ALTON DEVELOPMENT INC.

Alton Millpond Rehabilitation Project

LRIA Application
Project Description

Revision 0

September 5th, 2017
Project Nº 210-41-HS00171

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ALTON DEVELOPMENT INC.

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LRIA Application – Project Description

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PROJECT Nº 210-41-HS00171

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1. OBJECTIVE

Alton Development Inc. (ADI) presents herewith to the Ministry of Natural Resources and Forestry (MNRF) an application under Section 16 of the Lakes and River Improvement Act (LRIA) for the rehabilitation and improvement of the Alton Millpond hydraulic control structure.

The objective of this document is to provide MNRF with background information on the project in order to schedule a scoping meeting with the MNRF review team, as proposed during the various meetings that ADI and their representatives had with MNRF Aurora District representatives.

ADI expects that this scoping meeting will allow us to:

- Determine *LRIA* approval requirements;
- Discuss the application review and approval process; and
- Identify application information requirements.

This Project Description document outlines:

- The project's scope and objective;
- The structure and land ownership, and the role of the different participants involved;
- The proponent's understanding of how this project falls under LRIA jurisdiction;
- Selected technical background information.

ADI trusts that this document contains sufficient information to trigger a scoping meeting.

2. CONTEXT

2.1.1 Alton Millpond Description

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; at this time, the Alton Millpond dam is not used for any industrial or flood control purpose.

2.1.2 Alton Millpond Rehabilitation Project General Description

For over a decade, the Alton Millpond owners have been working with local representatives, MNRF, Credit Valley Conservation Authority (CVC) and others to develop a comprehensive Master Plan of the Millpond Rehabilitation. This Master Plan is presented in Appendix A. The most relevant information for the LRIA application under section 16 are summarised in this report. The main objectives of this rehabilitation are to:

- 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.

- 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.

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

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

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

- Stabilize the dam and associated structures to improve safety and prevent groundwater seepage into the mill building. Restore, if possible, the ability to generate (on a micro-scale) hydro-electric power and generate revenue to cover ongoing maintenance costs (hydro-generation is excluded from the current application; there is no firm plan to add hydro-generating equipment in the near or medium term).

- 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.

2.1.3 Alton Development Inc. and Alton Millpond Association

Alton Development Inc. (ADI), a private company owned and operated by Jordan and Jeremy Grant, owns the dam and adjacent pond, along with the Alton Mill Arts Centre and related lands. The Alton Millpond Association (AMA) is a non-profit organisation that has been mandated by ADI to properly plan, fund, and accomplish the Alton Milpond Rehabilitation Project.

2.1.4 Approval schedule deadline

AMA has been awarded a $495,000 grant **over 27 months** by the Trillium Foundation to assist with the costs of the design for the restoration work of the creek and millpond. The Trillium Foundation awarded this grant to encourage people to support a healthy and sustainable environment, and to help conservation and restoration efforts be better planned and more sustainable. Given that the grant was awarded in June 2017, the deadline for finalizing construction plans and obtaining the required permits and approvals is **September 2019**.

2.1.5 Previous Meetings with MNRF Aurora District and CVC

Two inception meetings between the proponent, CIMA+ and MNRF Aurora District have taken place during summer of 2017. Meeting minutes of the second meeting are presented in Appendix B.

3. PROJECT DESCRIPTION

3.1 PROJECT'S LOCATION

The Alton Mill Dam is located in the Village of Alton, 8 km south of Orangeville in the Regional Municipality of Halton, on the Shaw's Creek tributary watershed of the Credit River (43°51'59'' N 80°04'18'' W). The site is bounded by Queen Street to the south and Amelia Street to the east. Access to the south side of the dam is available from Queen Street. The north side is accessed from the west end of the existing mill building.

Figure 3.1 presents the dam location.

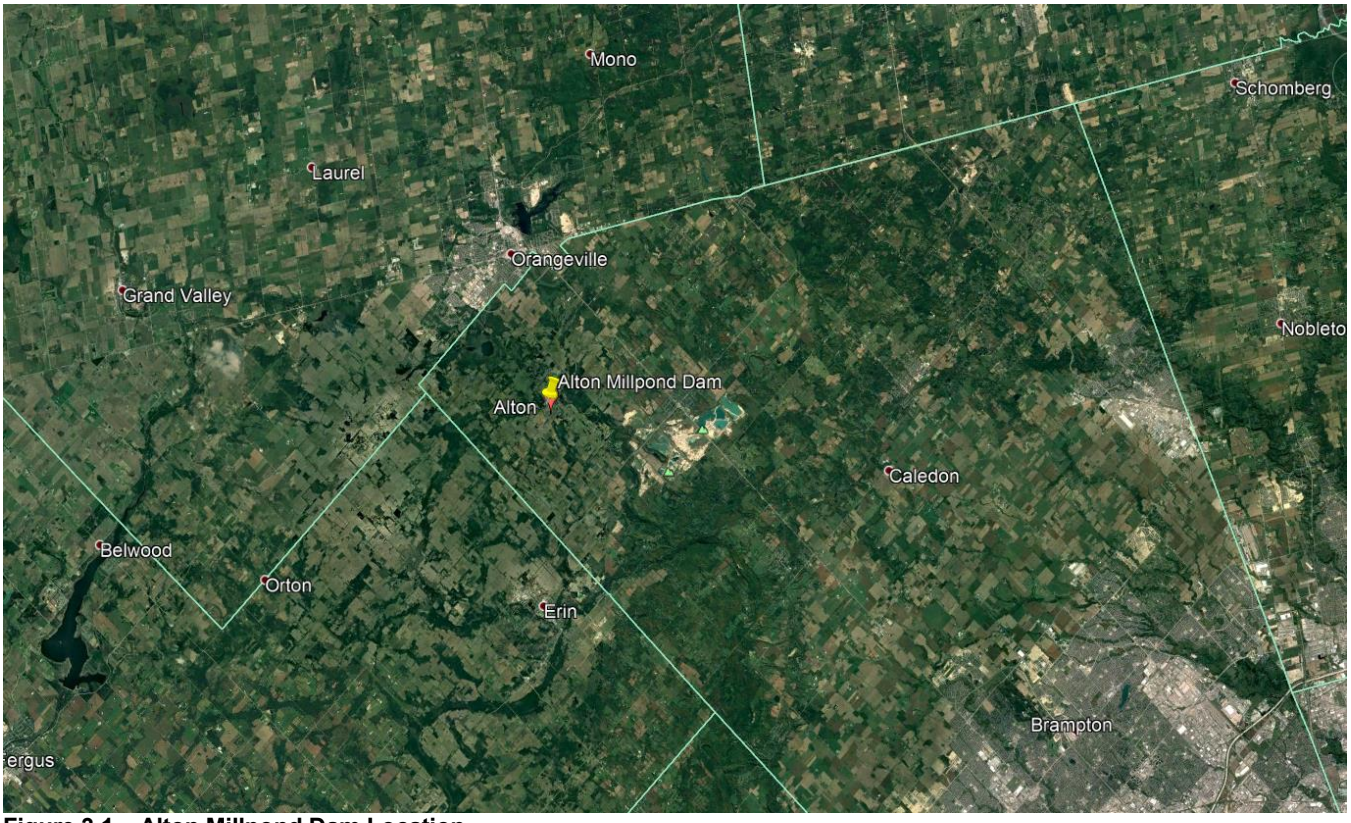

Figure 3.1 – Alton Millpond Dam Location

3.2 EXISTING DAM DESCRIPTION

The dam was originally constructed in the 1880's and is part of a heritage stone mill building that currently houses the Alton Arts Center. At present, the sole purpose of the dam is to maintain upstream water levels in the headpond for local recreational uses. Figure 3.2 presents a picture of the current condition of the dam.

The existing dam is a gravity structure and consists of an approximately 3.4 m high fixed weir spanning between abutments and a centre pier. Each spillway opening is approximately 6.5 m wide from face of abutment to face of pier, and approximately 2.3 m high from crest of the weir to top of abutment. Based on site observations, the limited background documentation available, and the construction of the mill building, it is anticipated that the weirs, the pier and the abutments downstream of the weir originally consisted of stone masonry construction which was subsequently encapsulated in concrete. The abutments extend approximately 10 m upstream of the weir as concrete retaining walls which serve to channel flows to the spillways.

Figure 3.2 – Existing Dam

Based on background data, the drainage area upstream of the dam is 85 km² and the dam's headpond covers an area of approximately 2 hectares. There is significant silt accumulation in the headpond, with the depth of water below the crest of the concrete weir estimated to be less than 0.3 m in much of the pond. The pond level can be raised above the crest of the concrete weir by means of timber flashboards placed in a series of vertical steel supports spaced at approximately 1.2 m centres.

Access for dam operators adjusting the flashboards is provided by narrow platforms spanning between the pier and each abutment. Each platform consists of two steel beams supporting a timber plank deck. A pipe handrail is provided on each side of the platforms, and access to the platforms is impeded by padlocked chain link gates at each abutment.

3.3 PROPOSED REHABILITATION

3.3.1 Dam Improvement

The objective of the dam's modification are the following:

- Adapt the structure to the proper IDF
- Restore the cold water stream flow past the site, allow upstream fish passage and allow for natural sediment transportation.

The proposed improvements to the existing dam structure are as follows:

- Replace the existing weir in the dam's North opening by an underflow gate. The sill elevation of the gate will be approximately the existing ground level on the downstream side of the structure. Therefore, sediment dredging in the pond is required prior to the commissioning of the gate to avoid potentially unacceptable amount of sediments travelling downstream. This modification will increase the dam's hydraulic capacity.
- Install a new energy dissipation structure directly downstream of the North opening, in order to control hydraulic jump downstream of the new gate.
- Remove the existing weir to an appropriate elevation in the dam South opening, in order to create a natural-type riverbed to create the downstream end of an appropriately designed fish passage. The South abutment will be rehabilitated, or replaced to ensure slope stability.
- The center pier will be extended approximately 90 m towards/into the pond, in order to create a new overflow section parallel to the rehabilitated stream. This structure will separate the pond from the stream. The toe of this structure will be designed to contain hydraulic jump and dissipate energy during floods.
- The new inline structure will terminate on the South bank. This portion of weir will form the head of the rehabilitated stream section, and will include a series of openings for controlling flows and allow for upstream fish passage.

The new structures will be incorporated into a site landscaping plan, which is not relevant for this application. Appendix A presents the project Master Plan, and Figure 3.3 presents the conceptual general layout of the proposed improvements.

Figure 3.3 – Proposed Improvements to Alton Millpond Dam

3.3.2 Offline Pond

The pond will maintain approximately the size of the existing pond less the portion that will be dedicated to the appropriately sloped fish passage / creek. The normal water level will comply with the existing rule curve. The accumulated silt will be totally or partially dredged, in order to restore hydraulic capacity. Sediments have been tested for contamination (see Appendix D).

3.3.3 Fish Passage

Starting downstream from the existing dam's South opening up to the closing portion of the pond separation structure, Shaw's Creek will be rehabilitated following a 4% to 7% grade, with the objective of allowing Brook Trout and other species of interest to travel upstream past the dam.

3.3.4 Shore Protection

Shore protection will probably be required in the rehabilitated portion of the stream, as well as in the downstream portion of the dam, in order to protect the exposed bank from erosion. Particular care will be taken in selecting material and arrangements, to provide a natural look and biological functions.

3.4 LAND OWNERSHIP

There has been a thorough search of ownership titles around the project location made by an Ontario Land Surveyor (OLS) (see Appendix C). Figure 3.4 summarises the results. As shown on this figure, the pond limits were transferred to the mill owner, but apparently not the natural

riverbed (prior to the construction of the dam in the XIXth century). No documents are available to locate the former riverbed, and so it is the proponent's opinion that it is impossible to now locate the exact position of this former riverbed: it might have been where shown (approximately) on figure 3.4, or more to the North, and probably intersected with the location of the former mill's water intake. Therefore, and as discussed with MNRF representatives of the Aurora District, it is the proponent's opinion that there is no required disposition of Crown/public land in the context of this project.

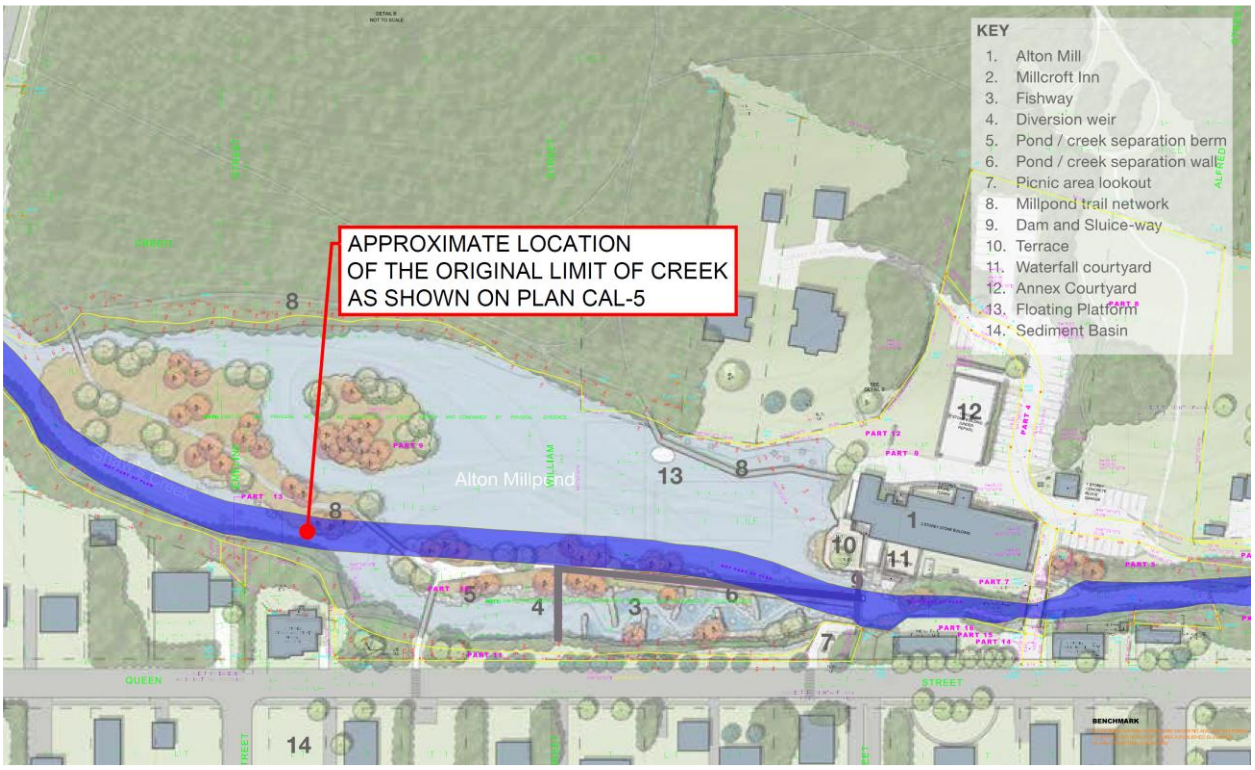

Figure 3.4 – Approximate Location of Former Riverbed

4. UNDERSTANDING OF THE LRIA APPROVAL PROCESS

4.1 COMPONENTS OF THE PROJECT THAT REQUIERES APPROVAL UNDER SECTION 16 OF LRIA

To our understanding, the proposed work can be considered as “alterations, improvements and repairs” of an existing dam. Therefore, approval under LRIA section 16 is required because the project includes the following activities:

- changes to the size of the dam;
- changes to the size of spillways or other appurtenant discharge facilities to the dam;
- changes in the hydraulic capacity of the dam;
- partial reconstruction of the dam and spillway;
- installation of cofferdams, upstream and downstream of operational stoplog gains;
- changes to the dam operations.

4.2 LRIA SECTION THAT WOULD NOT APPLY

The project is not the decommissioning of an old dam followed by the construction of a new one. Therefore, to our understanding and according to preliminary discussions with MNRF, approval under section 14 (Location Approval), is not required.

5. RELEVANT TECHNICAL BACKGROUND INFORMATION AND SCOPE OF APPLICATION

5.1 HYDROLOGY AND FLOOD LINE

CVC has completed hydrology studies and flood line determinations on Shaw's Creek, at the location of the project (see Appendix E). It is the proponent's intention to use those studies for the design of the structures at the site. The proponent would like to confirm with MNRF that those studies are sufficient for MNRF review in the context of Plans and Specification Approval.

5.2 PRELIMINARY HPC, IDF AND DAM SAFETY REVIEWS

The most recent dam safety review available was by TSH, in 2006 (see Appendix F). It is noted that this DSR was undertaken prior to the latest MNRF guidelines. That document establishes the HPC of the dam as Significant, based on the following observations:

- Flows resulting from a "sunny-day" failure would be limited to the release of the normal shallow depth storage volume of the headpond (0.6 m ± deep, 12,000 m^3 ± volume) and would likely be contained within the downstream channel.

- Flows resulting from a dam failure which occurred during a major storm event, when upstream water levels could be 1.7 m higher than for the "sunny-day" failure and therefore the resultant storage volume released would be significantly greater, could overtop the downstream channel banks causing property damage at the old mill building and three residences on Queen Street and the possibility of loss of life.

- Environmental impacts to fish habitat downstream of the dam would result as the headpond drained and the large volume of silt flushed downstream. The significance of this impact would be dependant on the timing of the failure with relation to the spawning season and the ability of the channel to clear / restore itself.

- The spillway of the dam cannot accommodate the Regional storm event without overtopping the abutments and adjacent earth embankments. As there is no formal emergency spillway, it is anticipated that Queen Street will act as a spillway when the dam is overtopped, subjecting numerous residential and commercial properties south-east of the dam to flood damage. This would be considered "incremental damage" because if the dam did not exist (or was decommissioned) the flow capacity of Shaw's Creek would be increased and the severity of flood damage under any specific event reduced.

- The channel immediately downstream of the dam is surfaced with cobble and believed to be underlain by bedrock at shallow depth, and is therefore resistant to erosion and down-cutting.

- The bridge located 65 m ± downstream of the dam will restrict outflow and dissipate energy.

Given the proposed improvements to the geometry of the dam, the proponent will carry out new dam failure analysis, taking into account the modified geometry of the dam and a recent survey of the potentially impacted structure. This analysis will be realised using HEC-RAS software. The HPC in normal and flood conditions will be reviewed and perhaps revised, and the IDF will be determined.

No other dam safety studies are planned for the existing structures.

5.3 EXISTING AND FUTURE DAM MANAGEMENT

The existing structure is essentially inoperable in flood condition. The proposed structure will comprises an under flow gate, and two non-regulated overflow weirs with additional discharge capacity. A new dam operating plan (DOP) will be defined for the new structure. Operation of the dam (under flow gate) will be limited to flood conditions.

5.4 POND SEDIMENT CONTAMINATION

Geomorphic Solutions tested the pond sediments for contamination (see Appendix D). Only conductivity was found to be greater than normal acceptable limits. During the project, the methodology for removing sediments will be defined, and contaminated sediments (if any) will be treated appropriately.

5.5 PRELIMINARY GEOTECHNICAL SURVEYS

Sarafinchin carried out preliminary geotechnical surveys in 2015 (see Appendix G). Sarafinchin created a total of 4 boreholes and 8 test pits on site. Results show that relatively sound dolostone is found near the existing dam foundation.

After a review of these investigations, CIMA+ foresees additional geotechnical surveys being required for the design of the dam.

5.6 GEOMORPHOLOGY AND SEDIMENTS DYNAMIC

In 2006, CVC performed a Subwatershed Study (Appendix H), in which it describes the geomorphology of Shaw's Creek. At the project site, the Millpond is currently a barrier to the natural transport of sediments, as the sediments are trapped in the slow moving water. According to MNRF biologist Mark Heaton, the stream downstream of the Millpond is "starving" for sediment. The project will change the sediment dynamic of the site by returning it to its natural condition.

No additional geomorphology or sediment dynamic studies for Shaw's Creek are planned in the context of this project.

5.7 RESTORING FISH PASSAGE

The rehabilitated portion of Shaw's Creek will be designed to facilitate the upstream migration of Brook Trout and other species of interest. The design criteria for this have been provided by Natural Resource Solutions Inc., in their 2015 memo (see Appendix I).

5.8 GENERAL DESIGN STANDARDS

The dam will be designed according to MNRF 2011 technical guidelines, and all up-to-date industry standards. No deviation from these standards are currently foreseen.

5.9 ADDITIONAL INFORMATION TO BE INCLUDED IN THE LRIA APPLICATION

In addition to the above, the following information will be included in the application:

- Temporary cofferdams and hydrological risk during construction
- Construction schedule
- Sediment control plan during construction
- Signed and sealed drawings for construction
- Technical specification

6. CLOSING

Through the improvement of the Millpond dam structure, the Alton Millpond Rehabilitation project aims to enhance the natural and social environment of this important feature of the village of Alton. For over a decade, the proponent has been consulting with local partners, agencies, and subject-matter experts to develop the current concept.

The Trillium Foundation grant, which ends in September 2019, allows sufficient but limited time to complete the permitting phase of this project. CIMA+, on behalf of ADI and AMA, trusts that the background information presented herein is sufficient to trigger a scoping meeting with MNRF, in order to begin the LRIA approval process in the most efficient manner.