

EXECUTIVE SUMMARY

Introduction

The Upper Thames River Conservation Authority (UTRCA) is responsible for the maintenance and operations of Harrington Dam, situated in Zorra Township (**Figure 1-1**). Zorra Township contributes 100% of the operating and maintenance costs of the dam and the costs may be offset where the UTRCA is able to obtain funding for capital projects. Results of a 2007 (Acres) Dam Safety Assessment revealed concerns of insufficient spillway capacity, spillway instability and embankment stability. A subsequent 2008 (Naylor) embankment stability analyses concluded that the Harrington Dam did not meet dam safety guidelines stability criteria. The dam was classified as having a Low Hazard, based on MNR (2011) Dam Hazards due primarily to the rural area in which the dam is situated and the low density of residential dwellings in the area.

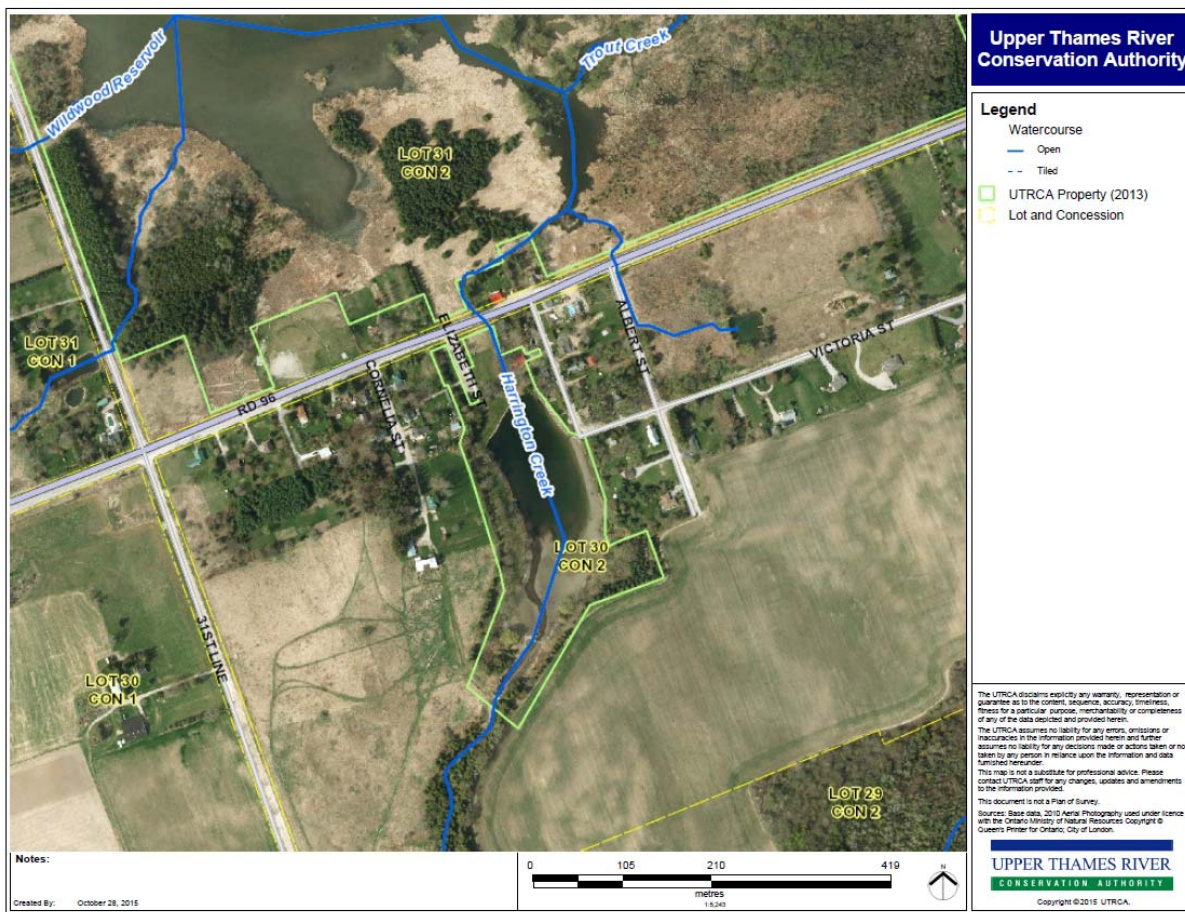


Figure 1-1. Location of the Harrington Dam and Pond within Harrington CA (Source: UTRCA)

The UTRCA, in partnership with Zorra Township, initiated a Class Environmental Assessment (EA) under the Conservation Ontario Class EA process due to the significant concerns related to the structural integrity and hydraulic capacity of the Harrington Dam and embankment. The objective of this EA study was to identify, evaluate, and ultimately to recommend an alternative (including Do-Nothing) that will allow the Upper Thames River Conservation Authority (UTRCA) to move forward with a plan to address the Harrington dam and embankment safety concerns.

Background

The Harrington Conservation Area (HCA), situated within the Village of Harrington, includes a dam, pond and the Harrington Mill. All are under UTRCA ownership. Harrington Conservation Area is a “Day-Use Only” area, with current uses including hiking, birding, fishing, and picnicking.

The Harrington Community Preservation and Historical Club Inc. entered into a lease agreement with UTRCA in 1999 for the long-term restoration of the grist mill and the management and maintenance of Harrington CA. Restoration of the Mill, to date, has been supported through community fundraising, volunteer hours, and a Trillium Grant. The restoration efforts are intended to result in a functioning museum and a working educational site. There is potential to support demonstration operations of the mill by water flow from Harrington Pond.

Existing Conditions

Review of background materials and site conditions was completed to define and confirm the problem statement. Characterization of existing conditions was completed through review of background information; completion of field investigations, data collection, data analyses and monitoring. This included a general assessment of the study area and investigations of Harrington Creek downstream and upstream of the dam, and within the pond.

Harrington Creek flows into Trout Creek and Wildwood Lake. The drainage area of Harrington Pond is ~ 12 km² and is made up of mostly agricultural lands. The study area is within 100 m of a Provincially Significant Wetland; wildlife species likely travel between the Wildwood Conservation Area and Harrington Conservation Area. Results of a three season botanical inventory revealed that 40% of the species observed within the 5 ha HCA are non-native; no species at-risk, rare, or uncommon species were found. The overall quality of the vegetation within Harrington CA was rated as moderately poor to average. The pond did not support any native rooted aquatic plants; only a narrow fringe of wetland emergent plants occurred along the shores.

In the community area surrounding the pond, shallow groundwater wells are used by several residential properties. Historically, these wells have been affected by water levels in the dam, including the 1949 dam failure event.

The three season bird survey recorded 42 species of birds within the HCA; all were considered common breeding or permanent residents of the area. Only one species-at-risk bird (Barn Swallow) was observed although no evidence of breeding was found. A snapping turtle, bluebird and milksnake have been observed by community members. Neither the pond nor other parts of HCA provide critical habitat for any sensitive bird or other species. Waterfowl appeared to use the pond on an occasional basis. The pond has been stocked annually with rainbow trout; UTRCA has recently (2016) been notified by the Ministry of Natural Resources that a permit for stocking the pond will no longer be provided; this will affect the annual fishing derby that has traditionally be held in Harrington Conservation Area. Downstream of Harrington Dam, Harrington Creek appeared to have been previously straightened and was considered to be stable. Results of the aquatic assessment indicated that the creek provides both seasonal and permanent habitat for warm water species; the abundance of young of the year fish suggested that this portion of the creek is valuable spawning and nursery habitat for warm water fish. Thirty (30) different species were recorded downstream of the dam. Cold water fish species are unable to successfully reproduce downstream of the dam. Benthic analyses revealed very pollution tolerant taxa in this section of the creek that were indicative of ‘fairly poor’ water quality. Measurements of water temperature revealed warmer water downstream than upstream of the pond; the pond appears to provide a warming effect.

Bathymetric surveys of Harrington Pond showed that approximately 48% of the available pond volume has filled with sediment. Analysis of the accumulated sediment indicated that the sediment was not defined as hazardous waste according to Schedule 4 Leachate quality criteria (Ontario, 2015). The footprint of Harrington Pond was determined to have no archaeological potential.

Harrington Creek, upstream of the backwater effects that are due to the pond was considered to be geomorphologically 'in transition'. The creek morphology was influenced by large woody debris with respect to profile controls and channel width; large woody debris is beneficial for aquatic species as it provides in-stream habitat. Results from the aquatic assessment indicated that the creek offers habitat for cold water fish species but that only seven (7) species in all were recorded. Benthic analyses in the same section of creek revealed that pollution sensitive taxa were present that were indicative of 'fair' water quality. The water temperature was cooler upstream than downstream of the dam indicating warming of the water through the pond.

The Harrington Conservation Area, in which the dam, mill, and pond are situated, is a beloved focal point of the community that dates back to 1846. The area has supported family and community picnics, fishing derbies, skating, swimming, bird watching, trail use, and canoeing. The Harrington and Area Community Association and its members are keenly interested in preserving the viewscape of the pond, enhancing the pond environment, providing educational opportunities, supporting the operation of the Harrington Mill, and enhancing tourism potential to the area.

Alternative Identification and Evaluation

Through review of study findings, seven potential alternative solutions were identified to address the failure of the dam and its embankment to meet dam safety guidelines stability criteria as identified and discussed in the Acres (2007) and Naylor (2008) studies. These alternative options identified for addressing the deficiencies of the dam and embankment included the following:

- 1) Do Nothing
- 2) Remove Dam and Install Rocky Ramp
- 3) Remove Dam and Construct Natural Channel
- 4) Remove Dam and Construct One or More Offline Ponds/Wetlands with a Natural Channel
- 5) Replace Dam with a New Structure Downstream of the Existing Dam
- 6) Lower the Dam Crest with Natural Channel
- 7) Reconstruct the Existing Dam in its Current Location and Configuration with New Materials

Evaluation of the potential alternatives was completed for each of the technical, environmental, socio-cultural, and economic categories as defined in MOE (2014). The specific criteria that were evaluated were selected based on study area characteristics and factors considered especially relevant by the study team and/or the community. Ranking of each criterion was undertaken to determine the preferred alternative considering an equal category weighting. Given the high community interest and local cultural value of the dam and pond, the ranking was also evaluated using an altered category weighting (i.e., 40% socio-economic, 20% for all other categories).

The preferred alternative, resulting from both the equal and the weighted evaluation processes, was Alternative 4 (**Figure 7-1**). In this alternative, the dam would be removed and one or more off-line ponds would be created. The channel would be naturalized and flow around the off-line pond. The alternative recognizes the socio-cultural value of the community regarding viewscape of the pond and recreational uses of the area along with environmental benefits that would be achieved with placing a pond off-line (i.e., improved water quality, species diversity, habitat continuity, etc.). The alternative allows for replication and enhancement of the terrestrial environment. Subsequent to the third PIC, an additional alternative was proposed by the community, and considered by the study team. That alternative was a variation of Alternative 7 (i.e., partial rather than full replacement; creation of a spillway at the upstream



Figure 7-1. Preferred Alternative

end of the pond) and considered a temporary solution rather than long-term. In conjunction with their description of the alternative, the community identified measures for environmental enhancement and recreational potential; many of these would not be exclusive to the variation of Alternative 7. The variation of Alternative 7 was evaluated, informally, to examine how the final scoring would compare to the preferred alternative. While the score, in both the equal and weighted evaluation tables would be higher than Alternative 7, the rank did not increase to be within the top 3 alternatives. Alternative 4 therefore remained the preferred alternative.

Prior to development of detailed design, additional study is required to further characterize Harrington Creek hydrology, examine potential effects on shallow groundwater wells, potential for upwelling into an off line pond, undertake further archaeological assessment, and further examine the hydrological requirements to operate the turbine within the Grist Mill. The offline pond should consider water taking needs required to operate the turbine, within natural constraints. Where possible, the detailed design should address and incorporate elements considered important by the community that include: large pond viewscape, trails and viewing areas for birds, habitat creation (snake, turtles, birds), wheelchair accessible fishing area, unobstructed access to the pond (i.e., avoid overgrown overhanging vegetation), and mosquitos management.

Public Consultation

Public Consultation was undertaken throughout the study process which included not only the immediate community, but also First Nations, and organizations that may be interested in the project and/or agencies that must be consulted during the Class EA process. Extensive Public Consultation was undertaken to communicate study findings and study process to the Harrington Community and to obtain public feedback to consider and incorporate into the study. All public notices, PIC presentation materials and draft reports were posted on the UTRCA website to provide public access.

In addition to three (3) public information centres (PIC), UTRCA organized a field tour of dam removal and restoration projects that have been completed in the jurisdiction of the Grand River Conservation Authority. Upon the request the Harrington Community & Historical Preservation Club (also called the Harrington and Area Community Association) provided a tour to the study team and Zorra Township representatives. After the third PIC, UTRCA met with the Harrington and Area Community Association to further clarify study process and findings and encourage community participation; a three week extension of the comment submission time period was given. Public comment and feedback received during the PIC and questionnaires were reviewed and used to inform the alternative evaluation process and refinement of the preferred alternative. While the preferred alternative is generally accepted by some community members and non-governmental agencies (12%); the majority of the communications (88%) received during the study process oppose dam and pond removal and prefer repair or reconstruction of a dam similar to the existing dam and embankment. The key concerns pertain to the perceived loss of cultural heritage through the loss of a large pond viewscape and loss of opportunity to use pond water to power the restored Mill. The community has expressed concern regarding mosquitos in an off-line pond, loss of wildlife habitat, and the introduction of non-native species to Harrington Creek upstream of the dam (e.g., carp).

Conclusion

A Class Environmental Assessment study was initiated by UTRCA with the intent of identifying the preferred alternative for addressing the failure of Harrington dam to meet dam safety guidelines with respect to its spillway and embankment. Review of existing conditions through background review and field studies demonstrated environmental impacts of the pond on water quality, fish species diversity, and channel function. No constraints were identified that would limit works associated with any of the potential alternatives. Through the evaluation process, Alternative 4 (remove dam, create off-line pond, naturalize channel) was determined to be preferred. Through the public consultation process, community members have made it clear that they, generally, prefer repair or replacement of the dam and embankment in contrast to the preferred alternative. The Harrington Community indicated that if the dam and pond could be retained that the community would intend to improve the

overall pond environment. Some plans were being made as the EA report documents were in completion, to initiate an improvement strategy. Preparation of design drawings for the preferred alternative should consider design elements that would support demonstration operation of Harrington Mill, maximize the viewscape, and enhance habitat. The design should also consider exclusion measures for invasive species (e.g., carp).