildlife Monitoring, include the following:

> *Fish and wildlife monitoring activities are related to monitoring the performance and progress of restoration projects relative to their established project goals. Because monitoring can allow for smarter decision-making, projects using this technique could cause indirect, long-term, minor to major beneficial impacts to* ***geology and soils, water resources, living coastal and marine resources, and threatened and endangered species*** *that may be localized or extend beyond the project site. . .*
>
> *In addition, indirect and direct, short-term, localized, minor to moderate adverse impacts* ***to living coastal and marine resources and EFH, and threatened and endangered species*** *may include effects from handling, noise, turbidity, displacement, and mortality (see Section 4.7 for more details).* ***Cultural and historic resources*** *may be impacted if disturbed during monitoring activities. Projects with successful monitoring programs would likely be more successful than those without such programs because monitoring*

> *would allow problems and flaws to be identified early in the process and corrected. Newly established invasive species also would be identified quickly, contained, and eradicated before they become widely established. Monitoring programs would have direct and indirect, long-term, minor beneficial impacts on* ***land use and socioeconomics*** *that extend beyond any project site, because the information gathered and any involvement of local citizens in environmental projects would promote environmental stewardship, an understanding of living coastal and marine resources and environmental issues, and a sense of community pride.*
>
> *Despite the beneficial impacts expected from this activity, monitoring could cause adverse impacts. Direct, short-term, localized, minor adverse impacts are expected to* ***geology and soils*** *from the human presence and movement around the project site (i.e., from soil compaction). Direct, short-term, localized, minor adverse impacts are also expected to air quality and noise at the project site due to the presence of crew members. . . Direct, short-term, localized, minor adverse impacts may occur to* ***water quality*** *because, depending on the water body's substrate, turbidity may increase from the movement of crew members throughout the project site. Potential impacts to* ***air quality*** *could include direct, short-term, minor adverse impacts to air quality during construction or other on-the-ground activities. . .Direct, short-term, localized, minor, adverse impacts would occur to* ***land use and recreation*** *because anglers or other individuals recreating at the project site may need to vacate or avoid the site in order to avoid interacting with monitoring activities. . .*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Pre- and post-project monitoring at Shaker Glen.
- Education and outreach project: All activities associated with herring monitoring at Scalley Dam.
- Freshwater Mussel and Clam Study.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.12 Environmental Education Classes, Programs, Centers, Partnerships, and Materials; Training Programs

According to the RC PEIS (Section 4.5.1.4), the impacts of Environmental Education Classes, Programs, Centers, Partnerships, and Materials; Training Programs, include the following:

> *Projects that provide environmental education classes, programs, and centers; encourage and maintain partnerships with local school systems; and fund the development of education materials would have direct and indirect, long-term, minor beneficial impacts on* ***geology and soils, water resources, living coastal and marine resources and EFH, threatened and endangered species, land use, and socioeconomics****. The beneficial impacts would result because education of local citizens and youth about environmental issues in the community and beyond, habitat restoration, and conservation would promote environmental stewardship, an understanding of living coastal and marine resources and environmental issues, and a sense of community pride. . .*
>
> *Projects that provide education programs on wildlife would have indirect, long-term, minor beneficial impacts on* ***water resources, living coastal and marine resources and EFH, and threatened and endangered species****, because they would encourage*

> *conservation, understanding, and environmental stewardship with respect to wildlife. Wildlife education programs would have no impacts on* ***geology and soils, cultural and historical resources, land use, or socioeconomics****. Projects are not likely to adversely impact* ***threatened and endangered species****. . .*
>
> *Projects that train volunteers to participate in restoration projects and provide outreach and education to the community would have indirect, long-term, minor beneficial impacts on* ***all resources*** *because training and involvement of local citizens in environmental projects would promote environmental stewardship, an understanding of living coastal and marine resources and environmental issues, and a sense of community pride. Projects are not likely to adversely impact* ***threatened and endangered species****.*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Education and outreach activities to be incorporated into Tier 1 projects. Downstream Fish Passage Restoration at Mystic Lakes Dam (Tier 2): Interpretation and educational components.
- Riverine, Floodplain, and Riparian Habitat Restoration at Davidson Park ("HWG Option 3"): Education and outreach components.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.13 Road Upgrading and Decommissioning: Trail Restoration

According to the RC PEIS (Section 4.5.2.7), the impacts of Road Upgrading and Decommissioning: Trail Restoration, include the following:

> *Road upgrading and decommissioning, and trail restoration activities would cause direct and indirect, short-term, minor and moderate adverse impacts, typically in riparian and upland affected environments, resulting from temporary construction activities in the project area. Aside from construction impacts, however, most of the impacts resulting from these activities would be direct and indirect, moderate to major beneficial impacts, as they are designed to control access to sensitive areas, limit the use of sensitive areas as routes for vehicular transportation, and reduce a road's propensity for erosion. . .*
>
> *Activities involving the decommissioning or upgrading of roads that travel through or adjacent to, or are located within watersheds that feed into, sensitive habitat areas would have direct and indirect, short-term, minor and moderate adverse impacts on* ***geology and soils, water resources, air quality, living coastal and marine resources and EFH, threatened and endangered species, and land use****. Impacts to* ***threatened and endangered*** *species may include effects from handling, noise, turbidity, contaminant exposure, altered hydrology, additional habitat quality/quantity, displacement, and mortality (see Section 4.7 for more details). These impacts would result from temporary construction activities in the project area. . .*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Davidson Park (HWG Option 2 and Option 3): Construction of a new pedestrian river walk with wildlife viewing areas; reconstruction of the former pedestrian footbridge.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.2.14 Signage and Access Management

According to the RC PEIS (Section 4.5.2.8), the impacts of Signage and Access Management, include the following:

> *Temporary or permanent fencing, signage, or netting is intended to eliminate or reduce degradation of streams, streambanks, lakeshores, riparian/wetland vegetation, and unstable upland slopes. The effects of livestock grazing, human access, and vehicle traffic on riparian and instream habitats can be detrimental to habitat quality. . .*
>
> *The installation of temporary or permanent fencing, signage, or netting would have direct, long-term (fencing would likely have a long-term impact, but not netting), moderate beneficial impacts on the* ***geology and soils*** *of the project site, and on* ***water resources****,* ***living coastal and marine resources and EFH****, and* ***threatened and endangered species*** *beyond the project site. The benefits of these actions are reduced disturbance by humans, animals, and vehicles. . .*

The Trustees identified the following proposed restoration activities as relevant to this impact category:

- Many of the restoration projects will require temporary or permanent fencing, signage, or netting to protect the restoration activities during and after construction.

The Trustees have determined that the impacts from these proposed restoration activities fall within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts.

6.3. Summary of Environmental Impacts of the Analyzed Alternatives

Based on the analysis in this Draft RP/EA, the Trustees have made the preliminary determination that the projects in Alternative 1 (preferred) and the projects in Alternative 2 (non-preferred) are within the range of alternatives and scope of potential environmental consequences analyzed in the RC PEIS and do not have significant adverse impacts. Moreover, the Trustees have fully considered and determined that there are no geographic, project- or site-specific conditions, sensitivities, unique habitat, or resources (with the exception of EJ, which is discussed below and in Section 7.2.1) that warrant additional NEPA analyses beyond what is provided in the RC PEIS. While the adverse impacts of Alternative 1 and Alternative 2 would be similar, Alternative 2 would provide fewer benefits.

The Trustees also found that the proposed projects would benefit the EJ communities described in Section 2, by improving the quality of the natural environment and providing educational and recreational benefits to the community. None of the alternatives are expected to adversely impact EJ communities.

Based on the analysis of environmental consequences in this Draft RP/EA, the Trustees' preliminary findings indicate that the alternatives evaluated in this Draft RP/EA would not result in any significant impacts on the human environment in accordance with the guidelines for determining the significance of proposed federal actions (40 CFR 1508.27). After public comments are addressed and if the preliminary findings are confirmed, the federal Trustee agencies will issue a FONSI appended to the Final RP/EA.

6.4. Impacts of the No-Action Alternative

Under the no-action alternative, there would be no direct impacts to the ecological and socioeconomic environment; however, no habitats would be preserved, restored, or enhanced beyond what municipalities, agencies, and organizations such as the Town of Winchester, City of Woburn, and MyRWA, are already doing in the area with limited existing resources. Aquatic, riparian, and wetland habitats would continue to be degraded along the Aberjona River and its tributaries. Herring populations and populations of other diadromous fish would saturate currently available habitat and be unable to grow without access to additional habitat. Local populations would not benefit from improved recreational

opportunities and increased education and stewardship. Future generations would not have access to an improved environment.

6.5. Cumulative Impacts of the Proposed Action Alternatives and the No-Action Alternative

Under NEPA, federal agencies are required to consider the cumulative effects of their proposed actions within the affected environment, taking into consideration other activities that have occurred, are occurring, and are likely to occur in the future.

The Trustees expect that there will be a long-term, minor to moderate positive cumulative effect on the biological and physical health of the Aberjona River watershed under Alternative 1 (preferred). The four Tier 1 projects (Shaker Glen, Scalley Dam, Davidson Park, education and outreach at all Tier 1 sites) cumulatively provide water quality, fish passage, and habitat benefits to the Aberjona River watershed, as well as monitoring, education, and outreach to support those restoration efforts. These benefits would be enhanced if Tier 2 projects can be funded and implemented. The Tier 2 projects would cumulatively provide additional water quality, fish passage, and habitat benefits to the Aberjona River watershed.

In addition to the projects proposed in this RP/EA, other actions are being undertaken throughout the Mystic River watershed to improve water quality, wetland and riverine habitat, and fish passage. For example, MVP grants are available to municipalities in the region to understand and mitigate the risks of climate change to their communities. These funds can be used to address stream and river related flood risk, which can work synergistically with the projects proposed in this plan. In addition, MyRWA is actively engaged in numerous initiatives to improve the connectivity, water quality, and resilience of the Mystic River watershed with a range of municipalities in the state. Finally, MassDEP is working with EPA to develop a Total Maximum Daily Load for Horn Pond (Woburn) Wedge Pond (Winchester) and Spy Pond (Arlington), which can help improve the water quality of these water bodies over the long term.

Based on the analysis in the RP PEIS combined with the Trustees' understanding of reasonably foreseeable future actions, cumulative impacts of Alternative 1 on relevant resources (geology and soils, water resources, air quality, living coastal and marine resources and EFH, threatened and endangered (T&E) species, cultural and historic resources, land use and recreation, and demographics) are expected to be minor to moderate short-term to long-term adverse impacts and minor to moderate long-term beneficial impacts.

As with Alternative 1, for Alternative 2 (non-preferred action alternative), the Trustees expect a minor to moderate positive cumulative effect on the biological and physical health of the Aberjona River watershed. However, the magnitude of the positive effect would be smaller than under Alternative 1 because Alternative 2 includes more studies and less investment in on-the-ground restoration projects providing direct benefits to injured resources. Also, Alternative 2 includes the non-preferred alternative for Davidson Park, which maintains a pond environment and constrains the benefit of the riparian restoration and channel reconstruction. Similar to Alternative 1, the cumulative impacts of Alternative 2 on relevant resources (geology and soils, water resources, air quality, living coastal and marine resources and EFH, T&E species, cultural and historic resources, land use and recreation, and demographics) are expected to be minor to moderate short-term to long-term adverse impacts and minor to moderate long-term beneficial impacts. Cumulative impacts resulting from Alternative 1 and Alternative 2 are not expected to be significant as defined under NEPA.

Under Alternative 3 (no-action/natural recovery), the Trustees anticipate that there would be a long-term adverse effect to the physical and biological resources of the Aberjona River watershed. While the MVP grant to the City of Woburn described earlier would support restoration of the Horn Pond Brook area, there would no further investments in restoration to offset injuries that occurred to natural resources

resulting from releases at the Site. However, the adverse cumulative effect of the no-action alternative is not expected to be significant as defined under NEPA.

7. Compliance with Other Authorities

The following federal, state, and local laws, regulations, and policies may affect completion of the restoration projects. Compliance with these authorities was considered as part of the restoration planning process. All project sponsors that receive NRDAR funding will be responsible for obtaining necessary permits and complying with relevant local, commonwealth, and federal laws, policies, and ordinances.

7.1. Laws

7.1.1 Federal Laws

National Environmental Policy Act

NEPA requires that federal agencies consider the environmental impacts of proposed actions and reasonable alternatives to those actions. The Authorized Officials will determine, based on the facts and recommendations in this document and input from the public, whether this EA supports a FONSI or whether an EIS will need to be prepared.

Clean Water Act

The CWA is intended to protect surface water quality and regulates discharges of pollutants into waters of the United States. All proposed restoration projects will comply with CWA requirements, including obtaining any necessary permits for proposed restoration actions.

Restoration projects that move material in or out of waterways and wetlands, or result in alterations to a stream channel, typically require CWA Section 404 permits. Dam removal actions also require 404 permits. Project sponsors will be required to obtain the appropriate permits before restoration work begins.

As part of the Section 404 permitting process, consultation under the Fish and Wildlife Coordination Act, 16 USC § 661 *et seq.* generally occurs. This act requires that federal agencies consult with the USFWS, the National Marine Fisheries Service, and state wildlife agencies to minimize the adverse impacts of stream modifications on fish and wildlife habitat and resources.

Compliance with the Rivers and Harbors Act, 33 USC § 401 *et seq*., generally occurs as part of the Section 404 permitting process. The Rivers and Harbors Act prohibits unauthorized obstruction or alteration of navigable waters. Any required permits under the Rivers and Harbors Act are generally included with the Section 404 permitting process.

Endangered Species Act

The Federal ESA of 1973, as amended, 16 USC §§ 1531 *et seq.*, was designed to protect species that are threatened with extinction. It provides for the conservation of ecosystems upon which these species depend and provides a program for identification and conservation of these species. Federal agencies are required to ensure that any actions are not likely to jeopardize the continued existence of a T&E species. No federal T&E species are known to reside in areas that would be affected by the proposed restoration projects. However, project sponsors may be required to consult with the Endangered Species Program of the USFWS before implementation in certain cases.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 as amended, 16 USC §§ 703-712, protects all migratory birds and their eggs, nests, and feathers and prohibits the taking, killing, or possession of migratory birds. The proposed restoration actions would not result in the taking, killing, or possession of any migratory birds.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, 16 USC §§ 470 et seq., is intended to preserve historical and archaeological sites. Compliance with the NHPA would be undertaken through consultation with the State Historic Preservation Office, which in Massachusetts is the Massachusetts

Historic Commission, established by M.G.L. Ch. 9, s. 26. Section 106 of this statute requires that federal agencies take into account the impact that their actions (permitting, licensing, funding) may have on historic properties. "Historic property" is any district, building, structure, site, or object that is eligible for listing in the NRHP because the property is significant at the national, state, or local level in American history, architecture, archeology, engineering, or culture. Federal agencies consult and coordinate with State Historic Preservation Officers/Tribal Historic Preservation Officers and other consulting parties to identify historic properties that may be affected by the proposed project and assess adverse effects of the actions.

Occupational Safety and Health Act

The Occupational Safety and Health Act (OSHA) of 1970, as amended, 29 USC §§ 651 *et seq*., governs the health and safety of employees from exposure to recognized hazards, such as exposure to toxic chemicals, excessive noise, mechanical dangers, and unsanitary conditions. All work conducted on the proposed restoration actions will comply with OSHA requirements.

7.1.2 State Laws

Article 97 of the Commonwealth of Massachusetts Constitution (1972)

"The people shall have the right to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment; and the protection of the people in their right to the conservation, development and utilization of the agricultural, mineral, forest, water, air and other natural resources is hereby declared to be a public purpose. The general court shall have the power to enact legislation necessary or expedient to protect such rights."

"In the furtherance of the foregoing powers, the general court shall have the power to provide for the taking, upon payment of just compensation therefore, or for the acquisition by purchase or otherwise, of lands and easements or such other interests therein as may be deemed necessary to accomplish these purposes. Lands and easements taken or acquired for such purposes shall not be used for other purposes or otherwise disposed of except by laws enacted by a two thirds vote, taken by yeas and nays, of each branch of the general court."

Executive Office of Energy and Environmental Affairs (M.G.L. c. 21A) and its land acquisition regulations (M.G.L. Chapter 51.00) and policies (1995)

EEA has adopted policies governing appraisals, environmental site assessments and surveys with respect to acquisition of real property for Article 97 purposes or interests therein.

Inland Fisheries and Game, M.G.L. Chapter 131: Section 47, Riparian Proprietors; Enclosure of Waters

Section 47. No riparian proprietor of a natural pond other than a great pond, or of an artificial pond of any size, or of a non-navigable stream, shall enclose the waters thereof within the limits of his own premises unless he furnishes a suitable passage for all anadromous fish naturally frequenting such waters to spawn; nor shall any riparian proprietor enclose the waters of any such pond or stream for the purpose of artificial propagation, cultivation and maintenance of fish, except shiners as authorized in section fifty-two, unless he first procures a propagator's license under section twenty-three authorizing him so to do.

A person, without the written consent of the proprietor or lessee of a natural pond which is not a great pond, or of an artificial pond of any size, or of a non-navigable stream, where fish are lawfully propagated or maintained under authority of a license under this chapter, shall not take, or attempt to take, fish therefrom.

Marine Fish and Fisheries, M.G.L. Ch. 130, s. 19

For the purpose of providing suitable passage for salt water fish coming into fresh water to spawn, the Massachusetts DMF, may (1) seize and remove, summarily if need be, at the expense of the owner using and maintaining the same, all illegal obstructions, except dams, mills or machinery, to the passage of such

fish; (2) examine all dams and other obstructions to such passage in brooks, rivers, and streams, the waters of which flow into coastal water, where in his judgment fishways are needed; and (3) shall determine whether existing fishways, if any, are suitable and sufficient for the passage of such fish in such brooks, rivers, and streams or whether a new fishway is needed for the passage of fish over such dam or obstruction; and he shall prescribe by written order what changes or repairs, if any, shall be made therein, and where, how and when a new fishway shall be built, and at what times the same shall be kept open and shall serve a copy of such order upon the person maintaining the dam or other obstruction.

Massachusetts Antiquities Act (M.G.L. Chapter 9, Section 27) and its implementing regulations (950 CMR 70 and 71)

MHC was established by the legislature in 1963 to identify, evaluate, and protect important historical and archaeological assets of the Commonwealth. The act and its implementing regulations provide for MHC review of state projects, State Archaeologist's Permits, the protection of archaeological sites on public land from unauthorized digging, and the protection of unmarked burials. The MHC is the office of the State Historic Preservation Officer, as well as the office of the State Archaeologist. Any new construction projects or renovations to existing buildings that require funding, licenses, or permits from any state or federal governmental agencies must be reviewed by the MHC for impacts to historic and archaeological properties.

Massachusetts Area of Critical Environmental Concern (M.G.L. c. 21A, s. 2(7); 301 CMR 12.00)

ACECs are those areas within the Commonwealth where unique clusters of natural and human resource values exist and which are worthy of a high level of concern and protection. These areas are identified and nominated at the community level and are reviewed and designated by the state's Secretary of Environmental Affairs. ACEC designation creates a framework for local and regional stewardship of critical resources and ecosystems. After designation, the aim is to preserve and restore these areas and all EEA agencies are directed to take actions with this in mind.

Massachusetts Clean Waters Act (M.G.L. 21, Sections 26–53)

This legislation authorizes MassDEP to take all action necessary or appropriate to secure to the Commonwealth the benefits of the Federal Water Pollution Control Act, as amended, and other federal legislation pertaining to water pollution control by establishing a program for prevention, control, and abatement of water pollution through permits, municipal, regional and interstate planning, water quality standards, sampling and reporting, and financial and technical assistance.

Massachusetts General Laws Chapter 21E, and its implementing regulations, the Massachusetts Contingency Plan, 310 CMR 40.0000

The Massachusetts Contingency Plan is intended to comport with and complement the National Contingency Plan promulgated by the EPA under CERCLA, as amended. The MCP provides for the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for assessment and response actions following release or threat of release of oil and/or hazardous material.

Under the provisions of 310 CMR 40.1012: Application of Activity and Use Limitations, (1) the purpose of an Activity and Use Limitation is to narrow the scope of exposure assumptions used to characterize risks to human health from a release of oil and/or hazardous materials pursuant to 310 CMR 40.0900, by specifying activities and uses that are prohibited and allowed at the disposal site in the future. 310 CMR 40.1012 establishes rules for determining when an Activity and Use Limitation must be used, when one cannot be used, and when one may be a factor to be considered in appropriately characterizing risk from exposure to contaminated soil and groundwater at a disposal site, pursuant to 310 CMR 40.0923(3).

Massachusetts Endangered Species Act, M.G.L. Ch. 131A, and its implementing regulations (321 CMR 10.00)

MESA is the Commonwealth analogue to the Federal ESA. MESA lists species as "endangered," "threatened," or a "species of special concern." Before project implementation, project sponsors will be required to consult with the Massachusetts NHESP to ensure that proposed activities do not have a negative effect on species listed under MESA.

***Massachusetts Environmental Policy Act, M.G.L. Ch. 30 § 61* et seq.**

MEPA is the Commonwealth's equivalent of NEPA; it requires that Commonwealth agencies consider and minimize the impacts of their actions on the environment. For a project that requires MEPA and NEPA review, consolidation of these two processes is encouraged. After the Final RP is completed, individual projects that are determined to trigger MEPA thresholds will be required to proceed through a MEPA review.

Massachusetts Surface Water Quality Standards (314 CMR 4.00)

These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, and protected; prescribes the minimum water quality criteria required to sustain the designated uses; and contains regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges.

Public Waterfront Act ("Chapter 91"), M.G.L. Ch. 91

The Division of Wetlands and Waterways within the MassDEP administers Chapter 91, which is designed to protect the public's rights for fishing, waterfowl hunting, and navigation in Massachusetts waterways. All project sponsors with actions that affect waterways will be required to seek the approval of the Division of Wetlands and Waterways under Chapter 91, before implementation. If the Scalley Dam restoration project proceeds to the implementation phase, consultation under Chapter 91 would be required. Other projects that affect waterways also would be required to seek approval before implementation.

Massachusetts Wetlands Protection Act, M.G.L. Ch. 131 §40

The WPA restricts the removal, filling, dredging, or alteration of fresh and salt water wetlands and coastal areas. The Rivers Protection Act strengthens and expands the WPA to protect watercourses and adjacent lands. Local conservation commissions, under oversight from the MassDEP, are responsible for permitting under these acts. All project sponsors whose actions would be subject to these acts will be required to seek approval of the relevant local conservation commissions before proceeding with implementation, as well as notifying nearby landowners and any other affected parties.

401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters within the Commonwealth (314 CMR 9.00)

These regulations are promulgated by MassDEP to carry out its statutory obligations to certify that proposed discharges of dredged or fill material, dredging, and dredged material disposal in waters of the United States within the Commonwealth will comply with the Surface Water Quality Standards and other appropriate requirements of state law.

7.1.3 Local Laws

As appropriate, restoration actions will consider and comply with local plans and ordinances. Relevant local plans could include shoreline and growth management plans. Relevant ordinances could include, but not be limited to, zoning, construction, noise, and wetlands. For example, in Massachusetts, municipal Conservation Commissions are empowered to administer the WPA (M.G.L. Chapter 131 s. 40) and may also adopt local bylaws as well as undertake other activities such as natural resource planning and land acquisition "for the promotion and development of the natural resources and for the protection of watershed resources of said city or town."

7.2. Policies and Directives

7.2.1 Federal Policies and Directives

The following federal policies and Presidential Executive Orders may be relevant to the proposed restoration projects in the proposed alternative.

U.S. Fish and Wildlife Service Mitigation Policy (Fish and Wildlife Service Manual, 501 FW 2)

Executive Order 11988 – Floodplain Management

Under this Executive Order, federal agencies are directed to avoid the occupancy, modification, and development of floodplains, when there is a practical alternative. For all projects, the Trustees will work to ensure that any floodplain impacts are minimized.

Executive Order 11990 – Protection of Wetlands

This Executive Order instructs federal agencies to avoid adverse impacts associated with destruction or modification of wetlands. The Trustees will work to make sure that any wetlands impacts associated with proposed projects are minimized and all necessary permits are obtained.

Executive Order 12898 – Environmental Justice

This Executive Order instructs federal agencies to assess whether minority or low-income populations would be disproportionately impacted by agency actions. There are EJ populations in Woburn and Winchester, MA, but the proposed projects are not expected to adversely affect the environment or human health for these communities. In fact, some aspects of the proposed projects are likely to provide benefits to these communities. For example, nearly all of the restoration projects are anticipated to improve the quality of recreation in projects sites (e.g., improving access to an area, enhancing scenic beauty that can be enjoyed while walking or picnicking, or allowing visitors to better view fish during migration). Community education and outreach efforts are also likely to benefit EJ communities.

7.2.2 State and Local Policies

Massachusetts EEA Land Acquisition Policies

Under the provisions of 301 CMR 51.05, the EEA (then referred to as the Executive Office of Environmental Affairs), established a set of four land due diligence acquisition policies on August 1, 1995. The policies cover appraisals, environmental site assessments, surveys, and title examinations reports.

Massachusetts Executive Order No. 569: Establishing an Integrated Strategy for the Commonwealth

This executive order directs the Secretary of EEA to coordinate and make consistent new and existing efforts to mitigate and reduce greenhouse gas emissions and to build resilience and adapt to the impacts of climate change.

Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs

It is the policy of the EEA that EJ shall be an integral consideration to the extent applicable and allowable by law in the implementation of all EEA programs, including but not limited to, the grant of financial resources, the promulgation, implementation and enforcement of laws, regulations, and policies, and the provision of access to both active and passive open space. Working with EJ populations, EEA will take direct action as part of the implementation of this policy to restore degraded natural resources, to increase access to open space and parks, and to address environmental and health risks associated with existing and potential new sources of pollution. This EJ Policy applies to all agencies of the EEA.

Other State and Local Policies

Proposed restoration projects will consider and comply with other relevant state and local policies and directives such as the EEA EJ policy and MassDEP's Stormwater Discharge policy.

8. Conclusion

The Trustees have developed this Draft RP/EA to facilitate consultation with the public regarding the proposed restoration alternatives. The Trustees seek public comment regarding the proposed alternatives and will consider all public comments received. The Trustees propose to expend approximately $3.7 million to implement the following preferred Tier 1 projects:

- Wetland and stream restoration at Shaker Glen Extension
- Scalley Dam fishway design and construction
- Riverine, floodplain, and riparian habitat restoration at Davidson Park ("HWG Option 2")
- Education and outreach activities to be incorporated into Tier 1 projects.

In addition, the Trustees would support implementation of the proposed Tier 2 projects to the extent that funding remains available after the implementation of the Tier 1 projects:

- Horn Pond Brook streambank and fish passage restoration
- Habitat restoration at Mill and Judkins Ponds
- Downstream fish passage restoration at Mystic Lakes Dam.

The Trustees may distribute any unused administrative funds as well as interest that has accrued on the settlement funds to these proposed projects.

9. List of Parties Consulted

Parties consulted for information include all of the organizations listed in Section 4 that submitted project information forms.

Additional parties consulted include:

- Federal agencies
  - EPA
  - USFWS
  - DOI, Solicitor's Office
  - NOAA
- State agencies
  - MassDEP
  - Massachusetts EEA
  - Massachusetts Fish and Wildlife.

10. References

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Appendix A: Regulatory Reviews

The following regulatory submittals, reviews, and permits may apply to the proposed restoration projects. Not all categories may apply to all projects.

Table A.1. Anticipated Regulatory Submittals, Reviews, and Permits for Proposed Restoration Project

Review/Permit	Agency	Applicability
ENF	MEPA Office	Requires state agency action and review thresholds potentially exceeded. Review thresholds exceeded may include: (1) alteration of 1,000 or more square feet of ORWs, (2) alteration of 500 linear feet of bank, or (3) alteration of one-half or more acres of any type of wetland.
Chapter 253 Dam Safety Permit	Massachusetts DCR, ODS	Any alteration of a jurisdictional dam structure beyond normal maintenance activity.
WPA NOI and Order of Conditions	Local Conservation Commission and MassDEP	Any construction in or near a wetland resource. The site is located within the 200-foot Riverfront Area. The following resource areas regulated under the WPA may also be affected: Bordering Vegetated Wetlands and 100-foot buffer zone, and Bordering Land Subject to Flooding. A field delineation will be necessary to determine the presence or absence of these resources areas. A WPA NOI and an Application for Permit/Determination under a relevant local Wetlands Ordinance would be required to be submitted to the local Conservation Commission. A copy of the NOI filing would also be submitted to MassDEP Bureau of Resource Protection.
CWA Section 404 General Permit	USACE	Discharge of dredged or fill material in a water of the United States, or instream construction activities. A Pre-Construction Notification under the USACE General Permit is required if the project involves one acre of temporary and permanent fill and secondary impacts are expected. An individual Section 404 permit is not anticipated to be required for the proposed projects.
401 WQC	MassDEP	Dredging or any activity resulting in the discharge of dredged or fill material (e.g., sediment release) greater than 100 cubic yards or any amount in an ORW. The watershed of Horn Pond is a public water supply for the City of Woburn and is mapped as an ORW (MassGIS, 2010) under the Massachusetts Surface Water Quality Standards 314 CMR 4.00.
Federal ESA Project Review	USFWS	Projects that require federal funding, licenses, or permitting and that may affect T&E species or designated critical habitat. The Information for Planning and Consultation tool should be used to request information on any federally protected species at the site.
Fishway Permit	Massachusetts DMF	Any activity to construct, reconstruct, rebuild, repair, or alter any anadromous fish passageway.
PNF and Section 106 Historic Review	MHC	Projects that require state or federal funding, licenses, or permitting. Submission of a PNF to MHC would be necessary to ensure consistency with Section 106 of the NHPA. Tribal coordination may also be required, as referenced in Appendix F of the Army Corps General Permit, to ensure consistency with Section 106 of the NHPA.

Review/Permit	Agency	Applicability
NPDES Permit	EPA	Discharges from certain construction sites, including clearing, grading, and excavation activities involving an acre or more of land disturbance.
Non Traditional Work Practice Removal	MassDEP BA&W	Under BA&W abatement program (310 CMR 7.15), removal of asbestos commingled with soil requires explicit approval of a work plan prior to commencement.
Immediate Response Action	MassDEP Bureau of Waste Site Cleanup	Under the 21E program / Massachusetts Contingency Plan (310 CMR 40.00), identification of one or more pounds of asbestos during soil removal activities would trigger a two-hour notification to MassDEP and immediate response actions (IRAs).
LOMR	FEMA	Required when a project results in an increase in the BFE.

Appendix B: Signature Pages

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs

Approval of the Draft Restoration Plan and Environmental Assessment for the Industri-Plex Superfund Site City of Woburn, Middlesex County, Massachusetts

In accordance with Trustee protocol regarding documentation for Natural Resource Damage Assessment and Restoration (NRDAR) projects, the Massachusetts Executive Office of Energy and Environmental Affairs is providing its approval of the Draft Restoration Plan and Environmental Assessment for the Industri-Plex Superfund Site in Woburn, Massachusetts.

The Draft Restoration Plan and Environmental Assessment (RP/EA) is hereby approved. This approval does not extend to the Final RP/EA. The Draft RP/EA shall be released for public review and comment for a minimum of 45 days. After consideration of the public comments received, the RP/EA may be revised, with the Final RP/EA to address such comments.

Approved by:

K. Theoharides 12/10/19

Kathleen A. Theoharides, Secretary Date:
Executive Office of Energy and Environmental Affairs
Commonwealth of Massachusetts

National Oceanic and Atmospheric Administration
Approval of the
Draft Restoration Plan and Environmental Assessment
for the
Industri-Plex Superfund Site
Town of Woburn, Middlesex County, Massachusetts

By the signatures below, the Draft Restoration Plan and Environmental Assessment (RP/EA) is hereby approved. This approval does not extend to the Final RP/EA. The Draft RP/EA shall be released for public review and comment for a minimum of 45 days. After consideration of the public comments received, the RP/EA may be revised, with the Final RP/EA to address such comments.

Approved by:

DOLEY.CHRISTOPHER.D.1365844042 Digitally signed by DOLEY.CHRISTOPHER.D.1365844042
Date: 2020.02.18 08:56:55 -05'00'

Christopher Doley
Division Chief
NOAA Restoration Center
U.S. Department of Commerce

Date

U.S. Department of the Interior
Approval of the
Draft Restoration Plan and Environmental Assessment
for the
Industri-Plex Superfund Site
Town of Woburn, Middlesex County, Massachusetts

In accordance with U.S. Department of the Interior (DOI) policy regarding documentation for natural resource damage assessment and restoration projects (521 DM 3), the Authorized Official for DOI must demonstrate approval of draft and final restoration plans and their associated National Environmental Policy Act documentation, with concurrence from DOI's Office of the Solicitor.

The Authorized Official for the Industri-Plex Superfund Site is the Regional Director for the U.S. Fish and Wildlife Service's North Atlantic-Appalachian Region.

By the signatures below, the Draft Restoration Plan and Environmental Assessment (RP/EA) is hereby approved. This approval does not extend to the Final RP/EA. The Draft RP/EA shall be released for public review and comment for a minimum of 45 days. After consideration of the public comments received, the RP/EA may be revised, with the Final RP/EA to address such comments.

Approved by:

Wendi Weber
Regional Director
North Atlantic-Appalachian Region
U.S. Fish and Wildlife Service

Date: 1/22/2020

Concurred:

Mark arash
Senior Attorney
North Atlantic-Appalachian Region
Office of the Solicitor

Date: 27/2019