

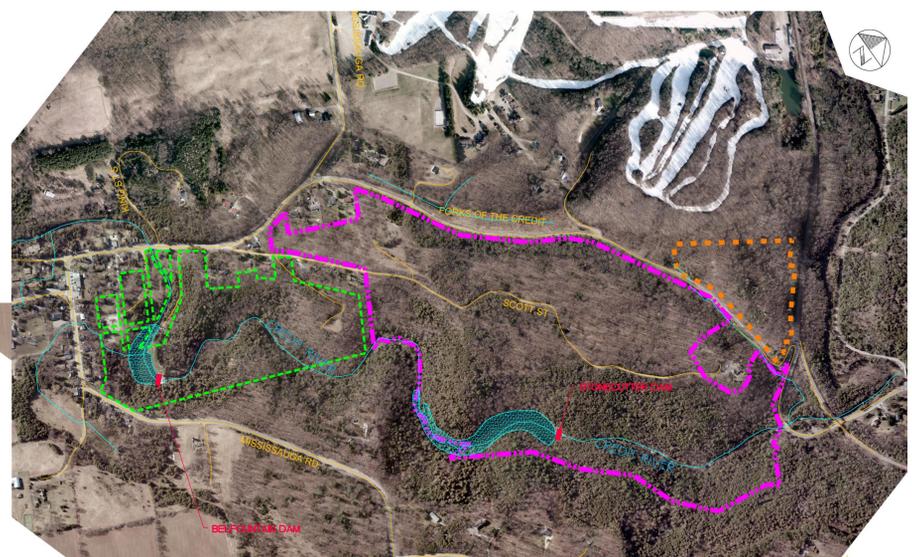
# Belfountain Dam and Headpond Class Environmental Assessment

September 22, 2015



The *Class Environmental Assessment Study Area* is a sub-area within the Belfountain Complex and the outcomes will be incorporated into the *Belfountain Complex Management Plan*.

- LEGEND**
- BELFOUNTAIN CONSERVATION AREA
  - WILLOUGHBY PROPERTY
  - COX PROPERTY
  - STREAM LINE
  - EXISTING HEADPOND

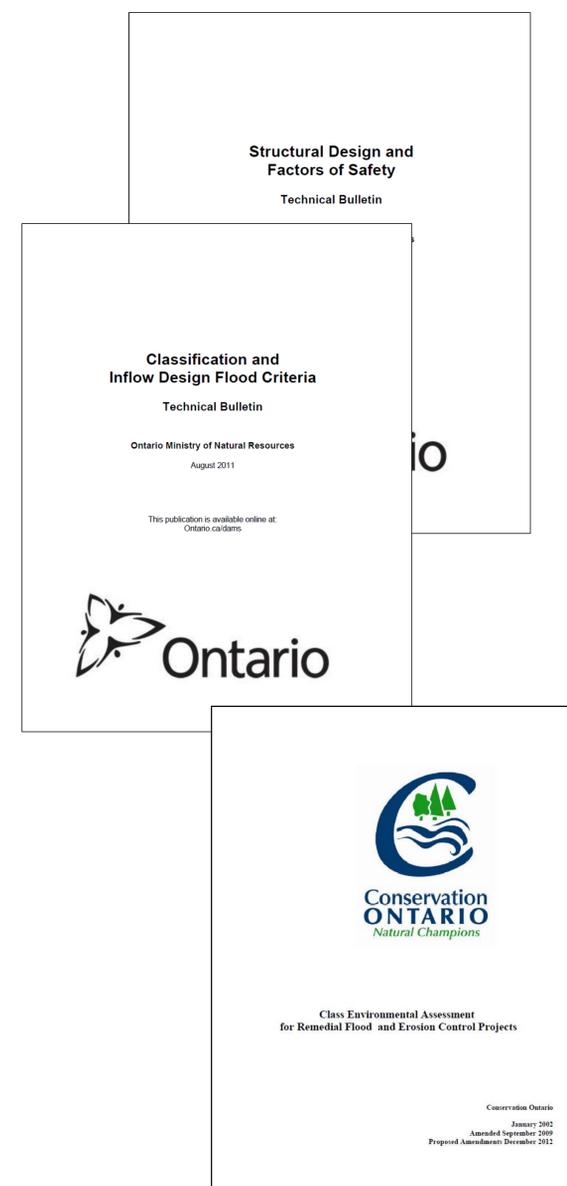


# Study Need, Area and Purpose and Approach



## Study Need

- The need for this study was identified in a previous evaluation of the dam's safety which revealed *Belfountain Dam does not meet all of the current provincial standards* for safety.
- Although the dam could simply be repaired, other management options are available that require additional study of several important factors including:
  - Park visitors
  - Cultural heritage
  - Natural heritage
  - Economics
  - And more
- CVC is a public body, and as such certain activities must be planned in accordance with the *Environmental Assessment Act*
- Under the Act, CVC is required to undertake a *Conservation Ontario, Class Environmental Assessment for Remedial Flood and Erosion Control (Class EA)*



## Study Purpose and Approach

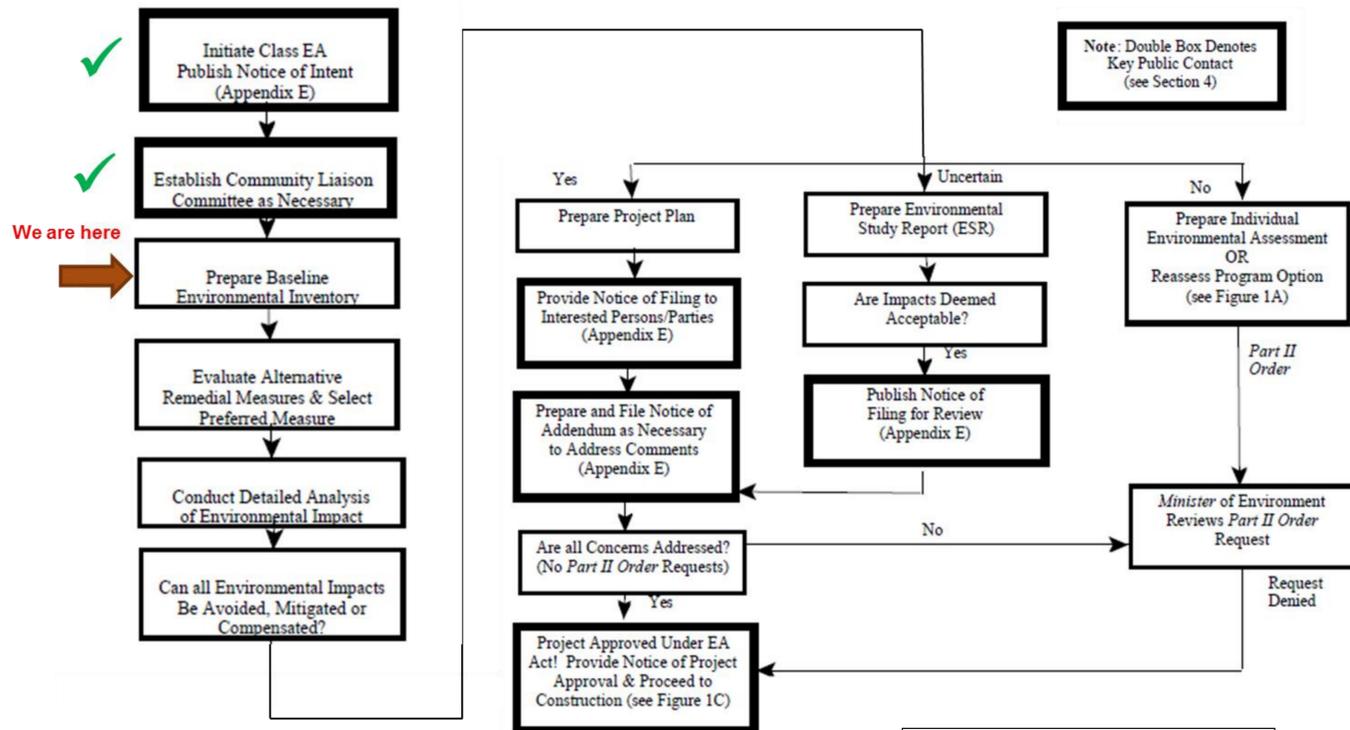
- The purpose is to determine how to manage the Belfountain Dam and Headpond in the future using the Class EA approach
- The approach applies the Class EA process, and will:
  - Document baseline environmental conditions
  - Establish a long-list of management alternatives
  - Evaluate each alternative using appropriate physical, biological, cultural and socioeconomic criteria
  - Select the preferred management alternative for the Belfountain Dam & Headpond



# Study Process and Objectives

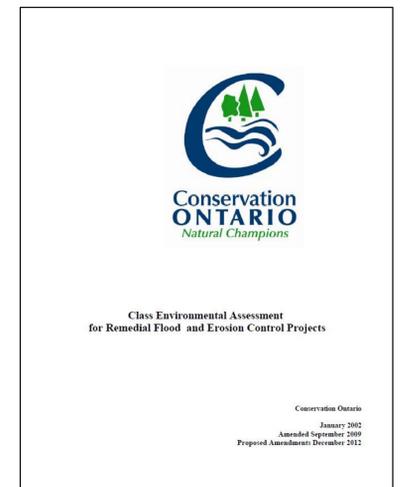
## Study Process

- This study follows: **Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects**
- The process provides a project planning and design framework for proponents (Conservation Authorities like **CVC**) to ensure they meet the requirements of the Provincial **Environmental Assessment Act**



### • The Class EA process requires:

- Consultation with all stakeholders including the public and agency partners
- Characterization of the study area
- Evaluation of preliminary alternatives
- Determination of the potential impacts of the proposed alternative on the environment
- Identification of measures and actions to mitigate possible negative impacts



## Study Objectives

CVC has established seven (7) Study Objectives for this project:

- 1) Maintain a fisheries barrier between upstream Brook Trout and downstream invasive and non-native species
- 2) Reduce/minimize risk to visitors, staff and affected property
- 3) Maintain or improve the visitor experience
- 4) Conserve and enhance cultural heritage attributes
- 5) Promote natural stream function
- 6) Strive for long-term sustainability including economic viability
- 7) Conserve and enhance natural heritage attributes

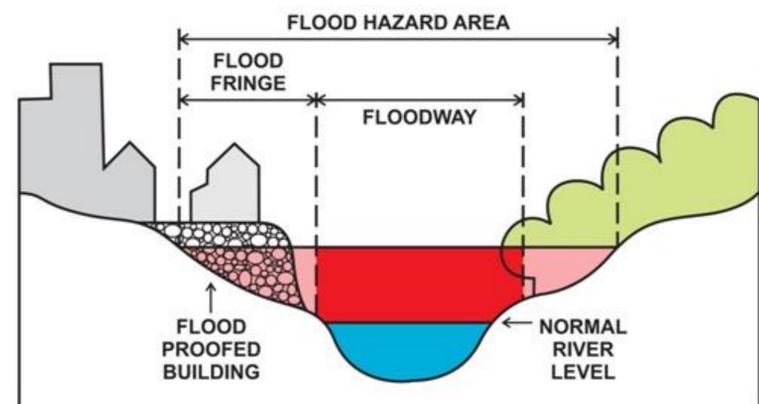


# Baseline Inventory

Nine (9) component technical studies have been completed to document existing conditions in the Study Area.

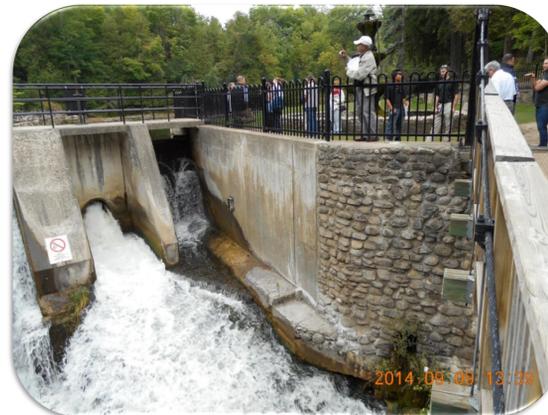
## Hydrology and Hydraulics

- The study of flows, levels and velocities in the West Credit River and through the dam.
- Analyses primarily determined the impacts to flood conveyance and inundation (extent of flooding or risk) within the study area and downstream areas caused by the dam.
- Any alteration to the configuration of the dam must not have an impact on its flood risk performance related to upstream or downstream properties, including the Stonecutters Dam.



## Structural Engineering

- Dam Stability: certain components of the dam do not meet Provincial factors of safety – a factor of safety is a measure to ensure the structural loads the dam can withstand are greater than those they are likely to experience
- Retaining Wall Stability: The north retaining wall is unstable during flood or flood-earthquake combined conditions. Mitigation will be required if the dam is proposed to remain.
- Dam/Retaining Wall Condition: the dam structure and retaining walls are in overall “good” condition with localized “poor” areas of concrete and undermined areas that will require rehabilitation



Dam outlet and north retaining wall



Concrete deterioration

## Geotechnical Engineering

- The geotechnical investigation relates to area soils and slope stability:
  - Test pits have been completed to obtain information on the retaining wall backfill
  - A review of the south valley wall will be completed to determine slope stability



Test pitting behind north retaining wall



South valley slope

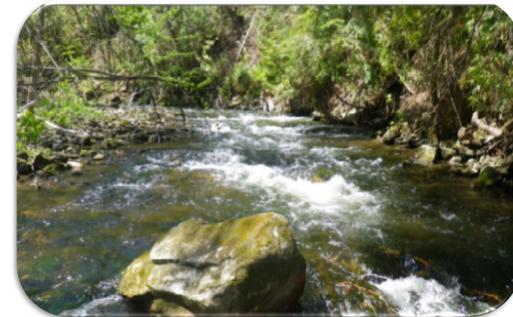
# Baseline Inventory



Nine (9) component technical studies have been completed to document existing conditions in the Study Area.

## Stream Morphology

- The study of stream stability and sediment transport within the West Credit River and how it is impacted by the dam.
- The primary impacts of the dam are:
  - Creation of a deep scour pool downstream of the dam
  - Accumulation of sediment in the headpond upstream
  - Widening of the upstream river
- Opportunities exist to improve channel dynamics, which would improve sediment transport and aquatic habitat and function.



## Aquatic Ecology

- The study of aquatic (water) species and their habitats
- The dam acts as a barrier and protects the native brook trout population upstream from the more competitive brown trout population downstream
- The dam also prevents other species, such as Atlantic salmon and the endangered American eel, from moving upstream of the dam.
- The slow-moving water within the headpond has the potential to create a warming effect which could negatively impact coldwater fish communities and sensitive species downstream of the dam.



Brook trout



Brown trout



Atlantic salmon



American eel

## Terrestrial Ecology

- The study of terrestrial (land) species and their habitats
- The Belfountain Conservation Area contains high quality woodland and valleyland environments.
- There are several "Species at Risk" surrounding the study area which include:

- |                           |                         |
|---------------------------|-------------------------|
| - butternut               | - chimney swift         |
| - little brown bat        | - Canada warbler        |
| - northern bat            | - eastern wood peewee   |
| - Jefferson salamander    | - wood thrush           |
| - eastern snapping turtle | - Louisiana waterthrush |



# Baseline Inventory

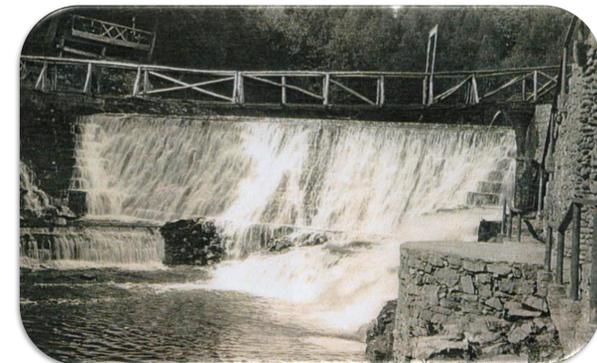
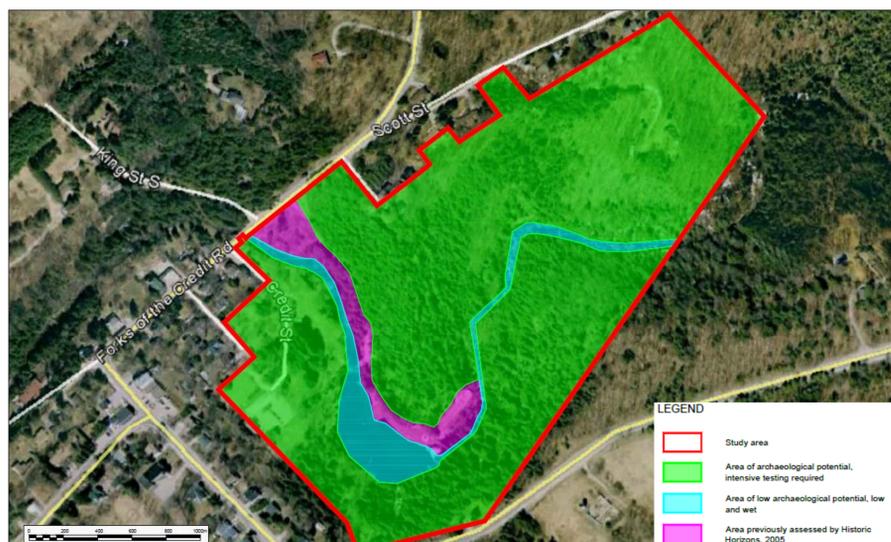
Nine (9) component technical studies have been completed to document existing conditions in the Study Area.

## Archeology

- Mack Park is a registered archaeological site in the Ontario Archaeological Sites Database (OASD, Site: AjHa-10)
- The Willoughby Industrial Heritage Site (AkHa-20) is within one-kilometre of the Study Area
- A majority of the Study Area (88%) has archaeological potential and would require further investigation if these area require disturbance as part of the preferred alternative

## Cultural and Built Heritage

- Belfountain Dam and Headpond were originally constructed in the early 1900's as part of Mack Park
- Mack Park was wealthy Toronto area business man's (Charles Mack) effort to recreate Niagara Falls
- Mack Park is now designated as a Cultural Heritage Landscape in the Town of Caledon Cultural Heritage Inventory (BC-13 Mack's Park, BCA, 10 Credit Street).
- Numerous built heritage resources have been identified within the Study Area including the dam, Yellowstone Cave, various walls and pathways, etc
- Specific recommendations will be made to mitigate potential effects on heritage resources and will be considered in the development and evaluation of alternatives.



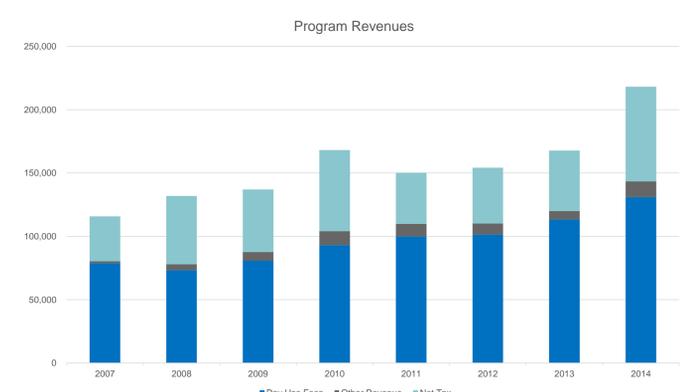
## Headpond Sediment Analysis

- The headpond has been observed to fill up with sediment over the years
- Sediment sampling was conducted to determine the volume and quality of sediment
- Approximate volume of 2500 m<sup>3</sup> (similar volume as an Olympic swimming pool)
- A low level of contaminants were found in the sediment
- The low level of contaminants indicate:
  - Significant implications for disposal or remediation are unlikely
  - A low risk of adverse effects to the in-stream ecosystem



## Finance

- Day use fees represent 60%+/- of total program revenues
- The balance of funding is raised from taxes
- Maintaining day use fees will be important to the long-term economic viability of the Conservation Area
- The dam is understood to be a major draw for visitors

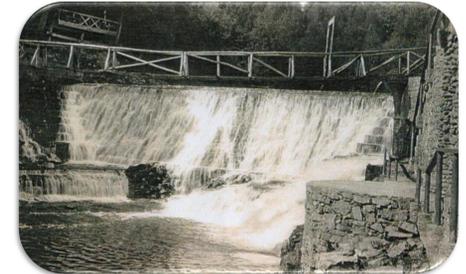


# Preliminary Long-List of Alternatives

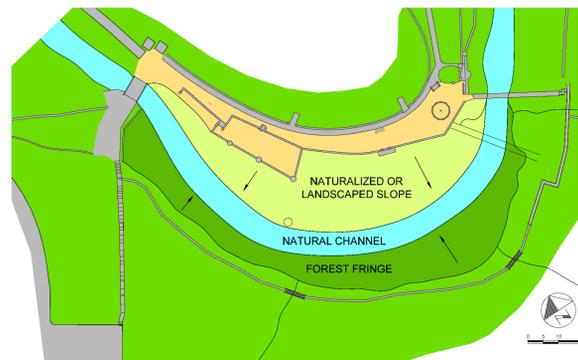


## Dam Alternatives

1. Do Nothing
2. Repair dam
  - i. In-kind
  - ii. Restore dam to historic condition
3. Replace dam
  - i. In-kind
  - ii. Restore dam to historic condition
  - iii. Relocate
4. Modify Dam (Lower spillway)
5. Decommission (remove) the dam and naturalize the river
  - i. Full
  - ii. Partial (leave portion of structure)
6. Offline dam and natural channel



The dam could be repaired, replaced or lowered. It could look as it does today, or be restored to a condition more similar to the original



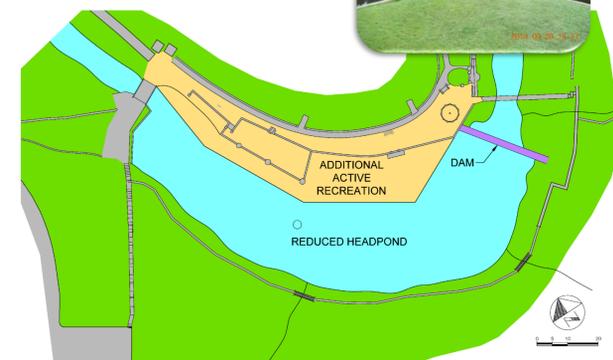
DECOMMISSION DAM, NATURALIZE RIVER

## Headpond Alternatives

1. Do Nothing
2. Rehabilitate existing headpond
3. Expand table land into headpond
4. Convert to wetland
5. Natural channel (dependent on dam)
6. Offline pond/wetland (dependent on dam)



CONVERT PORTION OF HEADPOND TO WETLAND AREAS

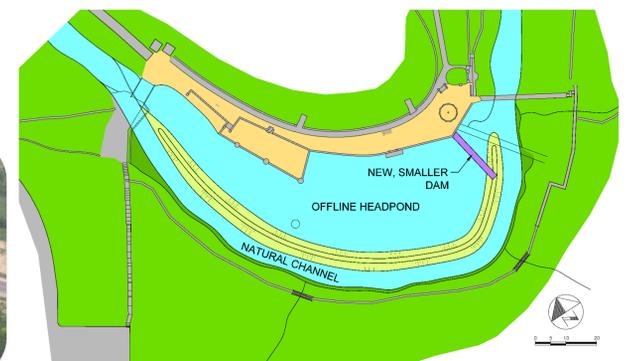


EXPAND TABLE LAND

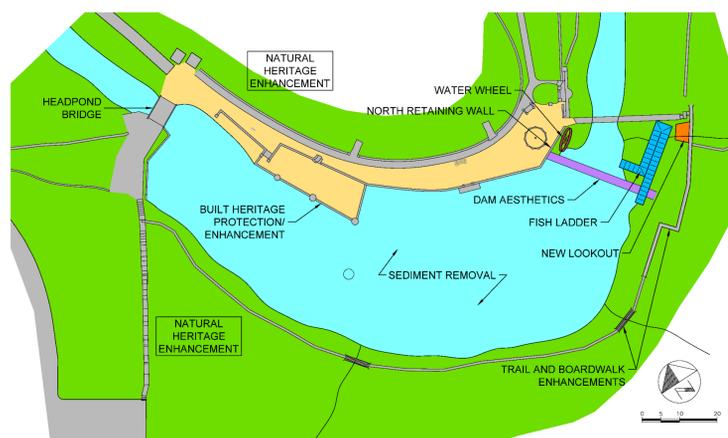
## Complementary Options

1. Sediment removal
2. North retaining wall stability mitigation
3. Built heritage protection/mitigation/compensation
4. Natural heritage enhancement options
5. Dam aesthetics
6. Fish ladder
7. Trail/boardwalk improvements, new lookouts
8. Headpond bridge
9. Water wheel, water ram

Example of Offline Pond: Mount Albion Pond – Hamilton



OFFLINE DAM, NATURAL CHANNEL



COMPLEMENTARY OPTIONS



Fish ladder



Water wheel



Sediment in the headpond



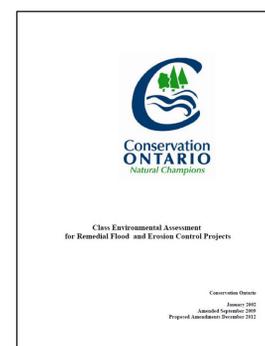
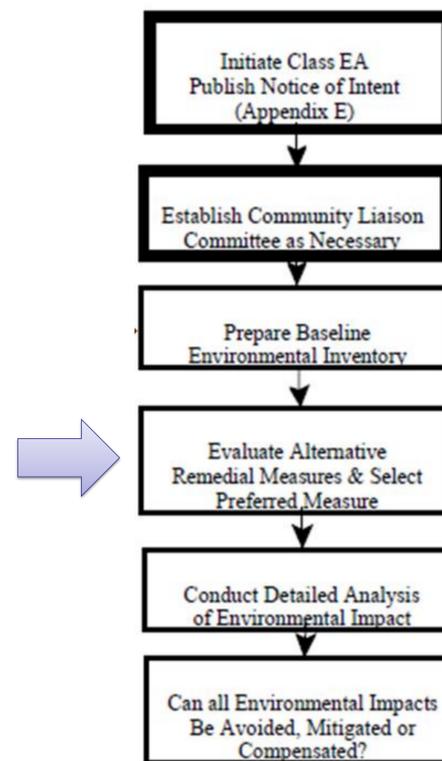
Historic lookout

# Next Steps and How to Submit Comments



## Next Steps

- Consider and incorporate comments from the public
- Characterize the alternatives
- Develop criteria and evaluate the alternatives
- Select a preliminary preferred alternative
- Public Information Centre #2 – November 2015



## How to Submit Comments



You can complete a comment form and submit it to the Study Team today. Or send your comments to either of the contacts provided below by:

- Mail
- Phone
- Fax
- e-mail

### Credit Valley Conservation Authority

Ms. Laura Rundle  
 Conservation Lands Planner  
 1255 Old Derry Road  
 Mississauga, Ontario, L5N 6R4  
 Tel: (905) 670.1615 ext.535  
 email: [lrundle@creditvalleyca.ca](mailto:lrundle@creditvalleyca.ca)

### Amec Foster Wheeler

**Environment & Infrastructure**  
 Mr. Ron Scheckenberger, M.Eng., P.Eng.  
 Project Manager  
 3215 North Service Road, P.O. Box 220  
 Burlington ON L7N 3G2  
 Tel: 905.335.2353  
 Toll Free: 1.866.751.2353  
 Email: [ron.scheckenberger@amecfw.com](mailto:ron.scheckenberger@amecfw.com)

**Please submit  
 comments no  
 later than  
 October 7, 2015**

**Thank you for your participation!**