

ALTON MILLPOND

Rehabilitation Master Plan

A Project to Enhance Shaw's Creek, a Tributary of the Credit River



April 2015

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Canada

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Introduction and Background



Introduction

The Millpond Rehabilitation project proposes to restore the beauty and function of the pond, improve the ecosystem health of Shaw's Creek, expand recreational and educational opportunities and resume its historic function as a source of green energy.

Background

The Alton Millpond is part of the Alton Mill Arts Centre property and a defining feature of the Village of Alton. It is an important environmental, cultural and recreational resource for the Town of Caledon and beyond.

The 1.4ha (3-acre) millpond was originally created in the 1880s to use the stored energy of Shaw's Creek, a tributary of the Credit River, to power the Alton Mill's woolen machinery. The mill was converted to other forms of production but remained in operation as a water-powered mill until 1982. The millpond today is a significant visual and recreational resource adjacent to the village main street.

The creation of the millpond also initiated long-term environmental problems. The pond has been slowly deteriorating, impairing both its cultural and green energy functions, negatively affecting fish habitat and impairing the overall health of Shaw's Creek.

The Alton Millpond is now in need of rehabilitation in order to reduce sediment deposition, restore fish passage, improve water quality and enhance the cold water fish habitat of Shaw's Creek. Beyond that, the intentions are to restore the potential for hydro-electric generation, improve the visual qualities, expand the recreational and educational opportunities for residents and visitors, and support the local economy.

The Alton Millpond Rehabilitation Committee

The millpond rehabilitation project was initiated in June 2009 with the formation of a committee which included representation from the owners of the millpond, local and regional government and agencies, environmental groups, businesses, community groups and private citizens from Alton. This committee has orchestrated and overseen the promotion, fundraising and outreach for the project and has commissioned preliminary engineering and other technical studies.

Environmental Responsibility and Stewardship

Having respect for and taking responsibility for the stewardship of the built and natural environment are the over-arching principles for all aspects of the Alton Millpond Rehabilitation project and associated works. This means being sensitive to the natural ecological processes, using resources carefully, doing the most with what already exists and intervening as gently as possible, where corrective measures are required.

The Alton Mill is a local landmark and tourism destination with great opportunity to serve as a showcase for dam mitigation/stream restoration and for education about the importance of coldwater habitat and environmental stewardship. The project will serve as a public demonstration site for other landowners who may be interested in dam mitigation projects on their own property.

Habitat Stewardship Program

Through Environment Canada's Habitat Stewardship Program (Prevention Stream), the Government of Canada has provided funding for this project. The aim of the program is to support the stewardship of private and public lands and resources and in this case, to enhance the habitat for Brook Trout and other identified species in Shaw's Creek through the rehabilitation of the Alton Millpond and related structures.

Synergy between Art and Environment

The Millpond project offers a special opportunity to fully integrate art with the natural restorative processes and the rehabilitative engineering. Artist Noel Harding brings his creative approach to link and connect the Alton Mill Arts Centre, as an arts-focused facility, with an underlying respect for heritage preservation, environmental protection and sustainable practices. It is anticipated that the art component will increase the project's value in terms of public attention, excitement and access to funding sources.

An Important Part of the Community

Through its active involvement in promoting the millpond's rehabilitation, nurturing corporate support, participating in programmed activities and in local fund-raising, the community has demonstrated that it strongly values and has a sense of a proprietary interest in the Millpond and its sustainable future.

Economic Benefits

The Millpond Rehabilitation Project has social, recreational and educational value but it is also seen by the community to have significant economic value. Restoration of Brook Trout habitat alone will add further attraction to sport fishing in the Credit River which already is estimated, by Credit River Fishery, to support 30,000 angler days per year for a value of \$48 million. The project complements the Town of Caledon's 2014 Tourism Strategy and Community Improvement Plan study presently underway.

In broader terms, the integration of environmental art, the inclusion of boardwalks and extended interpretive trails, expanded summer and winter pond facilities and programs together with other recreational and educational aspects of the project will strongly support the tourism role of the Alton Mill Arts Centre and other local enterprises. These will undoubtedly lead to increased economic benefits to the entire community.

Ecosystem Approach

It is recognized that this project will have implications beyond just the subject property. The ecosystem approach views all things as being interconnected and as such, it is anticipated the project will yield off-site impacts, which will require consideration during design and implementation to avoid negative impacts to the watershed.

The Millpond Rehabilitation Master Plan

This document is a comprehensive Master Plan for the rehabilitation of the Alton Millpond seen within the context of its broader cultural and natural landscape. The Master Plan is the guiding document for projects to restore, rehabilitate, reconstruct, present and celebrate the natural and cultural landscape of Alton Millpond and associated ecosystem of Shaw's Creek.

The Master Plan sets out the long term vision and a series of planning and design principles to guide the delivery of this vision. Just as the processes that shape the landscape are interdependent and dynamic, the design principles are necessarily interactive. The overall Master Plan seeks to demonstrate the necessary balance between the various objectives of this project.

Report Structure

This Report is structured into four parts which collectively form the Master Plan:

An Introductory section which provides background, context and vision for the project.

Design Principles and Criteria provide the guidance for ongoing actions and future projects for the component parts of the comprehensive design.

The Master Site Plan which presents the comprehensive design proposal for the project, supported by illustrative perspectives and other details that further explain the various dimensions of the design.

Technical Appendices

A Collaborative Effort

The Alton Millpond Rehabilitation project is also a community-building project

Initiated in June 2009 with the formation of the Alton Mill Rehabilitation Committee, the project has continued to have broadly-based community involvement. The Committee includes the owners of the millpond, local and regional government and agencies, environmental groups, businesses, community groups and private citizens from Alton.

Since 2009, community-based groups, businesses and individuals have been involved in fundraising for the project and over \$70,000 has been raised. Particularly popular fundraising events are the annual Alton Millpond Hockey Classic and the Alton Mill Cuisine-Art Festival, both of which have been supported by Scotiabank. Such efforts clearly demonstrate the strong community support for the project.

The Committee's ambitions for the project are also supportive of economic development efforts of the Town of Caledon. For example, the 2014 Town of Caledon Tourism Strategy confirms the role of arts and culture, heritage, festivals and events as important ingredients for the continued growth of the tourist industry. Similarly consistent with the Millpond Rehabilitation project, the Town has initiated a Community Improvement Plan (CIP) study that includes Alton. It is anticipated that this study will result in new tools to promote revitalization and economic development.

In September 2014 the Committee commissioned Caledon resident and internationally known artist Noel Harding to lead the integration of functional public art elements into the project. Noel's large-scale functional environmental art projects include the Elevated Wetlands alongside the Don Valley Parkway in Toronto and the Green Corridor Environmental Gateway to Canada in Windsor, Ontario.

In December 2013, the committee retained BluMetric Environmental Inc. to be the lead environmental engineering consultant on the project. A Stage One assessment was completed in July 2014 and led to a number of important findings and recommendations, many of which are contained in this document.

In September 2014 the committee submitted an application to the Habitat Stewardship Program - Prevention Stream (HSP), administered by Environment Canada, for matching funds to support the next stages of work. The application was successful and \$47,400 was awarded in December 2014 to the project. The application focused on a work plan geared to Brook Trout habitat enhancement and included the need for geotechnical investigation and site mapping, further design criteria research and environmental design with input from an ecologist/biologist consultant. Further commitments built into the master plan include opportunities for stewardship, community engagement, interpretive signage and points of public access to the water.

The funds provided by Environment Canada along with funds raised through the on-going community-based efforts in January 2015, enabled the project Rehabilitation Committee to retain and oversee a team of consultants for the preparation of the Master Plan: BluMetric (Environmental Engineering); Hydrosys (Hydraulic Structure Engineering); DTAH (Landscape Architecture); Sarafinchin (Geotechnical); NRSI (Ecology/Biology) and Noel Harding (Environmental Art). These consultants have contributed significant in-kind services to this assignment.

This document, the Alton Mill Rehabilitation Master Plan, including the technical appendices and order of magnitude cost estimates, is the result of this recent collaboration. The Master Plan, once implemented, should ultimately result in improved stream habitat and a broad array of cultural, recreational and educational community resources.



Alton Millpond Hockey Classic



The Brookie Award



The Millpond Cup



Alton Mill Arts Centre



Alton Mill Cuisine-Art Festival

Site Location



The Alton Millpond Study Area and Shaw's Creek in the centre of Alton Village

Project Vision

The Alton Millpond Rehabilitation project is an exciting and noteworthy environmental undertaking that has multiple objectives and constraints.



Promotional material produced by the Alton Millpond Rehabilitation Committee

Since 2009, part of the work of the Alton Millpond Rehabilitation Committee has been to articulate and promote a vision for the project. The following are the seven dimensions of that project vision.

Ecosystem Health

Improve ecosystem health and fish habitat of Shaw's Creek by mitigating the warming effect of the pond, restoring natural stream processes and removing the barrier to fish passage, especially Brook Trout, while maintaining some wetland habitat.

Education

Provide opportunities for students, residents and visitors to learn about ecology and renewable energy and engage in the stewardship of the millpond and Shaw's Creek.

Lower Pollution

Work with others to mitigate untreated stormwater flow into the pond from the surrounding village.

Public Art

Creatively infuse public art into every aspect of the project including structural features, educational awareness, ecological function and public appreciation.

Recreation

Create an attractive and widely-known outdoor space that includes an off-line pond and year-round opportunities for active and passive recreational uses.

Safety and Sustainability

Stabilize the dam and associated structures to improve safety and prevent groundwater seepage into the mill building. Restore, if possible, the ability to generate hydro-electric power and generate revenue to cover ongoing maintenance costs.

Silt

The Alton Millpond contains 125+ years of silt accumulation. The project endeavors to end the accumulation of new silt and allow it to flow downstream, restoring natural stream processes, as well as remove some of the accumulated silt.

Ownership, Public Access and Maintenance

One of the necessary requirements of this project is to address public access and safety, dam safety, and ownership/operational issues.

Except for the original creek bed, the millpond, dam and associated structures are owned by The Alton Development Inc. (ADI), owner of the Alton Mill. Mill privileges were granted by the Crown to the mill owner in the 1880's which gave the right to flood the land and which led to the ownership of the millpond itself, however the creek bed remained in the ownership of the Crown. The legal survey is illustrated to the right.

At the outset of this project, ADI made a standing offer to make the pond accessible to the public on a long-term basis in return for the public paying the cost of the proposed improvements. It was intended that the pond area would eventually be managed by a public agency such as the local municipality or Credit Valley Conservation Authority and/or a community group (e.g. "Friends of the Alton Mill Pond"). It was envisioned that the access rights could be granted through a variety of mechanisms ranging from a long-term (eg.100 year) lease, to a registered right-of-way, to a transfer of ownership. At the time, the only provisos were that the ADI would retain exclusive commercial rights to the pond including such things as the right to draw water for

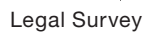
a micro-hydro turbine and the right to rent paddle boats, canoes or fishing rods. The general public would have the right to use the pond at no charge for personal recreational use but not for commercial purposes.

As this project has evolved, there have been questions and concerns raised by different community members about the approach described above. The project is still a work in progress and answers to the questions about access, ownership, the costs and benefits of the micro-hydro element, operational and maintenance costs and liability of the millpond and related structures are still being considered. Dialogue amongst stakeholders will need to continue to reach a mutually satisfactory arrangement.

ADI is open to exploring different options including possibly retaining ownership and responsibility for maintenance and liability while still providing guaranteed public access to the recreational and educational elements of the millpond. The overriding philosophy underlying the project is that it is intended to create positive change that will benefit both the public and the Alton Mill and that both the public and the mill owners should work together to make the most of this opportunity.

By far the project's overwhelming benefits are in the public domain – environmental, cultural/historical, recreational, social and even economic in that it will help consolidate Alton's place as a destination for people to visit. It has very little in the way of revenue-generating opportunities – a bit of electricity, perhaps boat or fishing gear rentals - certainly not enough to make this project possible as a private sector, profit-driven venture. The Alton Mill building rehabilitation is already a similar "social enterprise" - at the outset it was recognized that it couldn't generate enough revenue to justify its restoration costs on a private-only model and it received public support to make it happen.

ADI recognizes that public financial inputs and volunteer time will only be forthcoming if the public benefits are secured on a long-term basis, and the details of this are what must be worked out. It is important that any ongoing governance structure will have both the authority and financial resources to properly manage, maintain and support any associated liabilities related to the Alton Mill pond going forward. Whether this can be done while maintaining private ownership or if it would be better to transfer ownership or occupation rights to a non-profit entity, or if a hybrid is possible, must be determined as one of the next steps in the process.



The Key Issues

The pond has been slowly deteriorating, impairing both its cultural and green energy functions, and further impairing the health of Shaw's Creek, a tributary of the Credit River.

The key issues related to the millpond are:

- Silt and sediment build up caused by the existence of the dam
- Disruption of natural stream processes due to reduced sediment passage
- Barrier to fish passage for native fish species
- Introduction of non-native fish species
- Storm sewer inflows from the municipal storm sewer system
- Sediment from upstream sources
- Warm water which is harmful to the cold water fish habitat of Shaw's Creek
- Preservation of the millpond which is a key element of the Alton Mill heritage landscape designation
- Reinstatement of micro-hydro opportunities
- Lack of clarity as to long term maintenance requirements and responsibilities
- Capital costs required to design and implement project
- Long term maintenance, public safety, sustainability
- Deal with potential seepage into the building

Item	Existing Condition
Dimensions and Area of pond	+/- 1.4ha* to 1.9ha** (200 m long x 50 m wide)
Water Depth	+/- 0.5 – 1.5m
Water elevation	411.74 m. above sea level (masl) (as of Nov 30, 2005) 412.88 masl (historic Mill privilege level)
Site Drainage Area	65.8 km ²
Flood elevation at top/bottom of dam	414.34m / 411.3m***
Fish species in Shaw's Creek targeted for protection	Primary target: Brook Trout (<i>Salvelinus fontinalis</i>), Other species: Iowa Darter, Longnose Dace, Brook Stickleback, Bluntnose Minnow, Blacknose Dace, Northern Redbelly Dace, Northern Pearl Dace, and White Sucker
Sediment depth/volume	+/- 0.9 m to 1.80m +/-7,500 m ³
Uses	Ice skating in winter, informal/passive uses rest of year
Current dam maintenance costs	Nominal due to stop logs having been removed

* as per BluMetric Stage PPT 1 July 2014

** full mill privilege limits

***as per TSH Oct. 1-07

1.0 Design Principles and Criteria

A wide-angle photograph of an outdoor ice hockey rink on a sunny day. The rink is surrounded by snow-covered ground and bare trees. Several players in various colored jerseys (red, blue, black) are on the ice, some in motion. A goalie in a white jersey is positioned in front of the net. Spectators are standing around the perimeter of the rink. In the foreground, a person in a red and black jacket is walking towards the left, carrying a bag. Another person in a black jacket is standing near the center. The background shows a line of trees and a clear sky. The overall scene is active and captures a moment during a game or practice session.

Cultural Heritage - A Very Special Place

Preserve and enhance the special historic and scenic qualities of the Alton Millpond, the Mill Complex, associated structures and the landscape setting.

Located in the heart of the Village of Alton on the north bank of Shaw's Creek, the Alton Mill is the longest running water-powered mill on the upper Credit River system. The 1.4ha (3-acre) millpond was created in the early 1880s by the damming of Shaw's Creek, in order to exploit its stored energy to power the Beaver Knitting Mill. Surviving the ravages of flood and fire, expanded in the early 20th century and abandoned in the 1980s, the mill complex has been restored and converted in 2005 – 2009 to become Alton Mill Arts Centre.

The mill complex, including the millpond and the associated landscape, is a familiar landmark and a character-defining aspect of Alton that continues to epitomize the industrial and historical identity of the village. The entire Mill complex is designated under Part IV of the Ontario Heritage Act, (recognized for its heritage value by Town of Caledon, By-law 2004-201) and is listed on the Canadian Register of Historic Places. The conversion and adaptive re-use of the mill complex has received awards from Heritage Canada Foundation, the Canadian Association of Heritage Professionals, Ontario Heritage Trust and Business for the Arts and others.

Actions/ Design Criteria:

- From an urban design / place-making perspective, the Millpond is an indivisible part of a larger townscape / landscape composition of great scenic quality. The built/structural and planted components of the millpond rehabilitation should be designed in recognition of their role in adjusting, reshaping and enhancing this larger townscape / landscape composition.
- Enhance important views to and from the Alton Millpond and Shaw's Creek, particularly views from Queen Street looking across the millpond.
- Further view analysis should be undertaken during detailed design to reinforce the heritage significance.
- Develop a palette of vernacular forms, materials and native planting to complement and reinforce the built and natural heritage character of this place.
- Consult with Heritage Caledon during the planning and design of the Millpond rehabilitation.



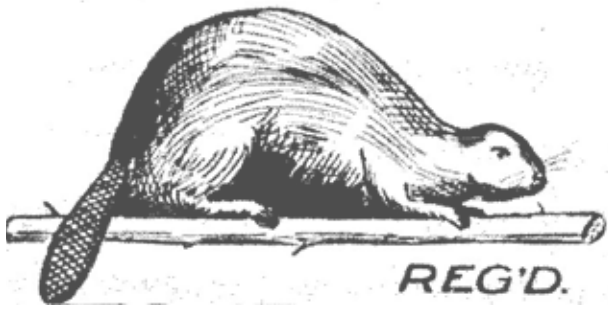
1905, Beaver Knitting Mill



1899, View of Millpond after the flood



ALTON POND - EARLY 1970'S
Circa 1970, Alton Millpond



The Beaver Knitting Mill trademark



1894, Goad Fire Insurance Map



2014, View from Queen Street over the pond

Extracts from the Canadian Register of Historic Places

Description of Historic Place

The Alton Mill is a late 19th century industrial stone complex located on the bank of Shaw's Creek in the heart of the village of Alton in the rural Town of Caledon. The 3.4 hectare site comprises the main two-storey stone mill building and three-storey water tower, a brick chimney stack, a stone livery, the remains of the stone wool warehouse, and the adjacent millpond and dam.

Heritage Value

The Alton Mill is one of only two late 19th century industrial stone complexes remaining in the once-thriving industrial village of Alton. Established in 1881 as the Beaver Knitting Mill by industrialist and 'Free Thinker' William Algie, it was renowned nation-wide for the production of fleece-lined long underwear. The mill, often referred to as the 'Lower Mill', was subsequently owned by two other leading local industrialists, John Dods of the Dods Knitting Company and Frederick N. Stubbs of the Western Rubber Company. Stubbs purchased and converted the mill for the manufacture of rubber products in the mid-1930s.

The mill complex represents the longest-running water-powered mill on the upper Credit River system, remaining in operation until 1982. Built between 1881 and 1913, the existing mill buildings are typical of industrial stone construction of the late 19th century, and reflect alterations, changes in use and the effects of flood and fire over a century of industrial operation.

Situated in the heart of the village amidst residential buildings of a similar age, the Alton Mill complex is a well-known local landmark that has defined the industrial character and history of the village of Alton since its construction.

Character Defining Elements

Key elements that express the value of the mill complex as a landmark and continue to define the industrial character and history of the village include: its location in the village core adjacent to the millpond and creek in the heart of the village; significant vistas from Queen Street, a principal road running parallel to the creek and millpond; the 'Pinnacle', a prominent landform directly north of the mill; and the surrounding residential buildings from the same late 19th century era.

Natural Heritage - Aquatic and Terrestrial Habitat

Design new habitats to emulate natural ecological systems with reference to the Ecological Land Classification for southern Ontario specifically considering wildlife and the potential Species at Risk (SAR).

The Alton Millpond Committee retained Natural Resource Solutions Inc (NRSI) to provide ecological/biological inputs into this study. The following is a summary of their findings.

Significant Natural Features

Three significant natural features are known in relatively close proximity to the Study Area:

The Coulterville Provincially Significant Wetland (PSW). The Coulterville PSW is located approximately 1km southeast of the Study Area and is largely separated from the Study Area by the Village of Alton.

Alton – Hillsburgh PSW. The Alton - Hillsburgh PSW is located west and southwest of the Study Area and comprises rolling terrain and forest. Several species at risk (SAR) are known from this feature.

The Credit River/Alton Wetland Complex. The Credit River/ Alton Wetland Complex is located north and east of the subject property, and comprises a large area of significant lands. The lands comprising the Credit River/Alton Wetland Complex are largely bound by 3 Line West and appear to be fragmented,

at least in part due to the road way along the west, east, and south. This designated natural area is also greater than 1km from the Study Area.

Vegetation Communities

The Study Area consists primarily of disturbed and cultural vegetation communities as shown in the figure on the next page. The Terrestrial and Wetland Ecology Existing Conditions report (see Appendix) identifies the following five significant plant species within 1km of the Study Area: Hart's-tongue; Rugulose Grape Fern; Carey's Sedge; Butternut; Slender Stubble-Moss. Of these species, the millpond Study Area has suitable habitat for Butternut and Slender Stubble-Moss.

Wildlife Communities

The Terrestrial and Wetland Ecology Existing Conditions report identifies the presence over 27 mammal species, 116 bird species, 22 butterfly species, 24 Herpetofauna species and 19 Odonata species with the Study Area. According to records from the Ministry of Natural Resources and Forestry, Common Snapping Turtles are known from the millpond and Monarch Butterflies, Canada Warbler and Barn Swallows are known from the adjacent

habitats. Other significant wildlife that may occur within the Study Area, based on known ranges and the availability of suitable habitat, include Eastern Milksnake and Little Brown Myotis.

Aquatic Habitat

The main aquatic feature within the Study Area is Shaw's Creek, which is located in the upper portion of the Credit River Watershed. Shaw's Creek flows in an easterly direction and meets with the Credit River approximately 2.0 km downstream from the Alton Mill. The Credit River Fisheries Management Plan indicates that Shaw's Creek is managed as a coldwater fish community, meaning that the community is comprised primarily of fish species intolerant of water temperatures that exceed 22°C. This is primarily due to the fact that Brook Trout exist within Shaw's Creek.

The aquatic habitat within the Study Area is characterized by three separate zones: Shaw's Creek Upstream, the Wetland (Millpond), and Shaw's Creek downstream.



Common Snapping Turtle



Slender Stubble-Moss



Canada Warbler



Butternut tree (*Juglans sp.*)



Little Brown Myotis



The millpond resident fox





Eastern Milksnake



Existing vegetation communities

FOCM6-3	Dry – Fresh Scotch Pine Naturalized Coniferous Plantation Type
Wetland	
MASM1-1	Cattail Mineral Shallow Marsh Type
Cultural	
CVR_1	Low Density Residential

Legend
 Study Area
 Ecological Land Classification (ELC)
 (CVR_1) Low Density Residential
 (FOCM6-3) Dry-Fresh Scotch Pine Naturalized Coniferous Plantation Type
 (MASM1-1) Cattail Mineral Shallow Marsh Type
 (OA) Open Aquatic



The Millpond (shown in the foreground) is characterized as a Cattail Mineral Shallow Marsh. The Pinnacle (shown in the background) is characterized as a Scots Pine Naturalized Coniferous Forest.

Shaw's Creek – Upstream

The Millcroft Inn and Spa is located along the banks of Shaw's Creek approximately 500m upstream from the Study Area. A small existing dam has created a large headpond that inundates nearly 500m of Shaw's Creek upstream of the existing dam. Below this dam the creek flows over a moderate gradient with riffles and shallow pools, through a channel ranging in width from 3 to 10 m and over substrates consisting of bedrock, boulder, cobble and gravel. The creek flows like this for approximately 200 m before it reaches the upstream extent of inundation created by the existing dam at the Alton Mill.

The Wetland (Millpond)

At the upstream extent of the Millpond the flow of Shaw's Creek is split into two channels and is directed to the northeast and to the southeast around a large island measuring approximately 180 m long and 50 m wide. The majority of flow and the main channel are on the south side of the island. The wetted width at this location ranges from approximately 10 to 12 m, which may change based on water levels within the pond. Along the north side of the island the wetted width measures approximately 5 to 10 m. Flows through the Millpond have been significantly reduced due to inundation created by the Alton Mill Dam. It is expected that prior to the construction of the dam, Shaw's Creek would have historically flowed along the south side of what is now the large island.

A large shallow pond exists between the island and the Alton Mill Dam encompassing an area of approximately 4,200 m². During the summer months the shallow water depth and soft substrates resulting from the accumulation of sediment on the upstream side of the dam, sustain dense aquatic vegetation. Emergent vegetation along the perimeter of the pond and the island is dominated by Cattails, while submergent and floating aquatic vegetation is found throughout the open water portion of the pond including Pondweed and Water Lilies. Ponding and shallow water created by the two existing dams on this reach of Shaw's Creek have impacted the overall water quality by reducing velocity, which minimizes the opportunities for water aeration and increases water temperature. The Master Site Plan identifies opportunities to improve flow and mitigate the effects of solar radiation (temperature inputs).

Shaw's Creek - Downstream

Downstream of the Alton Mill Dam, Shaw's Creek reverts back to a more natural system with water flowing over a moderate gradient and substrates consisting of bedrock, boulder, cobble, and gravel. Habitat is provided by riffles and shallow pools with some woody debris along the banks. The creek flows northeast through the Town of Alton and through a moderately forested riparian area before it opens up into meadow riparian zone approximately 900m downstream. It continues through this habitat before flowing into the Credit River approximately 1,100m downstream. It is

anticipated that groundwater inputs to Shaw's Creek exist downstream of the Alton Mill that help to cool the water and maintain habitat for a coldwater fish assemblage.

Historical Brook Trout spawning redds (nests created by trout or salmon for the purpose of spawning) were identified within Shaw's Creek in the vicinity of the Main Street crossing as well as near the crossing of the rail line, approximately 350m and 800m, respectfully downstream from the Alton Mill dam.

The rehabilitation of the millpond and creation of a new fishway is an opportunity to improve wetland and riparian habitats. Specific field studies may be required during detailed design and permitting stages to address potential impact questions. These will be scoped with agency reviewers at that time.

Actions / Design Criteria:

- Incorporate vegetation communities comprising assemblages of native plants that support and enhance the three distinct aquatic habit zones (Upstream, Millpond, Downstream)
- Planting plans to be in accordance with the Credit Valley Conservation (CVC) recommended plant lists.
- Integrate tree planting to the water's edge, to the berm and surrounding the dam to increase shade cover and assist in lowering the water temperature.



Shaw's Creek: Upstream



The Wetland (Millpond)



Shaw's Creek: Downstream

Fish and Aquatic Habitat

Creek restoration should optimize the conditions for fish habitat and passage by including a fishway, pools and riffles sequence, resting places in back eddies and other elements to create diverse in-stream habitat.

The Shaw's Creek Subwatershed Study Background Report (CVC 2006) identified 18 fish species present throughout the Shaw's Creek subwatershed. These species are listed in the Terrestrial and Aquatic Existing Conditions Report in the Appendix along with their thermal preference and provincial S Rank. All species listed are considered to be very common throughout Ontario with secure populations. The preferred water temperature regimes for these species, related to three mean water temperature categories, are coldwater (below 19°C), coolwater (19 to 22°C), and warmwater (above 22°C). Water temperatures from the pond often exceed 22°C and any reduction in the temperature would be a benefit.

Nine of the fish species known to occur in Shaw's Creek were identified in the federal HSP funding application as the focus of rehabilitation efforts and are identified as target species within this Master Plan. The primary species of interest in the Millpond Rehabilitation is Brook Trout (*Salvelinus fontinalis*), while secondary species include Iowa Darter, Longnose Dace, Brook Stickleback, Bluntnose Minnow, Blacknose Dace, Northern Redbelly Dace, Northern Pearl Dace, and White Sucker.

These nine species utilize a range of habitat types that are likely to occur within Shaw's Creek and in the Credit River. A detailed discussion of the habitat preferences of the nine identified fish species and swimming capabilities is provided in the Terrestrial and Aquatic Existing Conditions Report and the Fish Swimming Capabilities Technical Memo (see Appendix).

The Credit River Fisheries Management Plan, the Shaw's Creek Subwatershed Study and Credit Valley Conservation Authority's (CVC) biologists identify Shaw's Creek as important Brook Trout spawning and foraging habitat. The reach is also identified as a high priority restoration area to improve Brook Trout habitat.

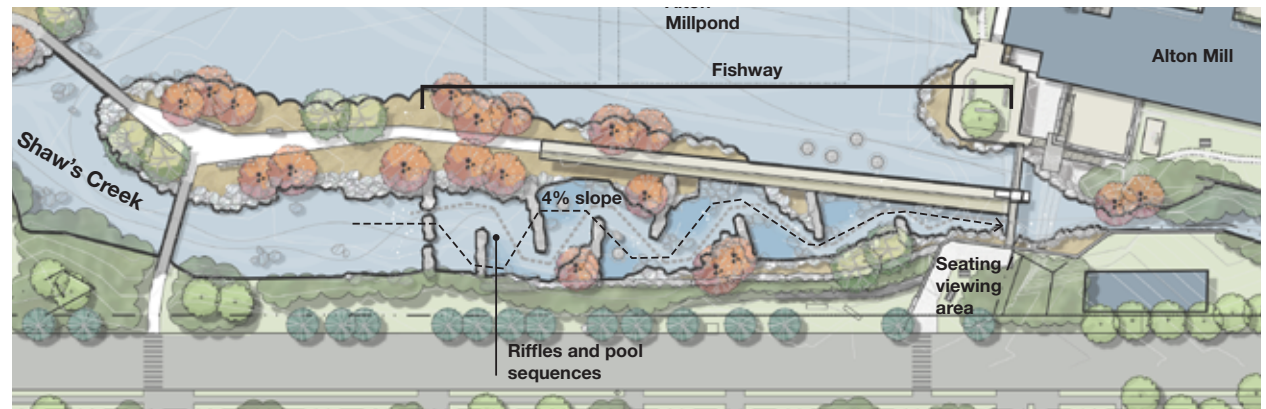
Currently, Brook Trout are present in the lower reaches of Shaw's Creek. The dam is a barrier to fish passage, causes elevated temperatures, disrupts natural channel processes, and reduces water quality and levels of dissolved oxygen, which are detrimental to Brook Trout and other coldwater species. This results in isolation of populations from spawning or refuge areas and inhibits long term exchange of genetic material with other populations, which can lead to localized extirpation. This project

will provide a natural channel bypass fishway around the Alton Millpond to enhance fish habitat and both upstream and downstream passage for Brook Trout and other fish species present in Shaw's Creek. Modifications to the existing dam and other rehabilitation elements including a natural channel bypass fishway (fishway) will mitigate much of the thermal impacts associated with the pond and re-instate natural stream processes such as the downstream transfer of sediment and nutrients.

Actions / Design Criteria

- Obtain currently available data on water temperature, flow and any other relevant parameters. If additional data is needed to facilitate approvals, investigate the cost, process and timing of obtaining such data.
- Undertake detailed design in accordance with management objectives for the Shaw Creek and Credit River watersheds.
- Facilitate fish passage through the incorporation of a meandering fishway. Design the slope of the fishway to be no greater than 4%, which is the target for passage of Brook Trout and other fish species found in Shaw's Creek.

- Any potential for groundwater infiltration into the creek should be exploited to enhance the base-flow within the channel and to increase downstream cooling.
- Incorporate well vegetated streambanks, riffle/pool sequences and resting habitats to provide a high diversity of in-stream aquatic habitat for a range of fish species. Cobble and/or boulders, woody debris arrangements and pools provide excellent fish resting habitat.
- Provide relatively stable minimum flows, reduce water temperatures and ensure stable banks. Target a water temperature range of 11 to 16 degrees centigrade, which is suitable for Brook Trout, who typically inhabit cold waters.
- Target a minimum 25% vegetated cover over the creek (for adults) and incorporate instream cover in the form of woody debris.
- Incorporate a 1:1 pool to riffle ratio including areas of slow, deep water to provide variations in habitat for the different fish life stages.
- Incorporate gravel beds in the shallows or in close proximity to areas of groundwater upwelling for Brook Trout spawning.
- Incorporate viewing and/or seating areas on the banks adjacent to Queen Street West for visitors to safely observe the fishway.
- Incorporate public art in the design of the engineering aspects of the fishway to tell a story about the setting and the restoration of the creek.



Fishway Concept



The stream restoration of Morningside Creek, ON, undertaken by the Toronto Region Conservation Authority, incorporates riffles, pool sequences and resting habitat



Naturally occurring riffle and pool sequences in the Credit River, just downstream of the Millpond.



Brook Trout (*Salvelinus fontinalis*)

Municipal Storm Sewer Inflows

Sources of untreated /uncontrolled stormwater from the surrounding village should be eliminated.

The Town of Caledon has a municipal storm sewer system in the village of Alton. Currently, there is an outfall structure on the south side of the millpond that outlets stormwater from the south side of Alton directly into the pond. The outlet structure is connected to a storm sewer that was installed in the mid 1980's to serve a residential subdivision south of Queen Street and east of Main Street. At the time of development, there was a temporary sediment basin located on Town property at the south east corner of Queen and Emeline Streets. The basin was decommissioned after the subdivision was developed. The basin was filled in, topsoiled and sodded and is now essentially a vacant property leaving storm water flows from the development to outlet directly into the millpond via the storm sewer without any quantity or quality controls. There is also no maintenance agreement, easement or other legal mechanism in place to address ongoing maintenance of the system.

In a meeting with the Town of Caledon Director of Public Works in February 2015, the Town has acknowledged that the system falls within its jurisdiction, does not meet current standards and that it will pursue remedying the situation. Specific details and timing are not known at this time,

however the intent is to re-instate some form of basin and control structure on the corner property to eliminate untreated/uncontrolled stormwater from entering the millpond. Other alternatives may also be considered but the preferred approach of the Millpond project committee is address the problem as close to the source as possible, by using the Town property as outlined above.

In addition to above, there is physical evidence of siltation/sediment build-up in the millpond in the vicinity of the outfall structure. Sediment testing carried out in 2010 indicates somewhat elevated electrical conductivity levels in the sediment. The details of the sediment testing results are contained in a report prepared by Geomorphic Solutions for the Millpond Committee in 2010. It is the Alton Millpond Rehabilitation Project's expectation that the Town will be involved in discussions to determine the extent of sediment removal in this area and will contribute to the costs associated therewith.

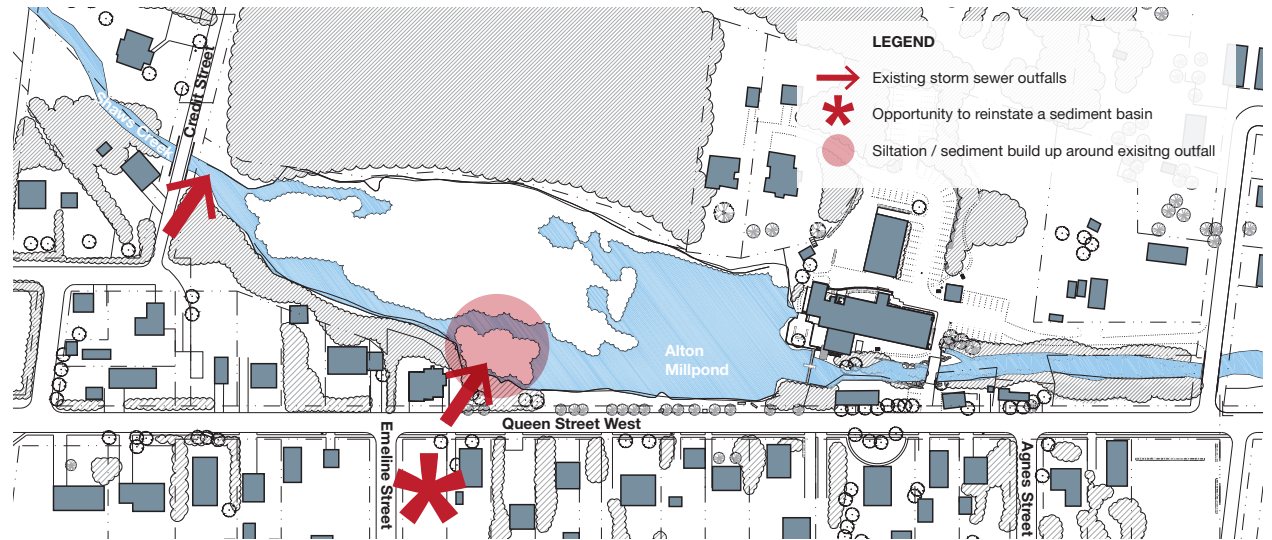
Further upstream at the west end of the millpond, there is another storm sewer outfall structure that was constructed in 2013 as part of a new development on the west side of Alton. The outfall structure is on the south side of the river just east

of the Credit Street bridge but is not yet in use as the site servicing is still underway and the sewers have not been connected to the outfall. The Town has advised that the new stormwater management system for the development meets current standards in terms of quantity and quality control and ultimately will be assumed by the municipality. However, during the fall of 2014 during the period of time the site was being serviced, there were several inflows of untreated construction runoff into the millpond via overland flow. These incidents occurred during heavy rainstorms and subsequently, improvements to the temporary sediment control system were made. However, there remain concerns that the release of uncontrolled stormwater may reoccur.

The Town has been asked by the Alton Mill to monitor the situation and take whatever measures are necessary to prevent further incidents. As the goal is to eliminate off-site sources of untreated stormwater, if there are any ongoing inflows of stormwater either during the construction phase or thereafter, the developer and/or Town will be responsible for any further accumulation of silt in the millpond.

Actions / Design Criteria

- Work closely with the Town to encourage the elimination of untreated/ uncontrolled stormwater from entering the millpond.
- Reinstall a sediment basin and stormwater control measures on the Queen and Emeline Street Town-owned property.
- Determine the extent, methods and cost of sediment removal in the area surrounding the outfall.
- Develop a maintenance agreement to address ongoing maintenance of the system.



Existing municipal storm sewer inflows



Examples of low impact measures to manage the quantity and improve the quality of stormwater runoff entering the Millpond could include rain gardens, bio-swales or infiltration trenches

Geotechnical Investigation

The Alton Millpond Rehabilitation Committee (AMRC) retained Sarafinchin Associates Ltd. to carry out a preliminary geotechnical site investigation in support of the proposed Alton Millpond Rehabilitation Master Plan. Below is a summary of the geotechnical background and initial findings. Refer to the Appendices for the Full Geotechnical Report.

Background

The Alton Mill Dam is a small low flow gravity structure constructed in about the 1880's. It is comprised of stone masonry and concrete with two fixed weirs. The dam height is approximately 3.4m with a total span of 15.4m between the concrete abutments. The upstream headpond (millpond) covers an area of approximately two hectares with a water depth in the upstream reservoir in the range of about 0.5-1.5m. The reported high water level is Elev. 412.13m. The seasonal flows are variable.

The area to the north of the dam site is predominantly comprised of ice-contact stratified glacial drift. The area south of the site is predominantly Port Stanley Till. The area in the immediate area of the site along Shaw's Creek is characterized by modern alluvial deposits of sand and gravel. The predominant bedrock unit in the Alton area is the Amabel Formation.

It is comprised of dolostone which is underlain by the Clinton (dolostone) and Cataract Group consisting of the Cabot Head Formation shale, the Manitoulin Formation dolostone (with shale) and the Whirlpool Formation sandstone.

Initial Geotechnical Findings

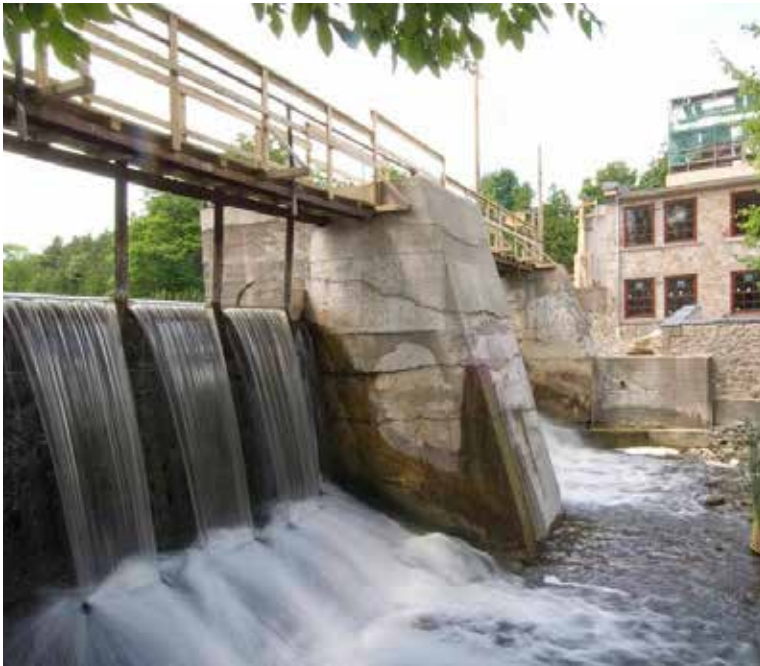
In January 2015 preliminary geotechnical site investigation was undertaken and comprised several deep and shallow boreholes and probings. The findings from the Initial Geotechnical Investigation are:

- The boreholes at the north and south abutments indicate the abutments are backfilled with very loose to compact silty sand, and very loose to compact sand and gravel overlying dolostone bedrock. These boreholes were terminated on probable slightly weathered to sound dolostone bedrock which was encountered at depths of 6.0 m to 6.4 m, or Elev. 407.1 and 407.4 m, respectively. Snow cover limited visual observations of the upstream and downstream areas.
- The bedrock levels encountered under the abutments are 1-2m lower than our measured upstream bedrock levels, possibly due to steps in the horizontally bedded sedimentary bedrock, and/or early dam pre-construction removal of surficially weathered bedrock, or otherwise.

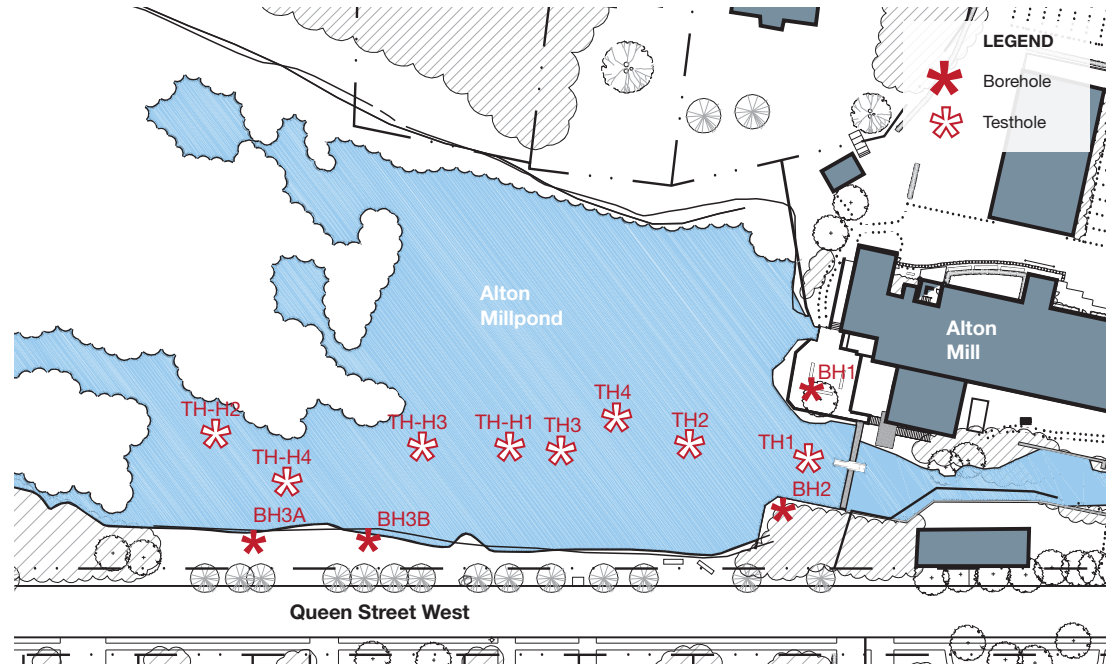
- Boreholes 3A and 3B were located at the south bank of the Millpond adjacent to the north edge of Queen Street West. These boreholes were terminated at depths of 2.4m and 1.2m encountering practical drilling refusal on probable boulders, or snow covered armourstone slope protection.
- Testholes within the millpond indicated relatively thin pond sediments comprised of loose wet silt, sand and organics, underlain by sand and gravel with a thickness of about 2.2-2.9m, overlying probable dolostone bedrock.
- Observations from this site investigation indicate that the existing dam is likely founded on relatively sound dolostone bedrock. On a planning basis the existing dam may be considered stable with respect to bearing capacity failure or excessive settlement. Our preliminary geotechnical assessment of bearing capacity, settlement, seismic parameters, seepage and uplift and resistance to sliding are provided for use in preliminary dam safety review, conceptual planning and pre-design stages.

Actions / Design Criteria

- Undertake further geotechnical investigation in conjunction with separate hydrological, hydraulic and structural assessments during detail design.



Existing Dam



Approximate borehole and testhole locations



On-site geotechnical investigation, winter 2015



Creek and Pond Restoration

Creek and pond restoration, including re-engineered channels, should emulate the characteristics of the existing natural creek and match the management objectives for the Shaw's Creek and Credit River watersheds.

To meet the various objectives of the Alton Millpond Rehabilitation Project, it will be necessary to rehabilitate at least a portion of the old dam and construct new structures to control the pond water levels and flows of Shaw's Creek in accordance with current best practices and regulatory requirements.

Through meetings held with the Ontario Ministry of Natural Resources and Forestry (OMNRF), design and permitting requirements were determined (see appendix 2). Dams in Ontario are regulated under the Lakes and Rivers Improvements Act (LRIA) as administered by the OMNRF. In doing so, the OMNRF applies the Ontario Dam Safety Guidelines. Any decommissioning, rehabilitation or new construction of water control structures in the province, such as in Alton, must adhere to these regulatory guidelines and the rigorous technical requirements. A Class Environmental Assessment (EA) for Resource Stewardship and Facility Development is anticipated to be required.

Recognizing that environmental factors such as climate change have and are likely to continue to affect the frequency and severity of precipitation events, the Dam Safety Guidelines assume the

possibility of larger flood flows than most existing older dams were designed to accommodate. There is also the additional complexity of designing new structures or modifying existing structures, to meet current regulation and permitting standards, in an already built-up area such as the Village of Alton.

KEY ENGINEERING DESIGN ELEMENTS

The figure, opposite, identifies the four key engineering elements incorporated within the Master Plan. The natural channel bypass fishway (fishway), weir, pond/creek separation structure and dam are described below and illustrated in the Master Site Plan. Refer to Technical Appendix 4.0 for preliminary engineering concepts, prepared by Hydrosys.

Weir

The weir will support the pond surface elevation and provide appropriate flows for fish passage along fishway. The design priority for the weir is to maintain an appropriate minimum ecological flow through the fishway at all times in preference to flow through the pond area. In summer low flow conditions, this may necessitate cessation of micro-hydroelectric generation. During infrequent severe drought conditions, the total creek flow may naturally drop below a desired minimum ecological flow.

Natural Channel Bypass Fishway (Fishway)

The fishway will extend downstream from the weir to downstream of the existing dam. It should be designed with a maximum slope of 4%, and provide appropriate flow velocities for fish passage under normal flow conditions. The fishway below the weir must be designed with materials and anchoring methods that ensure stability of the slope profiles under high velocity flood conditions.

Pond-Creek Separation Structure

Upstream of the weir, a permeable berm or similar structure will separate normal creek cold water flows from the water in the pond and be designed to ensure that the pond water temperature does not adversely impact the cooler creek flow.

Downstream of the weir, the pond-creek separation structure connecting the weir to the central pier of the existing dam should be designed to be impermeable to the extent required to ensure that the pond level can be maintained at its desired elevation under normal flow conditions.

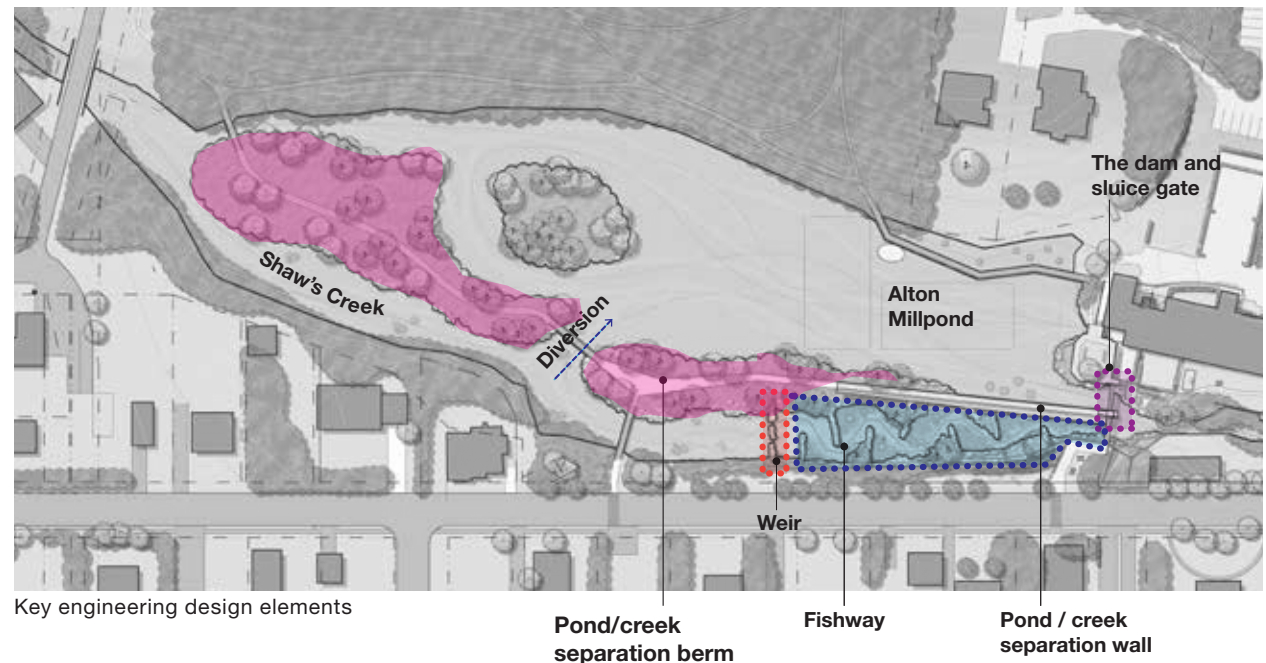
Dam

The existing dam will be rehabilitated to incorporate a new sluice gate of appropriate design to ensure that the entire site meets the OMNR LRIA Administrative guidelines.

Hydraulic connection(s) from the creek above the weir into the pond area must be suitable for diversion of an appropriate portion of flood flows through the pond to discharge through a new sluice gate in the rehabilitated north side of the dam. The design of this hydraulic connection and the water passages leading to the new sluice gate should be suitable to ensure appropriate sediment transport during annual freshet events, as well as during possible larger flood events, in support of the fluvial geomorphology objectives of the project.

Actions / Design Criteria

- Determine the Hazard Potential Classification (HPC) and resulting Inflow Design Flood (IDF) requirements for rehabilitation and new construction works at the Alton site. Until this can be accomplished through a rigorous application of the guidelines, it is assumed that the IDF will be based on the “regional” or “regulatory” storm event, which has been calculated to be 112.4 m³/s (cubic meters per second) for the Alton site. This is also the flow from which the Credit Valley Conservation Authority (CVC) has developed its existing flood plain mapping of the Alton area.
- Assess available data and collect any additional data that may be required to support the design and approvals process.
- Develop engineering plans for the rehabilitation of the existing dam and for the construction of the proposed new weir and pond-creek separation structures taking the appropriately derived IDF into account.
- Model the effects of IDF flows (as well as more normal flows) through the site using appropriate modeling software to demonstrate that the proposed rehabilitation and new works will improve the expected flood line.
- Incorporate the collaborative involvement of Noel Harding’s environmental art narrative in the design of the fishway.
- Sediment removed from the pond during construction are subject to the Fisheries Act Section 36 that prohibits the deposit of deleterious substances within a Fisheries.



Pond Water Level

The rehabilitated pond is to be visible from specific locations within the Village of Alton, and the surface level should be relatively stable under normal hydrological conditions.

Although the millpond was the result of industrial development and is not “natural”, it has been a defining feature of the Village for roughly 130 years. Village residents and other stakeholders have indicated that they support the ecologically-restorative aspects of the rehabilitation project (including cold water flow-through, fish passage and brook trout habitat enhancement, fluvial geomorphological objectives, etc.), but also desire that the millpond continue to exist as an aesthetically pleasing and practically meaningful body of water.

The millpond has been used in the past for various recreational purposes in both summer and winter. To continue or re-establish these uses will require the pond to be of a certain minimum elevation, area and depth. It should also not be susceptible to erratic fluctuations of surface level except in flood or freshet conditions or during severe drought.

The pond surface elevation is also important to the potential for developing micro-scale hydroelectricity at the site, which is dependent upon there being a drop in elevation between the pond and the creek somewhere on the site; the larger the difference in elevation, the more electricity that can be made with the same water flow.

Actions / Design Criteria

Include structures and operational components to ensure that the pond is:

- large enough for its intended recreational purposes
- visible from portions of Queen Street and elsewhere in the Village



The view from Queen Street

Hydroelectric Generation

Restore the ability to generate hydroelectric power through the installation of a micro-scale hydroelectric generator while being sensitive to natural ecological processes.

The Alton Mill was originally built to harness the renewable waterpower resource inherent in flowing and falling water of Shaw's Creek. The site is suitable for the installation of a micro-scale hydroelectric generation system if this can be accomplished without negatively impacting the ecological aspects of the rehabilitation project.

Hydroelectric generation involves using the force of falling water to spin a turbine which rotates an electromagnetic generator. The amount of electricity that can be produced is dependent upon the "flow" or volume of water passing through the turbine per unit of time, and the "head" or drop in elevation from the surface of the water above the turbine's intake to the surface of the water below the turbine's discharge.

At Alton, the targeted available head is approximately 4.7 metres. Assuming that the combined efficiency of the turbine, generator and transformer apparatus is approximately 75%, then a flow of 0.5 m³/s (or 500 litres per second) would produce approximately 15 kW instantaneously or 131,400 kilowatt-hours per year if operated 24 hours per day, 365 days per year.

A realistic estimate of production, taking into account typical seasonal low creekflows and maintenance downtime, would be approximately 66% of the maximum output potential. Output from a waterpower system with a 15 kW capacity is therefore estimated to be in the range of 60,000 to 75,000 kWh per year. This represents roughly 80% of the average annual electricity use in the Alton Mill building. On-site generation of this energy would thus further improve the overall ecological footprint of the Alton Mill building and the Alton Millpond Rehabilitation Project.

Flow to the turbine would necessarily pass through the rehabilitated pond and thereby also help to keep the water naturally refreshed and aid in limiting the potential for stagnation / eutrophication of the water in the pond. However, care must be taken to ensure that water from a turbine re-entering Shaw's Creek below the dam does not adversely affect the temperature of cold water flows. This consideration will be especially important during the warmer months of the year when the pond water temperature will naturally increase and may require restricted turbine use during the hottest months of the year.

Actions / Design Criteria

- Develop and evaluate a conceptual plan for harnessing a small portion of the site's waterpower potential during the detailed design of the hydraulic structures and operational elements.
- Allow for monitoring of flow and temperature conditions as part of any operational feasibility analyses.
- Incorporate the collaborative involvement of Noel Harding's environmental art narrative in the design and siting of hydroelectric generation elements to visualize and interpret the processes of sustainable energy generation.



Different approaches to hydro-electric generation could include small scale hydro-electric generators, Archimedes Screw (above left) or gravitational vortex generators (above right).

Trails and Recreation

Plan and design on-site recreational and interpretive trails to connect with the larger system of trails including those on the adjacent Millcroft Inn property, existing and proposed trails within the village of Alton and the broader regional trail system.

The trail and pathway system within the Alton Mill property is part of a larger trail network including regional trails, local trails and formal and informal pathways. This development provides an opportunity for the Alton Mill site to become the junction and nexus point of this larger inter-regional trail system.

Regional Trails

- The Grand Valley Trail (a 275m trail connecting Alton to Rock Point Provincial Park on Lake Erie) currently terminates at the Alton Mill property.
- The Alton Side Trail, part of the Bruce Trail, used to link the Pinnacle and Alton Mill with the Bruce Trail at the nearby forks of the Credit Provincial Park. Parts of this trail are now closed due to sections being flooded.
- The Credit Valley Trail is a project currently being undertaken by Credit Valley Conservation (CVC). It proposes to effectively re-open the Bruce's Alton side trail, running along the Credit River through the Charles Sauriol Conservation Area and Alton Grange/Forest to the eastern edge of Alton, reconnecting the existing side trail that leads through the Alton Mill property to the Pinnacle. CVC also plans to extend the trail northwards to the Upper Credit Conservation Area.

Local Trails and Informal Pathways

- A network of paths run throughout the Millcroft Inn property and connect the Millcroft Mill, the Millcroft Pond, the Millcroft Spa, the Water Tower, the Pinnacle / Grand Valley Trail terminus and the Alton Mill. At present, connectivity between the two properties is limited to a single access point at the east side of the Millcroft property where it abuts the Alton Mill property. The Master Plan identifies opportunities to improve this connection with a new trail along the north edge of the Alton Millpond and connecting with Church Street and the Pines Loop.
- At present, there is a network of paths and walkways forming an outdoor sculpture garden surrounding the Mill.
- An existing sidewalk is located on the south side of Queen Street. To improve the linkage to the Alton village core, better and safe connections to the existing Queen Street sidewalk are needed.

Recreation

This project offers an excellent opportunity to serve as a demonstration site for aquatic restoration. The partial conversion of the dam to a fishway, for example, will allow people to see an interesting, natural phenomenon in a close up and personal way. The inclusion of walking paths, boardwalks, interpretive signage, access points for connecting with the river and sitting areas can provide a place where education can take place. Whether in an informal manner or in a more formal outdoor education setting, people will be able to explore and learn about the river, the pond and overall site. An enlarged millpond will also create opportunities for seasonal recreational activities, possibly including canoeing/paddleboating and fishing in warm weather, and of course skating and hockey in the winter months. Cultural programming on the millpond, such as outdoor musical concerts and theatre on a floating stage, will also become a possibility.

Overall, the project provides an opportunity to incorporate landscape design and various interpretive elements that will promote recreation, education and stewardship and community engagement.



Vision for the Credit Valley Trail Upper Watershed
(Image credit: CVC)

Legend

Proposed Credit Valley Main Trail

Status

- Existing
- Proposed

Proposed Credit Valley Side Trail

- Elora-Cataract Trailway
- Caledon Trailway

Other Trail Networks

Bruce Trail

- Main Trail
- Side Trail
- Grand Valley Trail
- Trans Canada Trail



Trails at Evergreen Brick Works (Toronto) encourage exploration and discovery of marshland restoration and ecology



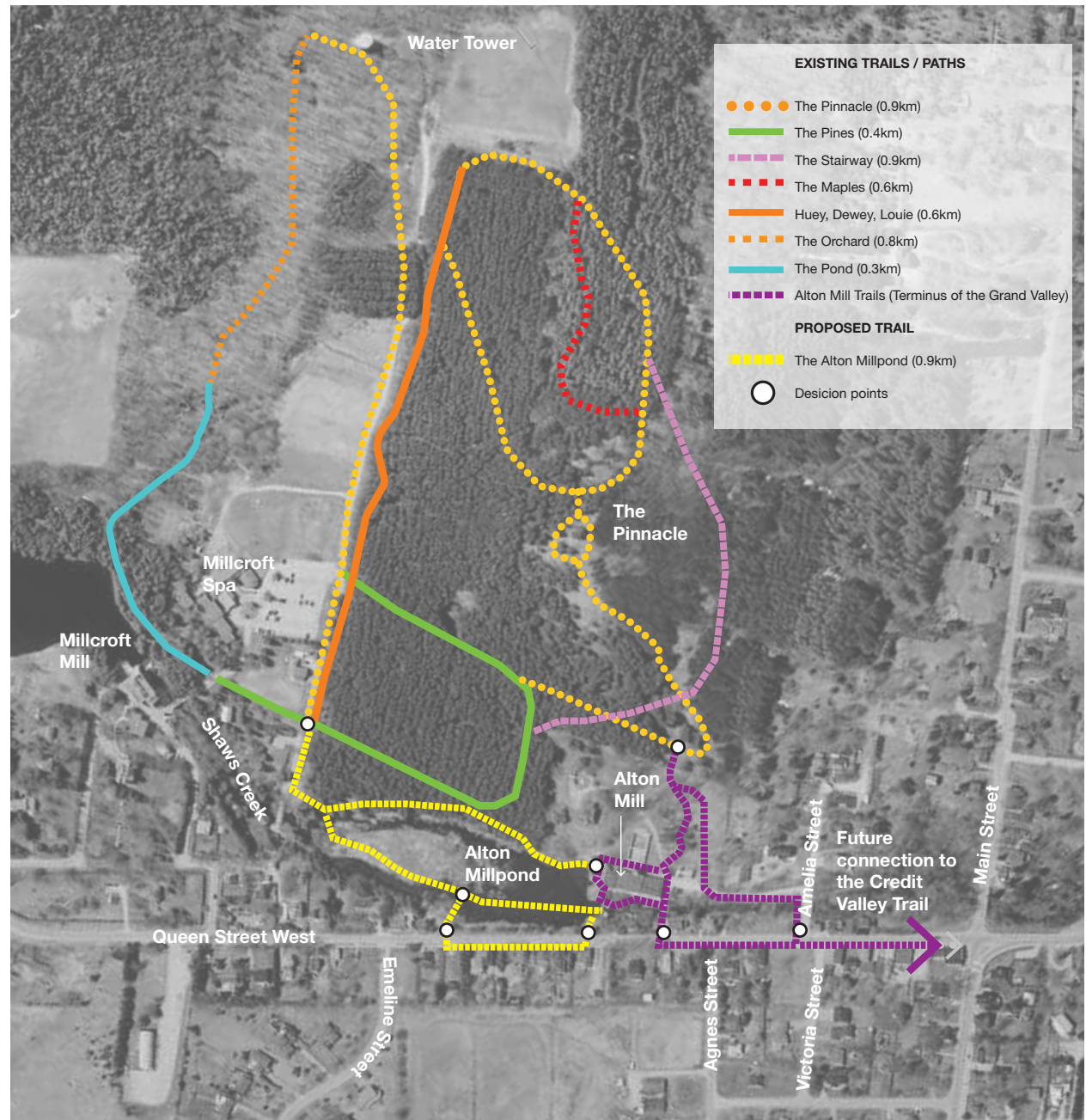
Potential summer recreation activities could include canoeing



The Alton Millpond Hockey Classic

Actions / design criteria

- Connect new trails with the regional trail network and the various foci of activities and observation places within and surrounding the Millpond.
- Facilitate accessibility for a broader range of people and provide a rich variety of sensory and interpretive experiences.
- Strengthen linkages to Queen Street through the incorporation of two new Queen Street trail entrances. Exact location to be determined during detailed design. Assess the feasibility of new crosswalks linking to the existing sidewalk on the south side of Queen Street.
- Develop a wayfinding system for the Alton Mill site that will encourage use and welcome new users. Signpost regional trail connections and uniquely brand the millpond through the incorporation of the Water Space Art elements.
- Wayfinding should be structured hierarchically, with trailhead signage placed around access and major decision points, and smaller markers at regular intervals and minor decision points.
- Incorporate an interpretive / educational system to tell the story about the cultural history of the Alton Millpond, the Alton Mill and their setting.
- Include landscape design elements such as access ramps, sitting places and observation areas or floating platforms to support the various winter and summer recreational and educational opportunities.



Millcroft Inn and Alton Mill trails and pathways identifying opportunities for new trails and linkages

Water Space

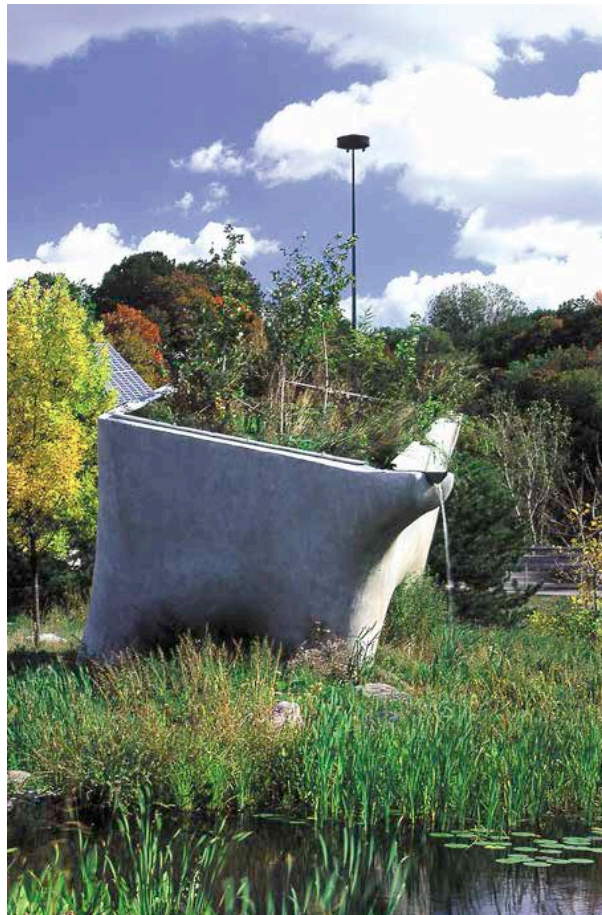
Integrate the theme of Noel Harding's Water Space to demonstrate a narrative of nature and bring a heightened perspective to the processes of aquatic, terrestrial and biological remediation.

Noel Harding's concepts engage audiences. His theme of Water Space demonstrates a narrative of nature and its reflections. His work consistently reflects "eco-revelatory design" being defined as landscape architecture intended to reveal and interpret ecological phenomena, processes and relationships.

In partnering Harding's public art to the Alton Millpond Rehabilitation Master Plan, the tools of nature become mediums inhabited with the scientifically and physically engineered designs, structures and forms. The intended goal of rehabilitation sets standards for the art and landscape to perform. Using nature and the physics of water and weather enables art and nature to affiliate themselves with aquatic rehabilitation and the goals of benefiting the fish and the natural habitat of the creek and pond.

Actions / Design Criteria

- Incorporate the collaborative involvement of Noel Harding's environmental art narrative into key aquatic, terrestrial and biological remediation elements of the Master Plan (See following page)



Elevated Wetlands (Toronto) by Noel Harding



Mimico Creek (Toronto) by Noel Harding








Dawes Crossing (Toronto) Noel Harding



Water Space Art Locations

Water Space Art acts as a visual narrative identifying specific locations to infuse a remediation story into structural elements, wayfinding and the educational interpretation aspects related to ecological function. (See figure above)

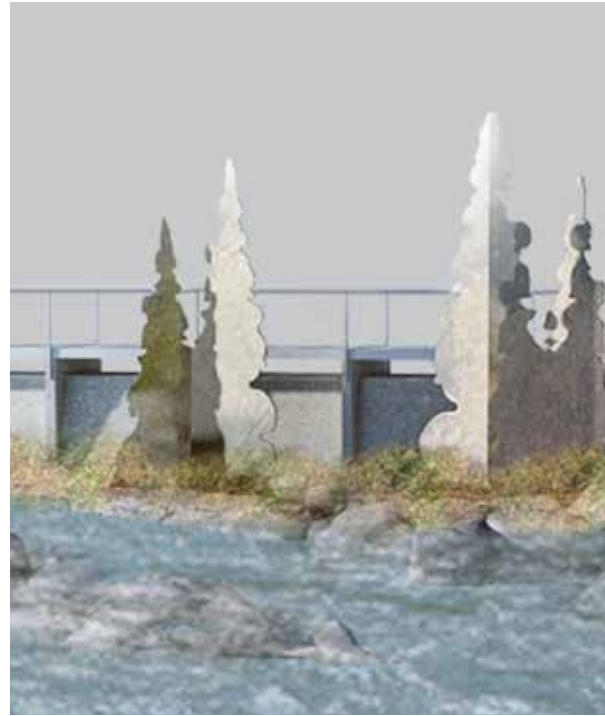
Key

-  Wayfinding/ interpretive elements
-  Floating Platform
-  Vegetated / phytoremediation floating islands
-  Water Forest
-  Water Walk



Water Walk

Vegetated floating phytoremediation islands and a floating boardwalk extend the trail system through the millpond, assist in providing shade and cooling of the pond temperature and help to reduce waterborne pollutants. They could also provide a privacy element for the adjacent properties. Water currents are created that eliminate stagnant pond areas. The walk can incorporate concealed associated infrastructure for water-powered light shows or other aeration elements. Solar powered waterfalls and water displays engage and animate along the floating walkway.



Water Forest

Rotating, floating vegetation islands and mirror polished stainless steel tree templates use wind and water currents to engage the sensory and visual experience of the fishway. The reflective steel tree surfaces extend views of the Queen Street riparian creek edge integrating the pond / creek separation structure into the overall landscape of the Millpond. The reflective steel shapes also mirror the islands as they move, animating a choreography. Concrete retaining walls become a kinetic mural of nature reflected.



Wayfinding / Interpretive elements

Interpretive signage will tell a story about the place, informing users about its natural and historic features, as well as the status of ongoing initiatives. References to aboriginal history, wildlife stream restoration can be included. A family of pathway markers / interpretive elements are located at key decision points in the trail network. Elevated stainless steel animal and fish profiles are mounted on cedar posts and act as kinetic devices with wind. Details of these elements will be worked out in the detailed design stage.

Floating Platform

The floating platform is a key element of the Water Space Art narrative. It is a movable element that acts as stage for summer and winter activities and place to house a solar-powered dredging platform. An integrated waterfall serves as a backdrop to pond activities and assists in water aeration and cooling. In the winter the waterfall aspect transforms into an ice climbing tower. A solar panel roof with an open timber frame provides the water runs for the waterfall. The platform could potentially also serve as a stage for outdoor concerts and other functional purposes.



In winter the waterfall aspect transforms into a climbing feature



Small scale harvesting of sediment for re-use as soil enhancement can be undertaken through a three person dredging process. As sediment build up occurs, the dredging device can respond with minimal intrusion and expense.



The Floating Platform is a venue for solar water display, stage and event space and houses the solar-powered dredging platform



Planted phytoremediation islands and floating walkways add shade to the pond areas and help reduce waterborne toxins. Trees planted to the water's edge and to the berm will also assist in this process.

A flat stagnant water surface allows the sun to heat the surface water. Disturbing of the pond water surface with ripples can assist in reducing the reflective heat build up in the water. Art opportunities to address water temperature include solar-powered floating aeration devices, solar-powered waterfalls and water displays to provide evaporation.

2.0 Master Site Plan



The Master Site Plan

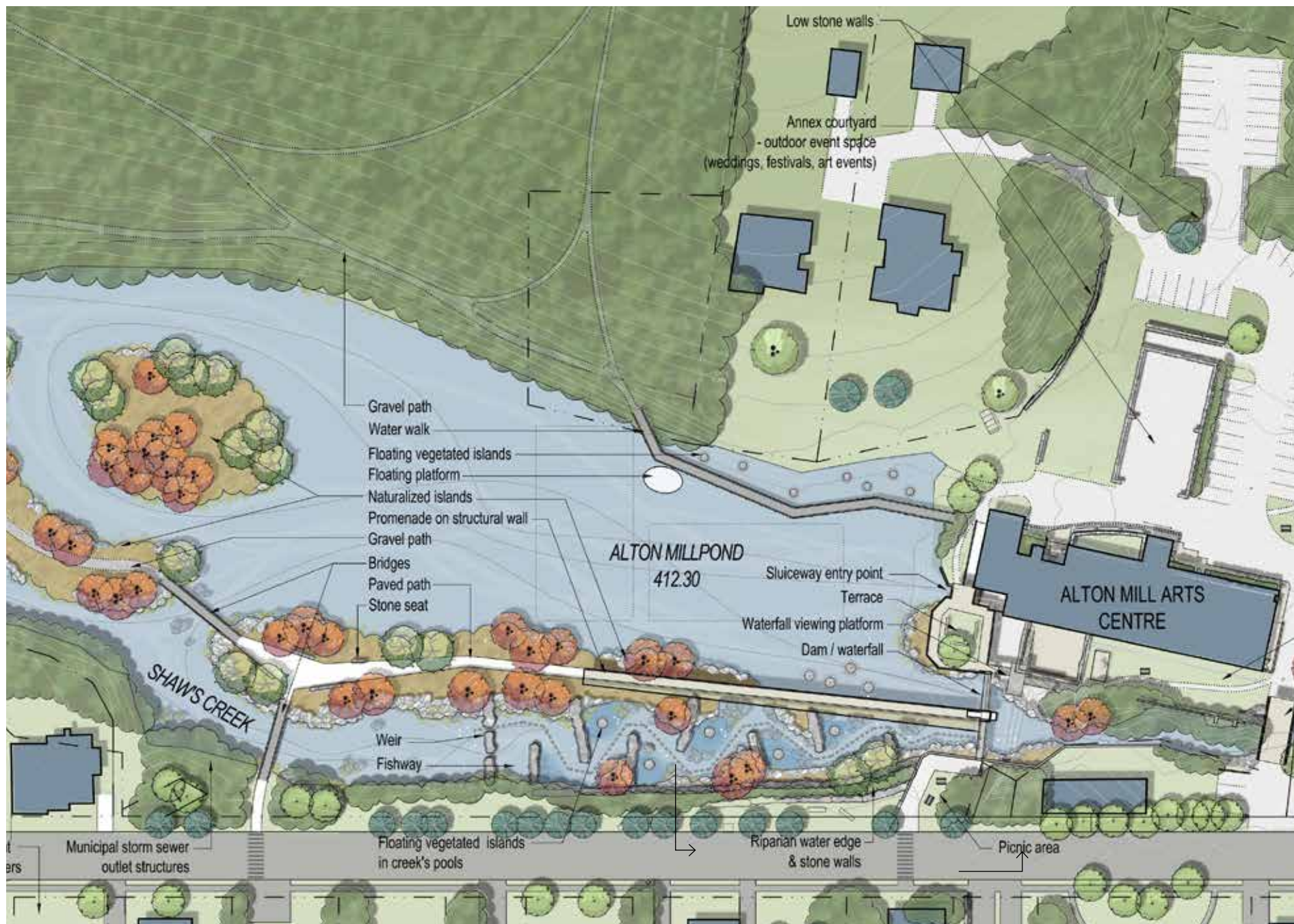
The following plan is an illustrated description of the plan for the site and surrounding context. Detailed 3D illustrated descriptions of component areas of the site are included in the following pages.

The Master Site Plan is intended to show the preferred way of bringing together the design and planning principles outlined in section 1.

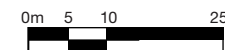


Master Site Plan





Detail Plan



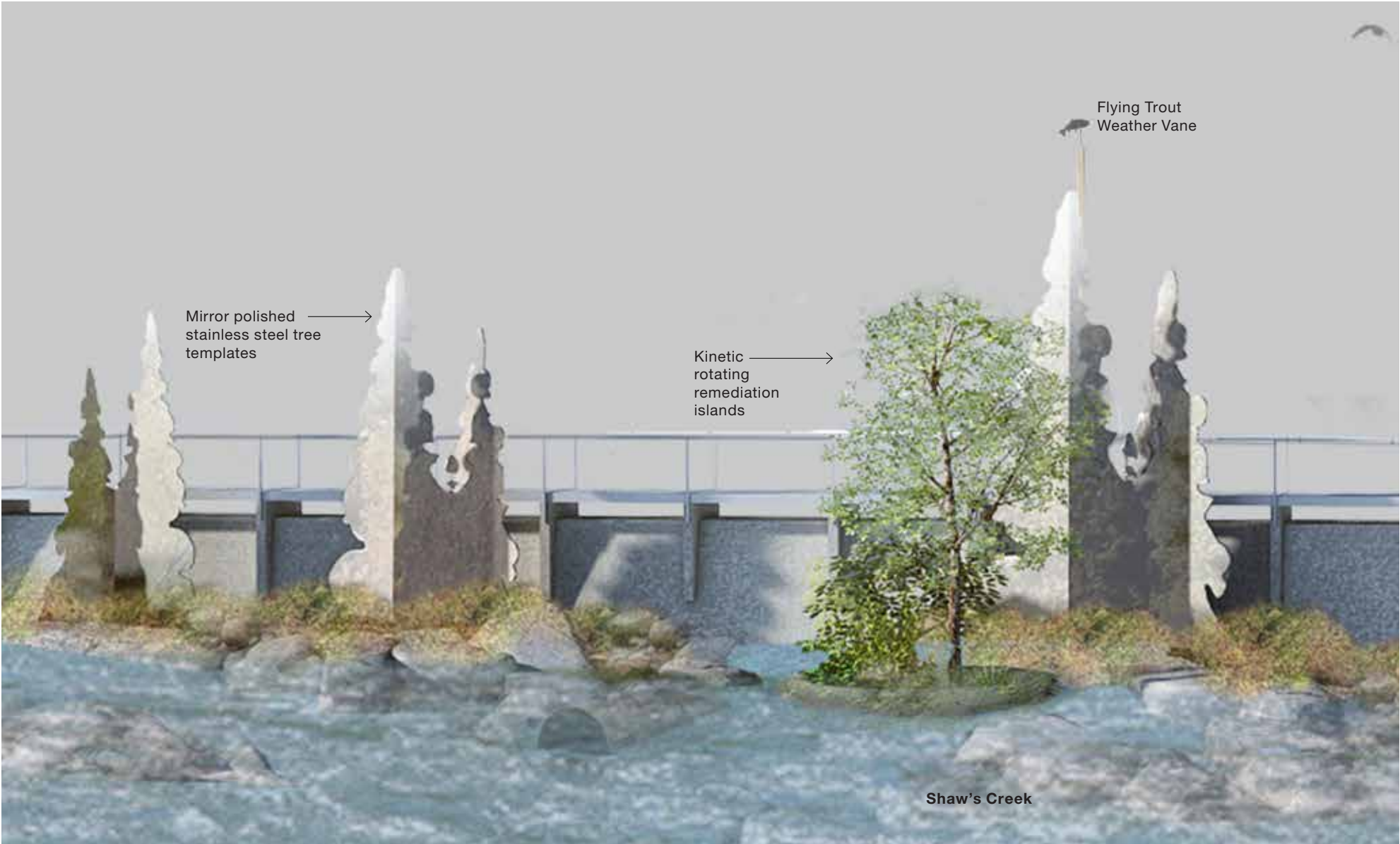


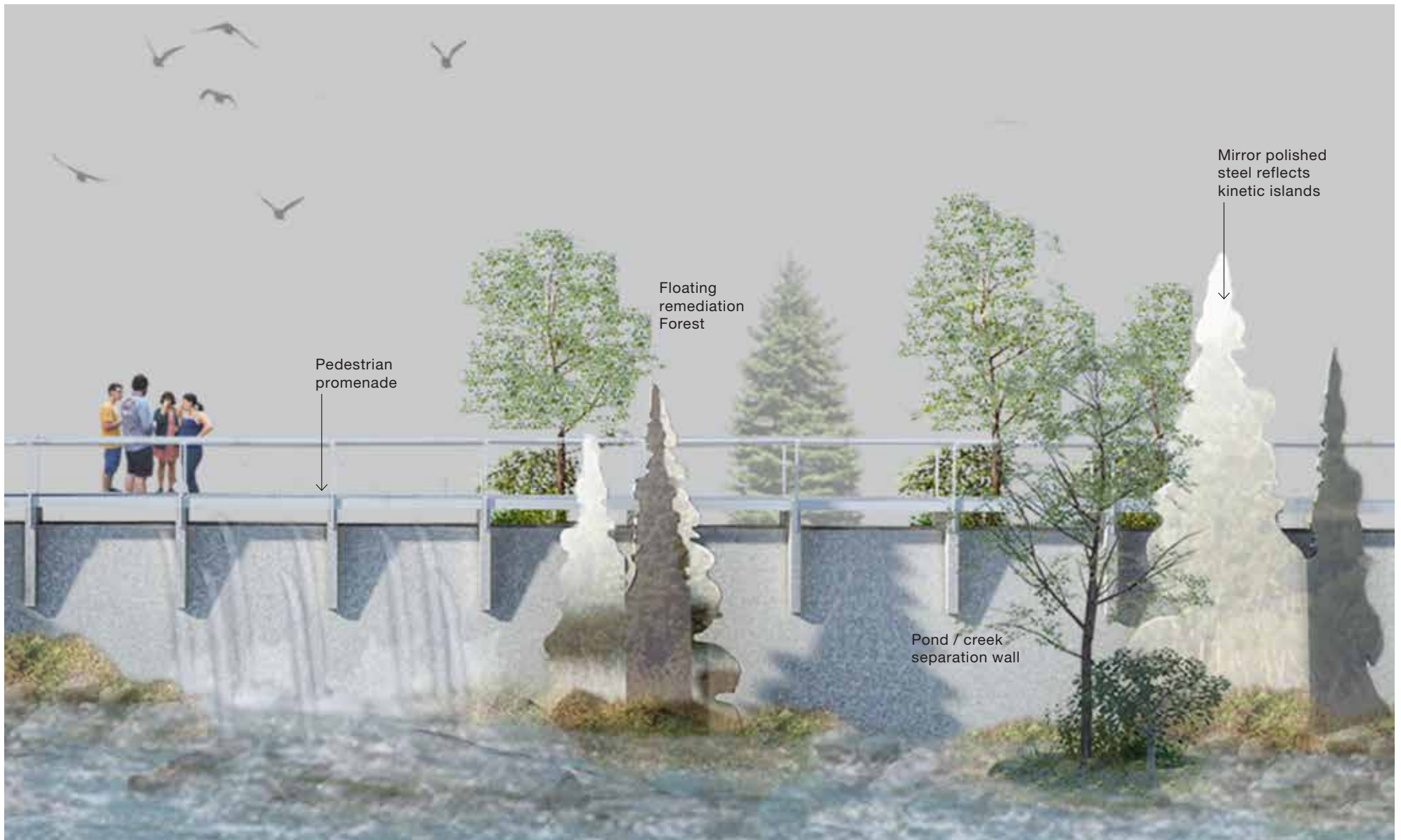
Aerial view looking up the fishway from the Waterfall Courtyard

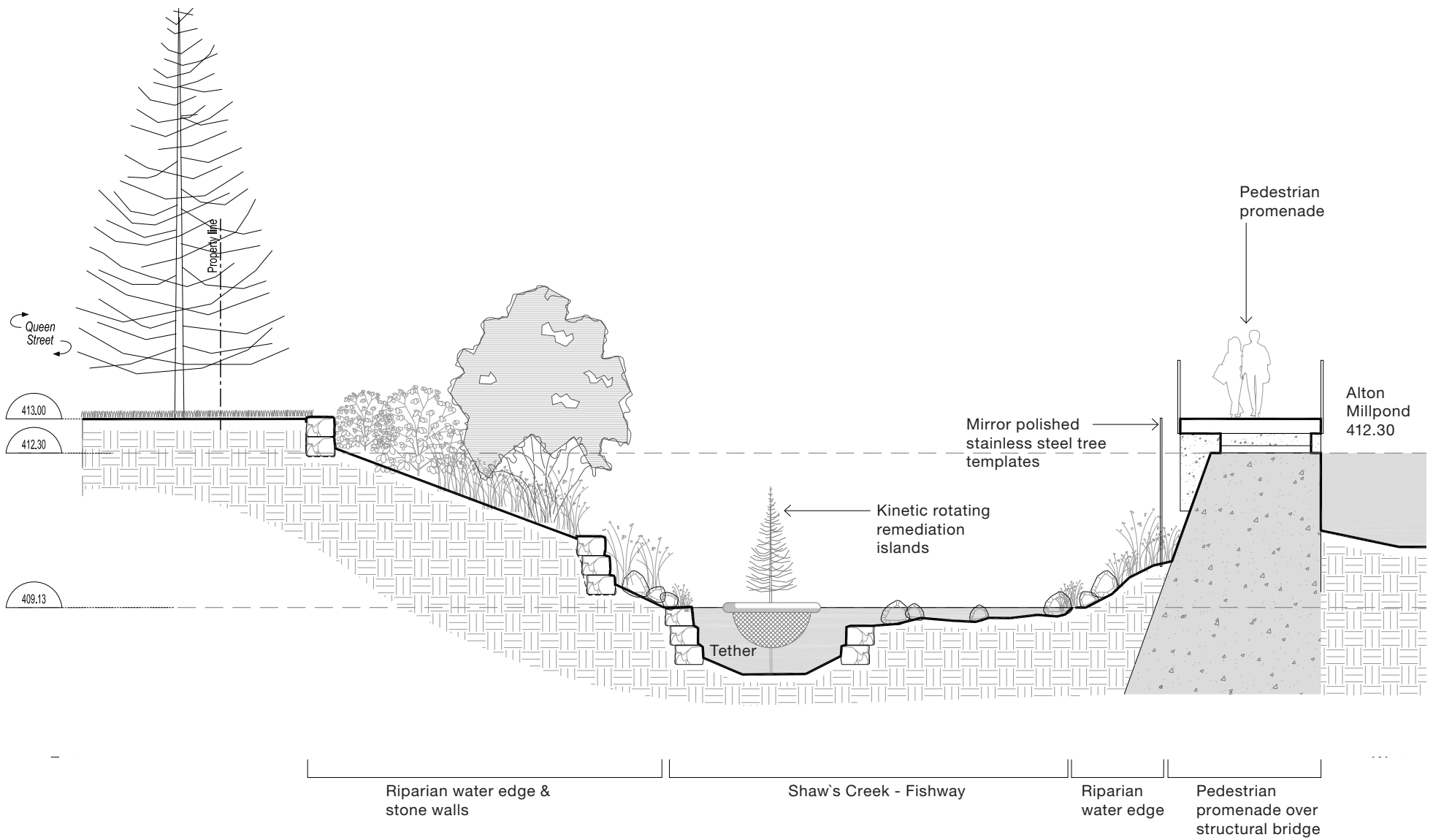


Aerial view looking over the fishway and millpond

Water Forest - Elevation







Pond and Fishway Interface - Cross-section

Conclusion and Next Steps

The Alton Millpond Rehabilitation project is clearly an ambitious and exciting undertaking. The project has numerous, interconnected environmental, social, economic and creative elements that combined will become a landmark in the region, if not the Province.

With an anticipated total project cost in the several million dollar range, it is understood the project time frame could well take several years to complete.

The exercise to develop this Master Plan represents a significant step forward in the project and hopefully paves the way to the next steps that need to be taken to implement this ambitious project. Research that has been undertaken in this stage of work has helped:

- Define issues.
- Establish actions/design criteria.
- Understand site conditions, fundamental engineering and environmental design specifications and how they interact.
- Identify legislative/regulatory requirements at various levels of government.
- Develop a better understanding of the challenge in meeting the stated project goals.

The process to move forward will have several elements, starting with raising of additional funds to proceed.

Specific other actions include, but are not limited to:

- Develop a stand alone condensed version of this report that can disseminated to the general public, potential funders and approval authorities.
- The development a project task list of actions to be taken.
- Development of a project budget.
- Environmental Assessment (EA) other approvals
- Continued dialogue with stakeholders to determine future ownership, operational and governance arrangements through a fully transparent process.
- Incorporation of a non-profit entity to facilitate fundraising if confirmed by the committee to be the appropriate course of action.

We thank all those involved in this project for their support and assistance and recognition that the process of rehabilitation is never easy nor quick. The challenge is significant yet worth pursuing.



NOEL HARDING STUDIO

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