Appendix J

Public Consultation

1. Embro Dam Public Consultation
2. Notice for Public Information Consultation 4
3. Embro Public Information Consultation 4 Boards
4. Embro Public Information Consultation 4 Comment Boards

Embro Dam Public Consultation

Public Consultation Index

Notice of Intent
Agency & Stakeholder Contact List

Public Information Centre #1

Notice of Intent and First Public Information Centre	June 10, 2015
PIC Materials (Presentation and Boards)	June 23, 2015
Blank Comment Form	June 23, 2015
Sign Up Sheet	June 23, 2015
Completed Comment Forms	June 23, 2015

Public Information Centre #2

Notice of Second Public Information Centre	April 22, 2016
PIC Materials (Presentation and Boards)	May 10, 2016
PIC Meeting Minutes	May 10, 2016
Blank Comment Form	May 26, 2016
Sign Up Sheet	May 10, 2016
Completed Comment Forms	May 10, 2016 to October 16, 2016

Public Information Centre #3

Notice of Third Public Information Centre	October 06, 2016
PIC Materials (Presentation and Boards)	October 17, 2016
PIC Meeting Minutes	October 17, 2016
Blank Comment Form	October 18, 2016
Sign Up Sheet	October 17, 2016
Completed Comment Forms	October 17, 2016 to January 18, 2017

Upper Thames River Conservation Authority

Embro Dam

Class Environmental Assessment

NOTICE OF INTENT

Upper Thames River Conservation Authority (UTRCA), through their consultant Ecosystem Recovery Inc., is undertaking a Class Environmental Assessment for the Embro Dam in the Township of Zorra. The map below shows the location of the study area.

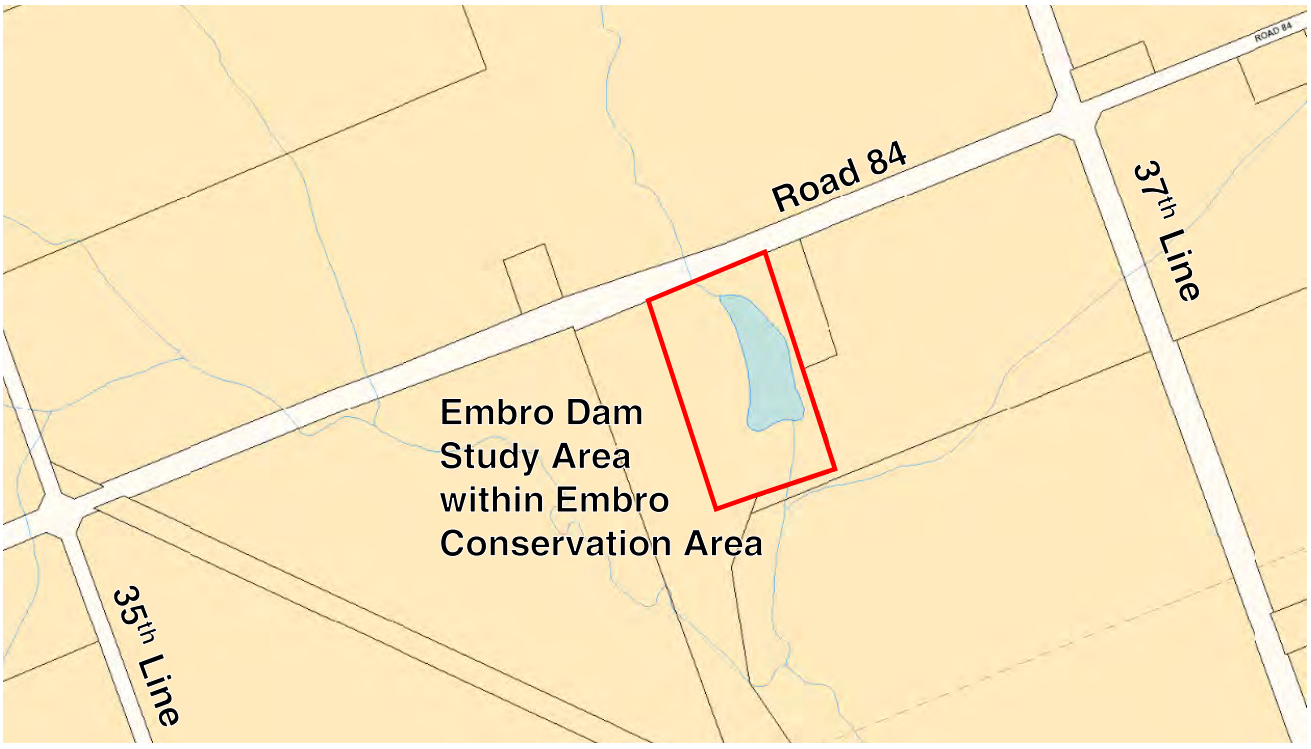
The UTRCA commissioned a Dam Safety Review (DSR) of the Embro Dam which was completed in 2007. The DSR identified issues with the spillway capacity and embankment stability of the dam. This Class EA study was initiated to assess the existing site conditions and constraints, and to develop potential alternatives to address the identified issues at the dam.

The project will be carried out under the *Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works* document.

The Project Team invites public input and comments, and will incorporate them into the planning and design of this project. The public will be notified in advance of a Public Information Centre that will be held to present information on the project and receive public feedback. To submit comments, request further information, or to join the project mailing list, please contact:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
goldtr@thamesriver.on.ca

Mr. Wolfgang Wolter
Senior Project Manager
Ecosystem Recovery Inc.
550 Parkside Drive, Unit B1
Waterloo, Ontario, N2L 5V4
Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca



HARRINGTON AND EMBRO DAMS CLASS EA
AGENCY & STAKEHOLDER CONTACT LIST

A.	**PROVINCIAL**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	UTRCA Land Use Regulations 1424 Clarke Road London, Ontario, N5V 5B9 Tel: 519.451.2800 Ext. 237 Fax: 519.451.1188 winfieldk@thamesriver.on.ca	Karen Winfield Land Use Regulations Officer				
2	Conservation Ontario 120 Bayview Parkway Newmarket, Ontario L3Y 4W3 905-895-0716	TBD	Jun-15			
3	Ministry of the Environment London Regional and District Offices 733 Exeter Rd London ON N6E 1L3 Tel: 519-873-5000 Fax: 519-873-5020	TBD EA Planning Coordinator	Jun-15			
4	Ministry of the Environment Environmental Assessment and Approvals Branch EAABGen@ontario.ca	*only Notice of Commencement and Completion via email				
5	Ministry of Natural Resources and Forestry Aylmer - District Office 615 John St N Aylmer ON N5H 2S8 Tel: 519-773-9241	TBD District Planner	Jun-15			
6	Ministry of Tourism, Culture & Sport 401 Bay Street 17th Floor Toronto, ON M7A 0A7	Heritage Planner	Jun-15	17-Jul-15		Please send presentation from PIC 1
B.	**FEDERAL**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	Central and Arctic Region Fisheries and Oceans Canada 520 Exmouth Street Sarnia, ON, N1G 4Y2	Regional Manager	Jun-15			
C.	**MUNICIPALITIES**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	Township of Zorra Phone: 519-485-2490 Ext 226 Fax: 519-485-2520 dmacleod@zorra.on.ca	Don MacLeod Chief Administrative Officer				
D.	**UTILITIES**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	Need to identify utilities that may be impacted at each project site	TBD				
E.	**FIRST NATIONS/ABORIGINAL (Provisional)**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	Ministry of Aboriginal Affairs 160 Bloor Street East, 9th Floor Toronto, ON, M7A 2E6	Ms. Heather Levesque Manager, Consultation Unit	Jun-15	27-Jul-15		First Natons in the project area: Six Nations of Grand River, Oneida Nation of the Thames, Chippewas of the Thames, Haudenosaunee Confederacy, Munsee-Delaware Nation
2	AANDC 25 St. Clair Avenue East, 8th Floor Toronto, ON, M4T 1M2	Environment Unit Re: EA Coordination	Jun-15			
3	Oneida Nation of the Thames 2212 Elm Avenue SOUTHWOLD, Ontario NOL 2GO (519) 652-3244 (Fax) 652-2930 Sheri.Doxtator@oneida.on.ca	Chief Sheri Doxtator	Jun-15			
4	Chippewas of the Thames 320 Chippewa Road, RR#1 Muncey Ontario, Canada phone: 519-289-5555	TBD	Jun-15			

	Fax: 519-289-2230 email: info@cottfn.com					
5	Caldwell First Nation Box 338 14 Orange Street Leamington, Ontario, N8H 1P5 phone: 519-322-1766 fax: 519-322-1533 email: cfnchief@live.com	Chief Louise Hillier	Jun-15			
F.	**COMMUNITY GROUPS / NGO'S**					
	AGENCY NAME	CONTACT PERSON	NOTICE SENT	RESPONSE (Y/N)	FOLLOW UP (Y/N)	COMMENT?
1	Embro Pond Association PO BOX 348 Embro, Ontario N0J 1J0 email: embropond@hotmail.com	TBD	Jun-15			
2	Harrington and Area Community Association 539 Victoria St S Harrington, ON N0J 1J0 phone: 519-475-4097	Doug Diplock, Chair Philip Kerr, Vice-Chair	Jun-15			
3	Thames River Anglers Thames River Anglers Association 2202 Coronation Drive London, Ontario, N6G 0B9 email: traa@anglers.org	TBD	Jun-15			
4	Trout Unlimited Unit #1, 27 Woodlawn Road West Guelph, ON, N1H 1G8 phone: (519) 763-0888	Stacey Stevens Ontario Office Coordinator	Jun-15			
5	Ontario Nature 214 King Street West, Suite 612 Toronto, ON M5H 3S6 Tel: 416-444-8419 Fax: 416-444-9866 E-mail: info@ontarionature.org	TBD	Jun-15			
6	Ontario Federation of Anglers and Hunters 4601 Guthrie Drive, PO Box 2800 Peterborough, ON, K9J 8L5 Phone: 705-748-OFAH (6324) Fax: 705-748-9577 Email: ofah@ofah.org	TBD	Jun-15			
7	Ducks Unlimited Canada 740 Huronia Road, Unit 1 Barrie, ON L4N 6C6 Tel: 705-721-4444 Fax: 705-721-4999 Email: du_barrie@ducks.ca	TBD	Jun-15			
8	Woodstock Field Naturalist's Club P.O. Box 20037 RPO Woodstock Centre Woodstock, ON, N4S 8X8 Email: WoodstockFNC@gmail.com	Roger Boyd President	Jun-15			
9	Oxford County Trails Council Email: oxfordtrails@gmail.com	TBD				
10	Stratford Field Naturalists c/o Sharon McKay P.O. Box 21113 RPO Stratford, ON N5A 7V4 Email: naturestratford@gmail.com	Marilyn Ohler, President	Jun-15			
11	Tavistock and District Rod & Gun Club Box #1 R.R. #3, Embro, ON, N0J1J0 Tel: 519-275-1867 E-mail: tdrgc@outlook.com Site: www.tdrgc.com	Tim Segeren, 2015 Club President				

Notice for Public Information Consultation 4

Upper Thames River Conservation Authority

Embro Dam
Class Environmental Assessment

NOTICE OF INTENT AND FIRST PUBLIC INFORMATION CENTRE

THE STUDY

Upper Thames River Conservation Authority (UTRCA), through their consultant Ecosystem Recovery Inc., is undertaking a Class Environmental Assessment (Class EA) for the Embro Dam in the Township of Zorra. The map on the reverse of this page shows the location of the study area.

The UTRCA commissioned a Dam Safety Review (DSR) of the Embro Dam which was completed in 2007. The DSR identified issues with the spillway capacity and embankment stability of the dam. This Class EA study was initiated to assess the existing site conditions and constraints, and to develop potential alternatives to address the identified issues at the dam.

The project will be carried out under the *Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works* document.

WE WANT TO HEAR FROM YOU

Public consultation is a key component of this study. The Project Team invites public input and comments, and will incorporate them into the planning and design of this project. Three public information centres are proposed for this Class EA: June 2015 to provide an overview of the study and Class EA process; September 2015 to review alternative solutions and evaluation criteria; and November 2015 to present the preferred alternative for the Embro Dam. The first public information centre will take place at the following time and location:

Date:	**June 23rd, 2015**
Time:	**7:00 p.m. to 9:00 p.m.**
Place:	**Embro Zorra Community Centre** **355644 35th Line** **Embro, Ontario**

An overview presentation will be held at 7:00 p.m. followed by questions and discussion.

STUDY CONTACTS

To submit comments, request further information, or to join the project mailing list, please send an email to the project email address:

embro_dam@thamesriver.on.ca

Contact information for the project team leaders is listed below:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
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Tel: 519-451-2800 ext. 244
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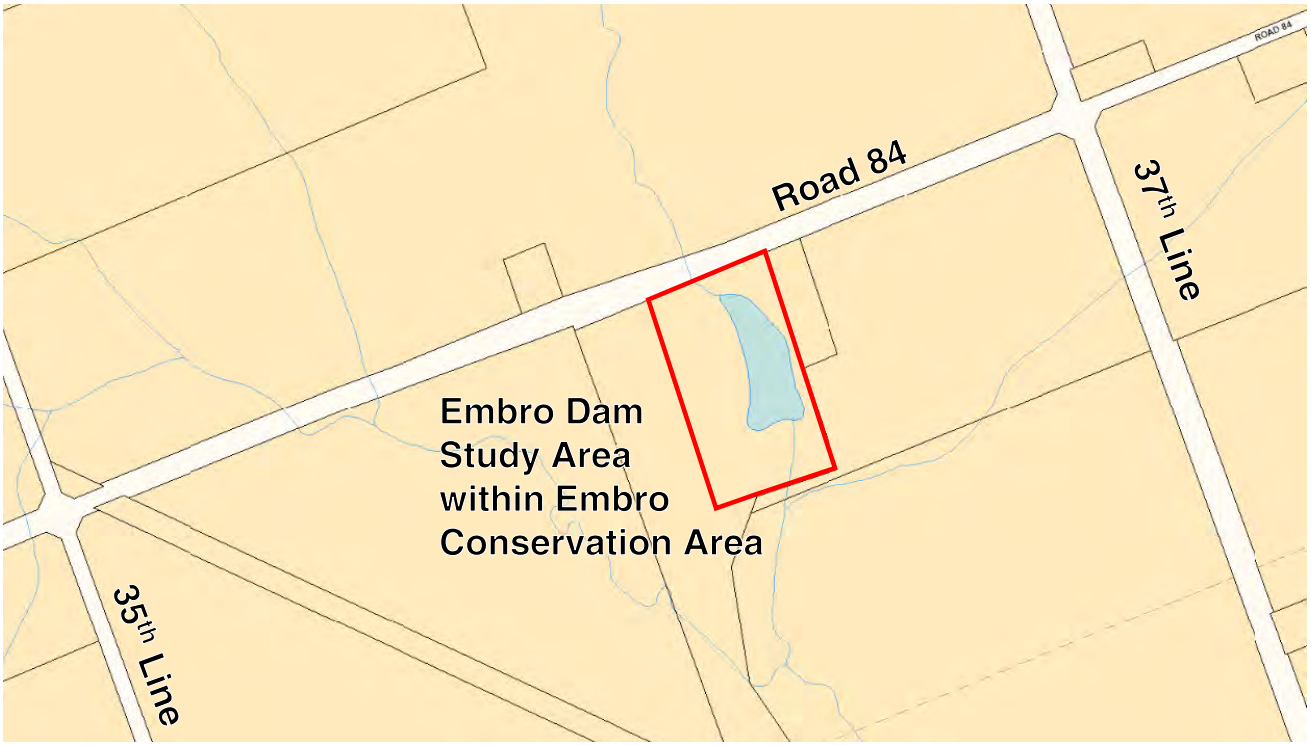

Road 84
37th Line
35th Line
Embro Dam
Study Area
within Embro
Conservation Area

Embro Public Information Consultation 4 Boards

Public Information Centre #1

Public Information Centre #1
PIC Presentation Slides

Embro Dam
Class Environmental Assessment

Public Information Centre #1

Upper Thames River Conservation Authority
Embro Zorra Community Centre
June 23rd, 2015 7:00 p.m. to 9:00 p.m.

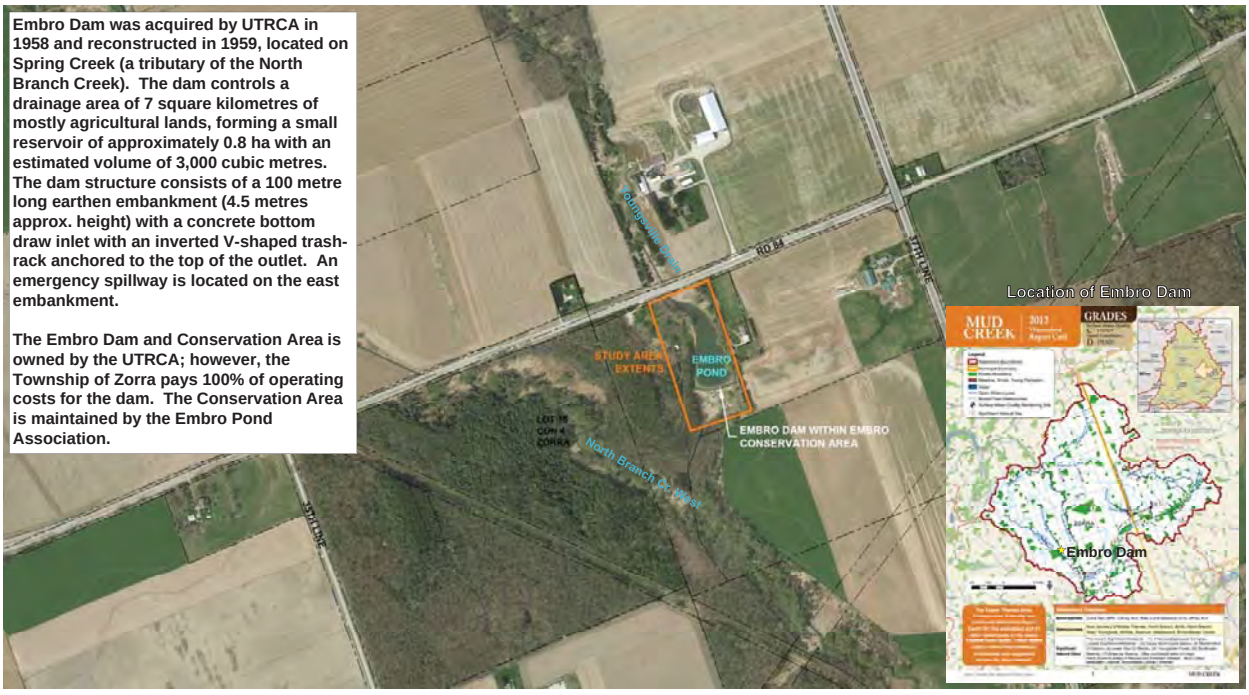
UPPER THAMES RIVER CONSERVATION AUTHORITY

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Embro Dam Study Area

Embro Dam was acquired by UTRCA in 1958 and reconstructed in 1959, located on Spring Creek (a tributary of the North Branch Creek). The dam controls a drainage area of 7 square kilometres of mostly agricultural lands, forming a small reservoir of approximately 0.8 ha with an estimated volume of 3,000 cubic metres. The dam structure consists of a 100 metre long earthen embankment (4.5 metres approx. height) with a concrete bottom draw inlet with an inverted V-shaped trash-rack anchored to the top of the outlet. An emergency spillway is located on the east embankment.

The Embro Dam and Conservation Area is owned by the UTRCA; however, the Township of Zorra pays 100% of operating costs for the dam. The Conservation Area is maintained by the Embro Pond Association.



UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Problem Statement: Why is a Class EA Necessary?

Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam have been identified through recent engineering assessments.

- ***Acres International. July, 2007****. Dam Safety Assessment Report for Embro Dam: Upstream and downstream embankment slopes do not meet stability acceptance criteria*
- ***Naylor Engineering Associates. September 2008****. Geotechnical Investigation Embro Dam Embankment Stability Assessment: The existing dam does not meet current standards and is not considered stable under existing conditions*

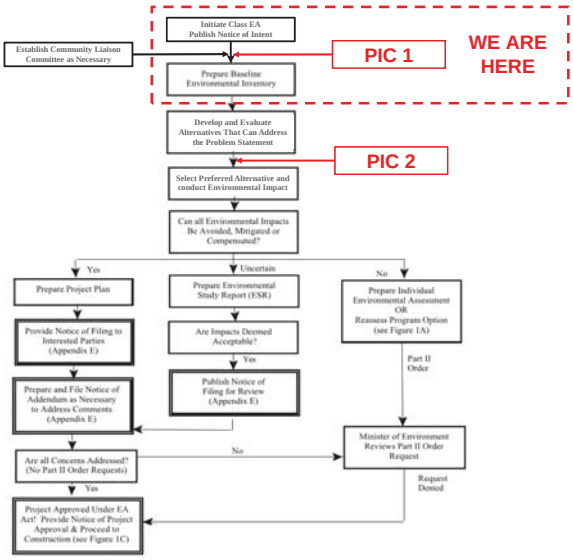
A Class Environmental Assessment has been initiated to evaluate a range of alternatives to address the identified issues in consideration of the environmental, social, economic, and technical aspects of the dam.

Class Environmental Assessment Process and Problem Statement

Class EA Process for Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works

In a nutshell:

- Publish Notice of Intent to advise all affected about the study
- Undertake a program to collect background information and relevant data on the study area
- Prepare a characterization of the study area as it relates to the problem statement, this includes technical, social and cost factors
- Develop alternatives that could address the issues
- Evaluate alternatives against a criteria (technical, social and cost)
- Select the preferred alternative
- Prepare concept level plans to depict the preferred alternative
- Prepare the EA report (project plan) and file for 30 days



Public Participation as Part of the Class EA Process

The process requires that proponents make public contact at two occasions, typically the Notice of Intent and Notice of Filing. These Notices invite interested members of the public to review and comment on the study process and results.

The UTRCA has elected to conduct three Public Information Centres (PICs) in addition to the two mandatory public contact notices, to deliver information to the community and to receive comments, feedback and input into the study. The PICs occur:

- **June 2015** – Introduction to the Study and Class EA Process
- **September 2015** (planned) – Presentation of Baseline Characterization and Potential Alternatives
- **November 2015** (planned) – Presentation of Preferred Alternative

Embro Dam and Area Description

The Embro Dam is approximately 100 m in length, 4.5 m in height and includes 1.1 m of freeboard. The entire dam is founded on overburden as opposed to bedrock or engineered soil.

The dam contains water year round and includes approximately 3.4 m of head acting across the dam.

Low earth fill embankment, a grassed, emergency spillway is located at the east end of the embankment. This spillway has a clear width of about 4.0 m and the inlet invert is 0.6 m below the crest of the dam.

The outlet of the dam includes a concrete bottom draw inlet structure covered with grated trashrack.

A 762 mm diameter (inner) concrete pipe conveys flow from the pond to a pool at the creek outlet.

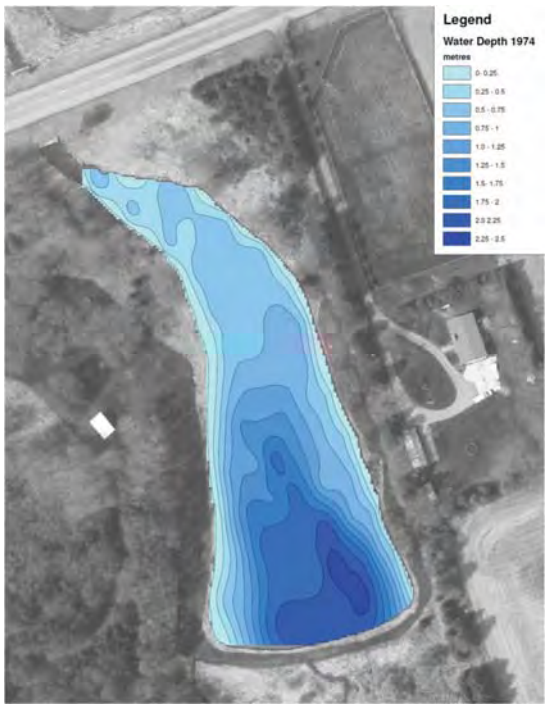
The Embro Dam is located within the Embro Conservation Area, with recent restoration and improvement works undertaken by the Embro Pond Association.

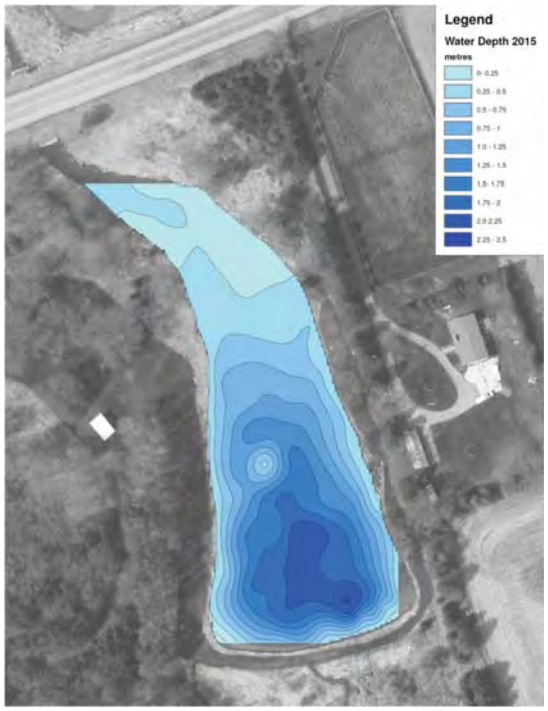
Field Data Collection and Site Characterization

A range of technical, environmental, and social factors will be characterized at the study site to provide insight into the generation of potential alternatives for the dam, as well as the evaluation of those alternatives.

Topographic Survey	**Aquatic Biology**	**Geotechnical Engineering and Hydrogeology**	**Civil Engineering (Dam Structure and Hazard Assessment)**
Hydrology	**Terrestrial Biology**	**Sediment Quality**	**Water Quality**
Fluvial Geomorphology	**Cultural/Social Environment**	**Archaeology**	**Sediment Survey**

Field Data Collection and Site Characterization – Sediment Survey





Next Steps and Contact Information

Next Steps for our project team include:

- Compile and review feedback from this Public Information Centre
- Complete field investigations and characterization of the study area
- Develop alternatives for the Dam to present at the next Public Information Centre, currently planned for September 2015
- Determine if community interest exists for a tour of dam reconstruction and removal projects in southwestern Ontario

To provide feedback and comments to the project team, please send all correspondence to the project email address:

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UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Public Information Centre #1
PIC Presentation Boards

Embro Dam
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PROFESSIONAL ENGINEERS

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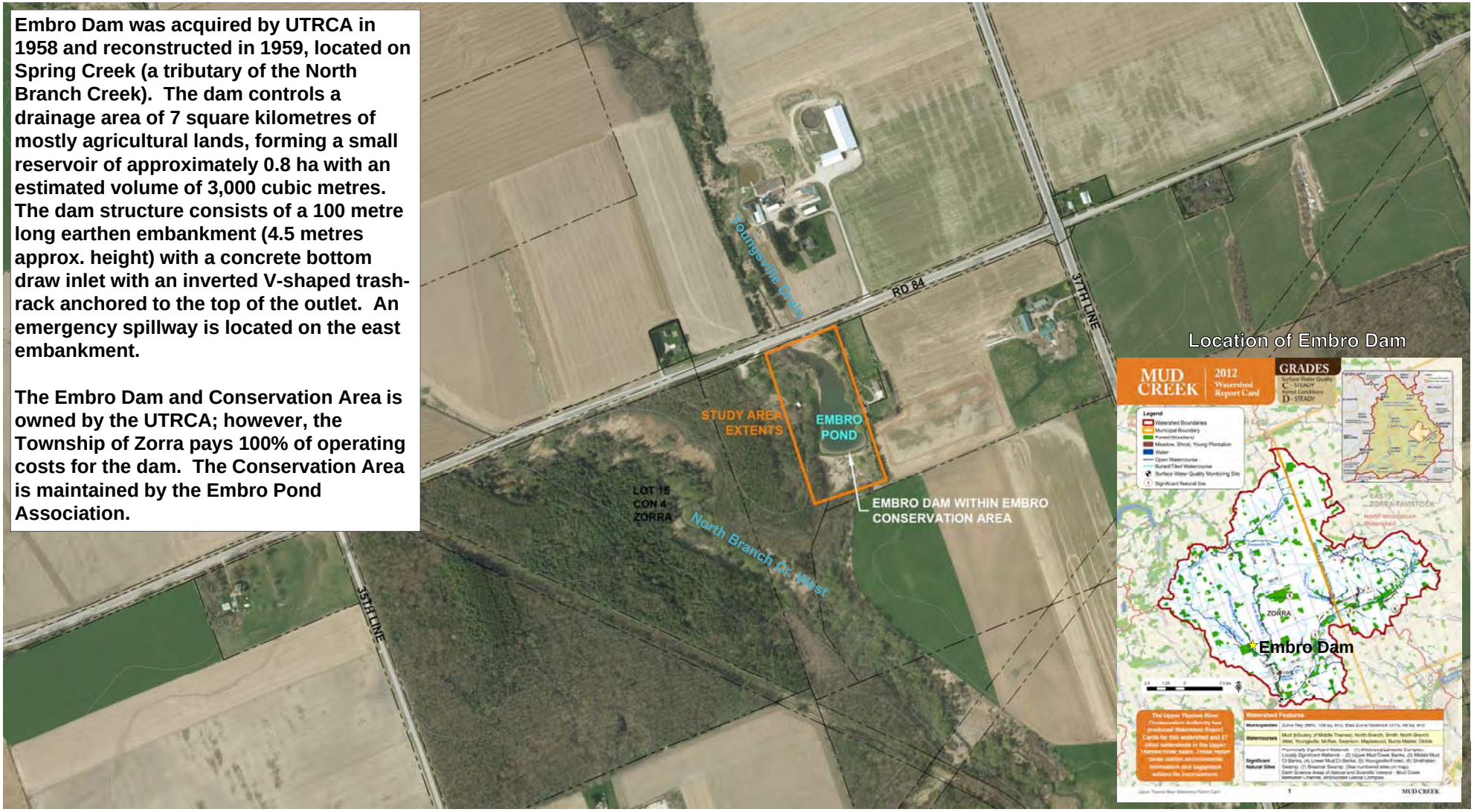

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Class Environmental Assessment Process and Problem Statement

Problem Statement

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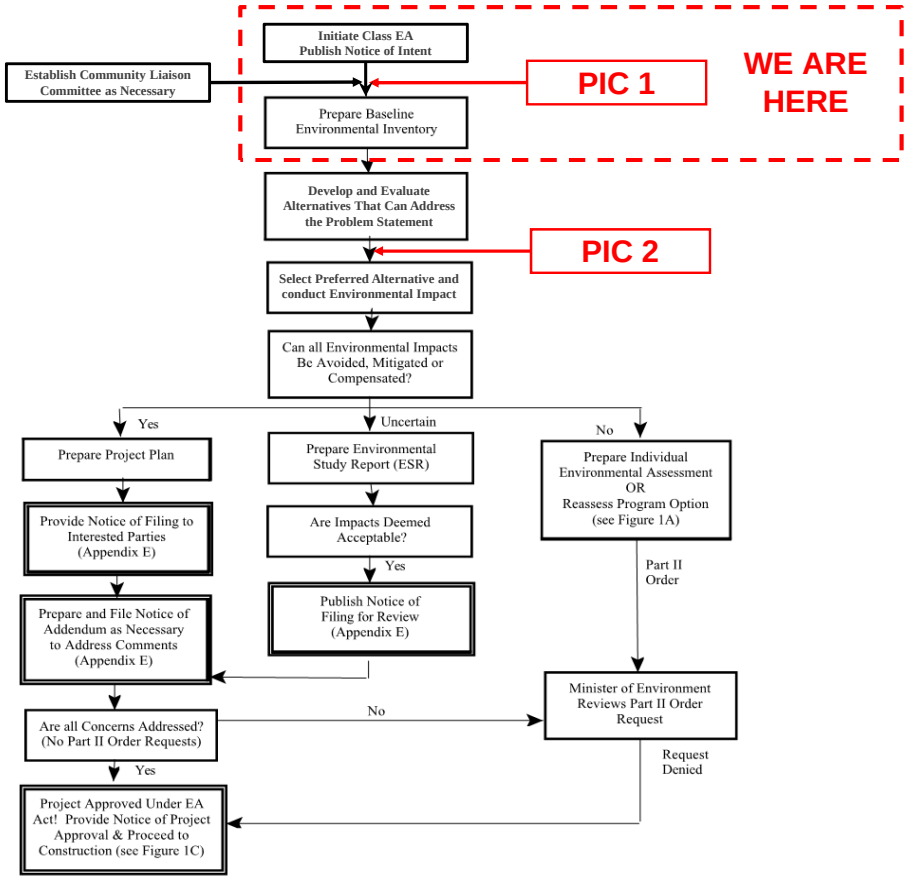
Class EA Process for Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works



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UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Field Data Collection and Site Characterization

A range of technical, environmental, and social factors will be characterized at the study site to provide insight into the generation of potential alternatives for the dam, as well as the evaluation of those alternatives.

Topographic Survey

Topographic characterization of the study area using GPS, total station, or level surveys.

A topographic survey is required to establish physical constraints on potential alternatives for the dam and pond, as well as to develop concept designs.

Topographic surveys are currently underway at the Embro Dam site.

Aquatic Biology

Characterization of aquatic life in the pond, as well as upstream and downstream of the pond, including an inventory of fish and benthic macroinvertebrates (bugs).

Understanding of the aquatic biology at each site is critical to characterize the current impacts of the pond and dam, and potential impacts and opportunities for proposed alternatives.

Aquatic biology surveys and analysis are currently underway.

Geotechnical Engineering and Hydrogeology

Geotechnical engineering and hydrogeology will consider the stability of the dam embankments and the flow of groundwater through and around the dam (seepage).

Characterization of the current dam stability and seepage is critical in developing potential alternatives for the dam, as well as understanding the risks and impacts of various alternatives.

Geotechnical stability assessments have been previously completed and led to the initiation of this study. Further review will take place in the context of this Class EA.

Civil Engineering (Dam Structure and Hazard Assessment)

A characterization of the current dam structure will be undertaken, including an update of the Dam Hazard Classification, under the *Lakes and Rivers Improvement Act*, to understand risks to downstream persons and property.

Legislation and guidelines for the management of dam structures have changed in recent years, requiring the results of the previous Dam Safety Assessments to be reclassified and a new Dam Hazard Classification established.

The assessment and revision of the Dam Hazard Classification is currently in progress.

Hydrology

Hydrologic characterization of the site includes monitoring and rating of river flows upstream and downstream of the dam.

An understanding of the site hydrology is required to inform the operational parameters so that potential alternatives can be generated, and to inform a number of other technical disciplines such as aquatic biology, water quality, and fluvial geomorphology.

Characterization of site hydrology is currently underway, including flow measurements during rain events and comparison to other similar watersheds.

Terrestrial Biology

The terrestrial biology of the site includes the range of vegetative and wildlife species that inhabit the site, as well as connectivity to adjacent natural areas and the significance of species found on site (i.e., Species at Risk, Endangered Species).

Understanding of the terrestrial biology of the site is required to establish and characterize the impacts of potential alternatives for the dam, and to recommend restoration and enhancement strategies for the site.

Terrestrial biology surveys are currently underway at the site.

Sediment Quality

Characterization of the sediment quality in the reservoir involves the collection of sediment samples and analysis at a laboratory to identify a range of constituents of interest (i.e., metals, nutrients, pesticides, hazardous materials).

An understanding of the sediment quality at the site is critical for understanding the potential impacts of proposed alternatives for the dam, particularly related to the costs associated with removal and disposal. In addition, upstream pollutant sources may be identified.

Sediment testing at the reservoir will be undertaken during summer 2015.

Water Quality

Water quality sampling at the site involves collection of water samples during dry weather and wet weather conditions, at locations upstream and downstream of the dam as well as within the pond. Samples are analysed at a laboratory for constituents of interest (i.e., metals, nutrients, pesticides, temperature, dissolved oxygen).

Analysing water quality at the site is required to understand the impact of the current dam and pond on the watercourse, specifically on the ability of the watercourse to support aquatic life.

Water quality samples will be completed throughout the summer of 2015.

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

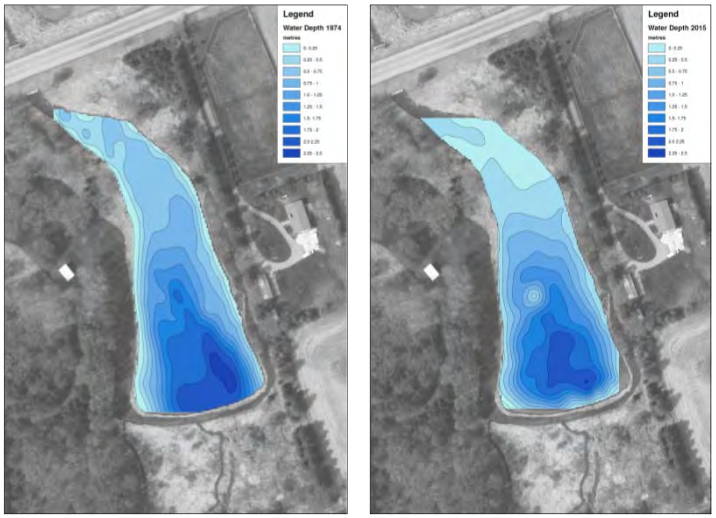
Field Data Collection and Site Characterization

Sediment Survey

Survey of the pond bottom and depths of sediment are completed using GPS survey equipment.

A sediment survey is required to estimate the current quantity of sediment in the pond and to estimate the rate at which sediment is accumulating in the pond, to inform potential alternatives for the dam.

Preliminary sediment depths and volumes have been determined at the pond; contour maps showing water depth (indirectly showing sediment accumulation) are shown at right.

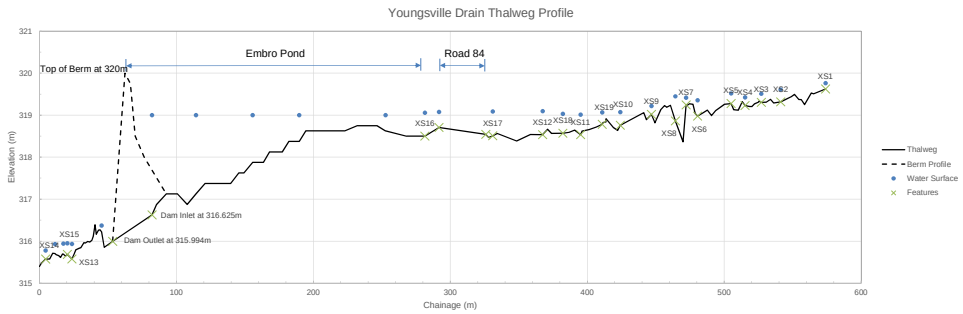


Fluvial Geomorphology

Fluvial geomorphology aims to understand the processes and functions of rivers and creeks, and their role in transporting sediment and providing habitat for aquatic life. A geomorphic characterization of the site, as well as the watercourse upstream and downstream of the site, has been partially completed.

An understanding of the natural watercourse function around the pond is important to characterize impacts of potential alternatives, as well as the current impact of the pond and dam on river processes.

The geomorphic characterization is currently in progress.



Archaeology

A Stage 1 archaeological assessment is being completed for the study area to identify known archaeological sites in the area, evaluate the site's archaeological potential, and recommend mitigation strategies if needed. The assessment will be completed under the provisions of the Ontario Heritage Act.

An archaeological assessment is required to identify potential archaeological and heritage sites that may impact alternatives for the dam, forming constraints and providing opportunities for enhancement and protection of heritage sites.

The assessment is currently in progress.

Cultural/Social Environment

The cultural and social environment of the site includes current and historical uses of the site, and its role as a community gathering and recreational place.

A thorough characterization and understanding of the cultural and social environment is required to understand the impacts of potential alternatives for the dam, and serves to ensure that the "human environment" is considered alongside technical, environmental, and economic criteria.

The review of cultural and social environment is ongoing, and will be supplemented by the input of interested and engaged residents.

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Next Steps and Contact Information

Next Steps for our project team include:

- Compile and review feedback from this Public Information Centre
- Complete field investigations and characterization of the study area
- Develop alternatives for the Dam to present at the next Public Information Centre, currently planned for September 2015
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embro_dam@thamesriver.on.ca

For further information please contact:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
goldtr@thamesriver.on.ca

Mr. Wolfgang Wolter
Senior Project Manager
Ecosystem Recovery Inc.
550 Parkside Drive, Unit B1
Waterloo, Ontario, N2L 5V4
Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Upper Thames River Conservation Authority
Embro Dam
Class Environmental Assessment

PUBLIC INFORMATION CENTRE – COMMENT FORM

Upper Thames River Conservation Authority (UTRCA), through their consultant Ecosystem Recovery Inc., is undertaking a Class Environmental Assessment (Class EA) for the Embro Dam in the Township of Zorra. The UTRCA commissioned a Dam Safety Review (DSR) of the Embro Dam which was completed in 2007. The DSR identified issues with the spillway capacity and embankment stability of the dam. This Class EA study was initiated to assess the existing site conditions and constraints, and to develop potential alternatives to address the identified issues at the dam.

The project will be carried out under the *Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works* document.

Public consultation is a key component of this study. Although the study is in an early stage, the project team welcomes public input and comments, and will incorporate them into the planning and design of this project. Please provide any comments in the space provided below.

_____

_____

_____

_____

_____

_____

Thank you for your participation.

Please print your name and address below, and leave your completed Comment Form in the box provided.

You may also email your comments to embro_dam@thamesriver.on.ca, or mail/fax your comments to:

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wolfgang.wolter@ecosystemrecovery.ca

Name: _____

Address & Postal Code: _____

E-mail Address: _____

Embro Dam Class EA

Public Information Centre #1, June 23, 2015

Sign Up sheet to receive notices and information during the EA project

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Name (print)	Full Address	Mailing address (if different)	Phone #	Email (print)	Would like to receive: (please check mark)	
					Notices	PIC erials
RANDY BAILEY	[redacted]					✓
BRIAN MCCOWAN						✓
Tyler Turpin						✓
Carol Harrison						
MARIE KEASEY						
Margaret Lupton						
DON CAMPBELL						✓

Personal information on this form is collected under the authority of the Conservation Authorities Act and will be used for the purposes of the Embro Dam Class EA only. Questions about the collection of personal information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424 Clarke Rd., London, Ontario. N5V 5B9, (519) 451-2800.

Embro Dam Class EA

Public Information Centre #1, June 23, 2015

Sign Up sheet to receive notices and information during the EA project

Name (print)	Full Address	Mailing address (if different)	Phone #	Email (print)	Would like to receive: (please check mark)	
					Notices	PIC materials
Laura Green	[redacted]					✓
Kathryn Walton						–
Marcus Rya					✓	
John Langlois						
CLINT DUBUQUE						–

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Embro Dam Class EA

Public Information Centre #1, June 23, 2015

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ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Name (print)	Full Address	Mailing address (if different)	Phone #	Email (print)	Would like to receive: (please check mark)	
					Notices	PIC materials
Tammy Hutson	[redacted]				✓	

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UPPER THAMES RIVER
CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Embro Dam
Class Environmental Assessment

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

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Good visual exhibits + clear powerpoint.
Difficult to manage some questions but speakers remained polite + informative.
Thank you.
Perhaps draw eg. of Woodstock Pond where residents opposed suggestion to drain + pond + authorities listened. The pond remains.

Thank you for your participation.

Please print your name and address below, and leave your completed Comment Form in the box provided.

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Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca

Name: Carol Harrison

Address & Postal Code [redacted]

E-mail Address: [redacted]

UPPER THAMES RIVER CONSERVATION AUTHORITY

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Embro Dam
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Would be better served to restore creek to original condition. Brook trout are resident above Embro Pond. Thames River Anglers Katchery has raised and reintroduced them downstream of the pond supports some brook trout but no reproduction takes place due to water quality + temperature. Removing the pond would remedy this.

Thank you for your participation.

Please print your name and address below, and leave your completed Comment Form in the box provided.

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wolfgang.wolter@ecosystemrecovery.ca

Name: RANDY BAILEY

Address & Postal Code: [redacted]

E-mail Address: [redacted]

Ministry of Aboriginal Affairs

160 Bloor St. East, 9th Floor
Toronto, ON M7A 2E6
Tel: (416) 326-4740
Fax: (416) 325-1066
www.aboriginalaffairs.gov.on.ca

Ministère des Affaires Autochtones

160, rue Bloor Est, 9e étage
Toronto ON M7A 2E6
Tél. : (416) 326-4740
Téléc. : (416) 325-1066
www.aboriginalaffairs.gov.on.ca

Ontario

Reference: EA #2015-182

Wolfgang Wolter
Ecosystems Recovery Inc.
B1 – 550 Parkside Drive
Waterloo, ON N2L 5V4

Re: Harrington Dam and Embro Dan Class Environmental Assessments
Notice of Intent and First Public Information Centre

Dear Mr. Wolter:

Thank you for informing the Ministry of Aboriginal Affairs (MAA) of your project. Please note that MAA treats all letters, emails, general notices, etc. about a project as a request for information about which Aboriginal communities may have rights or interests in the project area.

As a member of the government review team, the Ministry of Aboriginal Affairs (MAA) identifies First Nation and Métis communities who may have the following interests in the area of your project:

- reserves;
- land claims or claims in litigation against Ontario;
- existing or asserted Aboriginal or treaty rights, such as harvesting rights; or
- an interest in the area of the project.

MAA is not the approval or regulatory authority for your project, and receives very limited information about projects in the early stages of their development. In circumstances where a Crown-approved project may negatively impact a claimed Aboriginal or treaty right, the Crown may have a duty to consult the Aboriginal community advancing the claim. The Crown often delegates procedural aspects of its duty to consult to proponents. Please note that the information in this letter should not be relied on as advice about whether the Crown owes a duty to consult in respect of your project, or what consultation may be appropriate. Should you have any questions about your consultation obligations, please contact the appropriate ministry.

You should be aware that many First Nations and/or Métis communities either have or assert rights to hunt and fish in their traditional territories. For First Nations, these territories typically include lands and waters outside of their reserves.

In some instances, project work may impact aboriginal archaeological resources. If any Aboriginal archaeological resources could be impacted by your project, you should contact

your regulating or approving Ministry to inquire about whether any additional Aboriginal communities should be contacted. Aboriginal communities with an interest in archaeological resources may include communities who are not presently located in the vicinity of the proposed project.

With respect to your project, and based on the brief materials you have provided, we can advise that the project appears to be located in an area where First Nations may have existing or asserted rights or claims in Ontario's land claims process or litigation, that could be impacted by your project. Contact information is below:

Six Nations of the Grand River Territory P.O. Box 5000, 1695 Chiefswood Road OHSWEKEN, Ontario N0A 1M0	Chief Ava Hill (519) 445-2201 (Fax) 445-4208 Avahill@sixnations.ca
Oneida Nation of the Thames 2212 Elm Avenue SOUTHWOLD, Ontario N0L 2G0	Chief Sheri Doxtator (519) 652-3244 (Fax) 652-9287 Sheri.Doxtator@oneida.on.ca
Chippewas of the Thames First Nation 320 Chippewa Road R.R. #1 MUNCEY, Ontario N0L 1Y0	Chief Richard "Joe" Miskokomon (519) 289-5555 (Fax) 289-2230 chief@cottfn.com cdeleary@cottfn.com
Haudenosaunee Confederacy Chiefs Council 2634 6th Line Road RR 2 Ohsweken, ON N0A 1M0	Hohahes Leroy Hill Secretary to Haudenosaunee Confederacy Chiefs Council Cell 519 717 7326 jocko@sixnationsns.com

For your information, MAA notes that the following First Nation may be interested in your project given the proximity of their community or reserve lands to the area of the proposed project or because of your project's potential environmental impacts:

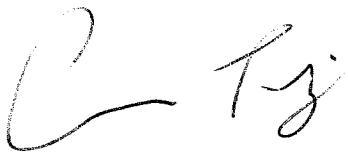
Munsee-Delaware Nation R. R. #1 MUNCEY, Ontario N0L 1Y0	Chief Roger Thomas (519) 289-5396 (Fax) 289-5156 Chief.thomas@munsee-delaware.org

The information upon which the above comments are based is subject to change. First Nation or Métis communities can make claims at any time, and other developments can occur that could result in additional communities being affected by or interested in your undertaking.

Through Aboriginal Affairs and Northern Development (AANDC), the Government of Canada sometimes receives claims that Ontario does not receive, or with which Ontario does not become involved. AANDC's Consultation and Accommodation Unit (CAU) established a "single window" to respond to requests for baseline information held by AANDC on established or potential Aboriginal Treaty and rights. To request information from the Ontario Subject Matter Expert send an email to: UCA-CAU@aadnc-aandc.gc.ca

Additional details about your project or changes to it that suggest impacts beyond what you have provided to date may necessitate further consideration of which Aboriginal communities may be affected by or interested in your undertaking. If you think that further consideration may be required, please bring your inquiry to whatever government body oversees the regulatory process for your project. MAA does not wish to be kept informed of the progress of the project; please be sure to remove MAA from the mailing list.

Yours truly,



Corwin Troje
Manager, Ministry Partnerships Unit
Aboriginal Relations and Ministry Partnerships Branch

Public Information Centre #2

Upper Thames River Conservation Authority

Embro Dam
Class Environmental Assessment

NOTICE OF SECOND PUBLIC INFORMATION CENTRE

THE STUDY

Upper Thames River Conservation Authority (UTRCA), through their consultant Ecosystem Recovery Inc., is undertaking a Class Environmental Assessment (Class EA) for the Embro Dam in the Township of Zorra. The study was initiated to address results of the 2007 Dam Safety Review of the Embro Dam which identified significant issues with the spillway capacity and embankment stability of the dam.

SECOND PUBLIC OPEN HOUSE

The first open house was held on June 23, 2015 to introduce the study and to receive comments from the public. A second Public Open House will be held on May 10, 2016 to present an overview of existing conditions, to introduce technically feasible potential alternative solutions for the future of the dam, to review the evaluation criteria for the alternatives, and to provide an opportunity for public comment and input. A third Public Open House will be held to present the preferred alternative for the dam; the expected date is June 2016.

The map on the reverse of this page shows the location of the study area.

WE WANT TO HEAR FROM YOU

Public consultation is a key component of this study. The Project Team invites public input and comments, and will incorporate them into the planning and design of this project. The second Public Information Centre will take place at the following time and location:

Public Information Center 2:

Date:	**May 10th, 2016**
Time:	**7:00 p.m. to 9:00 p.m.**
Place:	**Embro Community Centre** **355644 35th Line** **Embro, Ontario**

The evening will begin at 7:00 pm with a formal presentation that will be followed by a time for discussion and questions. Presentation boards will be displayed throughout the evening and comment forms will be provided to enable public feedback and input into the project. Further opportunity for questions and discussion with the project team will occur throughout the evening.

STUDY CONTACTS

To submit comments, request further information, or to join the project mailing list, please send an email to the project email address:

embro_dam@thamesriver.on.ca

Contact information for the project team leaders is listed below:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
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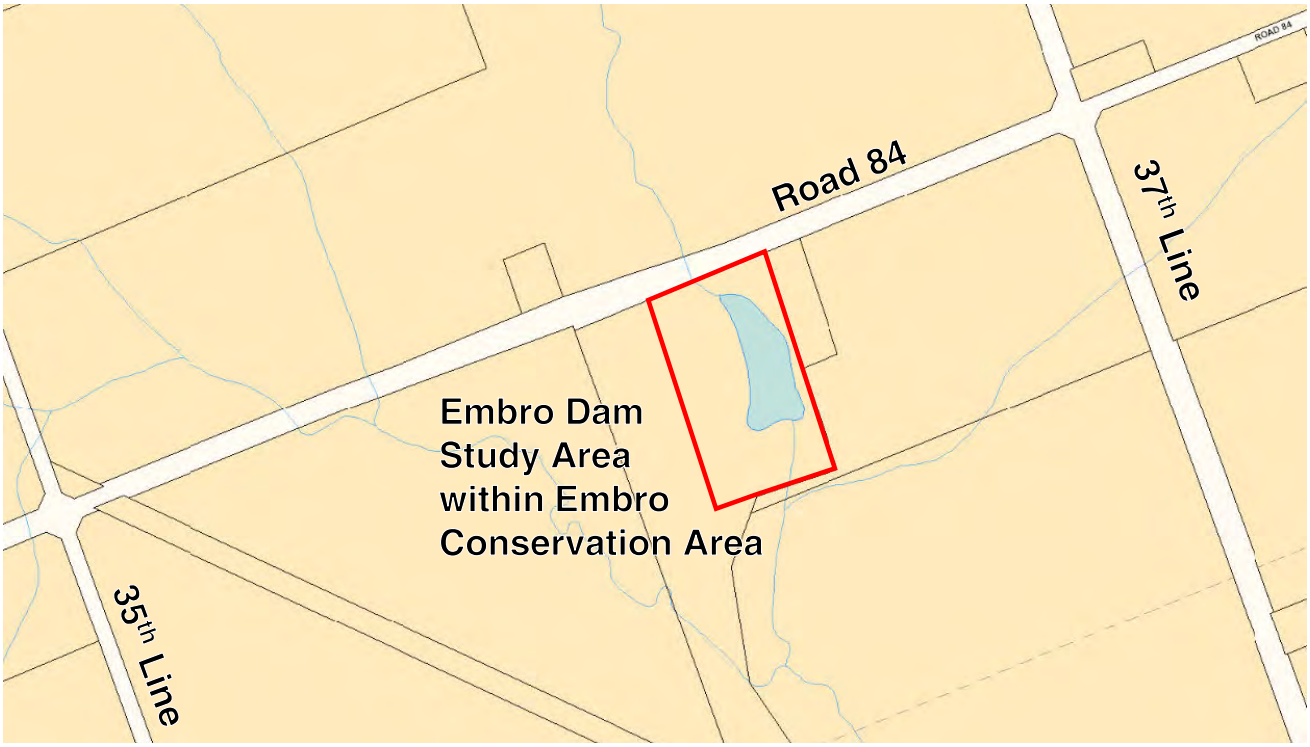

Road 84
37th Line
35th Line
Embro Dam
Study Area
within Embro
Conservation Area

Public Information Centre #2
PIC Presentation Slides

Embro Dam
Class Environmental Assessment

Public Information Centre #2

Upper Thames River Conservation Authority
Embro Community Centre
May 10th, 2016 7:00 p.m. to 9:00 p.m.

UPPER THAMES RIVER CONSERVATION AUTHORITY

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Class Environmental Assessment Process and Problem Statement

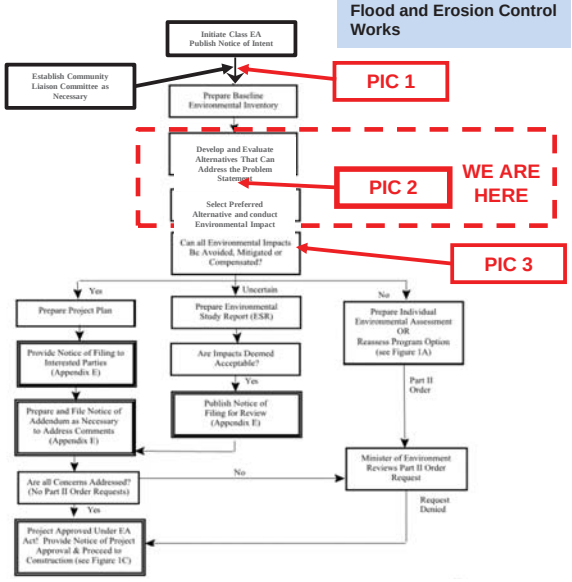
Problem Statement

Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam have been identified through recent engineering assessments.

- ***Acres International. July, 2007****. Dam Safety Assessment Report for Embro Dam: Identified issues with insufficient spillway capacity, insufficient freeboard, embankment stability and conveyance of flood flows through the emergency spillway*
- ***Naylor Engineering Associates. September 2008****. Geotechnical Investigation Embro Dam Embankment Stability Assessment: The dam does not meet current standards and is not considered stable under existing conditions.*

A Class Environmental Assessment has been initiated to evaluate a range of alternatives to address the identified issues in consideration of the environmental, social, economic, and technical aspects of the dam.

Class EA Process for Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works



UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Criteria and Evaluation

Information Highlights

Technical/Engineering	Natural Environment
Flooding Impacts/Enhancement Geomorphology/Sediment Transport Protection of Infrastructure Constructability Approvability	Aquatic Habitat Impacts/Enhancement Terrestrial Habitat Impacts/Enhancement Wildlife and SAR Impacts/Enhancement Groundwater Impacts/Enhancement Water Quality Impacts/Enhancement
Social/Cultural	**Economic**
Impact to Private Property Impact to Public Safety Impact to Cultural/Heritage Features Recreational Impacts/Enhancement	Construction Costs Maintenance/Future Costs Availability of Funding

Primary Areas of Site Characterization

Environmental	Technical	Social
Water Quality	Hydraulics and Hydrology	Cultural Heritage
Flow Characteristics	Geomorphology	Archaeology
Vegetation and Wildlife	Sediment	First nations
Aquatic Biology	Structural	

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

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Environmental

Information Highlights

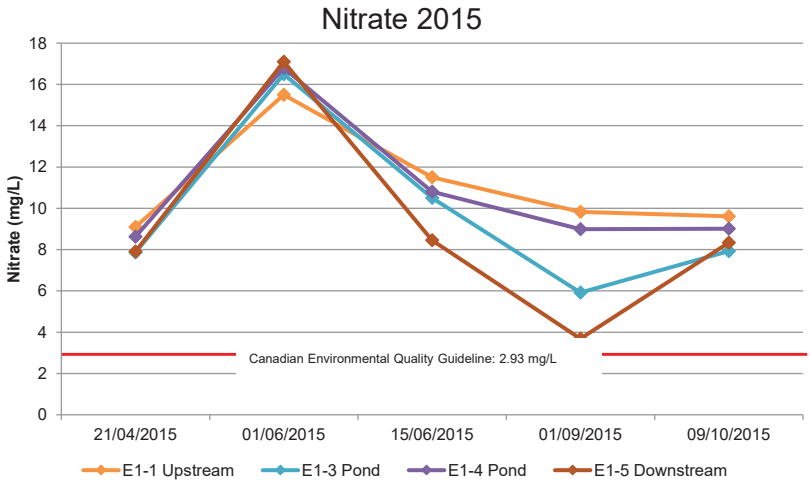
Water Quality

- 4 sampling locations (1 upstream of pond, 2 in pond, 1 downstream of pond), 5 samples were collected at each site

- Results (2015):
  - Lows levels of contaminants,
    - except Nitrate (i.e., above the Canadian Environmental Quality Guideline (CEQG), historically and currently, but similar to the rest of the Middle Thames River watershed)
  - Similar results to the historic data with E. coli

Environmental

Information Highlights



- Nitrate concentration is above MOE CEQG standard
- Concentration varies seasonally

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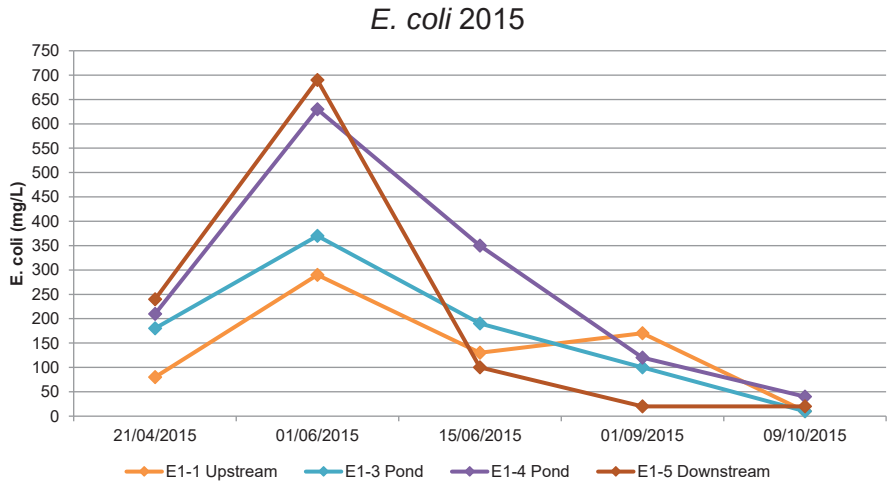
Environmental

Information Highlights



- E. Coli levels increase downstream of dam in summer
- E.Coli levels are generally higher in pond than upstream or downstream

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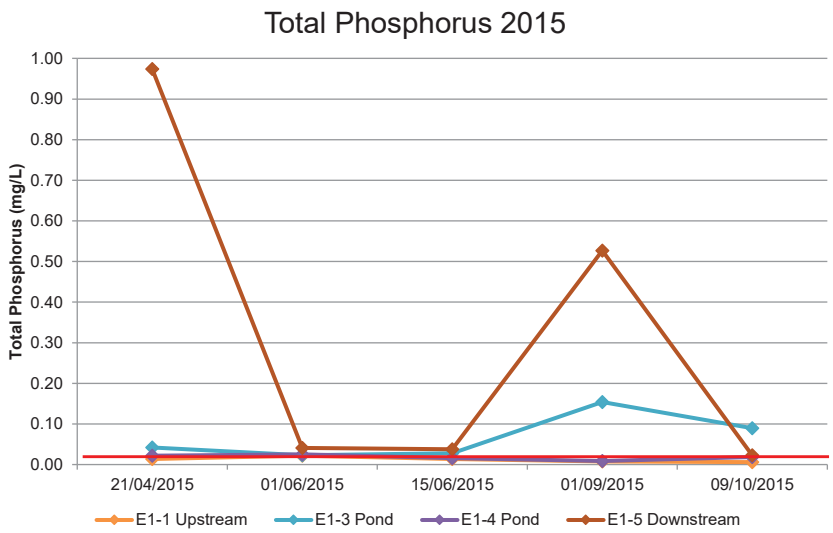
Environmental

Information Highlights



- Total Phosphorus is highest downstream of dam
- Levels are higher than Provincial objectives in and downstream of pond

Provincial Water Quality Objective 0.03mg/L

UPPER THAMES RIVER CONSERVATION AUTHORITY

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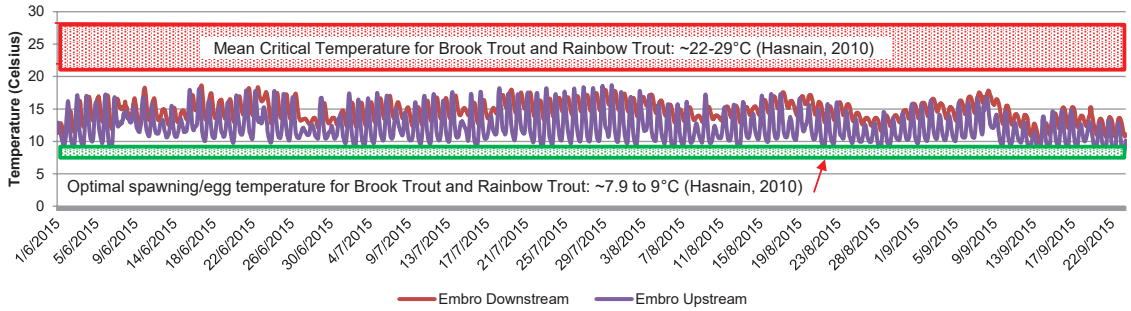
Environmental

Information Highlights

Water Temperature

- Continuous temperature measurements taken from June to September 2015
  - Water often warmer downstream than upstream of the pond:
    - Least temp. difference: 0.0^0C
    - Average temp. difference: 2.5^0C
    - Maximum peak difference: 7.0^0C
  - Temperatures are higher than optimal for Brook/Rainbow Trout spawning



Reference: Hasnain, Sarah, et. Al. 2010. Key Ecological Temperature Metrics for Canadian Freshwater Fishes. Prepared for the Ontario Ministry of Natural Resources.

Environmental

Information Highlights

Flow Characteristics

- Flow downstream of the pond contributes between 3.5 – 6.5% of the total flow downstream of Thamesford
- Flow contribution to Mud Creek (downstream) could not be estimated (no monitoring stations)
- Flow rates downstream of the dam are resilient to drought
- Groundwater input to the increases baseflow from upstream to downstream of the dam by 8%

UPPER THAMES RIVER CONSERVATION AUTHORITY

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Environmental

Information Highlights

Vegetation and Wildlife

- No Species at Risk or of Special Concern were found
  - No records of Species at Risk within a 2 km radius
  - No wetlands within 120 m
- Wooded areas of the Conservation Area are part of the Oxford Natural Heritage System
- Inventory Findings:
  - 198 plant species, 31% of species found are non-native
  - 40 species of birds, mostly common forest birds
  - Barn Swallow (Threatened) was seen but not found nesting in study area
  - Snapping Turtles (Special Concern) spotted in the reservoir

Environmental

Information Highlights

Aquatic Biology

- Classified as Shallow Aquatic (i.e., < 2 m depth)
- Very few wetland emergent plants (due to steep side slopes and consistent water levels)
- Duckweed and algae float on pond surface
- Four rooted aquatic species identified
- Vegetation does not provide good cover for fish species that are adapted to ponds

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Environmental

Information Highlights

Fisheries Resources

- Electrofishing conducted in 2015 (April, July, October and November)

Brook Trout

Image Source: Mandrak and Crossman, 1992

Upstream of Dam (8 species recorded):

- Brook Trout in large numbers
- Habitat suitable for cold water species

Downstream of Dam (21 species recorded):

- Brook Trout
- Cold water species
- Permanent and seasonally present warm water species

Environmental

Information Highlights

Benthic Resources

- Sampling was conducted in the spring and fall of 2015
- Sample records with the calculated Family Biotic Index (FBI) are shown below:
  - Water quality indicators upstream/downstream of pond are FAIRLY POOR

Water quality ranges for FBI values

FBI Value	Water Quality
< 4.25	Excellent
4.25 – 5.00	Good
5.00 – 5.75	Fair
5.75 – 6.50	Fairly Poor
6.50 – 7.25	Poor
> 7.25	Very Poor

Comparison for FBI values for Embro CA, Mud Creek and UTRCA watersheds

Benthic Sample Location	Spring 2015 FBI	Fall 2015 FBI	Average FBI	Water Quality
Youngsville Drain upstream of Embro Pond	5.82	6.06	5.94	Fairly poor
Youngsville Drain downstream of Embro Dam	5.84	6.37	6.12	Fairly poor
Mud Creek watershed 2012	N/A	N/A	6.20	Fairly poor
UTRCA watershed 2015	N/A	N/A	5.68	Fair
Provincial Guideline (target only)	N/A	N/A	< 5.00	Good

Technical

Information Highlights

Groundwater

- Soil is characterized as fill overlying silt and clay deposits, and native glacial till
- Groundwater generally occurs in the fill above the glacial till
- Groundwater flow gradient is towards the south side of the pond; a possible seepage zone is located on the south side of the dam
- Water level in the fill is ~ 0.4 m below the pond water level

Technical

Information Highlights

Well Information

- Approximately 13 wells exist in the vicinity of Embro Pond
- Installation dates range from 1959 to 2008
- Well depths range from 3.8 to 50.3 m
- Water depths range from 2 to 49 m below the top of well

Technical

Information Highlights

Geomorphology

- Air photo analysis:
  - 1955: creek is sinuous, no pond
  - 1972: pond is constructed, channel realignment
  - 1989-2010: minor planform changes in creek
- Three reaches have been delineated

Reach 1 (Downstream of dam):

- Relatively straight, slight meander
- Cross sections: symmetrical and trapezoidal and confined
- Bed morphology: riffles/runs with shallow pools
- Bed material: cobbles and gravel
- Riparian vegetation: dense grasses and herbaceous plants with some shrubs

Technical

Information Highlights

Geomorphology

Reach 2 (Backwater area (85 m long)):

- Straight channel with poorly developed bed forms
- Cross section: generally trapezoidal
- Bed material: silt and sand, some gravel
- Riparian vegetation: well vegetated with grasses and herbaceous plants

Reach 3:

- Riparian vegetation: grasses, herbaceous plants, and cedar trees
- Cross section: generally uniform in shape
- Bed morphology: riffles/runs with shallow pools
- Bed material: fine sand and silt with some large boulders/cobbles and gravel on riffles

UPPER THAMES RIVER CONSERVATION AUTHORITY

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ecosystem recovery inc. PROFESSIONAL ENGINEERS

Technical

Information Highlights

Sediment Characteristics

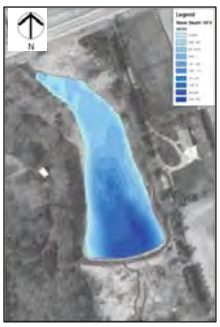
Sediment testing was conducted in 2015 to investigate parameters including:

- metals and inorganics
- volatile organic compounds
- petroleum hydrocarbons
- conductivity
- pH
- grain size analysis

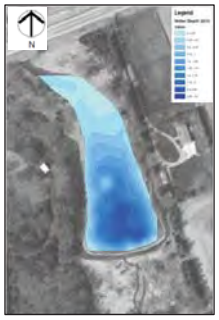
Sediment test results were compared to Ministry of the Environment (MOE) Table 2 and 3 Standard, O. Reg. 153/04

- One parameter is outside of the MOE limit: Cyanide (weak acid dissociable)
- Cyanide concentration was 0.092ug/g vs the MOE limit of 0.051ug/g
- Options for sediment: beneficial reuse (requires further investigation) or landfilling

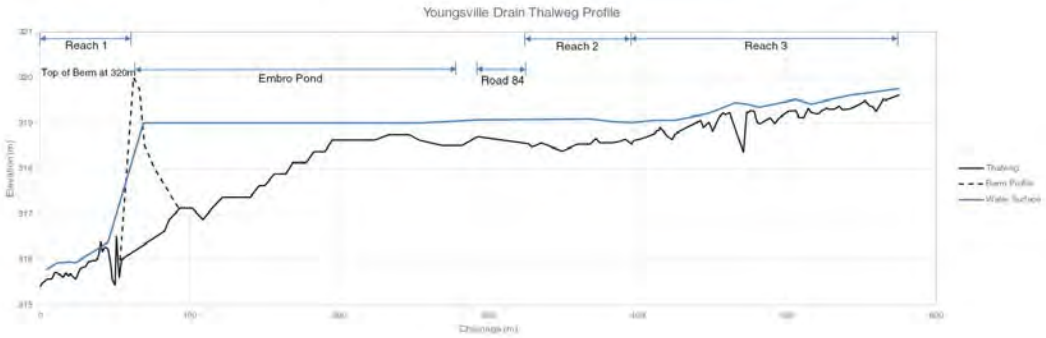
Sediment



Water Depth 1974



Water Depth 2015



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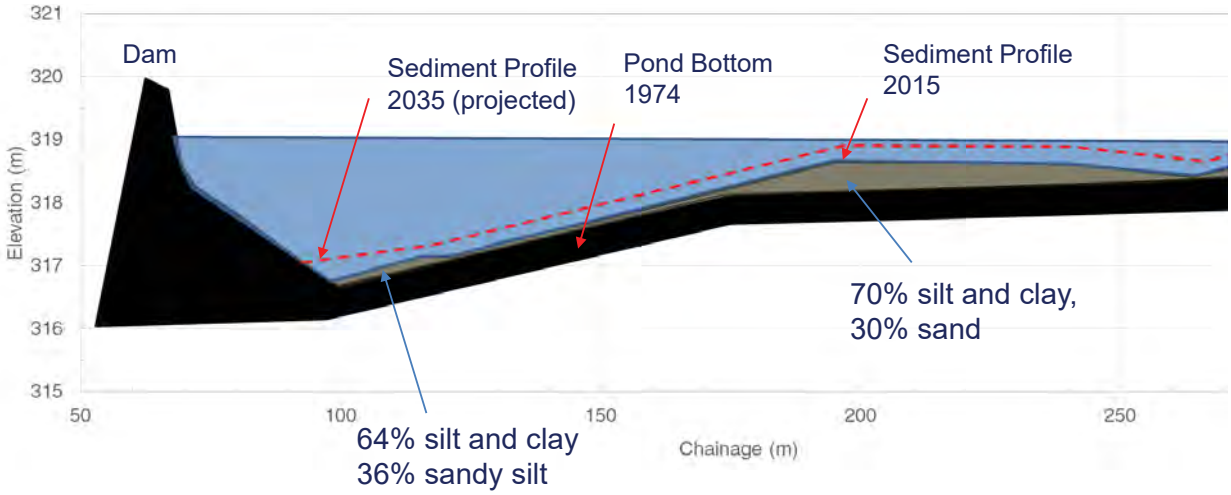
Technical

Information Highlights

Sediment Profile



UPPER THAMES RIVER CONSERVATION AUTHORITY

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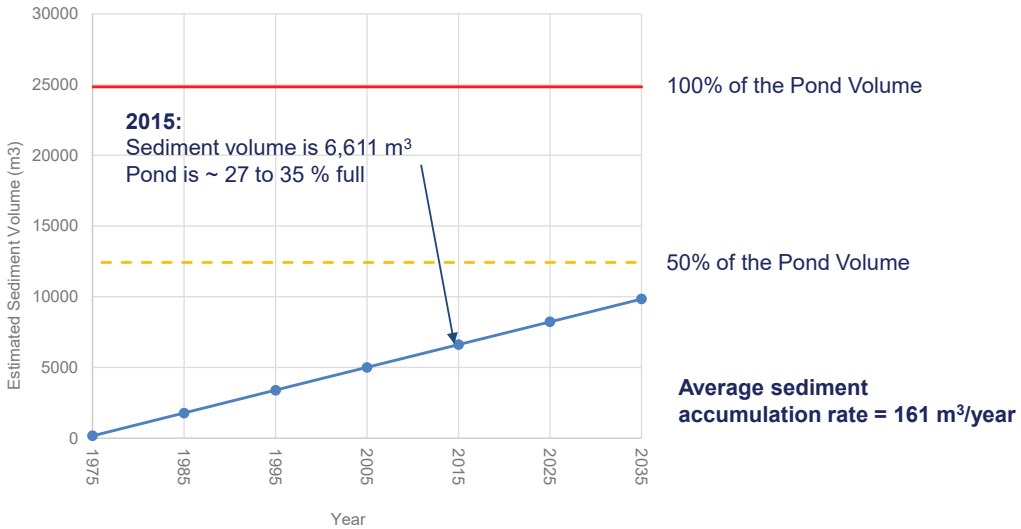
Estimated Sediment Volume (m3)

Technical

Information Highlights

Pond Capacity and Sediment Infilling Rate



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Technical

Information Highlights

Structural

- Dam impounded volume: 30,000 m^3 (small dam based on storage volume)
- Dam height ~4.5 m
- 100 m long earth embankment
- Inflow design flood (IDF) criteria: 50 year, 8 day spring snowmelt event

Structural Condition (2002/2003 Dam Safety Assessment)

- Spillway does not have current capacity to pass the IDF
- Insufficient freeboard
- Upstream and downstream embankment slopes do not meet slope stability acceptance criteria
- Flood flows are not adequately conveyed by the emergency spillway
- Date of last repair is unknown

Technical

Information Highlights

Updated Hazard Classification

2007: Dam hazard potential classification (DHC) for Embro Dam was completed:

- Loss of Life: VERY LOW
- Economic and Social Losses: VERY LOW
- Environmental Losses: VERY LOW

2011: the Ministry of Natural Resources and Forestry updated the DHC criteria and procedure

2015: Update to the Embro dam hazard potential classification:

- Life safety: LOW
- Property Losses: LOW
- Environmental Losses: LOW
- Cultural-Built Heritage Losses: LOW

Social

Information Highlights

Cultural Heritage

- Embro Conservation Area: 11.7 ha (28.9 acres) for passive recreation
- Includes hiking trails, cross-country skiing trails and picnic areas
- Memorial Tree Sign program run through the Township of Zorra
- The Embro Pond Association

Social

Information Highlights

Archaeology and First Nations

- Stage 1 Archaeological Assessment was completed
- No prior archaeological assessments within 50 m of the study area
- No prior identified archaeological sites within 1 km of the study area
- Archeological potential was assessed using soils, hydrology, and landform considerations

Findings: The study areas would have been attractive to both Pre-Contact and Euro-Canadian populations as a result of close proximity to water sources, well drained soils, and the diversity of local vegetation. The site was found to have archaeological potential.

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66.8% of the site has archaeological potential,

- requires test pit survey before any potential construction works in area

33.2% of the site has no archaeological potential (due to disturbance, permanent water features or steep slopes)

Criteria and Evaluation

Information Highlights

Technical/Engineering	Natural Environment
Flooding Impacts/Enhancement Geomorphology/Sediment Transport Protection of Infrastructure Constructability Approvability	Aquatic Habitat Impacts/Enhancement Terrestrial Habitat Impacts/Enhancement Wildlife and SAR Impacts/Enhancement Groundwater Impacts/Enhancement Water Quality Impacts/Enhancement
Social/Cultural	**Economic**
Impact to Private Property Impact to Public Safety Impact to Cultural/Heritage Features Recreational Impacts/Enhancement	Construction Costs Maintenance/Future Costs Availability of Funding

Alternatives

Information Highlights

1) Do Nothing
2) Repair Dam
3) Remove Dam and Construct a Natural Channel
4) Remove Dam and Construct Offline Pond(s) or Wetland(s)
5) Lower Dam Crest and Outlet and Naturalize New Pond and Perimeter

Opportunities and Constrains of the Alternatives

Summarizes how each of the alternatives impacts elements of the evaluation criteria

Do Nothing

No intervention would be implemented

Opportunities	Constraints
No immediate cost	Does not meet dam safety guidelines
Maintains current aesthetic	Has a risk of failure – this can impact the channel by flood, erosion and sediment
Maintains current uses	Requires regular monitoring
	Imposes an impediment to fish passage
	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

Repair Dam

Construct Dam 'Shell', add rock protection, extend outlet pipe, provide emergency spillway

Opportunities	Constraints
Complies with Dam Safety Guidelines	Imposes repair costs (moderate)
Maintains current aesthetic	Imposes an impediment to fish passage
Maintains current uses	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

Remove Dam and Construct Natural Channel

Remove Dam, construct natural channel, provide landscape restoration

Opportunities	Constraints
Restores area to pre-existing conditions	Imposes restoration costs (moderate)
Provides diverse fish habitat	Does not reflect existing aesthetic (open water)
Provides sediment transport	Has the risk of impacting shallow wells
Maintains creek temperatures	
Removes risk of dam failure	

Remove Dam and Construct Offline Pond/Wetland

Remove Dam, construct offline pond with less surface area as existing, create natural channel, provide landscaping

Opportunities	Constraints
Restores area to pre-existing conditions	Imposes restoration costs (high)
Provides aquatic habitat diversity	Reduces pond surface area (water views)
Provides sediment transport	
Maintains creek temperatures	
Removes risk of dam failure	
Partially provide water views	

Lower Dam Crest and Outlet and naturalize pond area

Lowers height of dam, provided less surface area as existing, create natural channel, provides landscape enhancements

Opportunities	Constraints
Partially maintains current aesthetic	Imposes restoration costs (high)
Reduces solar heat gain compared to existing	Reduces pond surface area (water views)
Reduces magnitude of potential impacts in the event of breach/failure	Imposes an impediment to fish passage
Provides diversity in landscape	Imposed risk to Increases in water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

Watershed Initiatives

Information Highlights

Initiative	Approach
2010 Water Quality Monitoring Station Added	A new water quality monitoring station was added to Mud Creek just south of Embro along Highway 6
Clean Water Program Since 2001	26 Clean Water Program (CWP) projects (fragile land retirement, septic upgrades, wellhead protection) have been completed since 2001
UTRCA Community Nature Program	Over 80 trees and 2800 native wildflowers and grasses were planted by 75 students at Embro Conservation Area
2008-2009 Mud Creek Community-based Watershed Strategy	Technical information about the state of the watershed combine with concerns and priorities of watershed residents combine to produce a list of recommended actions
2010-2011 Hardwood Forest Regeneration in Embro Conservation Area	5 ha conifer plantation at Embro Conservation Area was thinned by UTRCA to encourage the regeneration of hardwood forest. 2100 native hardwood seedlings were planted. Project funding was by Oxford County and the CWP.

Next Steps and Contact Information

Next Steps for our project team include:

- **Compile and review feedback from this Public Information Centre**
- **Final criteria and alternatives evaluation completed based on public feedback**
- **Select 'Preferred Alternative' and evaluate environmental impacts**
- **Public Information Centre #3**
- **If impacts can be mitigated, work will proceed to completion and filing of Project Plan**

To provide feedback and comments to the project team, please send all correspondence to the project email address:

embro_dam@thamesriver.on.ca

For further information please contact:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
goldtr@thamesriver.on.ca

Mr. Wolfgang Wolter
Senior Project Manager
Ecosystem Recovery Inc.
550 Parkside Drive, Unit B1
Waterloo, Ontario, N2L 5V4
Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca

Public Information Centre #2
PIC Presentation Boards

Embro Dam
Class Environmental Assessment

Public Information Centre #2

Upper Thames River Conservation Authority
Embro Zorra Community Centre
May 10th, 2016 7:00 p.m. to 9:00 p.m.

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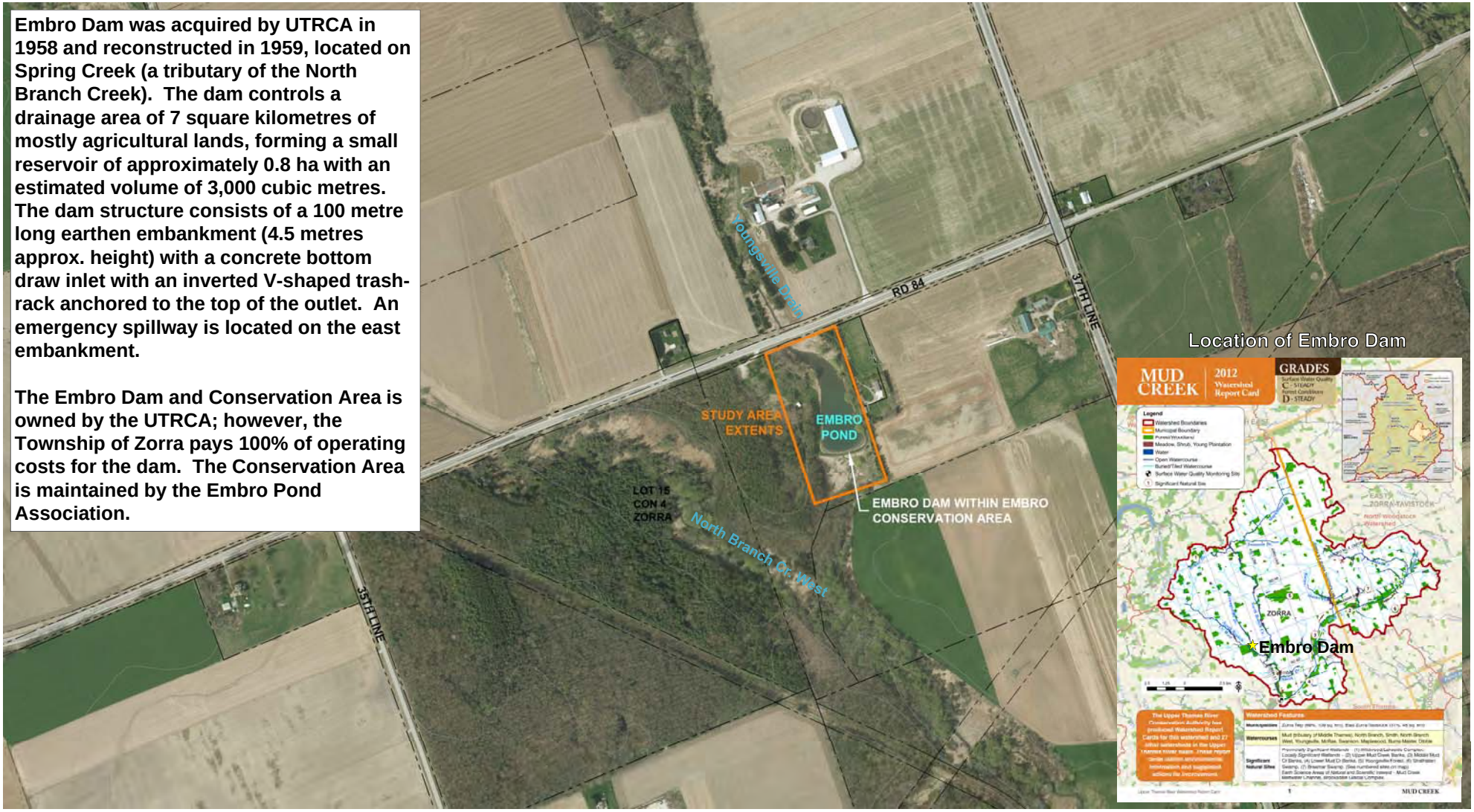
Embro Dam Study Area

Embro Dam was acquired by UTRCA in 1958 and reconstructed in 1959, located on Spring Creek (a tributary of the North Branch Creek). The dam controls a drainage area of 7 square kilometres of mostly agricultural lands, forming a small reservoir of approximately 0.8 ha with an estimated volume of 3,000 cubic metres. The dam structure consists of a 100 metre long earthen embankment (4.5 metres approx. height) with a concrete bottom draw inlet with an inverted V-shaped trash-rack anchored to the top of the outlet. An emergency spillway is located on the east embankment.

The Embro Dam and Conservation Area is owned by the UTRCA; however, the Township of Zorra pays 100% of operating costs for the dam. The Conservation Area is maintained by the Embro Pond Association.



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Class Environmental Assessment Process and Problem Statement

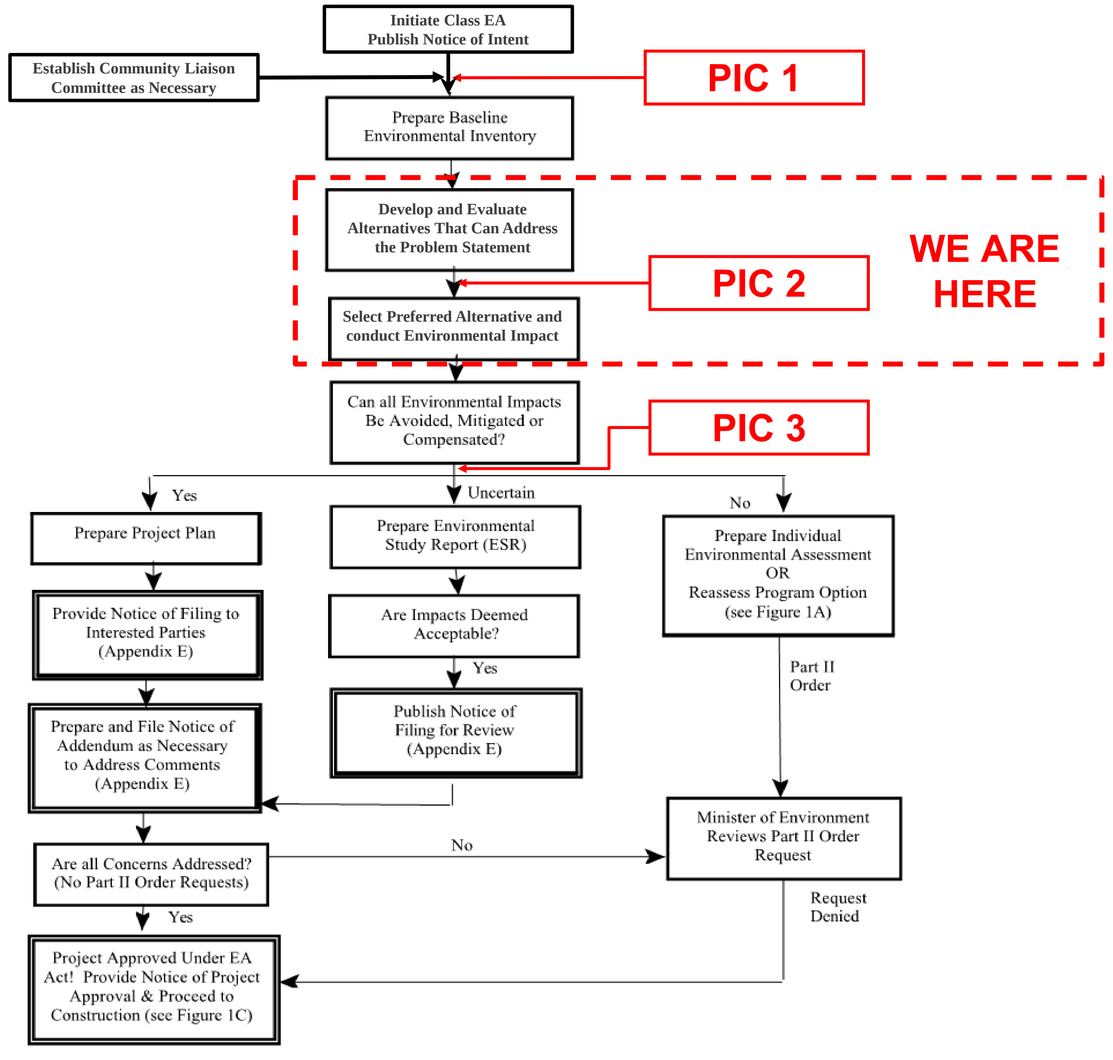
Problem Statement

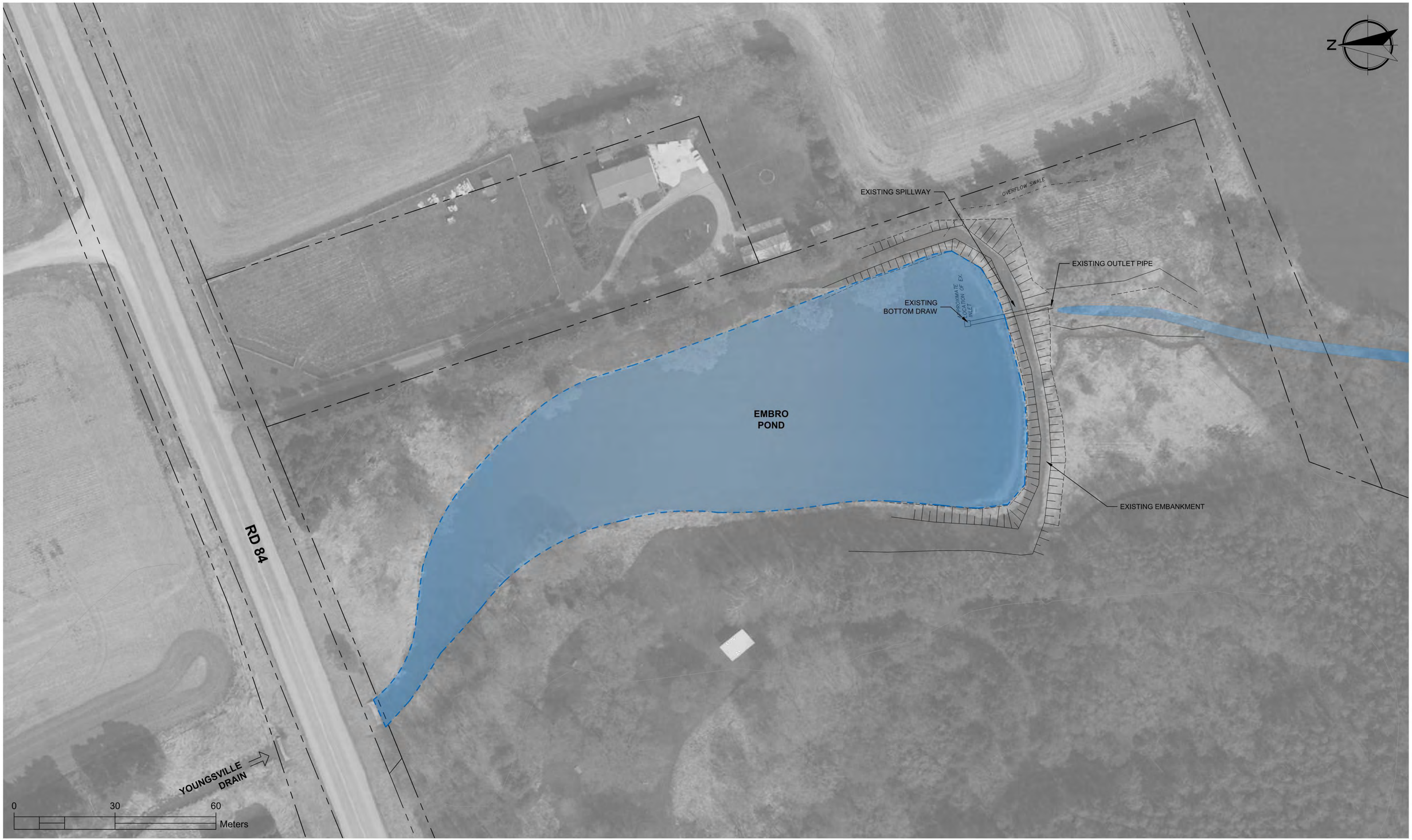
Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam have been identified through recent engineering assessments.

- ***Acres International. July, 2007****. Dam Safety Assessment Report for Embro Dam: Upstream and downstream embankment slopes do not meet stability acceptance criteria*
- ***Naylor Engineering Associates. September 2008****. Geotechnical Investigation Embro Dam Embankment Stability Assessment: The existing dam does not meet current standards and is not considered stable under existing conditions*

A Class Environmental Assessment has been initiated to evaluate a range of alternatives to address the identified issues in consideration of the environmental, social, economic, and technical aspects of the dam.

Class EA Process for Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works





EMBRO DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 1
DO NOTHING

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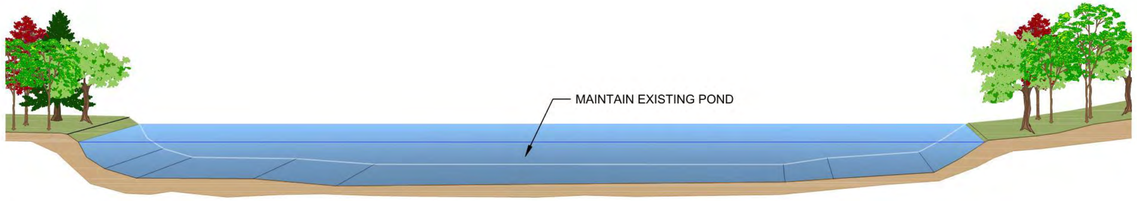
FIGURE 4-1



SECTION A-A

UPGRADE EMERGENCY SPILLWAY TO MEET INFLOW DESIGN FLOOD CRITERIA

OVERFLOW SWALE

REMOVE VEGETATION FROM DAM STRUCTURE

EXTEND EXISTING OUTLET PIPE

APPROXIMATE LOCATION OF EX. INLET

EXISTING BOTTOM DRAW

A

A

B

B

EMBRO POND

INSTALL GRANULAR SHELL ON DAM EMBANKMENT TO ACHIEVE 5:1 SLOPE ON NORTH SLOPE AND 4:1 ON SOUTH SLOPE

INSTALL GALVANIZED WIRE MESH ON BOTH SLOPES TO PREVENT ANIMAL BURROWS

INSTALL DRAINAGE SWALE AT TOE OF SOUTH SLOPE

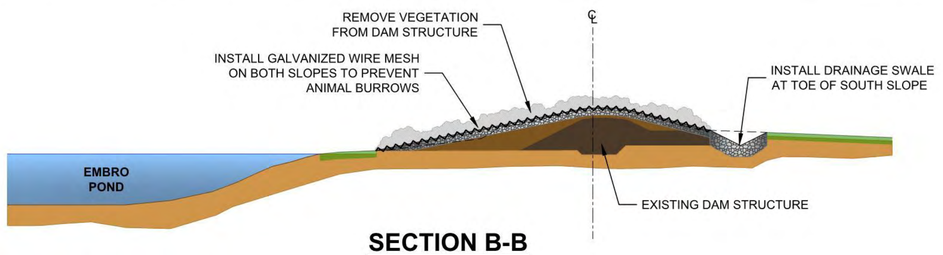
EMBANKMENT TO MEET SLOPE STABILITY AND FREEBOARD CRITERIA

RD 84

YOUNGSVILLE DRAIN

0 30 60 Meters

CORE FEATURES:
- SAFE SLOPES
- EMBANKMENT IMPROVEMENTS



SECTION B-B

EMBRO DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2
REPAIR/ RECONSTRUCT EXISTING DAM

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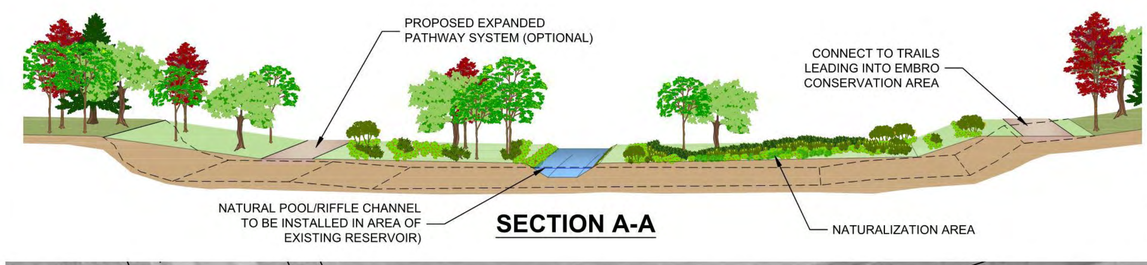
FIGURE 4-2



SECTION A-A

CREEK REALIGNMENTS

CORE FEATURES:
- NEW PATHWAYS/TRAIL CONNECTIONS
- NATURALIZE
- SAFE SLOPES
- NATURAL CHANNEL
- SHORELINE ENHANCEMENT

OPTIONAL FEATURES:
(subject to funding)
- PEDESTRIAN BRIDGE
- EXPANDED TRAIL
- LOOKOUT

EMBRO DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 3
REMOVE DAM AND CONSTRUCT NATURAL CHANNEL

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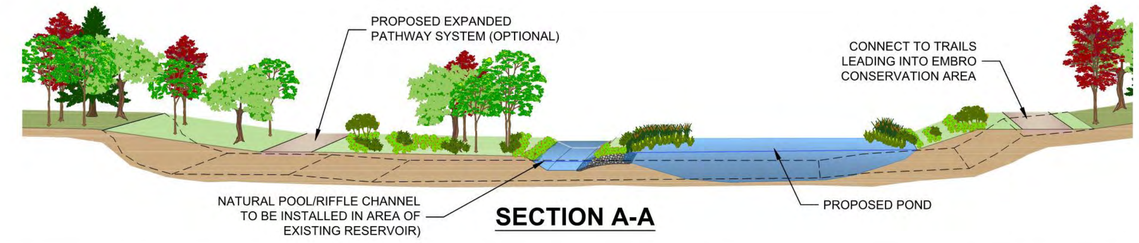
FIGURE 4-3



SECTION A-A

N

A

A

OVERFLOW SWALE

EMBANKMENT ENDS TO BE MAINTAINED AND INTEGRATED INTO SITE RESTORATION PLANS

DAM OUTLET WORKS TO BE REMOVED

FLOW CONNECTION TO NEW CHANNEL

PROPOSED EXPANDED PATHWAY SYSTEM (OPTIONAL)

INTEGRATE CHANNEL INTO DOWNSTREAM CHANNEL

BRIDGE (OPTIONAL)

PROPOSED OFFLINE POND OR WETLAND

WETLAND

POOL

RIFFLE

POND

EMBRO POND

PROPOSED LOOKOUT ON OLD DAM EMBANKMENT (OPTIONAL)

PROPOSED OFFLINE POND OR WETLAND

RESERVOIR TO BE DRAINED AND SEDIMENT REMOVED/REUSED AS REQUIRED TO ESTABLISH A NATURAL SLOPE IN THE NEW CHANNEL

RD 84

NATURAL POOL/RIFFLE CHANNEL TO BE INSTALLED IN AREA OF EXISTING RESERVOIR)

BIOENGINEERING BANK STABILIZATION

CONNECT TO TRAILS LEADING INTO EMBRO CONSERVATION AREA

YOUNGSVILLE DRAIN

0 30 60 Meters

POND WITH CREEK

CORE FEATURES:
- NEW PATHWAYS/TRAIL CONNECTIONS
- NATURALIZATION AREAS
- SAFE SLOPES
- NATURAL CHANNEL
- SHORELINE ENHANCEMENT
- OFFLINE POND/WETLAND

OPTIONAL FEATURES:
(subject to funding)
- PEDESTRIAN BRIDGE
- EXPANDED TRAIL
- LOOKOUT

EMBRO DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 4
REMOVE DAM AND CONSTRUCT OFFLINE POND(S) OR WETLAND(S)

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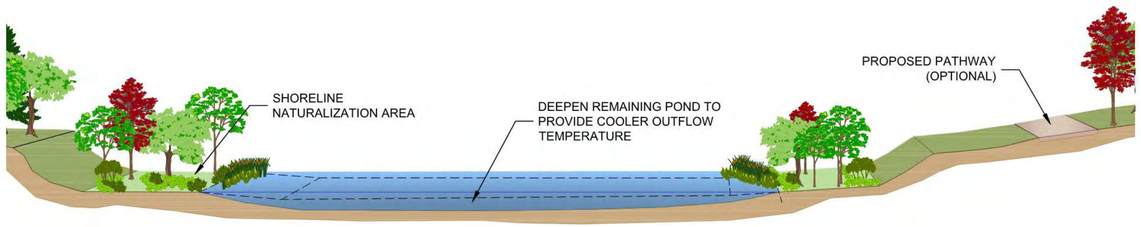
FIGURE 4-4



SECTION A-A

CORE FEATURES:
- NEW PATHWAYS/TRAIL CONNECTIONS
- NATURALIZATION AREAS
- SAFE SLOPES
- NATURAL CHANNEL
- SHORELINE ENHANCEMENT

OPTIONAL FEATURES
(subject to funding)
- EXPANDED TRAIL
- LOOKOUT

N

PROPOSED PATHWAY (OPTIONAL)

OVERFLOW SWALE

STABILIZE AND REPAIR
EMERGENCY SPILLWAY TO MEET
INFLOW DESIGN FLOOD CRITERIA

A

B

B

EMBRO
POND

LOWER DAM CREST AND
OUTLET BY
APPROXIMATELY 1.0m

DEEPEN REMAINING POND TO
PROVIDE COOLER OUTFLOW
TEMPERATURE

EMBANKMENT TO MEET
SLOPE STABILITY AND
FREEBOARD CRITERIA

SHORELINE
NATURALIZATION AREA

A

NATURAL POOL/RIFFLE
CHANNEL TO BE INSTALLED IN
AREA OF EXISTING RESERVOIR)

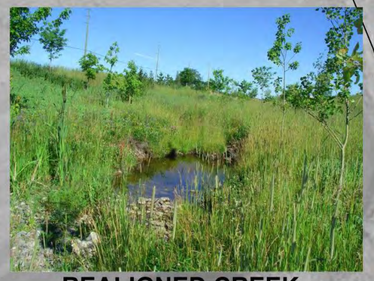
RIFFLE

POOL

RD 84

BIOENGINEERING BANK
STABILIZATION

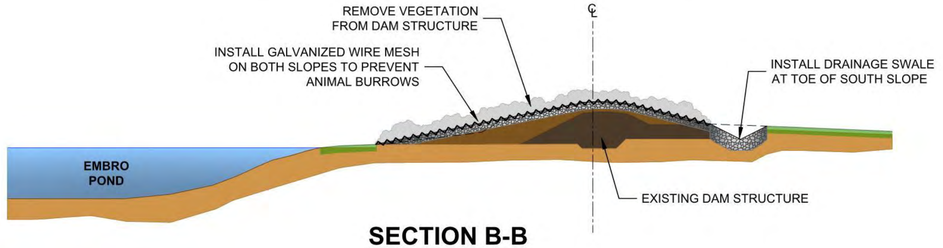
CONNECT TO TRAILS
LEADING INTO EMBRO
CONSERVATION AREA



REALIGNED CREEK

YOUNGSVILLE
DRAIN

0 30 60
Meters



SECTION B-B

EMBRO DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 5
LOWER DAM CREST AND OUTLET AND NATURALIZE NEW POND PERIMETER

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FIGURE 4-5

Opportunities and Constraints

Alternative 1 - Do Nothing

No intervention would be implemented

Opportunities	Constraints
No immediate cost	Does not meet dam safety guidelines
Maintains current aesthetic	Has a risk of failure – this can impact the channel by flood, erosion and sediment
Maintains current uses	Requires regular monitoring
	Imposes an impediment to fish passage
	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

Alternative 2 - Repair Dam

Construct Dam 'Shell', add rock protection, extend outlet pipe, provide emergency spillway

Opportunities	Constraints
Complies with Dam Safety Guidelines	Imposes repair costs (moderate)
Maintains current aesthetic	Imposes an impediment to fish passage
Maintains current uses	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

Alternative 3 - Remove Dam and Construct Natural Channel

Remove Dam, construct natural channel, provide landscape restoration

Opportunities	Constraints
Restores area to pre-existing conditions	Imposes restoration costs (moderate)
Provides diverse fish habitat	Does not reflect existing aesthetic (open water)
Provides sediment transport	Has the risk of impacting shallow wells
Maintains creek temperatures	
Removes risk of dam failure	

Alternative 4 - Remove Dam and Construct Offline Pond/Wetland

Remove Dam, construct offline pond with less surface area as existing, create natural channel, provide landscaping

Opportunities	Constraints
Restores area to pre-existing conditions	Imposes restoration costs (high)
Provides aquatic habitat diversity	Reduces pond surface area (water views)
Provides sediment transport	
Maintains creek temperatures	
Removes risk of dam failure	
Partially provide water views	

Alternative 5 - Lower Dam Crest and Outlet and Naturalize Pond Area

Lowers height of dam, provides less surface area as existing, create natural channel, provides landscape enhancements

Opportunities	Constraints
Partially maintains current aesthetic	Imposes restoration costs (high)
Reduces solar heat gain compared to existing	Reduces pond surface area (water views)
Reduces magnitude of potential impacts in the event of breach/failure	Imposes an impediment to fish passage
Provides diversity in landscape	Imposes a risk to increase water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

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Meeting Minutes

B1-550 Parkside Drive, Waterloo, Ontario, N2L 5V4
Tel 519.621.1500 ■ Fax 226.240.1080

Project:	Harrington and Embro Dam EAs	**Meeting No.:**	PIC 2
		Meeting Date:	May 10, 2016
Project No.:	1505	**Meeting Time:**	7 – 9 pm
Recorder:	M. Pushkar	**Report date:**	May 26, 2016

Location:	Embro Community Centre – 355644 35th Line, Embro, ON
Attendees:	Rick Goldt, Bill Mackie, (UTRCA) Wolfgang Wolter, Mariëtte Pushkar (ERI) Marie Keasey, Doug Matheson, Marcus Ryan, Margaret Lupton (Zorra Township) Members of the public (2)
Purpose:	Public Information Centre 2 – Embro Dam

Item	Description	Action By
1.	**Presentation** • Presentation of study findings, evaluation criteria and alternatives was made by Wolfgang Wolter (ERI)	Info
2.	**Questions posed by members of the public and answers provided by team:** **1. How much effort was put into identifying salamander Species-at-Risk?** Incidental observations of salamanders were made during the field assessments by UTRCA staff. A specific field investigation for the presence of salamanders was not undertaken. **2. Can shallow wells be identified on the slide so that we can make a better informed evaluation?** Where possible, based on MOE data, shallow wells will be identified on the mapping. **Are there shallow wells?** There are at least three shallow wells (2 – provincial monitoring, 1 well on the dam for monitoring) **3. With regards to the offline pond, will it go stagnant or green with algae?** • Algal growth can be a concern and is a risk. There are various aspects that would decrease the likelihood of algal growth in the study area, within the proposed alternatives: • There will still be high groundwater inputs • In the alternatives, there will still be a connection between pond and creek to ensure some water augmentation and/or flushing. • Adaptive management could be implemented • An offline pond does not have same risk of sediment concentration of nutrients: o Contaminated material will be dredged o There will not be as much sediment/nutrient loading as existing conditions (i.e., upstream landuse changes etc.) **4. What is the issue if fish species upstream and downstream are different?** • Habitat fragmentation occurs due to the dam. • Diversity and health of the fish communities is affected by the dam.	ERI

	• Species numbers are important factors in assessing health of community. • Removal of the dam will gain ~ 2 km of upstream habitat for the fish that now occur downstream. • Dam removal will improve water temperatures that will benefit downstream water quality and habitat. **5. U.S. and Canada want to decrease total phosphorous loading to the Great Lakes. Fifty percent of contaminated sediment goes through with total phosphorous, why then do we want sediment movement?** • Phosphorous becomes a part of the biomass (i.e. consumed by fish etc.). • Sediment movement is required for river processes (i.e., loss of sediment load increases erosion potential of flows) • Issue of total phosphorous loading involves sediment from fields (landuse management); not just the creek. **6. Is there any issue with silt sediment? What can be done?** • The silt can be re-used on land and does not have to be landfilled. Only a small sample was taken for the sediment testing. **7. What was the cyanide from? Was it from Blue-green algae? What was the concentration?** • The sample was taken 1 m below the ground. • The origin of the cyanide is not known at this time. • The concentration levels and MOE standard will be identified before the presentation is posted on the UTRCA website. **8. Where does the money come from for implementing the preferred alternative? What is the risk and feasibility of finding funding source?** • Government funding – there is a table which indicates that more money is available for dam removal projects • Fundraising by public/friends of environment • Conservation Authority **9. Is the selection of the preferred alternative limited by funding?** • Funding is considered in the alternative evaluation process but does not define the preferred alternative. Funding may impact selection of the preferred alternative. **10. No weather data was provided; what happens if a catastrophic even occurs?** • UTRCA – risk of dam overtopping is based on the 50-year IDF. **(Residents have had 5" of rain in 24 hours)** The magnitude of the event depends on existing conditions at time of storm such as; pre-existing soil moisture, time of year, area over which storm occurs (was it local?), duration/intensity of storm etc. **11. Once decision is made, what will be the time span for taking action (e.g. 10 years)?** Action will take place as quickly as possible - although obtaining funding may take a few years. The EA process allows 5 years.	ERI

Upper Thames River Conservation Authority

Class Environmental Assessment

Embro Dam

Public Information Centre – Comment Form

The Environmental Assessment for the Embro Dam, in the Embro Conservation Area, is intended to address safety concerns identified as part of the Dam Safety Assessment (ACRES, 2007) including insufficient spillway capacity, insufficient freeboard, embankment stability and conveyance of flood flows through the emergency spillway. Through the study, potential alternatives will be evaluated to determine a course of action to mitigate dam safety concerns.

The project is being carried out in accordance with the requirements of the *Conservation Ontario Class Environmental Assessment.* The study is being undertaken by the Upper Thames River Conservation Authority (UTRCA).

Public consultation is a key component of this study. This Public Information Centre (PIC) is held to receive public input on the possible future alternatives for the Embro Dam. Any feedback and comments provided will become part of the public record for this project.

Please provide your comments in the areas that interest you.

Comments:

Considering the evaluation criteria required to be assessed through the Environmental Assessment process, what I like and/or dislike about each alternative for the Embro Dam is as follows :

Alternative 1 – Do Nothing

Alternative 2 – Repair Dam

Alternative 3 – Remove Dam and Construct a Natural Channel

Alternative 4 – Remove Dam and Construct Offline Pond(s) or Wetland(s)

Alternative 5 – Lower Dam Crest and Outlet and Naturalize New Pond Perimeter

The Alternative that I like the most is Alternative: 1 2 3 4 5 (Please Circle)

Other things that have not been discussed but which the study team should consider?

Please print your name and address below, and leave your completed Comment Form in the box provided. You may also email your comments to embro_dam@thamesriver.on.ca, or mail your comments to:

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Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clark Road, London, ON N5V 5B8
Tel.: 519-451-2800 ext. 244
goldtr@thamesriver.on.ca

Name: _____

Address & Postal Code: _____

E-mail Address: _____

Please submit comments by May 31, 2016
Thank you for your participation.

Personal information on this form is collected under the authority of the Conservation Authorities Act and will be used for the purposes of the Embro Dam Class EA only. Questions about the collection of personal information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424 Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

Embro Dam Class EA

Public Information Centre #2, May 10, 2016

Sign Up sheet to receive notices and information during the EA project

Name (print)	Full Address	Mailing address (if different)	Phone #	Email (print)	Would like to receive: (please check mark)	
					Notices	PIC materials
MARIE KEASEY	[redacted]				✓	✓
DOUG MATHESON					✓	✓
Marcus Ryan					✓	✓
Margaret Lupton					✓	✓
DON CAMPBELL					✓	✓

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Embro Dam Class EA

Public Information Centre #2, May 10, 2016

Sign Up sheet to receive notices and information during the EA project

Name (print)	Full Address	Mailing address (if different)	Phone #	Email (print)	Would like to receive: (please check mark)	
					Notices	PIC materials
PHILIP KERR	[redacted]					

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From: "P. Hunter" [redacted]
To: Rick Goldt <goldtr@thamesriver.on.ca>, SOX Roger Boyd [redacted]
CC: [redacted]
Date: 6/15/2016 4:20 PM
Subject: CEA Embro PIC Comment Form

Hi Folks,

Rick,
Pls accept the following reply formatted from your earlier email -

From: Rick Goldt
Sent: Wednesday, June 15, 2016 12:14 PM
To: Pud Hunter ; Pud Hunter
Subject: Comment Sheets Harrington and Embro EA PIC2

- which I copied/ attached to this/ my email.

Thk you, Pud

****
Upper Thames River Conservation Authority Class Environmental Assessment

Embro Dam

Public Information Centre - Comment Form

The Environmental Assessment for the Embro Dam, in the Embro Conservation Area, is intended to address

safety concerns identified as part of the Dam Safety Assessment (ACRES, 2007) including insufficient spillway

capacity, insufficient freeboard, embankment stability and conveyance of flood flows through the emergency

spillway. Through the study, potential alternatives will be evaluated to determine a course of action to mitigate

dam safety concerns.

The project is being carried out in accordance with the requirements of the Conservation Ontario Class

Environmental Assessment. The study is being undertaken by the Upper Thames River Conservation Authority

(UTRCA).

Public consultation is a key component of this study. This Public Information Centre (PIC) is held to receive

public input on the possible future alternatives for the Embro Dam. Any feedback and comments provided will

become part of the public record for this project.

Please provide your comments in the areas that interest you.

Comments:

This submission is on behalf of Stewardship Oxford (SOX), an Oxford County based Council promoting sustainable resources management.

Such management are to be achieved through current environmental standards and science based information.

Considering the evaluation criteria required to be assessed through the Environmental Assessment process,

what I like and/or dislike about each alternative for the Embro Dam is as follows :

Alternative 1 - Do Nothing

Dislike: perpetuates status quo which is detrimental to sustainable recourse management and results in deteriorating environmental conditions.

Does not allow upgrading to current environmental standards.

Alternative 2 - Repair Dam

Dislike: perpetuates zero environmental standards of the 1964 construction; suggest cost-benefit analysis.

Alternative 3 - Remove Dam and Construct a Natural Channel

Like: upgrading to current environmental standards; enhancing watershed benefits.

Page 2 of 2

Alternative 4 - Remove Dam and Construct Offline Pond(s) or Wetland(s)

Like: preference for wetland prior to pond.

Dislike: artificial structure; management needs so pond or wetland does not negatively impact watercourse; suggest cost-benefits analysis.

Alternative 5 - Lower Dam Crest and Outlet and Naturalize New Pond Perimeter

Dislike: maintains status quo management; perpetuates degraded/ degrading environmental conditions.

The Alternative that I like the most is Alternative: 1 2 3 4 5 (Please

Circle) 3

Other things that have not been discussed but which the study team should consider?

Please print your name and address below, and leave your completed Comment Form in the box provided. You

may also email your comments to embro_dam@thamesriver.on.ca, or mail your comments to:

Rick Goldt C.E.T.

Supervisor, Water Control Structures

Upper Thames River Conservation Authority

1424 Clark Road, London, ON N5V 5B8

Tel.: 519-451-2800 ext. 244

goldtr@thamesriver.on.ca

Name: Submitted on behalf of Roger Boyd, Chair Stewardship Oxford (SOX)

Address & Postal Code: [redacted]

E-mail Address: [redacted]

By: P. Hunter, Director on Stewardship Oxford (SOX); [redacted]

Please submit comments by May 31, 2016

Thank you for your participation.

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information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424

Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

From: "P. Hunter" <[redacted]>
To: Rick Goldt <goldtr@thamesriver.on.ca>, Robert Huber <[redacted]>
CC: Randy Bailey <[redacted]> <[redacted]>
Date: 6/15/2016 4:20 PM
Subject: CEA Embro PIC Comment Form

Hi Folks,
Pls note this is submitted on behalf of, & copied to, Thames River Anglers Association attn Rob Huber, President and Randy Bailey, Past President.

Rick,
Randy Bailey was the TRAA rep at the Embro Open House.

As well, pls accept the following reply formatted from your earlier email -

From: Rick Goldt
Sent: Wednesday, June 15, 2016 12:14 PM
To: Pud Hunter ; Pud Hunter
Subject: Comment Sheets Harrington and Embro EA PIC2

- which I copied/ attached to this/ my email.

Thk you, Pud

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Upper Thames River Conservation Authority Class Environmental Assessment

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Public consultation is a key component of this study. This Public Information Centre (PIC) is held to receive

public input on the possible future alternatives for the Embro Dam. Any feedback and comments provided will

become part of the public record for this project.

Please provide your comments in the areas that interest you.

Comments:

This submission is on behalf of the Thames River Angling Association (TRAA).

TRAA is a Thames River Watershed based Association promoting wise resources management and benefits associated with the Thames River Watershed.

Considering the evaluation criteria required to be assessed through the Environmental Assessment process,

what I like and/or dislike about each alternative for the Embro Dam is as follows :

Alternative 1 - Do Nothing

Dislike: perpetuates status quo which is detrimental to sustainable recourse management and results in deteriorating environmental conditions.

Does not allow upgrading to current environmental standards.

Alternative 2 - Repair Dam

Dislike: perpetuates zero environmental standards of the 1964 construction; suggest cost-benefit analysis.

Alternative 3 - Remove Dam and Construct a Natural Channel

Like: upgrading to current environmental standards; enhancing watershed benefits.

Alternative 4 - Remove Dam and Construct Offline Pond(s) or Wetland(s)

Like: preference for wetland prior to pond.

Dislike: artificial structures; management needs so pond or wetland does not negatively impact watercourse; suggest cost-benefits analysis.

Alternative 5 - Lower Dam Crest and Outlet and Naturalize New Pond Perimeter

Dislike: maintains status quo management; perpetuates degraded/ degrading environmental conditions.

The Alternative that I like the most is Alternative: 1 2 3 4 5 (Please

Circle) 3

Other things that have not been discussed but which the study team should consider?

Please print your name and address below, and leave your completed Comment Form in the box provided. You

may also email your comments to embro_dam@thamesriver.on.ca, or mail your comments to:

Rick Goldt C.E.T.

Supervisor, Water Control Structures

Upper Thames River Conservation Authority

1424 Clark Road, London, ON N5V 5B8

Tel.: 519-451-2800 ext. 244

goldtr@thamesriver.on.ca

Name: Submitted on behalf Robert Huber, President, Thames River Anglers Association

Address & Postal Code: London, Ontario

E-mail Address: [redacted]

Addition: Randy Bailey; [redacted]

By: P. Hunter, Thames River Anglers Association; < [redacted]

Please submit comments by May 31, 2016

Thank you for your participation.

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information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424

Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

EA Process:
Might help to use layman's terms for spillway and freeboard.

Alternative 1 – Do nothing

- Don't like that it doesn't support the needs of the EA (Including insufficient spillway capacity, insufficient freeboard, embankment stability and conveyance of flood flows etc.).
- Don't like that it postpones safety issues and re-investment financially into an asset that requires attention now

- Like – That there is no loss to end users.

Alternative 2 – Repair dam

- Don't like cost (what is the cost)
- Don't like missing the opportunity to re-connect fish species and improve water quality by taking the dam off-line/out.

- Like no loss/change to end users

Alternative 3- Remove Dam and Construct a natural channel

- Don't like cost (what is the cost?)
- The "loss" of pond feature will cause some heritage impact, a community feature that has been in place since the development of the community.

- With suggested changes can we also reinforce/support bird species community?
- Would a wetland type restoration be a more true representation of what features would have existed before the dam? (cedar trees, some skunk cabbage, cattail etc. exist there already) plus the benefits of water retention (upstream of the dam)
- Can we retain a serene escape area with trail which supports fish and bird species in the most naturally congruent way?
- Perhaps a heritage feature that is water-fall sounding as tribute. A lot of the serenity of the area is created from the current water cascade feature.
- Like that it takes the opportunity to re-connect fish species and improve water quality by taking the dam out.

Alternative 4 –

- Don't like additional cost?

- Like - similar to alternative 3 but reconciles "boat" users losses

Alternative 5 – Lower Dam Crest and Outlet and Naturalize New Pond Perimeter

- Don't like missing opportunities to re-connect fish species and improve water quality
- Cost?

- Like less heritage impact – change to end users would be felt by the "water craft" community if there is one.
- Like that it maintains possible community functions like skating and peaceful waterfall feature etc.

Other thing that have not been discussed but which the study team should consider?

Has the question been asked: What does the community treasure about the dam area specifically?

- Bird watching?
- Skating?
- Water fall (sound)
- Trail?
- Fishing?
- Tourist attraction?

- If there is a way to gear the outcome so some needs of the community are still met? To minimize loss and show investment from the side of the "management" (while still navigating the financial costs carefully).

- Wetland feature seems like a good way to reintroduce some water retention feature and eco-community structure
- Is there any concern of the carp in the pond being reconnected to brook trout downstream?
- Is there any mitigation planned to reduce the effects of carp downstream if re-connection is decided upon?

Name: Anonymous
Address and Postal Code: London, Ontario
Email Address:

Comments on the Considerations for the Embro Dam Environmental Assessment.

By

Donald Campbell, M. Sc., Landowner, [redacted] (not in the watershed but a taxpayer)

21 May 2016

Introduction:

We were told the undertaking of the Class Environmental Assessment has been by The Upper Thames River Conservation Authority and The Township of Zorra.

There have been two public meetings regarding this Environmental Assessment for the Embro Dam. At the first, June 23, 2015, the subject of Dam safety and stability was addressed and the existence of two engineering reports that were both in agreement that the Embro Dam did not meet current safety and stability specifications for earthen dams were made known with no details given. (Acres International, 2007 and Naylor Engineering Associates, 2008). The liability of the owner was also discussed briefly with no real understanding given of the gravity of the liability, as outlined by Rylands v. Fletcher, 1868 (LR 3 HL 330), the standard for strict liability in this country, and with very direct application because it is about liability and negligence of a dam that gave way. The balance of the meeting was taken to describe the process of Environmental Assessments and the methodology that would be undertaken by the Upper Thames River Conservation Authority (UTRCA) and Ecosystems Restoration Inc., (ER) a consultant.

At the second meeting, May 10, 2016, the results of the study for alternative suggestions with what to do with the Embro Dam site were presented by an employee of Ecosystems Restoration, Mr. Wolfgang Wolter. Results were presented from 2 draft reports from 2015: one on existing environmental conditions including 4 appendices, A, B, C, D, (by UTRCA) and one on existing geomorphic conditions (by ER), augmented by several poster boards and power point slides, not all illustrated in the reports. It was evident that the presenter knew very little about the data collected by UTRCA and its implications on his work for solutions on dam safety. As two examples, he did not know the data for a 50 year, 8 day snowmelt event, the standard that he or the company was apparently working to. Nor did he know any details about the cyanide levels that were above provincial guidelines. The details on the Cyanide concentrations have since been added to the presentation slides and the levels of Cyanide are almost double the MOE standard. In my opinion, at that level, it ought to have raised eyebrows to determine the source. The concentration of 0.092 ug/g is an equivalent concentration to 0.092 mg/kg. The LD_{50} for cyanide compounds vary from 5 to 11mg/kg orally and from 11 to 100 mg/kg for inhalation or dermal exposure. (Science Lab.com, MSDS information). Data for Hydrocyanic acid is available from the Center for Disease Control at http://www.atsdr.cdc.gov/toxprofiles/tp8-c3.pdf and this can be lethal at dosages of 100 ppm when breathed for as little as 10 minutes.

At the second meeting, several topics that had not been mentioned in the first were brought forward: as examples, the possibility of extending a cold water creek for some distance, possibly 2 kms, downstream, and increased accessibility for fish to the upper levels of the watercourse without the obstruction of the dam.

No mention of the liability, or summary of the engineering reports, or meteorological data were brought forward at the second meeting and no mention of the usage of this conservation area facility was made.

Only two questions regarding costs were asked by the Mayor of Zorra: how much, and who pays? The estimates of costs were given verbally as the estimate from the engineering company in 2007-8 of $200,000, and so a probable $300,000 today, with additional costs if one of the more sophisticated schemes were selected.

I asked several other questions at the time, including the effort put into looking for Jefferson's salamanders, a species at risk, cyanide concentrations, liability, shallow well location, and others.

My overall analysis:

In determining a course to take on the analysis of this project, I have read both engineering reports by Acres International and Naylor Engineering Associates and the draft reports and appendices of 2015. I have copies of the two draft reports and have attended both meetings. I also have firsthand knowledge of the effects of Rylands v. Fletcher, the law case.

There does not seem to be any conflict that there is either maintenance required to upgrade the Embro Dam to current standards or its removal to end an unsafe dam. The question of liability is the top priority for my analysis. The second priority for my analysis is total cost of the project and then how the cost is reconciled with a cost/benefit to the community.

To locate this pond, Acres says in at least 3 instances in their report that the pond is south of the village of Embro, Naylor says it is north of the village. Acres is not correct. Both engineering reports say the dam is on Spring Creek while the UTRCA calls the watershed the Youngsville Drain. The creek in the watershed immediately west of the Youngsville Drain is called the Embro Creek in the UTRCA report. I will use the nomenclature of the UTRCA in this report.

To make a good recommendation on Liability, one needs good facts on which to base the risk of a failure of any kind, and some understanding of the facts that might provoke a catastrophic failure with all of the water behind the dam set free.

None of the 2015 reports including appendices have any weather data in them, and there is no mention of what the storm event is, in numerical terms, for their standard or whether we are experiencing more frequent, or more severe weather events, although those of us who do live in the area know that, in fact, we are experiencing heavier rainfalls in shorter time spans, more frequently. This is confirmed in the Acres report in a comparison of Tables 6.1 and 6.2. The liability of this project ought to be determined by accepting the simulation data of the chosen rainfall events in the Acres' report with ensuing run-off and watershed loading into the dam catchment area, the rate of rise into the catchment basin and the rate of water exit from the catchment basin. That material shows that in only two incidents of historical weather events does the dam overflow the crest by simulation. It ought to be noted that in Figures 6.5, 6.6 and 6.7 of the same chapter of the Acres' report, the simulation calibration curve is higher than actual in each event modeled. This model could now be run with both the current weather data and proposed systems to estimate differences in downstream water flow and potential damage to downstream property. Without such a mathematical approach, all else is but a guess. It ought

to behoove the UTRCA, as owner, that there might be at least an educated guess, rather than a blind faith approach with regards to their liability. However, there is the shoe on the other foot that might argue that the removal of the dam facilitated immediate runoff and damage that would have been less had the reservoir been maintained, and so the owner could be deemed negligent for its removal. See the last paragraph of page 6-23 of the Acres' report.

The application of Rylands v. Fletcher in this country is well known and I have used the principle and case against the Township of Zorra for the loss of trees to their roadside spray programme. The principle of Strict Liability is forthrightly set out in this case.

To illustrate how difficult it is to attempt to quantify risk from these reports (as measured by the volume of water withheld by the dam) consider the data regarding the surface size of the pond. Without the surface size, it is virtually impossible to define volume withheld in the dam catchment.

In the executive summary of the Acres study, the area of the pond is stated as 0.008 km^2 or 0.08 hectares. In Figure 1 of the same executive summary the area is stated as 0.005 km^2. In section 3.1 of the Naylor Engineering report, the area is considered to be 6500 m^2. On page 3 of the Existing Environmental Conditions report the area is given as 0.8 hectares, and the site is further expanded on Page 17 as a structure of 91 meters and a lake 183 m long by 91 m wide. Then to complicate things even further, Appendix F of Appendix D suggests that in 1959, "the new structure is 300 feet and a lake (600 feet at the dam narrowing to 200 m x 300 feet long)". On May 17, 2016, I went and measured the pond with a Golf Buddy, a laser device claimed by the manufacturer, Deca Systems Corp., to be accurate to within 1 yard or 0.9144 m. My measurements were as follows: the dam is 91 m. from outside lateral edge to outside lateral edge. The distance within the pond from the dam to the inlet (a large granite boulder on the east shore) was 183 m. (See photo on panel 12 of the Environmental Highlights powerpoint presentation : http://thamesriver.on.ca/wp-content/uploads//FloodStructures/OtherStructures/Embro-PIC2-UTRCApresentation-2016-05-10.pdf. There was a further 45 m to the culvert at the road. The narrowest point of the pond was 137 m. from the dam, and at that point, the pond was 40 m wide. The water width at the outlet structure was 77 m. There is additional surface area at the same level as indicated in the Existing Geomorphic Conditions report in Figure 1-3, but in this figure, they have a rise of about 0.1 to 0.15 m from the culvert on road 84 to about the station XS11 at 400 m. on their scale of chainage with no reason in the Thalweg to have a rise in water level.

There are considerable differences in the description of the pond, and the closest to my measurements, although it overstates the area of water at the existing overflow level, is that of the UTRCA at 91m x 183m. or 16,653 m^2. My measurements indicate that it would be 9,934 m^2 if I treat the area as a rectangle and triangle attached. Both of these methods overestimate area due to the narrowing of the pond on both sides and so for convenience sake, 10,000 m^2 might be reasonable considering the area above the 183 m distance with the same surface level. In any event 10,000 m^2 is one hectare so the errors in the various reports are substantial and make quantifying the volume of water in the catchment nearly impossible and verifying it no better. That ER has calculated the volume of 30,000 m^3 as the possible catchment volume as reported in the second presentation, would mean that the current pond would have sides at 90° vertically for the whole of the area and that the dam would be overridden for the whole of the length. From their Figure 1-3, this is not the case. Once again, this significantly overestimates the potential liability.

With respect to costs, the presenter, Mr. Wolfgang Wolter, a senior project manager of ER, said at the meeting, that the estimates from the engineering reports were in the neighbourhood of $200,000.00 and that inflation from 2007-8 to now meant that that would be $300,000.00. Mr. Wolter considered that as moderate in the descriptions on the slides that considered costs. Only Acres estimated costs for rehabilitation and at less than $81,000. 00, (Table 11.5 in Acres' report) and therefore the verbal estimates of costs were not particularly accurate, given Mr. Wolter's formula for inflation, unless things have become much worse than he projected or the designs are incredibly cost intensive.

At some time in the past, and within the last 25 years, this pond has been drained and the silt cleaned from the pond floor, although this was not recognized in the questionnaire in Appendix E of the Acres' report. It is the recollection of both Mr. Fred Munro (personal communication) and me that the excavated silt was all deposited on the south and west face of the dam. On inspection by the author on May 17, 2016, it was observed that there was considerable earthen support for the back slope that extended to almost half the length of the dam or about 44 meters from the west. It also appeared that the fill on the backside was higher than the water level in the pond at the level of the current overflow, although I had no way of measuring that easily. This surface sloped off down the hill but was considerably less steep than the 1V:4H recommended in the engineering reports and for a much greater distance than was suggested in those reports. What may need to be incorporated, may be the seepage layer and drain that, in all probability, was not installed at the time, because that fill was placed prior to the engineering reports. This silt removal may also make the predictions by ER of the silting rate moot, because the rate with the current silt levels appears slower than it really is.

At the second meeting, it was stated that 3 shallow wells (that were unable to be identified but were of concern for effects if the pond were drained), as discussed in the meeting would be indicated on the Figure 7 of the Environmental Conditions report once posted on the website for general distribution. In fact there are 5 noted on the updated Figure 7 of the UTRCA. Further to my discussion with Mr. Fred Munro, Ornum Farms now rely on two drilled wells for the farmstead on Lot 16 Conc.4. that are both artesian and overflow constantly. The blue dot in the upper left corner of Figure 7, may be a well bore, but it is on top of the hill and is the exit for a manure transmission line that is below the creek bed, as some security to avoid spills. All the shallow wells marked are on the property of the UTRCA and therefore only impact the owner of the dam. However, the flow from the wells may have biased the conclusions for recharge mentioned in Appendix A of the UTRCA report.

There are several other areas that require comment. The first is the suggestion that a cold water creek could be continued below the dam for up to two kms. At no time has the measurement of water temperature or flow been considered from the Embro Creek to the west, which joins the Youngsville Drain, estimated at 400 m south of the overflow of the Dam.

It should be noted that the diurnal temperature of the upstream flow in Figure 9 of the Existing Environmental Condition study and again as Figure 2 in Appendix B, is such that daytime upstream water temperatures are nearly the same as those downstream of the dam, and if plotted as Daily Maxima against each other, the difference would not be very great. Figure 3 shows that the upstream water temperatures are higher than the downstream temperatures at some times in the day, but if both curves in Figure 3 were integrated, it is obvious that there is more area under the downstream curve than the upstream curve so, there is more heat energy in the water downstream than in the upstream water. It is the night time minima that remain

different. This suggests that the water mixing in the pond would be different from day to night. The daytime mixing would occur on the surface of the pond because the water is of similar temperatures and the night time mixing would have the colder water subsiding as it entered the pond. Therefore, at night the flow exiting the pond would be surface water pushed up and out by water entering and staying low, and the water exiting will be warmer than the inflow from the calorimetric effects of the past day. Daytime overflow would also be surface water exiting but a mixture of old and new water if the currents managed to get new water to the overflow structure in the day. It would appear as if cooler water temperatures in the upper part of the watershed might be maintained more effectively with more tree cover. During the early 1980's, I did own the west part of lots 17 and 18, conc. 4, which did include this drain, and there was almost no tree cover on the creek on that 150 acres at that time.

With regard to fish and the effects of the dam on their accessing the upper reaches of the drain, the species count above and below differs by 13, with more below, as shown in Appendix C. No mention was made of those species that were cold water fish and those that were not. Thus the benefit for extending the range or the accessibility of the cold water creek is not well defined in this report.

Without the temperature data and flow rates from the Embro Creek, no estimate of the calorimetric data can be ascertained from this report and therefore no real estimate of how far below the dam the cold water creek might realistically extend. It is unlikely that it would be much past the confluence of the Embro Creek.

A further area for comment is the water flow data in the Environmental Conditions report and Appendix A .There were no HOBO measuring devices or any flow meters of any kind on any part of this water system within a reasonable distance to measure water flows. On page 11 it is assumed that the weather patterns for Embro and Harrington are similar. That is not a particularly good assumption. Mr. Charles Munro kept weather records while he was alive and in a discussion with him, he said that his farm at lot 16, conc. 4, immediately north of the pond on Road 84, received 2" (5 cms) more rainfall a year than Braemar, a small hamlet just 4 miles (about 6 kms) east of the Embro Road (County Road 6) on road 84. Harrington gets more snow than the Youngsville drain as the nominal southerly limit of a snowfall line is about Brooksdale. (It was pointed out to Mr. Wolter and Mr. Goldt at the meeting in June of 2015 that there was a good dataset of precipitation near the Harrington water shed with Mr. Robert Matheson on the 31st Line. Whether that dataset was obtained is not known.)

Thus comparisons made by extrapolations made this way of apparent water flows between the Youngsville Drain and Harrington watershed are not reproducible in any scientific way. There is no scientific reason to join the data points in Figure 9 of Appendix A, because these are one day measurements not continuous measurements, and it would appear as if the readings on 11 June 2016 indicate a difference in weather pattern. Unlike section 6 of the Acres' report, there was no detailed calibration to observed measurements over time to attempt to justify this method. As well, although shallow aquifers are mentioned in both water sheds, no mention was made of artesian wells overflowing within 300 meters of the Embro Pond inlet. In any event, the flows measured and reported do not come anywhere near the 50 year, 8 day snowmelt that is the standard. Nor do they represent a rainfall event like the one in 2000, or the one in the mid to late 80s when we received more than 180 mms (7 inches) of rain in less than 36 hours in early June. When the method for estimating flows and water level rises was so clearly laid out in the Acres Report at 6.2, the reason for not using that is not understood.

There are other minor errors in the text of the Geomorphic report. In table 1-1 section 1, there is no separation of the drain from Private property by trees. All of that land including the Youngsville Drain is on that farm, which has been in the Munro family for 5 generations now, and it has been private for all five generations.

Within the Environmental Conditions report, it is not really reasonable to present data in charts with the lines joining the points because all data reported are taken on a particular day with 4 sample dates, and amount to "snapshots", rather than peaked, continuous curves as shown.

As a plant physiologist by training, the comments about orthophosphorus availability and uptake on page 5 of Appendix B, are of questionable accuracy. Normally phosphorus is absorbed by specific root clusters in the top few centimeters of soil while the plant is in the juvenile stage for most grasses and cereals. This occurs well before mid to late summer, as Winter wheat absorbs 90% of its phosphorus by the time it has reached 25% of its growth. In maize, the uptake continues past anthesis but at a declining rate, with almost no uptake at or beyond physiological maturity in the fall. In a study on phosphorus loading into Holiday Creek by researchers from the Canada Center of Inland Waters in Burlington, results showed that 50% of the phosphate that entered the stream was adsorbed onto soil particles. That experiment centered on my home farm at Lot 16, conc.1, less than 3 miles west of the Dam. This effect is illustrated by comparing suspended solids in Figure 9 with the phosphorus data in Figure 6 of this same appendix. With the current undertaking by Canada and the United States to reduce nutrient loading into watercourses emptying into Lake Erie, particularly phosphorus, more emphasis ought to be given to remediation that does cause settling out of suspended solids with the associated clean-outs over time, than has been suggested in this report. At the very least, the terms of this international undertaking ought to be known before implementing any changes to this watercourse. It is a chance to lead, not redo once things are better understood. Within the last few slides of the second meeting that outline pros and cons of each choice put forward, silt deposition and impedance of silt transport are always considered as negative effects. These two processes do have the advantage of decreasing Phosphorus runoff and ought to be reconsidered as positives within the new phosphorus control initiative between Canada and the United States.

To conclude the second meeting, Mr. Wolter said that the data from all of the reports and public input would be used in a "risk matrix" to come up with the best solution. This would include the cultural, economic, technical and environmental material and suggestions put forward, mostly by the UTRCA and ER.

The current science to deal with weather simulations is an iterative approach because of the number of possibilities that arise to predict weather. The same sort of approach ought to be undertaken here because each of the four main criteria have several divisions within each group and so every choice offers a different outcome. Using a linear or non-iterative approach will bias the results to the method of input of choices. For a description of the weather prediction process, it is described in the lecture given by Dr. Tim Palmer of Oxford University in Waterloo, Ontario on May 4, 2016 that is available on the website of The Perimeter Institute in the Video Library. The title of the lecture is Climate Change, Chaos and Inexact Computing.

The second presentation includes comments about building a natural watercourse in some options suggested. I would like to point out that in the case of the Van Mannen Drain

heard before the Provincial Drainage Referee, The Township of Zorra's lawyer argued that any improved watercourse was no longer a natural watercourse and that was accepted by that Referee. This watercourse cannot be re-established as a natural watercourse, unless the dam is removed and everyone just walks away. The proposals are anything but natural watercourses.

Conclusions:

It is particularly discouraging to see the lack of quality in a report of this kind. It has very little data on which to make decisions that significantly impact both owners of dams and taxpayers. There have been major oversights not to include weather data of any kind when there is data available. There have been some considerable overestimations and underestimations in pond volumes and underestimations of dam profiles on the south west surface. There has been some misrepresentation of data by presenting graphs with continuous lines rather than points, because there is no continuity to the dataset used. And there has been a great amount of disinterest on getting the facts accurately reported for the meetings by Mr. Wolfgang Wolter. He has not had the information when he ought to have. It makes for very discouraged tax payers who foot the bill for such so called experts or consultants.

To my mind, there are only two choices for the future of the dam. Both engineering reports say the risk of failure of the Embro Dam is very low, even if the dam is topped by overflow. While the nomenclature of the wording has been changed by the Ministry, (the lowest class of risk is now "low") a dam that meets safety and stability codes still might be an acceptable risk. The choice ought to be the cheaper of only two projects: to take out the dam completely and fashion a simple watercourse to take the 50 year event as outlined by Acres at 6.3.5 for the spillway with the additional 3 m^3 capacity for the normal drop inlet volume, or follow the Acres and Naylor reports and refurbish the dam. By adding the shell as Naylor Engineering Associates Limited describes it, some additional height will be added, and from the data in Tables 6.8 a and b and 6.12 of the Acres' report, it would appear as if that may prevent the dam from being overtopped. I suspect that the fall between the culvert on Road 84 and the current dam outlet is some of the steepest on the immediate watercourse, and so the construction of the 230 m of watercourse to withstand the 50 year event, may be the more expensive option of these two. Any other choice is not warranted from the current reports because of the lack of good data on which to base choices.

I realize that part of the decision process will rest with the owner, their outlook to liability and the purpose of having such a small holding for day use and how they want to manipulate the environment to suit their mandate of the Conservation Authority Act. In any event, the cost incurred for the benefit of the few day users, or cold water access for a fish population will be high when stated as a cost per use per day. That cost can only be offset by the decrease in liability of either of these two choices when compared to the present risk and liability. Having two engineering reports that agree that the dam is not up to current specifications does document negligence if neither report is acted upon, and the dam fails. It is a wonder that no report is included from the Risk Management Advisor of UTRCA, when such a position exists, because risk is also a part of the environment at this site.

References:

Palmer, Tim. Climate Change, Chaos and Inexact Computing. 2016. Available at http://perimeterinstitute.ca/video-library

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Embro Dam and Conservation Area: Existing Environmental Conditions. (Including Appendices A, B, C, and D). Draft Report, November 24, 2015. No author stated. Upper Thames River Conservation Authority.

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Embro Dam Class Environmental Assessment: Public information center #2. May, 10, 2016. Presentation by Wolfgang Wolter. Available at

http://thamesriver.on.ca/wp-content/uploads//FloodStructures/OtherStructures/Embro-PIC2-UTRCApresentation-2016-05-10.pdf

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http://thamesriver.on.ca/wp-content/uploads//FloodStructures/OtherStructures/Embro-AlternativePlans-2016-05-10.pdf

Geotechnical Investigation, Embro Dam Embankment Stability Assessment. Naylor Engineering Associates Limited. 2008. Available at

http://thamesriver.on.ca/wp-content/uploads//FloodStructures/OtherStructures/EmbroDam-EmbankmentStability-NaylorOct2008-REPORT.pdf

Material Safety Data Sheet, Potassium Cyanide:
http://www.sciencelab.com/msds.php?msdsId=9927707

Material Safety Data Sheet: Sodium Cyanide:
http://www.sciencelab.com/msds.php?msdsId=9927711

Toxicological Data for Hydrocyanic Acid: http: //www.atsdr.cdc.gov/toxprofiles/tp8-c3.pdf

Rylands v. Fletcher URL: http://www.bailii.org/uk/cases/UKHL/1868/1.html

From: "Don Campbell" <[redacted]>
To: "Goldt Rick" <goldtr@thamesriver.on.ca>
Date: 5/25/2016 8:09 PM
Subject: Embro Dam
Attachments: Report on the considerations for the Embro Dam Safety Considerations.docx

Hi Rick:
I seemed to have a problem with saved files on the weekend and realized that you did not get the complete file. I hope this sorts that out. I ought to have commented that the option with the pond beside the creek would leave the area subject to mosquito production if there were no flow through that pond, and hence the very real probability of West Nile Virus and possibilities for both Malaria and Zika if there is any movement in the mosquito population that harbours that virus. In any event, that pond offers some real risks for the UTRCA. There ought to be 7 pages in the attached file.
Don

Comments with regards to the Class EA for the Dam holding the Embro Pond

From Donald Campbell, [redacted]

Two engineering studies in the hands of the Upper Thames Conservation Authority have apparently shown that there are problems with the integrity of the dam holding the Embro Pond. It was stated that the construction of this dam in 1958 or 59 is now not up to "current standards" and therefore this Class EA has been undertaken.

This appears to be a problem of insurance risk based on Rylands vs Fletcher (1868) LR3 HL330. This does not seem to be an environmental or ecosystem choice, nor a flood control choice. The fact that engineering reports have shown definite weakness within this dam is a cause for a duty to care. That means the choices for that duty to care are that either the dam and spill way are made sufficient to withstand a current big rain event, or the structure is removed and the rain event is now an act of God and so damage exempt from insurance claims.

While the public was invited to comment on a presentation by the Ecosystem Recovery employees, they really did not define the problem in definite, clear terms. I asked the question and received no defined answer for the problem to be solved. There was no definition of what aspects did not fit current construction standards, except to say some angles were wrong and perhaps the materials and core were not proper, but no criteria for data selection were given.

Without the problem being specifically defined, there can be no assurance that data collection that Ecosystem Recovery undertake are relevant to the real problem, however they may relate to an undefined problem and bigger report and consulting fee. In discussions after their presentations, I suggested to Mr. Wolfgang Wolter that many of these studies must have been because of pressure from insurance companies and the strict liability imposed by the historical definition of that in Rylands vs Fletcher. Mr. Wolters agreed that insurance companies played a big part in especially American studies on dams, and the risk of payouts by them, although he had, as far as I could gather, never heard of, or read the court's decision in this case (which is a case involving dams).

For that I submit that the decision can be found at the following web address: http://www.bailii.org/uk/cases/UKHL/1868/1.html

It is somewhat disconcerting to think that The UTRCA has not defined the problem before hiring another engineering firm to do research on the solutions for the dam's conditions when they have two engineering reports in hand on which to base a defined problem. I for one have never seen a problem resolved without the problem well and narrowly defined because collecting and analyzing any data may not be relevant and only relevant data need be collected and analyzed.

The original dam apparently held 3000 cu. m. and the pond has since silted in. The angles of repose of the dam are apparently not what they would be if built today. The mapping of the silt in the pond had been done but no calculation on volume change had been made. Whatever the volume of water held now, it is less than 3000 cu. m. because of silting and so all the pressures on the dam are reduced from the initial build. It would seem that the challenge now is to consider the effect of a big rain event on the overflow capacity, because the effect of a rain event will be to raise the water level at a rate that will be determined by the rate of inflow less the rate of outflow. If the spillway is sufficient, there should be no more water force on the dam than with a full pond. If the inflow is greater than

the outflow, the water will rise and pressures on the dam will increase for at least the duration of the rain event, or until the outflow is equal to or greater than the inflow. This is a fairly simple calculus to determine those changes. While the angles of repose may not be correct, the only changes that can be made are with materials added to the current structure and that will entail either working under water or drain the pond to add and shape the wet side of the dam. Adding more to the berm will not change the core weakness if that is contained in the current reports.

It would seem that if the dam is to be maintained, the safety of the spill way is the most important aspect. That would entail sufficient capacity to take the overflow and sufficient protection to avoid any and all erosion from that flow, since any wear on the backside of the dam will be subject to massive erosion and dam failure. While the watershed for this project was measured at some 7 or 8 square kilometers, the actual watershed of the creek that flows into the Embro Pond is more like 325 to perhaps 500 hectares, and while the runoff from the whole watershed would affect downstream owners, there would only be the additional volume currently held by the pond should it fail catastrophically. If that one time surge is too great a risk for damage to houses on the north edge of Embro, then there is no option but to remove the structure to avoid failure.

The silt currently in the reservoir is only a problem if there is a catastrophic failure and it would leave the site relatively quickly in that failure. By definition, silt is highly erodible and easily carried by water. This material in the base of the pond has all been washed away once, so there will be no effort required to have it move again. Therefore, if the dam is removed, this silt needs to be removed so it will not change ecosystems downstream in a big rain event.

If the dam is to be removed, then it would seem to be wise to contract the silt removal for sale, hopefully with the possibility of silt sales equaling dredging costs. I have removed materials from the pond on Lot 16 in the first concession, and we had Higgs Construction remove the materials from the pond with a 2 cu. yard bucket dragline and then let those piles dry out before trucking. They had no trouble reaching 100' out into the pond for collection of materials. There are a number of contractors selling soils, so there is opportunity for competitive bids for the sale of this material.

The restoration or rehabilitation or additional construction to upgrade to current standards for this dam is only justified if there are ecological, habitat, or flood control benefits that outweigh insurance risk. It will incur costs to remove the dam or shore up the system, but the major risk is the liability. Please be straight with whatever solutions are proposed and the liability ought to be first on the list. My feeling is that not much data need be analyzed for that, beyond what the insurance companies have already told you.

Donald Campbell

From: Rick Goldt [mailto:goldtr@thamesriver.on.ca]
Sent: October-16-16 11:37 AM
To: Don Campbell [redacted]
Subject: Embro Dam EA - Your comments

Dear Sir:

We would like to provide information in return for your comments forwarded to us by email May 21, 2016 following the Public Information Centre #2. While you have not requested a response, we feel it would be appropriate to provide an information update.

First, thank you for the effort you have undertaken in looking through the background documentation we had provided on our website or provided at the PIC. We appreciate your attention to this important matter.
Relevant updates to reports will be posted as completed.

Following in the general order of items noted in your email:

Introduction:

Problem Statement: A summary of the Dam Safety Report (DSR) considerations relevant to the problem statement was presented at all Public Information Centres. The problem statement and presentation indicated the issues to be resolved and particularly the issue that the dam was not safe. Technical data was available in the DSR and was available for download from the UTRCA website.

Flood Standard: Details of flood analysis were contained in the DSR.
Further information is noted below.

Sediment Chemistry: The purpose of sediment sampling and analysis will be clarified in project reports. Sampling of pond sediment was completed to provide a preliminary assessment of sediment quality for the context of potential sediment management needs in the event of dredging. The analytical results are based on one sediment sample collected in the downstream end of the pond. The cyanide (weak acid dissociable) concentration is double the recommended threshold (0.051 mg/kg) when considering reuse of the material for agricultural, residential or Industrial/commercial/community property use. Further investigation will be required to determine if dredged sediment could be landfilled; such investigation would occur during detailed design/maintenance planning.

The threshold values for exposure as you indicated (5 -11 mg/kg for oral ingestion; 11 -100mg/kg for inhalation or dermal exposure) are much higher than the threshold value for sediment reuse (0.051 mg/kg) as defined by MOECC under the Environment Protection Act. Hence, there is minimal concern for health risk, for inhalation or dermal exposure due to cyanides.

Species at Risk: Field wildlife inventory work was completed to make incidental observations for any potential Species at Risk (SAR) identified species, which is an appropriate level of detail for a Class EA study. UTRCA maintains SAR information as up to date as possible in conjunction with the Ministry of Natural Resources and Forestry (MNRF).

SAR was not identified in the vicinity of Embro Dam. We would encourage you to provide a record of observance for your own property as you indicated, to the MNRF to assist them in documenting SAR information if that is the case.

Analysis:

For information we have noted in the 2007 Dam Safety Report name or location description changes required in future for various sections.

Report Graphs: Further to your comments UTRCA has revised the presentation of water quality and hydrology information in the report on existing conditions. Relevant 2015 and other climate data was documented where it may be useful.

Climate Change: We acknowledge the likelihood of more intense local rainfalls anticipated under climate change and are gradually pursuing such research for the Upper Thames watershed as funding permits. This is a point that acknowledges overall that whether a dam remain or be replaced, the risks to existing and future dams may increase under these expected changing conditions.

Flood Standard (continued): The design standard climate event was developed in the DSR prepared by Acres based on existing climate information up to the early 2000's. Section 6 of the DSR develops the critical design events simulated to develop critical hydrology flows and hydrographs. There were many types of flood hydrology scenarios tested.
The Consultant indicated the most critical condition for the Embro Dam for dam safety assessment purposes. Climatic information could be updated for the modeling from 10 - 15 years earlier however in our experience the additional data to date has not yet resulted in any significant change to precipitation statistics. In addition, a local streamgauge is not available to improve calibrations if at all warranted. Regional inferences of hydrologic model inputs, flow information, and type of calibration for the DSR are sufficient to characterize the risk aspects for the Embro Dam at this time. The DSR sufficiently demonstrates that the Embro Dam is not a flood control structure. However, should an alternative which includes a dam then potential climate change conditions would be considered in the detailed design process as much as practical.

Pond Areas - Volumes: We acknowledge that there are differences in the documentation of pond area estimates. We note some of the notations are from historical documentation. There was one typographical error. Values at those times may have been based on other information sources. We have noted that the Acres values in some instances are due to misplaced decimal place. A typo was found in a reference to Embro Pond historical reference and changed. We re-measured the pond area from aerial photos as 0.98 ha which is close to your area of 0.99 ha. More critical are estimates of pond volume. The purpose of estimates through the DSR were to estimate the water storage volume to determine the hazard classification for the dam and to verify sufficiently the flood routing and flood passing capacities. For the EA, the purposes of new volume estimates were to evaluate the potential sedimentation rates of the pond and was based on information developed after the DSR. UTRCA found that the normal level pond volume estimates are comparable between Acres and Ecosytsem Recovery Inc. estimates. A substantial increase in Acres volumes would be required to improve major floods routing capability and potential for reduced flow discharge capacity requirement.
Estimates of storage loss may be a trend indicator that may affect future flood discharge capabilities. Non- archival plans from 1974 found in 2015 provided some information on pond contours at that time and that may have been the time that dredging was last done, however we have no specific records of

dredging that may have taken place. Pond sediment estimates were based on a comparison of pond bottom elevations obtained by bathymetric surveys completed in 1974 and 2015. There may have been other arrangements . If you have more specific information on dredging if 25 years ago as you noted we would appreciate copies for review. If sediment had been removed some time after 1974 then that would indicate that the rate of sedimentation is a more serious problem.

Costs: At PIC#3 updated estimated costs for all options will be presented.

Wells: The well locations are based on MOECC well data. Review of this data indicates that the particular well mentioned is a 'deep' well.
Any discussion regarding recharge potential were based on a smaller scale/regional study results as depicted on UTRCA mapping. Conceptually, groundwater within the shallow aquifer would could contribute to Embro flows, which may account for the apparent resiliency of these flows during drought conditions. Well locations and classifications will be confirmed during the detailed design process if well function may be affected by the design.

Fisheries: Improvements in reports have been made indicating specific coldwater species.

Embro Creek: Existing conditions reports are intended to provide baseline environmental information; the effects of alternatives is provided within the overall EA report. We did a check on information we had available for comparison of Embro Creek and the Drain. The stream length from the Dam to Embro Creek confluence is about 350 metres and further length from the confluence to North Branch Creek of approximately 1600 metres. Water temperature information was collected coincident for both tributaries only in one past period in 2011 indicated over summer and fall that the average temperature difference at Road 84 on both tributaries was about 7 degrees C. This is not necessarily an indicator for the confluence as seeps and shading below the Road 84 for Embro Creek (County Forest) could ameliorate temperatures towards the confluence. Noted by our fisheries biologist is that brook trout have been sampled on Embro and North Branch Creek although not as abundant as on Youngsville Drain. From an overall perspective any potential for reducing stream temperatures may be a benefit.

Graphs: Air Temperature information is now overlain over the water temperature information presented.

Streamflow: The purposes of flow measurement at Embro was in the interest of attempting to collect representative flow information that might be useful in characterizing the change in flow from upstream to downstream of the dam, and to assist with information relative to geomorphology for evaluation and design purposes. Low flow characterization was the main benefit derived from the field monitoring program. Flow monitoring for the purposes of detailed flood management could take a number of years at significant cost before sufficient representative information could be assembled. UTRCA attempted to contact the references you provided for additional rainfall information, however the information was not at the level desired for the report.

Riparian Vegetation: We appreciate your comments on the riparian vegetation. Text has been modified to indicate that a hedgerow occurs east of the creek.

Phosphorus: We appreciate your comments on phosphorus management.
Overall preferred scientific and practice direction as we understand it
is towards management at source.

Alternatives Evaluation: At the PIC#3 the consultant will be presenting their analysis of the alternatives with respect to the evaluation criteria required as part of the EA process. The methodology is in general accordance with guidelines of practice for environmental assessments provided by the Ministry of Environment and Climate Change and is common practice. We encourage your further participation as this work is further presented.

Natural Channels: The term natural channel design refers to the
alteration of a watercourse into one that replicates the form and functions, from a geomorphologic perspective, of a natural channel.
Although the channel would be 'constructed', flows will modify and maintain elements of the channel so that the watercourse becomes a natural channel again. The intent of natural channel design is to speed up the process of planform and profile development to avoid an increase in sediment delivery to the downstream watercourse, and to more quickly establish favourable aquatic habitat conditions. To our knowledge there is nothing that impedes designated municipal drainage with an appropriate configuration from functioning in many respects as a natural watercourse. A fully functional natural watercourse with flood plain could be possible particularly where a larger corridor is available as on the Embro Conservation Area lands . As you indicated the existing dam impedes a natural watercourse option in the vicinity of it's influence unless removed.

Again, thank you for your comments. If you have further questions or information on this project contact me.

Rick Goldt C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Rd.
London ON
N5V 5B9
ph. 519-451-2800 X244
C 519-719-4192
goldtr@thamesriver.on.ca

Public Information Centre #3

Upper Thames River Conservation Authority

Embro Dam
Class Environmental Assessment

NOTICE OF THIRD PUBLIC INFORMATION CENTRE

THE STUDY

Upper Thames River Conservation Authority (UTRCA), through their consultant Ecosystem Recovery Inc., is undertaking a Class Environmental Assessment (Class EA) for the Harrington Dam in the Township of Zorra. The study was initiated to address results of the 2007 Dam Safety Review of the Embro Dam which identified significant issues with the spillway capacity and embankment stability of the dam.

THIRD PUBLIC OPEN HOUSE

The first open house was held on June 23, 2015 to introduce the study and to receive comments from the public. A second Public Open House was held on May 10, 2016 to present an overview of existing conditions, to introduce technically feasible potential alternative solutions for the future of the dam, to review the evaluation criteria for the alternatives, and to provide an opportunity for public comment and input. A third Public Open House will be held on October 17, 2016 to discuss the evaluation process and to present the preferred alternative for the dam.

The map on the reverse of this page shows the location of the study area.

WE WANT TO HEAR FROM YOU

Public consultation is a key component of this study. The Project Team invites public input and comments, and will incorporate them into the planning and design of this project. The third Public Information Centre will take place at the following time and location:

Public Information Center 3:

Date:	**Monday October 17th, 2016**
Time:	**7:00 p.m. to 9:00 p.m.**
Place:	**Embro Community Centre** **355644 35th Line** **Embro, Ontario**

The evening will begin at 7:00 pm with a formal presentation that will be followed by a time for discussion and questions. Presentation boards will be displayed throughout the evening and comment forms will be provided to enable public feedback and input into the project. Further opportunity for questions and discussion with the project team will occur throughout the evening.

STUDY CONTACTS

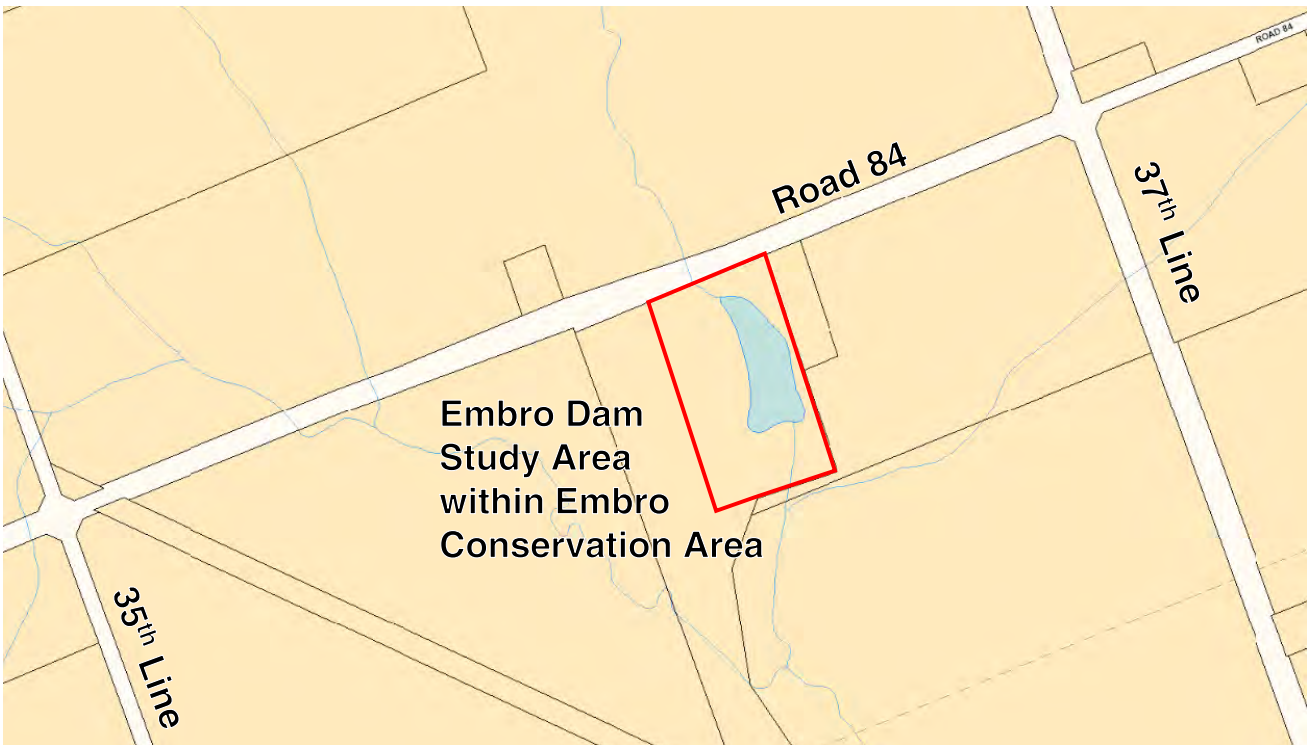
To submit comments, request further information, or to join the project mailing list, please send an email to the project email address:

embro_dam@thamesriver.on.ca

Contact information for the project team leaders is listed below:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
goldtr@thamesriver.on.ca

Mr. Wolfgang Wolter
Senior Project Manager
Ecosystem Recovery Inc.
550 Parkside Drive, Unit B1
Waterloo, Ontario, N2L 5V4
Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca


Road 84
37th Line
35th Line
Embro Dam
Study Area
within Embro
Conservation Area

Public Information Centre #3
PIC Presentation Slides

Embro Dam
Class Environmental Assessment

Public Information Centre #3

Upper Thames River Conservation Authority
Embro Community Centre
October 17th, 2016 7:00 p.m. to 9:00 p.m.

UPPER THAMES RIVER CONSERVATION AUTHORITY

ecosystem recovery inc. PROFESSIONAL ENGINEERS

Overview

- Impetus of project
- Class EA process
- PIC 2 feedback
- Evaluation process
- Embro dam evaluation
- Preferred alternative

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Introduction and Background

- UTRCA acquired dam in 1959
- Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam based on:
  - *Acres International. July, 2007.*
  - *Naylor Engineering Associates. September 2008.*

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Study Process

- In addition to repair, other options are available that require study
- As a public body, UTRCA must plan any activities associated with the dam according to the Environmental Assessment Act
- Under the Act, UTRCA is required to undertake a *Class Environmental Assessment for Remedial Flood and Erosion Control*

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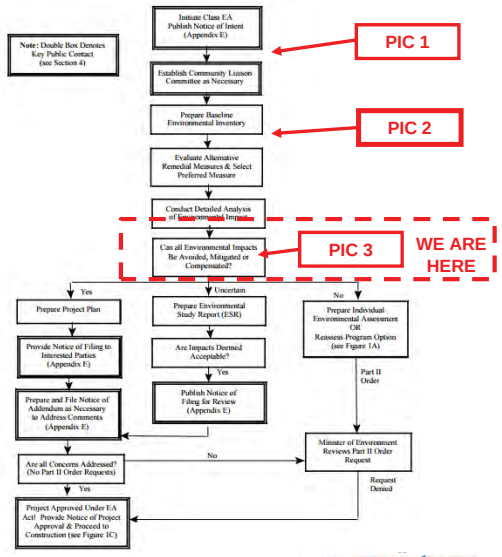
Class EA Process for Conservation Ontario Remedial Flood and Erosion Control Works

- Environmental Assessment Act, RSO 1990, chapter E.18.
- Code of Practise: Preparing, Reviewing and Using Class Environmental Assessments in Ontario. (MOE, 2014)
- Class Environmental Assessment for Remedial Flood and Erosion Control Projects (Conservation Ontario, 2012)



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Public Information Centre

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Class EA Process

- Problem Identification – PIC 1
  - Structural integrity and hydraulic capacity of dam
- Baseline Inventory – PIC 2
  - Background review and field assessments
- Alternative Identification – PIC 2
  - Methods that can be used to address problem, mitigate impacts
- Alternative Evaluation – PIC 3
- Preferred Alternative – PIC 3
  - Identify measures to further avoid, mitigate, and/or enhance

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Alternatives

1) Do Nothing
2) Repair Dam
   - construct dam 'shell', add rock protection, extend outlet pipe, provide emergency spillway
3) Remove Dam and Construct a Natural Channel
   - provide landscape restoration
4) Remove Dam and Construct Offline Pond(s) or Wetland(s)
   - create natural channel, provide landscape enhancement
5) Lower Dam Crest and Outlet and Naturalize New Pond and Perimeter
   - provide landscape enhancement

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Alternative 1 – Do Nothing

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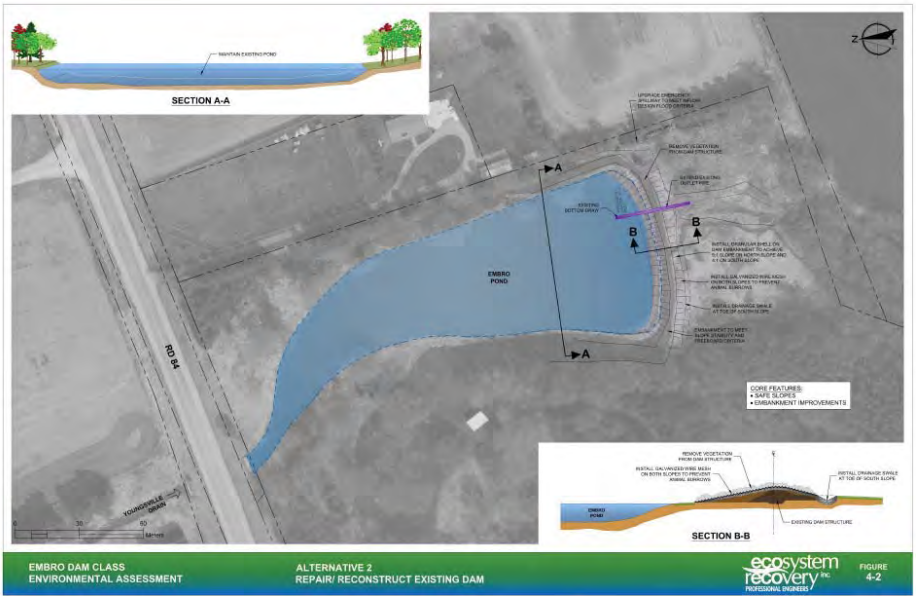
Alternative 2 – Repair Dam



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Alternative 3 – Remove Dam, Natural Channel

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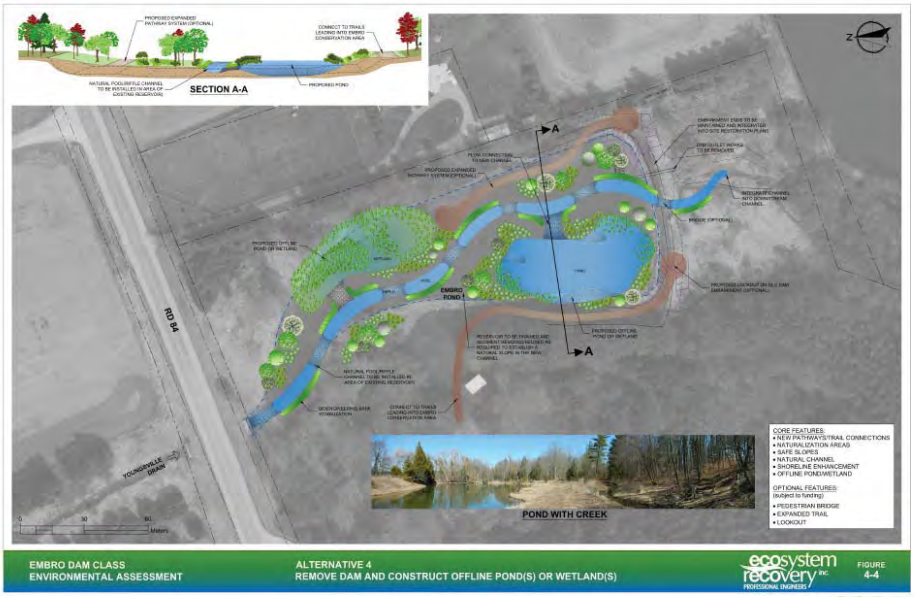
Alternative 4 – Remove Dam, Natural Channel and Offline Pond



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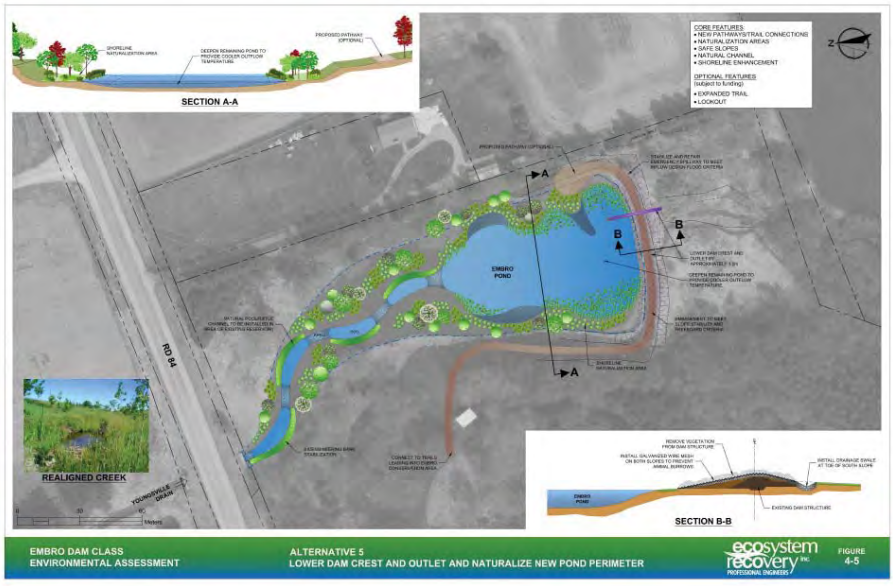
Alternative 5 – Lower Dam Crest, Naturalize Perimeter



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Overview of PIC 2 Feedback

- Comments provided by three representatives of public
  - Alternatives that perpetuate status quo, deteriorating environmental conditions, or lack upgrade to current environmental status not preferred.
  - Technical input – climate change effects, consideration of liability, further documentation and review of conditions (water temperature, fish species)

Alternative	Number of individuals who liked this alternative most
1. Do nothing	
2. Repair dam	1
3. Remove dam and construct a natural channel	3
4. Remove dam and construct offline ponds or wetlands	
5. Lower dam crest and outlet and naturalize new pond perimeter	

UPPER THAMES RIVER CONSERVATION AUTHORITY

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Criteria and Evaluation

Technical/Engineering	Natural Environment
Flooding Impacts/Enhancement Protection of Infrastructure Constructability Implementability Approvability	Aquatic Habitat Impacts/Enhancement Pond Habitat Impacts/Enhancement Terrestrial Habitat Impacts/Enhancement SAR Impacts/Enhancement Geomorphology/Sediment Transport Groundwater Impacts/Enhancement Water Quality Impacts/Enhancement
Social/Cultural	**Economic**
Impact to Private Property Impact to Public Safety Impact to Public Access Impact to Cultural/Heritage Features Recreational Impacts/Enhancement	Construction Costs Maintenance/Future Costs Availability of Funding

Scoring: *1) least positive benefit --> 5 = most positive benefit*

Estimated Costs for Alternatives

Alternatives	Primary elements/ factors influencing costs	Initial Costs (1 to 5 years)	Operation and Maintenance
Alternative 1 Do Nothing	Repairs to concrete structures, site restoration in the event of failure (assumed)	$3,000 to $15,000	$1,500 to $5,000 per year, Site /sediment restoration ($80,000)
Alternative 2 Repair Dam	Improve dam embankment and outlet, construct emergency spillway, rock protection	$150,000 to $200,000	$1,500 to $20,000 per year, Dam retirement (75 yrs) costs $80,000[1]
Alternative 3 Remove dam and construct natural channel	Dam removal, channel construction, sediment removal, site restoration	$250,000 to $320,000	$1,500 to $3,000 per year
Alternative 4 Remove dam and construct offline pond / wetland	Dam removal, channel construction, sediment removal, offline pond construction, site restoration	$350,000,to $450,000	$1,500 to $5,000 per year
Alternative 5 Lower dam crest and outlet, naturalize pond	Dam crest reconstruction, replace outlet bottom draw structure, sediment removal	$500,000 to $600,000	$3,000 to 20,000 per year. Dam retirement (75 yrs) costs $80,000[1]

[1] dam retirement cost is based on 2016 estimate

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
TECHNICAL/ENGINEERING						
Dam Safety/Integrity	Effectiveness of the alternative to address dam safety requirements, reduce risk of failure	1	4	5	5	4
Protection of Properties	Effectiveness of the alternative in mitigating risk (flooding, failure) to adjacent properties	1	2	5	5	3
Constructability	Potential to construct the project using conventional, accepted construction and engineering practices	5	5	5	5	5
Implementability	Potential to implement the alternative, based on common accepted management practise	3	3	5	5	3
Approvability	Potential for regulatory agencies to grant approval for implementation	1	3	5	4	3
TOTAL CATEGORY SCORE		11	17	25	24	18
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		11	17	25	24	18
CATEGORY RANKING (1 = most preferred; 5 = least preferred)		5	4	1	2	3

1 – Do Nothing
2 – Repair Dam
3 – Remove Dam, Natural Channel
4 – Remove Dam, Natural Channel and Off-line Pond
5 – Lower Dam Crest and Outlet, Naturalize New Pond Perimeter

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
NATURAL ENVIRONMENT						
Aquatic (Creek) Habitat Impacts/Enhancement	Effectiveness of the alternative to enhance fisheries resources; fish diversity, food source, and fish passage	1	1	5	5	1
Aquatic (Pond) habitat Impacts/Enhancements	Effectiveness of the alternative to enhance pond habitat (fish, fowl, wildlife) resources, diversity, food source	3	4	1	3	5
Terrestrial Habitat Impacts/Enhancement	Potential for impact and/or enhancement to connectivity and terrestrial habitat (amphibian, avian, mammal) due to implementation of the alternative	1	1	4	5	4
SAR Impacts/Enhancement	Potential for impact and/or enhancement to potential SAR in the project area	1	1	4	5	3
Geomorphology/Sediment Transport	Effectiveness of the alternative to promote dynamic stability of channel processes and mitigate sediment impacts	1	1	5	5	2
Groundwater Impacts/Enhancement	Potential for impact and/or enhancement to groundwater regimes in the project area (baseflow, recharge, water table, etc.)	3	4	4	3	3
Water Quality Impacts/Enhancement	Effectiveness of the alternative to improve water quality, temperature, TSS, phosphorous, nutrient uptake	1	2	5	4	3
	TOTAL CATEGORY SCORE	11	14	28	30	21
	NORMALIZED CATEGORY SCORE (25% WEIGHTING)	8	10	20	21	15
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)	5	4	2	1	3

UPPER THAMES RIVE CONSERVATION AUTHORIT

1 – Do Nothing
2 – Repair Dam
3 – Remove Dam, Natural Channel
4 – Remove Dam, Natural Channel and Off-line Pond
5 – Lower Dam Crest and Outlet, Naturalize New Pond Perimeter

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Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
SOCIAL / CULTURAL ENVIRONMENT						
Impact to Private Property	Measure of the impact to adjacent private property (i.e., loss of property, access to property)	4	4	4	3	3
Impact to Public Access	Measure of impact to public access (e.g., trails, recreation - picnic, fish, boat)	3	4	3	3	4
Impact to Public Safety	Measure of the impact to public safety in the surrounding area resulting from the alternative	1	3	4	3	3
Impact to Cultural/Heritage Features	Potential impact to existing cultural and/or heritage features in the project area	5	5	1	1	4
Recreational Impacts/Enhancement	Measure of the impact to existing recreation and opportunities to enhance recreational activities in the project area	3	3	3	4	4
	TOTAL CATEGORY SCORE	16	19	15	14	18
	NORMALIZED CATEGORY SCORE (25% WEIGHTING)	16	19	15	14	18
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)	3	1	4	5	2

UPPER THAMES RIVE CONSERVATION AUTHORIT

1 – Do Nothing
2 – Repair Dam
3 – Remove Dam, Natural Channel
4 – Remove Dam, Natural Channel and Off-line Pond
5 – Lower Dam Crest and Outlet, Naturalize New Pond Perimeter

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Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
ECONOMIC						
Construction Costs	Relative measure of the initial costs to install/construct the proposed works, including environmental mitigation, sediment management, etc.)	5	4	3	2	1
Maintenance/Future Costs	Relative measure of the ongoing maintenance costs following implementation (or continued maintenance)	1	3	4	4	3
Availability of Funding	Estimate of the availability for funding to implement the alternative	3	3	5	4	2
	TOTAL CATEGORY SCORE	9	10	12	10	6
	NORMALIZED CATEGORY SCORE (25% WEIGHTING)	15	17	20	17	10
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)	4	2	1	2	5

1 – Do Nothing
2 – Repair Dam
3 – Remove Dam, Natural Channel
4 – Remove Dam, Natural Channel and Off-line Pond
5 – Lower Dam Crest and Outlet, Naturalize New Pond Perimeter

Preferred Alternative

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	OVERALL NORMALIZED CATEGORY SCORE (100% WEIGHTING)	50	63	80	76	61
	PREFERRED OVERALL RANKING (1 = most preferred; 5 = least preferred)	5	3	1	2	4

1 – Do Nothing
2 – Repair Dam
3 – Remove Dam, Natural Channel
4 – Remove Dam, Natural Channel and Off-line Pond
5 – Lower Dam Crest and Outlet, Naturalize New Pond Perimeter

Potential Impacts and Mitigation

- Technical
  - Complete shallow well inventory/assessment
  - Drill new wells,
- Environmental
  - Loss of open water feature

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Potential Impacts and Mitigation

- Social and Cultural
  - Loss of open water feature – replace with trails
  - Stage 2 Archaeological study may be required
- Financial
  - Conservation authority funds
  - Township/Municipal contribution
  - Provincial funding sources
  - NGO funding

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Preferred Alternative

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Clair Creek, Waterloo

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Next Steps and Contact Information

Next Steps for our project team include:

- Compile and review feedback from this Public Information Centre
- Further refine the 'Preferred Alternative'
- Proceed to completion and filing of Project Plan

To provide feedback and comments to the project team, please send all correspondence to the project email address:

embro_dam@thamesriver.on.ca

For further information please contact:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
goldtr@thamesriver.on.ca

Mr. Wolfgang Wolter
Senior Project Manager
Ecosystem Recovery Inc.
550 Parkside Drive, Unit B1
Waterloo, Ontario, N2L 5V4
Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca

Public Information Centre #3
PIC Presentation Boards

Embro Dam
Class Environmental Assessment

Public Information Centre #3

Upper Thames River Conservation Authority
Embro Zorra Community Centre
October 17, 2016 7:00 p.m. to 9:00 p.m.

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CONSERVATION AUTHORITY

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Class Environmental Assessment Process and Problem Statement

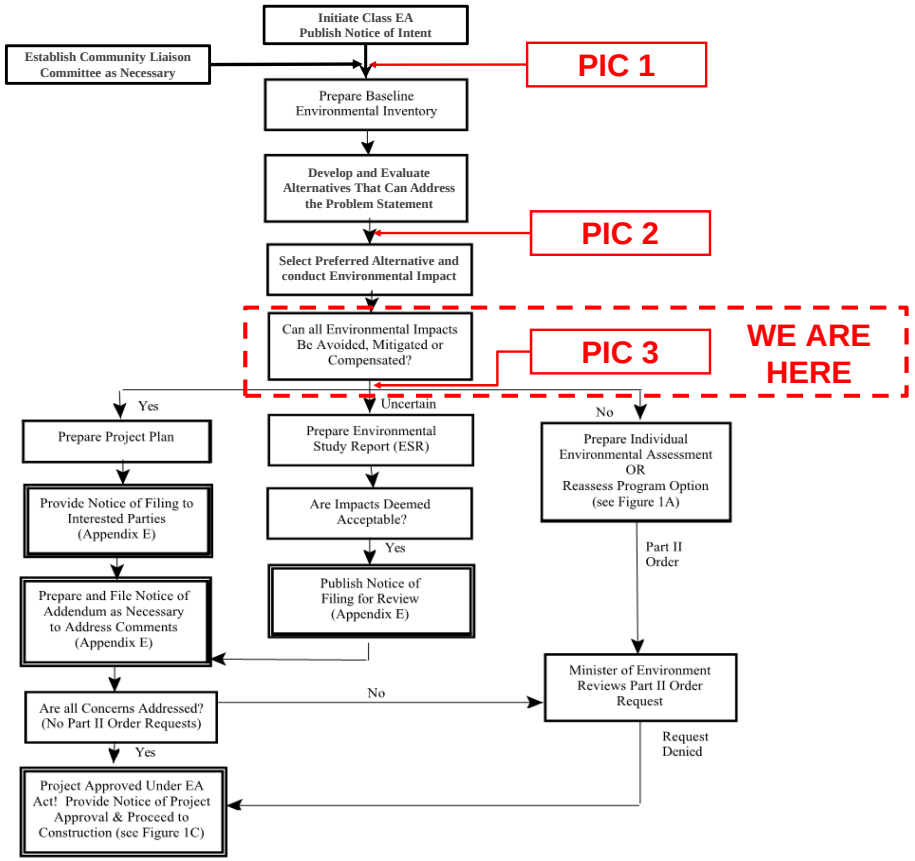
Problem Statement

Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam have been identified through recent engineering assessments.

- ***Acres International. July, 2007****. Dam Safety Assessment Report for Embro Dam: Upstream and downstream embankment slopes do not meet stability acceptance criteria*
- ***Naylor Engineering Associates. September 2008****. Geotechnical Investigation Embro Dam Embankment Stability Assessment: The existing dam does not meet current standards and is not considered stable under existing conditions*

A Class Environmental Assessment has been initiated to evaluate a range of alternatives to address the identified issues in consideration of the environmental, social, economic, and technical aspects of the dam.

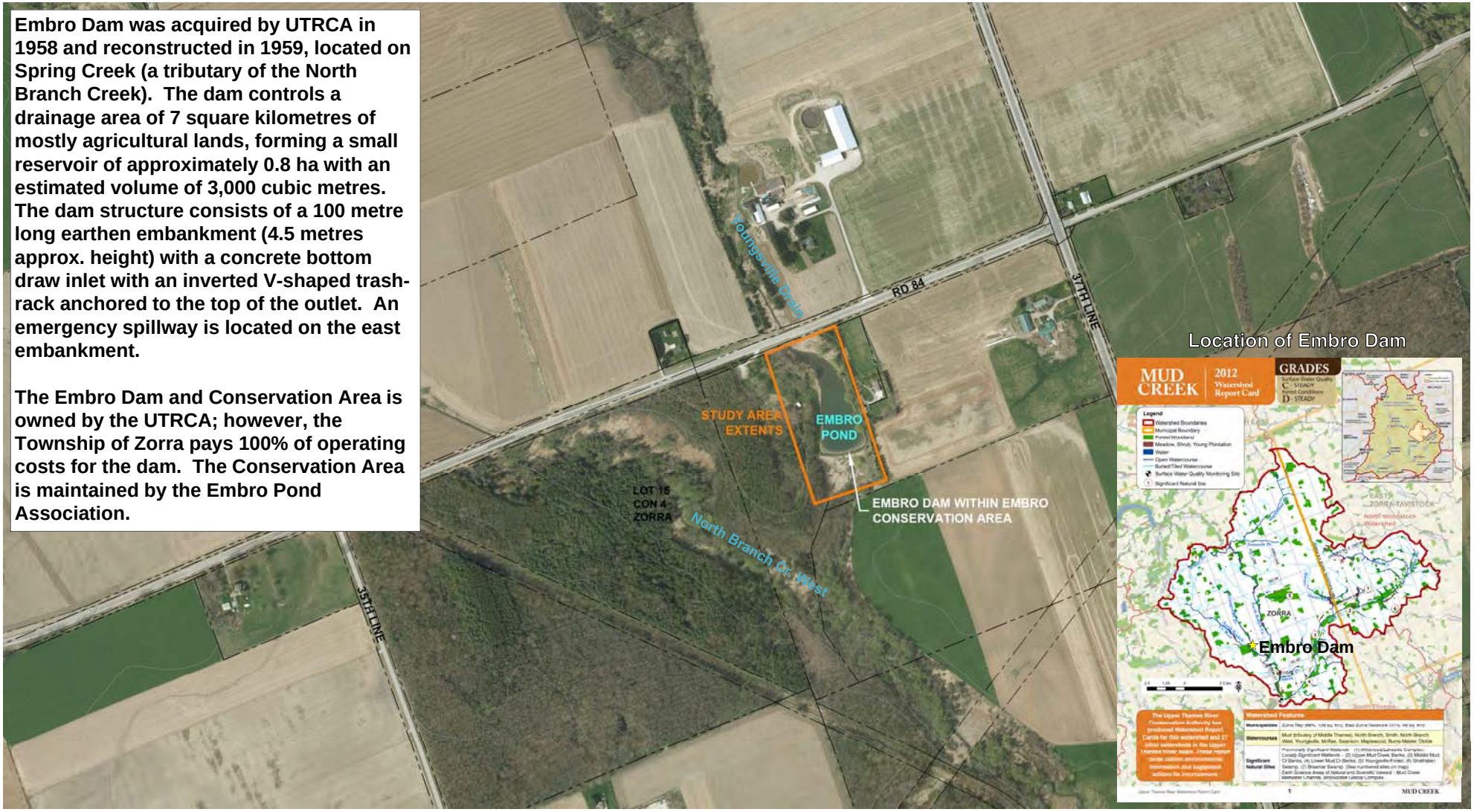
Class EA Process for Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Works



Embro Dam Study Area

Embro Dam was acquired by UTRCA in 1958 and reconstructed in 1959, located on Spring Creek (a tributary of the North Branch Creek). The dam controls a drainage area of 7 square kilometres of mostly agricultural lands, forming a small reservoir of approximately 0.8 ha with an estimated volume of 3,000 cubic metres. The dam structure consists of a 100 metre long earthen embankment (4.5 metres approx. height) with a concrete bottom draw inlet with an inverted V-shaped trash-rack anchored to the top of the outlet. An emergency spillway is located on the east embankment.

The Embro Dam and Conservation Area is owned by the UTRCA; however, the Township of Zorra pays 100% of operating costs for the dam. The Conservation Area is maintained by the Embro Pond Association.



UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

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Cost Estimates

Alternatives	Primary elements/ factors influencing costs	Initial Costs (1 to 5 years)	Operation and Maintenance
Alternative 1 Do nothing	Repairs to concrete structures, site restoration in the event of failure (assumed)	$3,000 to $15,000	$1,500 to $5,000 per year
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[1] dam retirement cost reflects today's (2016) cost

Alternative Evaluation

Criteria	Description	Alternative 1 Do Nothing	Alternative 2 Repair Dam	Alternative 3 Remove Dam and Construct a Natural Channel	Alternative 4 Remove Dam and Construct Offline Pond(s) or Wetland(s)	Alternative 5 Lower Dam Crest and Outlet and Naturalize New Pond Perimeter
TECHNICAL/ENGINEERING						
Dam Safety/Integrity	Effectiveness of the alternative to address dam safety requirements, reduce risk of failure	1	4	5	5	4
Protection of Properties	Effectiveness of the alternative in mitigating risk (flooding, failure) to adjacent properties	1	2	5	5	3
Constructability	Potential to construct the project using conventional, accepted construction and engineering practices	5	5	5	5	5
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	CATEGORY RANKING (1 = most preferred; 5 = least preferred)	5	4	1	2	3
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Aquatic (Creek) Habitat Impacts/Enhancement	Effectiveness of the alternative to enhance fisheries resources; fish diversity, food source, and fish passage	1	1	5	5	1
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	OVERALL NORMALIZED CATEGORY SCORE (100% WEIGHTING)	50	63	80	76	61
	PREFERRED OVERALL RANKING (1 = most preferred; 5 = least preferred)	5	3	1	2	4

Preferred Alternative

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority
Public Information Centre

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Next Steps and Contact Information

To provide feedback and comments to the project team, please send all correspondence to the project email address:

embro_dam@thamesriver.on.ca

For further information please contact:

Mr. Rick Goldt, C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clarke Road
London, Ontario, N5V 5B9
Tel: 519-451-2800 ext. 244
Fax: 519-451-1188
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Tel: 519-621-1500
Fax: 226-240-1080
wolfgang.wolter@ecosystemrecovery.ca

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Meeting Minutes

B1-550 Parkside Drive, Waterloo, Ontario, N2L 5V4
Tel 519.621.1500 ■ Fax 226.240.1080

Project:	Harrington and Embro Dam EAs	**Meeting No.:**	PIC 3
		Meeting Date:	October 17, 2016
Project No.:	1505	**Meeting Time:**	7 – 9 pm
Recorder:	M. Pushkar	**Report date:**	October 18, 2016

Location:	Embro Community Centre – 355644 35th Line, Embro, ON
Attendees:	Rick Goldt, Bill Mackie, (UTRCA) Wolfgang Wolter, Mariëtte Pushkar (ERI) Marie Keasey, Doug Matheson, Marcus Ryan (Zorra Township) Members of the public (8)
Purpose:	Public Information Centre 3 – Embro Dam

Item	Description	Action By
1.	**Presentation** • Presentation of study process, evaluation criteria, evaluation process, preferred alternative, impacts and mitigation made by Wolfgang Wolter and Mariëtte Pushkar (ERI)	Info
2.	**Questions posed by members of the public and answers provided by team:** **1. For Alternatives 2 and 3, why did you not look at the IDF?** At the EA stage, actual design flow values are not necessary to enable an evaluation of the alternatives. During detailed design stage, however, the flows that need to be accommodated for dam function, or for the creek design, will need to be determined; this will require further analysis. **2. How will sediment load affect the downstream watercourse, will there be a delta?** Under the preferred alternative, sediment is expected to be conveyed downstream. Currently, the creek downstream of the dam is sediment starved. There may be some increase in sediment deposition, but this is not expected to be excessive and to result in delta formation. Sediment will be deposited onto the floodplain during periods of high flow. **3. Was sediment considered in the cost evaluation?** Yes, sediment removal was considered in the cost evaluation. The cost for operation and maintenance includes sediment removal costs pro-rated on an annual basis; actual sediment removal work would occur on a zero to ten year frequency. **4. On what data sources was the sediment accumulation rate based? Did it consider sediment removals completed in the 1980s** Bathymetric surveys of the pond were compared, as outlined presented at PIC 2. Yes, the sediment volumes did consider sediment removals. The rate of sedimentation within the pond changes through time in response to landuse practices. The estimated volume is appropriate for planning purposes.	

	5. How does the overall rank include cost, doesn't cost drive everything? Cost is specifically included as one criteria within the economic evaluation category. Cost does not determine the evaluation result since it is only one component of the evaluation process. **6. Did you know that there is potential Federal Funding available? It is the Recreational Fisheries Conservation Partnerships Program** Thank you, this will be noted in the report. **7. Please describe the iteration process of the evaluation table** The evaluation table was first developed by ERI. The table was reviewed and updated through review by several UTRCA staff. Additional input to the table and rankings was obtained through a Technical Steering Committee meeting in which UTRCA staff and Township staff participated. **8. Brook Trout and the potential for habitat creation should be considered in the evaluation** Brook Trout are considered in the aquatic (river) criteria, under the Natural Environment category.	

Upper Thames River Conservation Authority
Class Environmental Assessment
Embro Dam
Public Information Centre – Comment Form

The Environmental Assessment for the Embro Dam, in the Embro Conservation Area, is intended to address safety concerns identified as part of the Dam Safety Assessment (ACRES, 2007) including structural integrity, hydraulic capacity, insufficient freeboard, embankment slope instability and inadequate conveyance capacity for flood flows through the emergency spillway. Through the study, potential alternatives will be evaluated to determine a course of action to mitigate dam safety concerns.

The project is being carried out in accordance with the requirements of the *Conservation Ontario Class Environmental Assessment.* The study is being undertaken by the Upper Thames River Conservation Authority (UTRCA) in partnership with the Township of Zorra.

Public consultation is a key component of this study. This Public Information Centre (PIC) is held to receive public input on the preferred alternative for the Embro Dam. Any feedback and comments provided will become part of the public record for this project.

Please provide your comments regarding the preferred alternative.

Comments:

Please print your name and address below, and leave your completed Comment Form in the box provided. You may also email your comments to embro_dam@thamesriver.on.ca, or mail your comments to:

Rick Goldt C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
1424 Clark Road, London, ON N5V 5B8
Tel.: 519-451-2800 ext. 244
goldtr@thamesriver.on.ca

Name: _____

Address & Postal Code: _____

E-mail Address: _____

Please submit comments by October 31, 2016
Thank you for your participation.

Personal information on this form is collected under the authority of the Conservation Authorities Act and will be used for the purposes of the Embro Dam Class EA only. Questions about the collection of personal information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424 Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

Upper Thames River Conservation Authority

Class Environmental Assessment

Embro Dam

Public - 8
Town - 3

Sign-in Sheet

PUBLIC INFORMATION CENTRE 3
October 17, 2016

Name	Address	Contact Number
Carl Hunsa	[redacted]	
D K Campbell		
BRIAN McGOWAN		
Town DOUG MATHESON.		
ROBERT HUBER (ONTARI		
PAUL Holmes		
Pud Hunter		
Town MARIE KEASEY		
Town Marcus Ry		
Tammy Hutson		
Katherine Grieve		

Personal information on this form is collected under the authority of the Conservation Authorities Act and will be used for the purposes of the Embro Dam Class EA only. Questions about the collection of personal information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424 Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

The Thames River Anglers Association
[redacted]

October 31st, 2016

Rick Goldt – Upper Thames Conservation Authority

Re: Comments Regarding Embro Dam Preferred Solution

Rick

The Thames River Anglers has been dedicated to protecting and sustaining a viable multi-species fishery within the watershed for over 25 years through education, environmental advocacy and grassroots projects that help to rehabilitate the river. In particular our club has been working closely with the Upper Thames Conservation Authority during the last 5 years to reestablish wild brook trout in the headwaters of Embro Creek. The results of this program has exceeded our expectations.

http://thamesriver.on.ca/2016/05/12/new-record-7500-brook-trout-reintroduced-may-12-2016/

We are strongly in support of the preferred approach to decommission Embro Dam and create a naturalized channel. If approved and financially supported this decision would be yet another great example of a municipality, conservation authority, organizations and residents working together to improve and protect ecosystems for future generations.

Thanks again,
Paul

Paul Holmes
Stream Restoration Committee Lead and Chairman
Thames River Anglers Association

ONTARIO RIVERS ALLIANCE

[redacted]

OntarioRiversAlliance.ca

31 October 2016

By email:

Re: Embro Dam

Dear Rick:

Ontario Rivers Alliance (ORA) is a Not-for-Profit grassroots organization acting as a voice for several stewardships, organizations, and private and First Nation citizens who have come together to protect, conserve and restore healthy river ecosystems.

Embro Dam:
On behalf of the ORA, we would like to make our comment publicly available that we support the preferred option to decommission Embro Dam and rehabilitate the former reservoir to a natural channel.

Our organization felt that the Environmental Assessment process was delivered extremely well by Ecosystem Recovery Inc., and their efforts to present the alternatives in a clear manner while engaging the community was very evident. ORA did not have any concerns with the information presented in the community feedback sessions.

Robert Huber
Vice-Chair Ontario Rivers Alliance
[redacted]

Comments regarding the choices for the Embro Dam site put forward in the third public meeting.

Donald Campbell

[redacted]

This project to repair or remove the Embro dam is a study in liability and risk. Liability is a legal responsibility and risk is a measure of how that liability will affect the owner. It also ought to be a study in the best outcome for the money spent to reduce or control that liability. Because the cause of the liability in this project is not fixed but occurs on a graduated scale, the solutions ought to reflect that graduation.

There are three things that occur in nature that Mankind is not able to control very well, Wind, Water, and Seismic Vibrations that we call earthquakes. As a society, both in law and from a risk analysis in insurance assessments, we have recognized the events that involve these natural inputs at levels that exceed normal and that occur infrequently as outliers to the normal and call them “Acts of God”. While God is not defined, we do recognize that these events are beyond Man’s control, and those in the path of the event have to accept the consequences. However, there are analyses of risk, both in Law and in insurance protocols to evaluate these three natural factors, and that ought to be of some help in such a situation as the repair or removal of this dam. But in every case of such an event, the result is from an outlier to normal, and as such, the analysis of a project like this one ought to embrace outliers, not normalize data as we were told was done in this “mathematical “ approach in this case. The test done to suggest performing a normalized treatment of data is usually undertaken to confirm that the data at hand are an estimate of the true mean, and thus the data collected as a sample represents a sample of that mean, so that a statistical procedure will be relevant. No such statistical procedure was discussed in the presentation of this project, although normalized data was.

Because there are varying levels of damage that depend upon how much of an outlier the event might present, the only way to realistically analyse the problem is with an iterative approach, so that as the event becomes more abnormal and approaches a value that might be outside twice the standard deviation of a mean on a normal curve, both the risk and the damages increase. This has been done in the Acres report where they have been able to run their simulation model with a 50 year, 100 year and 250 year outlier to provide an estimate of possible water flow and associated damages for each event. No such analysis has been done in this EA, and as such no estimate of damage or risk or liability has been discussed for events beyond the 50 year event. No outside opinion, either legal or insurance related, was apparently sought out or considered in this report, even for the 50 year event.

There were five choices proposed in the third meeting and there were no changes among these proposals and the five put forward in the second public meeting. The only difference was that the matrix “mathematical” procedure for choosing the desired option was put forward at this time. I have indicated some very real concern over the term mathematical, because, from the discussion presented at the meetings, all of the inputs to the matrix appear to be subjective and not based on mathematics at all, which reduces the method to a numerical approach, but is not at all mathematical or objective in its results. It was also very obvious at the meeting that the method used was confusing for most of those that were there. At the PIC3, it was said that the

determination of the matrix numbers were done on an iterative process, which included going back to the CA for further input. If there were to be an iterative process, it ought to have been done on the choice among options because that might have offered some objective separation of the proposals and included more options with gradations, when unintended consequences arise, like further liability or cost issues that vary as the project changes occur. The logic and reasoning with the chosen method has been subject to the most subjective review and when the expert has asked for further input from the CA in mid process, he has abdicated his unbiased approach to all solutions. It makes him no expert at all. As expected from my comments after the second meeting, the criteria put forward as the evaluation parameters were such that only the removal of the dam and replacement by a reconstructed stream and flood plain were reasonable for consideration.

The relevance of these five proposals deserves some comment. The public has no information on the exact particulars of the terms of the hiring of Ecosystems for whatever job or expertise they have or bring to the problem. Because of that, the public has no way of determining how well these 5 approaches measure up to the requirements of the letter of transmittal. Ecosystems' presentation showed other work they have either designed or supervised some 2 to 5 months after construction. That is no time for evaluation. The time for evaluation is after the design maximum has been overstepped, and that was not considered. We were told the site would contain recreational opportunities, with the highlights to be trails. Most walkers use trails to walk, and usually some distance like 10 kilometers, which cannot be achieved here on the base of the reservoir. For these reasons, it means that the framing of the question is of major importance for determining the proposals.

In the first meeting, the consideration of liability was paramount and the liability lay with the lack of stability of the dam. There are two engineering reports, by Acres and Naylor, two engineering firms, defining the terms of the problem and there are two main factors that determine the Atterberg limits for stability: Soil Type including particle size, and Water Content of that soil. As the water content approaches the limit of plasticity, the stability decreases and the greater the force on the unstable soil from water pressure in the reservoir, the more likely a failure. In the third meeting another main factor was revealed, and that was financial support from sources other than the Upper Thames River Conservation Authority, (CA), and the Municipality, Zorra Township.

The proposed costs were also introduced in this presentation, with the proviso that the five proposals were all subjective, and so costs could only be guessed at without final designs. It was highly intimated that the cost of final designs for more than one proposal were out of the question financially. This limitation is justification for using an iterative process with reasonable costs and proposals so that the choice is as carefully reasoned as possible, and less biased than this report has been. Since it was said that input on the numerical evaluation process included further information and iteration by members of the CA, it is clear that the results presented were not at arm's length and were biased to the desires of the CA. In any event, the proposal for the dam removal and reconstruction of a stream has been the choice and it was obvious from the beginning that this was the preferred choice of the CA before the EA process was undertaken. Thus the EA process appears to be a sham, and a fairly expensive one at that.

At this third meeting, there were no supporting facts or updates on the work done over the past year that might have been an addition to the work presented at the second meeting, and from

personal communication with Mr. Goldtof the CA, there were changes to some of that information that did occur over the past summer.

The option of choice is not just the apparent reduction of the liability issue or the applicability of costs supported by other funding sources. We were told Provincial monies are only available for dam removal or flood control systems. This preferred option includes far more than just the reduction of liability, and the preliminary costing was so vague that it was impossible to tell what portion of the $250,000 to $325,000 were for reduction of liability and what was considered for the esthetic stream reconstruction which would morph into Brook Trout habitat.

I have said in prior comments that there were only two options for consideration if liability were the criteria for decision making: repair the dam and spillway as suggested by the engineering reports of Acres and Naylor, or remove parts of the dam so there is no impediment to water flow. I still maintain that those are the only two options, but at a reasonable cost, especially to taxpayers who have very little say in how the CA levies assessments for water control within its jurisdiction. There is a very clear duty of care from a legal sense when the CA is as powerful in its ability to assess costs as it sees fit. I think that the CA has forsaken some of that Duty to care with the process of this EA.

The estimate for costs for the proposal to remove the dam and build a watercourse and flood plain were $250,000 to $320,000. The estimate for the proposal to repair the dam and overflow, was $150,000 to $200,000. Maintenance costs were also estimated for these two choices at $1,500 to 3000 for the watercourse and $1,500 to $20,000 for the repair with an additional $80,000 for dam removal at 75 years. The estimates for maintenance were far greater for the repair than for the stream. While the author of the report may have seen the billing history for maintenance at the Embro pond area, it was not evident to the public that there has been much maintenance on the actual dam or pond itself. In fact, the pond maintenance has been reduced. As an example, the pond used to be drained every year before winter, but has not been since about 2000. This has, in effect, increased the liability of the owner, because water has been allowed to remain in the berm over the winter, rather than recede when the reservoir drained and the effect of internal and external water forces and gravity work away over the fall and winter to lower the water levels within the berm. Thus the history of maintenance costs would appear to be on tree management and grass cutting, which is not going to change with a change from pond to stream. The report boards for the PIC3 indicate that the township pays all of the operating costs for the dam and the Embro Pond Association maintains the Conservation Area. The owner has abdicated his responsibility for his liability with a lack of overseeing the changing conditions of the dam on a regular basis.

Up to now, there has been no report made public from the risk assessment officer within the CA so there is no quantified risk for liability, nor any measure of how well the liability is defined or whether any option satisfies such a risk analysis. There have been no reports from outside sources, either legal or insurance based, brought forward either. There may also be a liability problem that is not well defined among the Municipality, the CA, and the Embro Pond Association, and that would rest with the legal agreements among these three parties. However, in law, the landowner has the responsibility of the liability and it is his responsibility to do maintenance if the Municipality or Pond Association is not doing the agreed upon work, or the liability is beyond the agreements among those three identities. <u>The worst case is that the Municipality and the Pond Association have liability but don't know they have, so can take no action to mitigate their risk!</u> It is unlikely the owner would ask either the Municipality or the Pond

Association to remove the logs for draining the reservoir, as that is a specialized task that they have done in the past, so know the system, its dangers, and have the tools to do that task.

Other ways of using the resources that do exist at this site ought to have been considered. Because the availability of funds from sources other than the CA and Municipality were not mentioned until the third meeting, no opportunity for the input of this factor by the public existed until now. If the goal is to reduce liability, it can be done in more ways than by removing the dam. There is a third proposal that ought to merit consideration, given that funding is available for flood control as well as dam removal, and that is to drain the pond, repair only the overflow and perhaps consider a small fish ladder from the current outflow pipe to the creek level above. I am not an engineer but from the Acres report, with an inflow design of 9.4 m^3 per second for a flood situation, which the current consultant refuses to consider because he says the design for creeks is different than for dammed ponds, there is a standpipe that with three logs removed will allow for a flow of 3 $m.^3$ maximum at full dam capacity, and the pond basin would act as some flood control provided the overflow is repaired. Having the pond drained as the normal course of events will reduce the wetness factors and the seepage factors in the berm, so influence the stability factors and make the repairs suggested by Naylor unnecessary. Adding a way to make the system so that fish can travel through the system ought to be possible even if a small concrete pad needs to be added at the base of the standpipe and a small pool exist there. The cost for the overflow repair in the Acres Report is $8,000.00. The current consultant has chosen to double the values of this report in his current cost estimates. Thus to repair the overflow would be $16, 000.00 and that included moving 420 m^3 of materials.

At this third meeting, the question was asked about the age of this dam. No answer was given, except to say the CA ‘s involvement began in 1958. I have consulted the historical atlas of Oxford County for 1876 and there is a grist mill located on this creek at that time, and so there would have been some dam in place then. The building of the first dam would have preceded that date. Therefore whatever flaws are in the current dam, some part of the foundation of this dam has withstood the weather and storms from 1875 to now, in spite of the concerns of today’s requirements and standards. In all probability, there is a good chance that this dam was originally constructed with horses and slush scrapers as the only means available to bring soil to the site. Compaction and consolidation of materials would not have been a high item on the list of necessary conditions to be met. It has been sufficient until now. If there have been failures of the dam, there is not much record of damage from that failure, probably because it was not major, and our society was much more tolerant and less litigious than it seems to be at present, in spite of the fact that Rylands and Fletcher, the standard for Strict Liability is a law case from 1868 (most of the life of this dam). It also needs to be said that the estimates of sedimentation were 161 m^3 per year. This number was determined without consideration of the fact that there had been a clean out of the pond bottom in the 1980’s that the CA cannot document, but at least three people at the PIC3 meeting could remember. Thus this value is probably underestimating the rate of sediment deposition.

Further on the subject of sediment, while it is a natural process and streams need some sediment flow to stay healthy, there will be increased pressure on landowners to reduce sediment loading to comply with phosphorus run-off into watercourses within the Great Lakes basin, and the possible loss of a settling pond for phosphorus management has been completely disregarded in this process. The area of 7 $kms.^2$ ought to be a reasonable test watershed for research on phosphorus loading within all of the Thames River watershed, and if

this dam is removed, then the settling pond will be removed for research options. The soil in this water shed is part of Oxford County , the only county in Canada with a rating of 95% class 1 soils for agricultural production and because it is soil of relatively large particle size, very subject to erosion. The high productivity of this soil increases the chances for heavy use of fertilizers and so this resource is one that would be most sought after for research purposes. As well, our highways seem to include catchment ponds in the current construction methods, so there is a lack of co-ordination with overall water policy here. This option of a research study area has been overlooked.

There was one proposed option to add an off watercourse pond to the design. It was more expensive than preferred proposal. It also did not give any regard to possible mosquito breeding and the four big mosquito borne diseases have not been considered: Malaria, Zika virus, West Nile virus and Dengue fever. The species that carries Zika has been found at Windsor, Ontario in 2016, so the mosquito can survive in this climate, at least in the summer. No virus was found on or in these insects but the ominous sign is there that transmission is possible. Malaria was a major killer in the 1820's in Ontario when the feeder canal was being built for the Welland Canal, particularly in the area of Stromness and the marshes of the Grand River delta, so we have records of this disease in Ontario. West Nile virus is now an annual event in Ontario. Such ponds as the one proposed ought to be avoided completely if liability is a concern for the CA. This design ought to be considered off the matrix grid, because a negative score of 1 to 5 for one social factor is not damaging enough to the proposal, given the gravity of the liability not thus far considered.

The fifth proposal was to lower the dam height and landscape the surrounding area to fit the lower level. The cost estimates were in the neighbourhood of $500,000 to $600,000. This is a highly exaggerated cost because the lowering of the water surface and hence the effective top of the dam would merely require the overflow to be lowered and the logs to be removed from the standpipe. This would lower the top of the water curve in the dam as well. The estimated costs in Acres for the overflow were $8,000, and the bare soil remaining by lowering the water level would be less than the bare soil remaining if the whole reservoir were drained, so less remedial work needs be done, especially on the length of the stream. Such over estimations reflect poorly on the expert and more so because of the over-exaggeration compared with the practical ways to lower the reservoir height, repair the overflow and change the standpipe. There is no need to take the top off the berm for relocation, it is only necessary to make it redundant and leave it in place.

It makes no sense to me that there is no design flow in these proposals. It would seem that if the run-off from a storm event is projected at 9.4 m^3 per second, (based on calibrated simulation data from the Acres report), the flow will be the same entering the proposed constructed stream, and that this ought to be the design flow for the creek and flood plain. Since there has been a mill on this creek since the 1870's, the site and design was chosen by a miller who needed power and his estimate was that the required power could be supplied by the flow, and the fall at this site which is about 3.1 m. in the length of the reservoir of 200 m. from the road culvert at road 84 to the current dam. Acres suggests the total fall in the creek is about 15 m. and so the fall here is 20 % of the total. This will mean that the water coming in will accelerate for this 200 m distance with this much fall and no dam. Nowhere in this report has an energy balance been estimated or undertaken, and unless energy is considered, there will be mistakes from unintended consequences within the final design. I suspect that the actual final design for a

creek to take this much flow without liability for erosion or added maintenance to rebuild the stream after a 50 year event will not resemble the meandering course shown in the presentation materials but will more nearly be the concrete blocks cabled together that Acres has suggested for the overflow of 60 m. length rather than the 200 m of the reservoir bottom.

A further comment about the considered costs of the current five proposal is warranted. In the dam repair proposal, suggested annual maintenance costs are estimated to be as high as $20,000 and include a further $80,000.00 (2016 dollars) for dam removal at the end of the projected life of 75 years. It is not obvious how these costs are arrived at. Even if costs are incurred on an irregular basis, maintenance of the dam, including clean out of sediments (which, so far, has been once in the time the CA has owned the dam), ought not be this great. To remove the dam with a profile that allows for the flow in the Acres report means that a stream bed of some 5 to 6.5 m, (from Acres) or 10 m at the most, needs to be dug into the current embankment. Since there is a requirement to remove considerably more fill from the west side of the current outlet, because there is more fill there, much of the fill will be removed from the side east of the outlet. It was inconceivable to many who were at the PIC3 meeting that the costs could be as projected and that would include that the dam removal will be $80,000, because good operators on a dozer and hydraulic shovel ought to be able to move enough to vacate the dam, accommodate the required flow and place it to the east of the creek in a few days. One member of the public thought biological design was far superior to the geomorphological one suggested by the consultant because of superior results at less cost. In any event, higher estimated costs at this stage means that if the actual design comes in at less, then things appear better than they were. This is merely presentation of false information to bias the results and embellish the reputation of the consultant when final designs are not as expensive as first thought.

There was no mention of timing on the aging of the dam. If the age were to be taken from the initial date of CA ownership of 1958, then much of the 75 years has passed. If the 75 years were to begin after the Acres and Naylor repairs were made, then there is no understanding today of the wear on the dam by that date and no necessity to include those sorts of unknown factors and costs in a decision making process to-day. This sort of biased view not only clouds clear thinking, but also makes for an impression that dam repair is not effective to reduce liability. Thus far, that dam has weathered for 145 years and still holds water! At the same time, if the costs for dam removal in the preferred case do not include removal costs of the same $80,000.00, and we were not told that they were that, then the costs have been estimated differently for different proposals and that is not a fair test of objectivity for the choice of options. The presented cost data was so gross that this sort of detail was not available. However, it allows for the implication of faulty logic and faulty science, neither of which is a good base on which to build any project.

Within this whole process, there is no method to evaluate how well money has been suggested to be spent. This was questioned at the meeting and the response was that all the proposals were subjective and as such the consultant was unable to be specifically quantify either costing, (capital costs and maintenance costs) or effectiveness. However, careful spending of funds to give value for money spent, to achieve specified purposes, is still a requirement for taxpayers who really want to see the value received. The feedback thus far from the public is such a small sample (with only 4 comments on removal or repair after the second meeting and only a very small turn out for PIC3) that the decision must fall on the shoulders of the CA and Municipal

Council to evaluate money well spent ONLY TO REDUCE THE OWNER'S LIABILITY WITH AN OPTION FOR OUTSIDE FUNDING. Any further expenditure of funds is unwarranted to achieve the goals of reduced liability and financial support. "While we are at it, we might as well do _____ (Fill in the blank with "a trout creek") is only an attempt to seek funds for projects not covered by the purpose of the Acres and Naylor reports or current outside funding and as such ought **not** to be undertaken as part of this project. There is nothing wrong with a trout creek but not as a solution for the liability problem. While Brook Trout habitat was being looked forward to by some few individuals, the costs for this are not reasonable as proposed, at a $100,000.00. difference between dam removal and stream construction estimates. Better use of funds needs to be made and decisions made only with non-biased, objective processes, and they are not evident within this process here.

The other parameter that has not been considered is the standard to which things are measured. The Acres report states that the CA uses a 250 year storm in their own simulation model and the standard here is only a 50 year, 8 day snowmelt (from the first two meetings). No estimate is given for the repairs on any of these options if conditions exceed this weather event, and it is a given that they will be exceeded. The process of this EA has failed such testing for examining the reasonableness of any of the five options put forward in this study.

In conclusion, the recommendation by the consultant for the option to remove the dam and reconstruct a creek has been chosen with a very problematic processes that cannot be evaluated for effectiveness because of lack of disclosure of the terms of the hiring and their stating that the CA has had input on the iterations of the matrix numbers as the process was evaluated. Such a process only allows for errors in logic to determine a valid option, whether the errors are from clouded, misapplied or ill-defined purpose, biased inputs from the CA, lack of disclosure of the importance of funding from outside sources, or grossly distorted estimates of probable costs. All of these failures do exist in this presentation this far. They skew the results for choosing an unbiased selection of an option that ought to be based on science and good cost estimates. The result is that the choice of the best option at the best cost is not possible. This process as it has occurred here only offers the pubic a sham of what is reasonable, at a very high cost, given the CA's desire to remove the dam before the EA was undertaken. That the CA and the Ausable Bayfield Conservation Authority have 15 dams between them to have to undergo this process is a tremendous financial stress across both watersheds when the results are determined with such low quality workmanship.

If there were any question on the reasonableness of the report thus far, one might ask and answer two questions: The first is what will the project look like five days after the 100 year storm, or the 250 year storm, and were the maintenance costs estimated reasonably for the aftereffects of those events? The second question to ask is would this expert and his technique stand up to a rigourous cross-examination in a court to provide the explanation of the preferred choice by an unbiased expert providing advice based on science, and reasonable, uniform costing to come up with the results proposed at this time. I am sure the answer to both questions is negative.

My feeling is that the money for this EA has not been spent well, that there is little value for the monies expended thus far, and that the choices are not well fit to only the liability reduction

requirements. This sort of low value, high volume spending ought not continue into the final design process.

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Mariëtte Pushkar

From: Marcus Ryan <mryan@zorra.on.ca>
Sent: October-31-16 11:19 AM
To: Rick Goldt
Subject: Fwd: PIC#3 comments

Rick, I have responded to Don (see below) and just wanted to ask that his concerns be reviewed against the EA to date to see if they can be either integrated or addressed in some way?

Thanks

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Begin forwarded message:

From: Marcus Ryan <mryan@zorra.on.ca>
Subject: Re: PIC#3 comments
Date: October 31, 2016 at 11:17:41 AM EDT
To: Don Campbell <dk.campbell@xplornet.ca>

Don, I just wanted to get back to you with some specific feedback.

I have responded to UTRCA with your concerns and asked that they be reviewed against the EA to date to see if they can be either integrated or addressed in some way.

I have to disagree with your assertion that "the EA process appears to be a sham" since "it was obvious from the beginning that this was the preferred choice of the CA before the EA process was undertaken". I have spoken to UTRCA Staff about this concern as I know this is the opinion of many in the community. The EA process is a Provincially mandated one that the UTRCA, Zorra, and EcoSystems Recovery are bound to follow (flaws and all). Also, it is an ***Environmental*** Assessment, not a general decision making or risk assessing tool; and as such is just one (very big)

part of the overall decision making process. In my opinion UTRCA Staff (and EcoSystems Recovery) have a great deal of experience with the EA process and Provincial Government Policy with respect to dams and this experience may have given the impression that they had a good idea what the outcome would be. I think this has been interpreted by some as ***preferring*** a particular outcome, but in my opinion it was experience and knowledge ***predicting*** the outcome.

With respect to cost estimates I share your concern that "the proposals were subjective and as such the consultant was unable to be specifically quantify either costing, (capital costs and maintenance costs) or effectiveness. However, careful spending of funds to give value for money spent, to achieve specified purposes, is still a requirement for taxpayers who really want to see the value received." However, there are limited funds available to fund the EA and that does not allow for the preparation of full detailed RFPs or Tenders. In my opinion this will HAVE to be done before a final decision is made.

Overall I agree that the liability is the main concern and should be the first consideration in alternatives.

If you want to talk more about this please don't hesitate to contact me. I am usually at the Township Office on Monday mornings.

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> On Oct 27, 2016, at 4:36 PM, Don Campbell <dk.campbell@xplornet.ca> wrote:
>
> Hi Rick:
> Attached, please find my comments on the EA after the third PIC meeting. It is such a shame that you have to spend big dollars on such poor quality stuff as this on all of your dams to get to do a project.
> I have tried to offer some alternatives that still fall within the two main criteria that I see as necessary –reduce liability and have additional outside funding. I will be more than happy to come in to talk this sort of thing over in an effort to get better results for you at a reasonable cost which I think has been lost in the work so far. If such a discussion would be better at the site, I am happy to do that too. At some point in the process practicality needs to

be considered, and that is non-existent in the discussion so far with the admission that all is subjective in the current project.
Don Campbell
<Embro Dam 3rd meeting good.docx>

From: Don Campbell [redacted]
Sent: November-11-16 9:21 AM
To: Goldt Rick <goldtr@thamesriver.on.ca>
Subject: Fw: Embro Dam

Hi Rick:
Marcus Ryan responded to my letter to you which I copied to three council members. In his reply he attempted to defend Ecosystems Recovery Inc. as experienced and knowing of the process of Environmental Assessments. The public has the idea that there has been too much collusion between your wanting no dams and the capability to predict the outcome by Ecosystems prior to the PIC#3. I suggest that the ability to predict is a done deal by the criteria chosen and the units with the criteria, given the numerical outcome of their normalization and 25% valuation method. I do not disagee that Ecosystems may be an experienced Company, except that I think the system is flawed so that the costs are poorly spent, when the justification for a preferred choice is done with such sloppy means as has been done for your Embro Dam case. This is my reply to Marcus's comments to me. I do hope that you can ask for an evaluation of a more reasonable choice than he has put forward.
As an owner, it is imperative that you consider the maintenance costs after a storm bigger than the 50 year snow melt and the liability that may accrue from that, and I have tried to suggest a means of coping with more than the 50 year event. Clearly, since this dam has been in place since before 1876, it has withstood the 100 year event somewhere along the way and since it was there for Hurricane Hazel , it has withstood that, although the damage this far west was not nearly what occurred in Toronto on the Humber and Don rivers particularly.
Don Campbell

From: Don Campbell
Sent: Thursday, November 10, 2016 2:09 PM
To: [redacted]
Subject: Embro Dam

Hi Marcus:
I am sorry that I cannot make it in to the office on Monday mornings at the moment. We are down to one vehicle and my wife needs it on Mondays to do her preparation work for her Early Childhood learning programme.

As you know, I have been very critical of the personnel working on this project because he has not told us the truth about costs in the engineering reports accurately and so I have real questions about his capabilities if he is that loose with facts and trust. I do want to illustrate the folly of Ecosystems Recovery and their method of determining the preferred choice, based on their choices of criteria for evaluation and their methods of calculations. With their choices of criteria, and an understanding on their part that there is no mathematical or scientific basis for the assignment of values, and that arithmetic appears to be mathematical and unbiased (which it is not) their system appears to be valid. What is very evident, is that they know the system for EAs and how to work that to appear to be reasonable.

In the case of the Embro Dam, there is a definite liability by having a dam because there is always the possibility of a failure.(Rylands and Fletcher). Due diligence by UTRCA has provoked two engineering reports that illustrate scientific reasons from Atterberg limit tests of increases in risk to the owner because the water content of the earthen dam is approaching the plastic levels for that soil type. Thus a prudent owner would take steps to make the dam safer from a liability standpoint. This means changing the water levels in the dam so that the Atterberg limits for plasticity are not met. The engineering report by Acres details how that can be achieved, and the Naylor report offers specifics for construction so that the risk is reduced and the liability is minimal. Because of these reports and f construction were to be done to the standards within these reports, the liability then shifts from the owner to the engineer and his stamp.

In this case, the owner has reduced the maintenance that it has undertaken in the past and has discontinued to drain the pond annually, so that the water contents have stayed high in the berm for the full year, with no opportunity to drain by gravity over half the year if the pond were drained for the winter. In this respect, the owner has been more negligent than in the past, and has in fact increased its liability and risk by not draining this pond annually.

In the Acres report, there is the step that the project does need to undergo an Environmental Assessment. And thus an outside consultant is hired to do that: in this case Ecosystems Recovery Inc. In my experience, a consultant is hired as an unbiased professional to do the work prescribed. In this case, the public is not privy to the letter of transmittal for the hiring of Ecosystems, but you should have that as one of those doing the hiring. In my discussions with Mr. Goldt at the first meeting, it was very evident that the CA wanted no dam in place as the end result. (I have known Mr. Goldt from the sailing club at Fanshawe many years prior to this, so it is not as if I did not know who I was talking to at this point).

If one looks at this problem from the two main factors that have emerged to the public over the three meetings, but should have been evident from the start for those involved, they are liability and outside funding, Neither are really a part of the natural environmental situation that occurs at any site involving geography and an ecosystem on the surface of the planet. However, within the broad picture, the environment includes all things including risk which has not been well addressed by the consultant and which is a main factor in determining the liability of the CA for any given choice of project. Further, that the CA has specifically asked for enhancements of the environment to change fish habitat and have an unbiased professional comment on those is biased from the start. (I do fully understand that fish habitat is a part of outside funding though, and that the provincial government and their MNR are far more likely to agree if there is apparent enhancement of particularly fish habitat at the present time. I have seen this happen in other EAs recently.)

When one looks at the methodology of the consultant, he has chosen 4 main criteria on which to evaluate the environment : Technical, Social, Natural Environment, and Economic. He has chosen to arithmetically weight these criteria equally. Within each of these four, he has chosen several units to use for defining and evaluating the criteria. His choice of the 4 main criteria and their subsequent units within can be chosen such that the outcome is predictable before any data is collected, because there is no scientific reason stated to include or exclude any of his choices made or any of his choices not included. In those choices omitted, I would suggest that the simulation programme in the Acres Report ought to be included to establish the degree of severity of weather events, but that has clearly been left out, thus far. As a scientist, I expect a consultant working on an environmental assessment to have and to declare his reasons for choosing and reasons for not choosing his methods and inputs, and we have been shown nothing concrete on this and have a summary that everything from inputs to costs is subjective. To me that is very suspicious and only smacks of someone who knows how to use the system for his employment. That is as close to a sham as one can get, by my definition of sham. I have found the same sort of problem in the two other EAs that I have been involved with, so it is not just Ecosystems but the process which exacerbates this sort of work.

I we look at the overall weighting of the 4 main criteria that have been chosen, there are 5 units in Dam Safety, 7 units in Natural Environment, 5 units in Social/Cultural and 3 units in Economic. Once the wonderful normalization and 25% factor are done, any category with 5 units in it has the same score before and after, those with more than five are reduced , and those that have less than five are enhanced. Thus the technical and social are at their given score, the natural environment reduced and the economic is greatly increased because it has only three units in it. The consultant is very well aware of the system to promote things by his choices of more or less units within a criteria to dramatically change weighting and final outcome. Again, I see this as the work of not an unbiased professional.

Within the units I can criticize almost every one as not representative of the description given on the 5th page of the Boards presented at the PIC3. Unfortunately, the pages are not printable as shown, so it is a bit of a task to do them one by one. As an example, the first unit under dam safety is the effectiveness of achieving dam safety and reduce the risk of failure. The score for repairing the dam is less than the score for removing the dam. The risk of the liability if the dam were to be repaired to the standards of Naylor and Acres is completely off set to the engineers and so is exactly the same for the owner as if the dam were not there. Obviously, no legal advice has been sought on a question of legality. Protection of property is about the risk of flooding property adjacent to the CA. No mention of any volume or flow was ever made and so this is totally subjective. In any event, with the flow determined by Acres of 9.4 m^3/sec., that flow will be present with no dam or once the dam is full, so the flow will be 9.4 m^3/sec below the dam and above it, thus the dam will have no effect on flooding. There is little reason to include this factor in an evaluation but by doing so, there is a gradation of values and so a bias towards dam removal based on the scoring chosen (without a flow rate given!). There is no real value in the constructability factor as all are equal.The

implementability factor is based on management practice and the numerical evaluation appears to say it will be more difficult to manage the repair of the dam – which is not complicated, as the engineering reports outline, than to remove the dam and build all the associated watercourse. If this is a factor of maintenance costs, it ought to be in the economic unit and so the arithmetic distortion is again brought to the fore. As for the approvability factor, the owner can go ahead with the repair with no approvals because it is negligent to not do so. This approvability may include outside financing so is a duplicate factor already in the Economic criteria which again distorts the arithmetic output in both this and the economic unit. In summary, if the two economic units are removed from this criteria and the constructability factor deleted so that only 2 units remain in this criteria, the risk properly evaluated for removal and repair, and the flooding determined realistically, it would increase the weight substantially for this criteria and there ought to be no difference for dam repair or removal.

Within the natural environment units much the same can be said. The aquatic habitat enhancement is divided into creek and pond in the first to units. The difference in total for the sum of these two units is one point for the creek, entirely due to the fish passage from below to above the dam. However, no data were presented to us to define the species below as warm or cold water fish, or the consideration of whether any species would remain in the creek that is to traverse the current pond bed. The third unit is based on enhancement and if the dam is repaired, the status quo is maintained. The costs for the enhancement are considerable as projected. Regarding species at risk, the reports we had been given were that there are no species at risk in this area and so this is a trumped up category because there was no suggestion that any SAR would be introduced. The 5th unit talks about dynamic stability and that is an oxymoron. If things are stable there is nothing dynamic about it and if things are dynamic they are not stable. Sedimentation is going to be a much discussed topic over Phosphorus and Nitrogen loading into the Great Lakes. The consultant has chosen to disregard this current and upcoming topic to the detriment of us all, even though there have been vey recent international undertakings on the topic. The unit on groundwater is non-descript. There has been a concern over shallow wells and the effect on them. From my investigations, the owner has all of the shallow wells in this project and most were for test holes for engineering reports, not water sources. The last item in this criteria is the water quality and while the quality of the pond water now is not good, there is nothing in this report to say how it will improve with a change from pond to creek. Having no sediment catchment will mean it is only more difficult to remove phosphate especially, because from experimental work done by Canada Center for Inland Waters on Holiday Creek, with the base station on my farm, 50% of the phosphate in creeks is adsorbed onto soil particles. Undoubtedly the water quality may improve, but the effects of the nutrient loading will then be washed down further without any attempt to control it. As for the temperature of the water, the data presented earlier showed that the daytime temperature of the creek above the pond was higher than the pond water temperature and that it was only night time temperature that was cooler. The balance of the energy system has not been investigated by this consultant on this project and so the only thing

for sure is that subjective results are only supposition and without basis in fact, hence no reason for conclusions, except erroneous ones.

The social criteria are similarly in contention. The first unit is loss of property or access to property. The evaluation is that there will be some loss or lack of access in the removal and pond rebuild and lowering of the level of the current pond alternatives. It seems to me that all the effects of either of these proposals will be on the owner's land and there ought not be any loss or restricted access. There is no real difference between the first and second units except for boating, which is not a big factor in the current pond. The Embro cubs used the pond to do some canoeing but the last year they tried it they could not get across the pond to the edges for lack of water close to shore, the slope was so gentle. (My wife happened to be a cub leader at the time.) As for a measure of public safety, the liability of the dam is paramount for that and has already been included in the first criteria. The liability with access to any water body by the public is always a liability concern and so are trails, creeks and open fields. That is the cost of ownership and if that is too great, then the owner should re-evaluate this property in the CA. As for the impacts to the heritage features, there is no mill remaining and while there is a water surface there, and there are a number of waterfowl species that do alight on this pond in migration times, (more than was mentioned in the appendix on birds from personal experience and observations), it should not be a big factor in the liability and cost decision making process. As for the last unit, why removing a big pond and making a smaller pond ought to increase recreation is not logical. There is less opportunity to boat, and there is no mention of fishing. Any trails would be short and not for exercise as in rail trails, so their scoring is suspect in this criteria as well, in that it is all subjective and without documentation of fact.

As for the economic criteria, the first unit is the relative measure of initial costs and this is a straight line, again, without merit because there is not an equal cost difference among the alternatives.The second is ongoing maintenance costs. These were spelled out as subjective and there is no measure of consistency in them, for example, the dam removal cost in 2016 dollars in the repair project, for the dam removal in 75 years. Was this cost included in the removal project in 2106 as an initial capital cost? If so there is not a big difference between removal and making a creek and so the creek has been over priced or the repair under priced. There is also no realization that there is no necessity to remove all of the dam berm but only to remove enough to allow the flow through the berm. However, the level of storm event matters here and the use of the 50 year snowmelt is much less than the 100 year storm or the 250 year storm, both of which the CA relies on for other calculations and projects. Thus there is a real problem with applicability of the standard and hence the liability and damage that may ensue in a bigger storm event. This is not a good report for the effects of the possibilities that may happen at this site.

There has been no energy balance done on this project because there has been no consideration for a flow rate and slope that has been shown to us. All I can say is from past experience, when energy is not considered carefully, the base on which to build a case for naturally occurring environments is not going to work out the way it was thought to be. This will be a classic case of failure if this is not considered.

As a reasonable alternative, I would suggest that the case be evaluated for the pond be drained, that the overflow be constructed as in the Acres and Naylor reports, that some fish ladder be evaluated on the upside of the culvert through the berm, and that the standpipe be re-designed to allow for the pond to automatically fill under storm conditions, and with a way to manually release the water entrapped after the storm event. Such a system would reduce the energy in the system initially and offer a buffer to the flow throughout the storm event, maintain a catchment for sediment control, and reduce the liability for the failure of the dam to very low levels, not just for a 50 year event but across the board. There still ought to be outside funding for this as storm water controls, but in any event, it would remove the $80,000 cost for dam removal now in these projects as a beginning. Since the Acres report had the cost of the spillway at about $8,000 and they added a 25% contingency, this ought not be an huge value now. This project does not need to cost $250,000 to $325,000 to achieve the goals set out in the beginning, even without outside funding!

Don Campbell

Bradley Burrows

From: Rick Goldt <goldtr@thamesriver.on.ca>
Sent: January-02-17 8:43 AM
To: Don Campbell
Cc: Mariëtte Pushkar; Wolfgang Wolter
Subject: Embro Dam EA PIC#3

Dear Sir,

Thankyou for your recent email correspondence following the Public Information Centre #3 for the Embro Dam Class EA. Your correspondence brings forward many of the comments from earlier PIC that we responded to by email dated Oct 16, 2016. The consultant will consider these comments in preparing their reports.

We would like to respond to a number of new issues you have raised.

1. Conservation Authority Involvement

Ecosystem Recovery Inc. was hired through a request for proposal process whereby experience with the subject matter was weighted with the cost proposed. A consultant was hired as the Authority does not have the staffing dedicated to undertake similar work. Class Environmental Assessment projects under the Conservation Authorities of Ontario Class Environmental process are not frequently called for. The Authority as a normal function does have the expertise and opportunity to contribute to EA study matters regularly through planning advisory roles and Regulations applied under the Conservation Authorities Act. UTRCA staff and Zorra township through representation on a project team (not just the Authority) had the opportunity to contribute to the consultant's work. Evaluations are best a collaborative effort.

2. Normalizing the Evaluation

You have highlighted a concern with "normalizing" of data through a "mathematical" approach. We would like to reiterate that the focus of the presentation of material at PIC#3 was on the evaluation of alternatives for Embro Dam and that "normalizing" of the various element or issue scores under each criteria of Technical, Natural Environment, Social / Cultural, and Economic was undertaken so that the 4 criteria were weighted equally, which is common practice. As example where 7 issues under the Environment criteria were evaluated the scores of 1 to 5 as noted for each of the 7 issues and for each alternative were added and factored lower based on a maximum potential score of 5 issues, which is the average number of issues under the 4 criteria. If there were 3 issues under a criteria they were factored higher in total score to ensure equal weighting across the 4 criteria. These aforementioned mathematical steps then contributed to normalizing the scores. The process may be explained many different ways but the intent is to present a balanced assessment.

The public has been given the same information and opportunity to comment as provided to the project team and the consultant. Checking back on the original draft evaluation by the consultant it was found that following the input of the project team the relative rankings between alternatives had not changed. As a result of the fair evaluation of the alternatives with inputs from the consultant and the project team as noted above, the preferred alternative has been put forward.

All alternatives were evaluated with respect to economic factors based on experience with various funding opportunities whether government or non- government. It was stated that our experience with provincial government funding for dams was that priority was for repairs to existing flood control infrastructure and some opportunities for funding for dam removal. There is also interest in funding dam removal from the non government side. The government funding

opportunities are not guaranteed and are merit based against all other applications from conservation authorities for very limited funding.

3. New Alternative

You describe an alternative on the basis that funding would be available for flood control as well as for dam removal. Your alternative description of altering the control of the dam to reduce liability is similar in intent to the Alternative 5 presented.

The alternative you have put forward would permanently increase inflow to the stand pipe - culvert system. It is suggested that fish passage could be added. The effect of implementing the alternative would be that a pond feature would be normally drained and function without the pond or stream environment attributes put forward with Alternative 1 through 5. The former pond area would be utilized for storm event surcharge conditions and would rise and fall with storm runoff events. The pond bottom would for some time be exposed and there would be a permanent loss in fish habitat. As the dam would remain, maintenance would still be required.

The flood control function that would be enhanced would be entirely for the purpose of protecting the structure from failure as much as is reasonably required. Alternatives 2 and 5 address this also and fall under the same funding limitations. The repair would not provide any additional flood control benefit to downstream areas as non are threatened or protected through the current dam. An alternative proposal to provide for a new flood control function as suggested is not funded by the Province.

The consultant will consider the proposal in the report being prepared.

4. Costs

Costs developed by the consultant reflect experience with many similar and ongoing projects. Their estimates are current and have considered the costs for various measures brought forward from the HATCH (Acres) studies in the early 2000's and the additional costing provided by Burnside in 2009.

The economic evaluations considered common elements required for each alternative. The primary objective of developing cost estimates and cost ranges is to account for the variability in effort between alternatives. The costs are an estimate for completing a project in a reasonable time frame (usually one contract and one fiscal year) to achieve the results intended.

Various aspects of the preferred alternative will be further evaluated as to the best means towards implementation. You as we are concerned with the potential costs overall and the Authority does look for ways to reduce costs as evidenced in some of our dam removal projects to date. Ultimately for Embro Dam through the process of implementing the preferred alternative, external and local funding will be explored and would be intended to be utilized in the most effective way possible.

Again, thank you for your comments. The consultant will consider them towards completion of the reports and they will be documented in the reports as part of the record.

Rick Goldt C.E.T.
Supervisor, Water Control Structures
Upper Thames River Conservation Authority
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goldtr@thamesriver.on.ca

Bradley Burrows

From: Don Campbell <dk.campbell@xplornet.ca>
Sent: January-18-17 12:57 PM
To: Goldt Rick
Subject: Further to our meeting today
Attachments: catchbasin for dam.docx

Hi Rick:

Between my awkward drawing and trying to get things on paper, I have come up with this. Figure A is a top view and Figure B is a side view from the north. I did not do an end view because there would be very little added information. I could not manage to figure out how to add dimensions to these figures. Thus the following descriptions:

Figure A

I imagine the box to be concrete of suitable strength to support the weight of water above it when the pond is full. The outlet is on the left and it would exactly match the current diameter of the culvert currently below the dam with the box placed as close to the culvert as possible. The standpipe is on the right and I would leave an opening on the south side of the pipe so that it always will accept overflow, once above a chosen height, so that the top of the box may be buried with 30 or 40 cms or so of soil. That opening could taper so it is more open at the top, similar to the fixed structure at the golf course on Highway 5 about 1.5 kms west of Highway 6 at Clappison's Corners. The standpipe ought to be the same diameter as the current one in place now and be shielded as it is now, but the shielding should increase to include the slit. The reason I have put the opening at the south is so that any detritus that is washed up against the structure may be removed without working over the stream entrance. This also forces the flow in a reverse direction to normal inflow so combats momentum in the flow pattern. I suggest the stream entrance be of suitable diameter to include the normal flow for a 2.5 to 3.5 cm /24 hour rain event. I suggest that this inlet be a u trough to attempt to prevent sediment washing in straight from the pond bottom. Such a shape would allow for the fabrication and placement of a trash gate that could go to the bottom of the trough and both sides as well. Otherwise a 45 degree slant top catch basin could be put on top of the U tube and the grate fabricated accordingly.

Figure B

This figure shows the side view of Figure A and illustrates that the bottom of the inlet is the same as the bottom of the outlet. This would mean that fish could move from below the culvert opening at low flow to the stream above the catch basin and have access to the above berm territory with fair ease. The blue rectangle in the standpipe indicates an opening in the circle of the standpipe. I do not think this ought to be too difficult to get since I see all sorts of holes in concrete pieces from J.D. Oakes that are on construction sites.

My reasons for this suggestion is twofold. Firstly, I believed that your main priority was to reduce liability, particularly a failure of the dam in an abnormal weather event. At the same time, I believe that there is a liability exposure to letting the watercourse run through this berm without maintaining the energy balance that now exists because this berm has been here for at least 145 years and there is building and road engineering on or near Oxford Road 6 based on the momentum of the flow as it is now with the berm in place. In my estimation, the momentum of this creek starts again at the base of the berm because the spillway overflow meets the stream at about 90 degrees now, the momentum (M) (M = mv, where M is momentum, m is mass and v is velocity, a directed distance) approaches 0 because the velocity in the stream direction approaches 0. Any water coming from the standpipe also has low momentum because the velocity of that flow is perpendicular to the flow in the culvert and is only propelled by the hydraulic head of the water in the standpipe and air pressure above that column if the pond level is above the standpipe. Acres has said their calculated flow from their simulation is 9.4 m^3 /sec under the culvert on Road 84. The momentum of that flow is taken out by the effects of the mass of the water in the pond, and the lack of fall that remains once there is a pond surface in place. Thus, the velocity of the

water going into the standpipe is low and in any event, the velocity of the resulting current in the pond is at right angles to the flow in the standpipe so Momentum approaches 0 again.

Whatever the design is for the streambed in the current pond basin, there are two main problems to overcome. The first is to control the acceleration that will occur across this 200 m and the second is to control the momentum as well. Meanders will do this for normal flow but the difference in flow from normal to the 50 year event or more is what has to be considered. In my estimation, that you consider the 100 year storm as a base for much of your work and the 250 year storm in the simulation work that you do, the standard of a 50 year snow melt (with decreasing snow falls but increasing variability and magnitude in rain events) is poor planning. Regardless of the design of the flood plain, water will go where it has the least resistance. I suspect it will inundate the meander system and begin to erode things as it goes or deposit silt where it can. At that point, it will override the design and cause damage to the plan as designed. I am skeptical that there was any maintenance allowance for this sort of damage in the projections put forward at PIC3.

I believe my suggestion to solve both the liability issues, and the momentum and acceleration problems of a major storm event in a cheaper and more effective option than removing the dam, even after the present overflow has the repairs that the Naylor report proposed for just the spillway. This will reduce the liability of the dam failure to very low levels, because it will allow the berm to dry out and only rewet under significant weather events. The concerns of both Naylor and Acres were that the moisture levels in the dam were approaching the plastic level, and at that point, even the ice on a full pond could move the structure significantly. I have raised this maintenance issue in previous notes to you that I thought the pond level ought to be lowered for the winter to allow the berm to drain. The controlled fill of the pond will offset the momentum and acceleration on the flood flow. Even with a meander system in place for normal flows, I suggest that the damage to that system with a controlled pond fill will be less than without the pond fill.

Secondly, the issue is costs. When it comes to the fish, I have no issues with trying to include a way to have fish able to get through the berm, until the prime purpose of dam removal becomes fish habitat in a 200 m stretch of the creek and the cost approaches $300,000. I have suggested a way fish can move through the berm at low flows, and I am fairly sure they would not be moving through that 200 m when the creek is in flood regardless of the openness of the watercourse. I am sure my suggestion is not in the cost realm of $300,000.00

You mentioned in your letter of Jan 2 this year that the normalizing was to treat all four categories equally. There are some issues that are so overwhelming, they ought not to be treated equally, and that includes liability, costs, cost /benefit result, disease potential, safety for users and I would add water quality, including phosphates. Since all of the criteria in all of the 4 areas were selected subjectively, treating them equally does not really pick the best option, but merely allows for the desired option to be advanced apparently objectively. One cannot get truly objective results from subjective data.

Don Campbell

Figure A

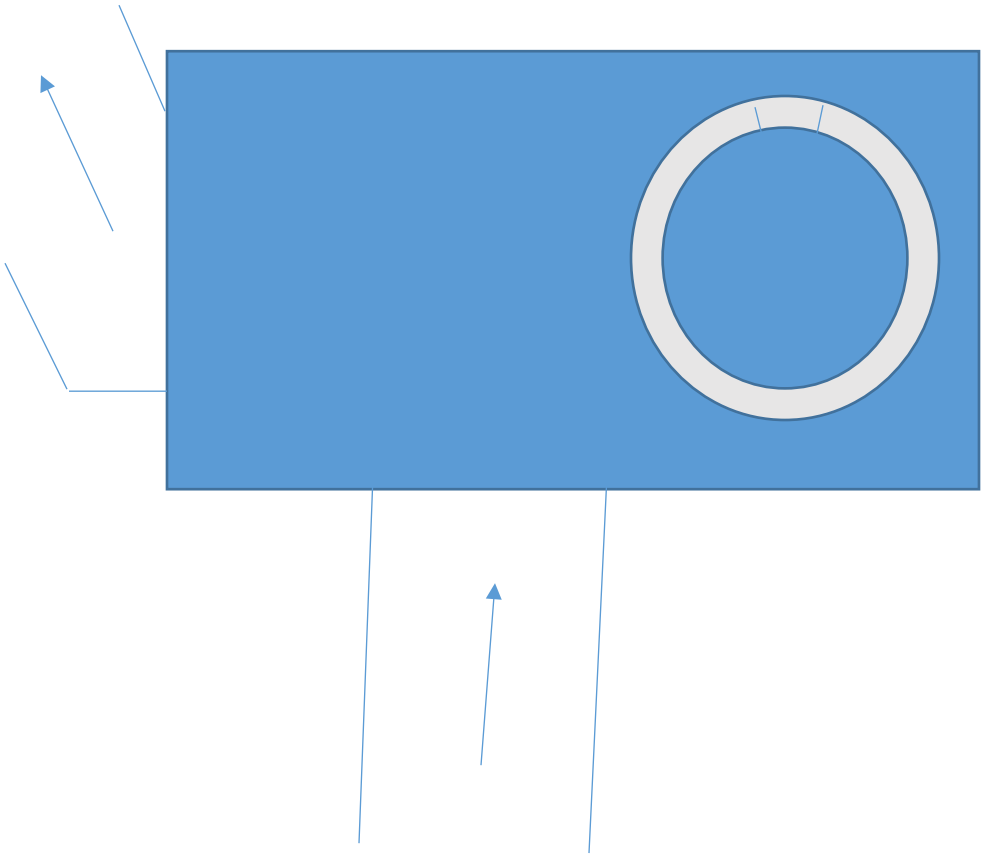
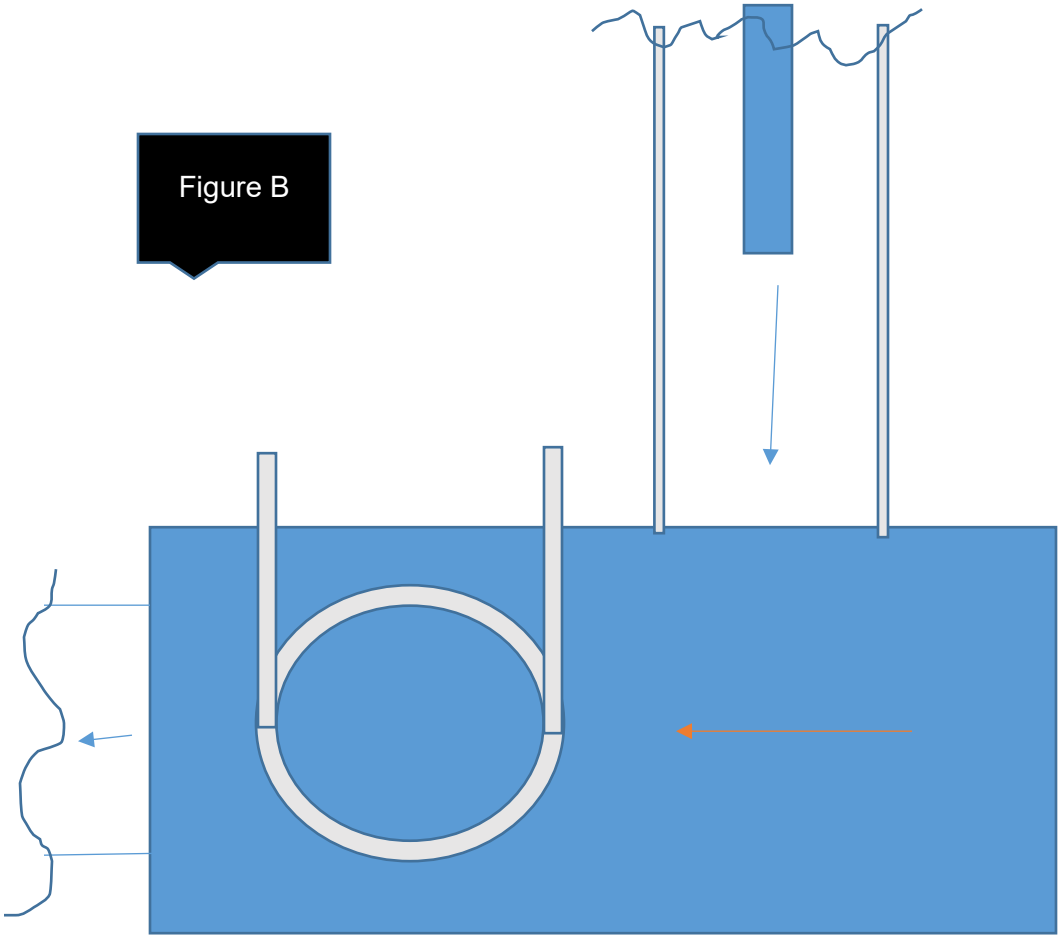


Figure B



Scan me for more info!

Upper Thames River Conservation Authority

Embro Dam
Class Environmental Assessment Continuation

Notice of Public Information Center #4

The Upper Thames River Conservation Authority (UTRCA), through their consultant Matrix Solutions Inc., is continuing work on the Class Environmental Assessment (EA) for the Embro Dam within the Township of Zorra. This work is the continuation of the 2015 Embro Dam Class EA. For more information, please visit: www.bit.ly/3QkrmzA

A fourth Public Information Centre (PIC) is being held to provide information on the project background, current project status, and receive public feedback on the proposed alternatives. The PIC will be an informal open house with presentation boards; project and UTRCA staff will be available to discuss the project with the visitors as they drop in.

Date/ Time

Monday, January 30th, 2023, 4 pm to 7 pm

Location

Embro Zorra Community Centre (EZCC), Small Hall
355644 35th Line, Embro, ON N0J 1J0

The Project Team invites public input and comments which will help inform the planning and design of this project. We will also invite expressions of interest from the interested stakeholders who would like to participate on the Community Liaison Committee during the EA and subsequent design stages. To submit comments, request further information, or to join the project mailing list, please contact:

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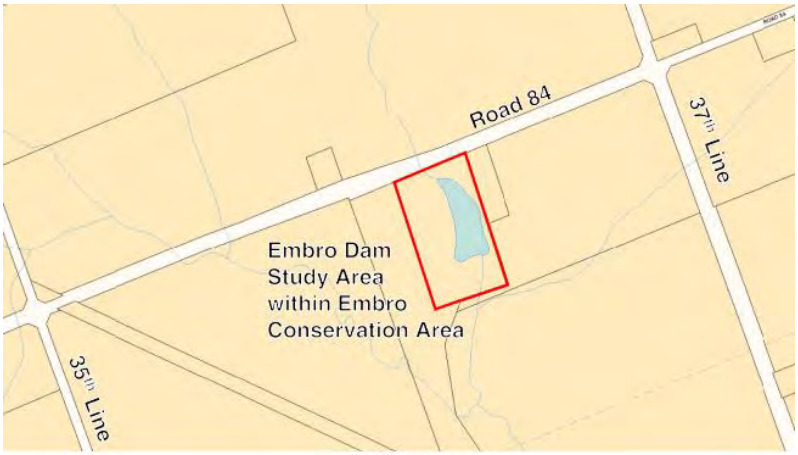


Embro Dam
Class Environmental Assessment

Public Information Centre

UPPER THAMES RIVER
CONSERVATION AUTHORITY

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

STUDY LOCATION

FIRST NATIONS LAND ACKNOWLEDGEMENT

We acknowledge that the land on which we gather is the traditional territory of the Haudenosaunee, Lunaapeewak, and Anishinaabeg peoples who have longstanding relationships to the land, water and region of southwestern Ontario.

This territory is covered by the Upper Canada Treaties, including Treaty 29, the Huron Tract Purchase of 1833.

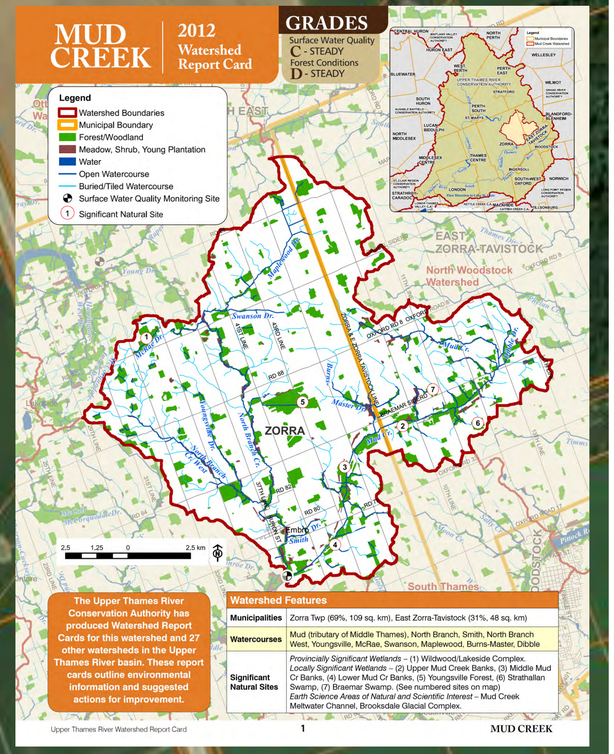
The local First Nation communities of this area include Chippewas of the Thames First Nation; Oneida Nation of the Thames; Munsee-Delaware Nation; Mississaugas of New Credit First Nation; and Six Nations of the Grand (which consists of Mohawk, Cayuga, Seneca, Onondaga, Oneida, and Tuscarora Nations). In the region, there are eleven First Nation communities and a growing Indigenous urban population.

We value the significant historical and contemporary contributions of local and regional First Nations and all of the Original peoples of Turtle Island.

Embro Dam was acquired by UTRCA in 1958 and reconstructed in 1959. The dam is located on Spring Creek, also known as Youngsville Drain, and is a tributary of North Branch Creek.

The dam controls a drainage area of 7 square kilometres of mostly agricultural lands, forming a small reservoir of approximately 0.8 ha with an estimated volume of 3,000 cubic metres.

The dam structure consists of a 100 metre long earthen embankment (4.5 metres approx. height) with a concrete bottom draw inlet with an inverted V-shaped trash-rack anchored to the top of the outlet. An emergency spillway is located on the east embankment.



UPPER THAMES RIVER CONSERVATION AUTHORITY

Public Information Centre
Embro Dam Class Environmental Assessment

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING

STUDY OBJECTIVES AND CLASS ENVIRONMENTAL ASSESSMENT PROCESS

Embro Dam is owned by the UTRCA; however, the Township of Zorra pays 100% of operating costs for the dam due to significant Provincial funding cuts in 1995.

Significant concerns related to the structural integrity and hydraulic capacity of the Embro Dam have been identified through previous engineering assessments.

- ***Acres International. July 2007***. *Dam Safety Assessment Report for Embro Dam. : Upstream and downstream embankment slopes do not meet stability acceptance criteria. Though determined to represent a VERY LOW incremental hazard potential due to small economic, social, and environmental consequences in the event of dam failure, including no loss of life, the discharge capacity of the structure (outlet pipe plus emergency spillway) is inadequate to pass the "inflow design flood" without overtopping the dam structure itself.*

- ***Naylor Engineering Associates. September 2008***. *Geotechnical Investigation Embro Dam Embankment Stability Assessment : The existing dam does not meet current standards and is not considered stable under existing conditions*

UTRCA initiated an Ontario Conservation Class Environmental Assessment Study to review the identified concerns regarding Embro Dam. Findings are used to identify alternatives that would address the concerns (structural integrity and hydraulic capacity of Embro Dam) and to evaluate these with consideration of technical, environmental, social, and economic aspects of the dam and setting.

The study was initiated in 2015 and paused in 2017. In 2022, a cultural heritage assessment and updates to several study components were completed. Updated information will be used, along with public input, to evaluate alternatives.

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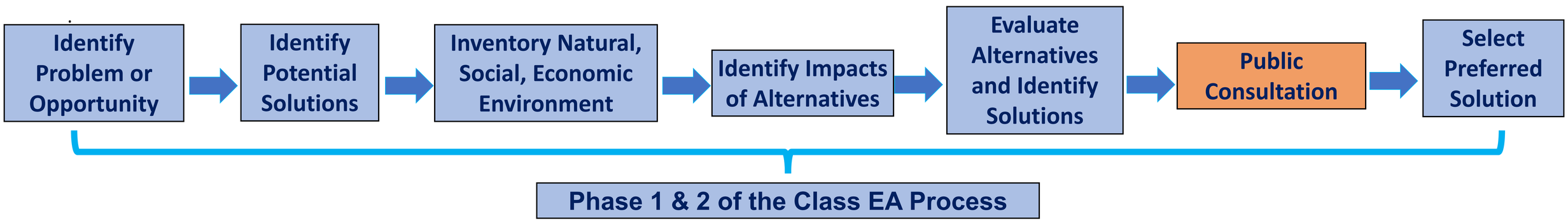


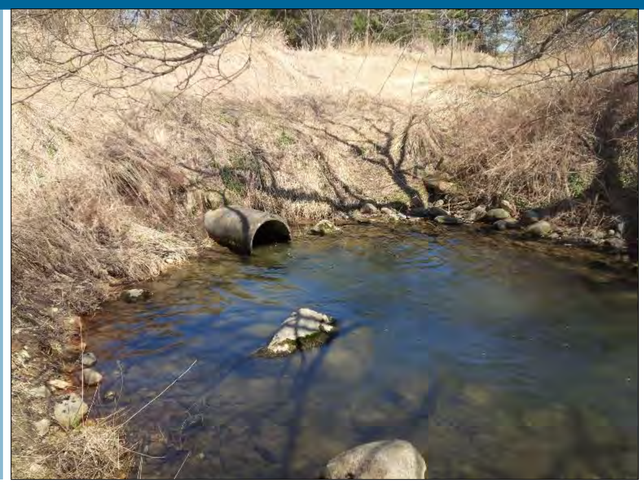
SITE CHARACTERIZATION

Civil Engineering (Dam Structure and Hazard Assessment)

A characterization of the current dam structure was undertaken, including an update of the Dam Hazard Classification, to understand risks to downstream persons and property.

The dam has an impounded volume of 30,000 m^3 and consists of a 100m long earth embankment. Spillway does not have the current capacity for inflow design flood (50-year, 8-day spring snowmelt). Upstream and downstream embankment slopes do not meet slope stability acceptance criteria. Flood flows are not adequately conveyed by the emergency spillway. Date of last repair is unknown.

An updated Hazard Classification was completed for the Embro Dam in 2015: **Threat levels for Life Safety, Property Losses, Environmental Losses, and Cultural-Built Heritage were considered LOW.**



Geotechnical Engineering and Hydrogeology

Geotechnical engineering and hydrogeology considers the stability of the dam embankments and the flow of groundwater through and around the dam (seepage). Characterization of the current dam stability and seepage is critical in developing potential alternatives for the dam, as well as understanding the risks and impacts of various alternatives.

Soil is characterized as fill overlying silt and clay deposits, and native glacial till. Groundwater generally occurs in the fill above the glacial till. Groundwater flow gradient is towards the south side of the pond; a possible seepage zone is located on the south side of the dam. Water level in the fill is ~ 0.4 m below the pond water level. Geotechnical stability assessments have been previously completed and led to the initiation of this study. The existing dam does not meet dam safety guidelines and stability criteria and is not considered stable under existing conditions. No new data collection was completed in 2022

Sediment Quality

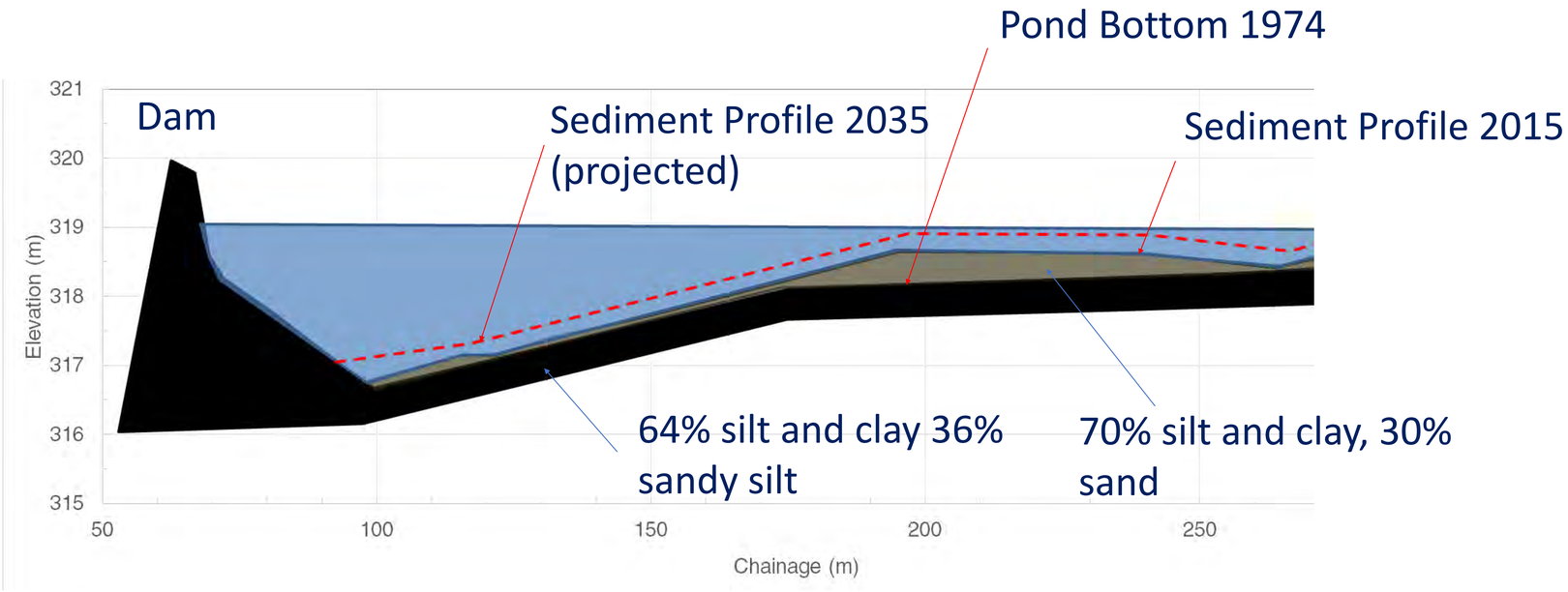
Characterization of the sediment quality in the reservoir involves the collection of sediment samples and analysis at a laboratory to identify a range of constituents of interest (i.e., metals, nutrients, pesticides, hazardous materials).

An understanding of the sediment quality at the site is critical for understanding the potential impacts of proposed alternatives for the dam, particularly related to the costs associated with removal and disposal. In addition, upstream pollutant sources may be identified.

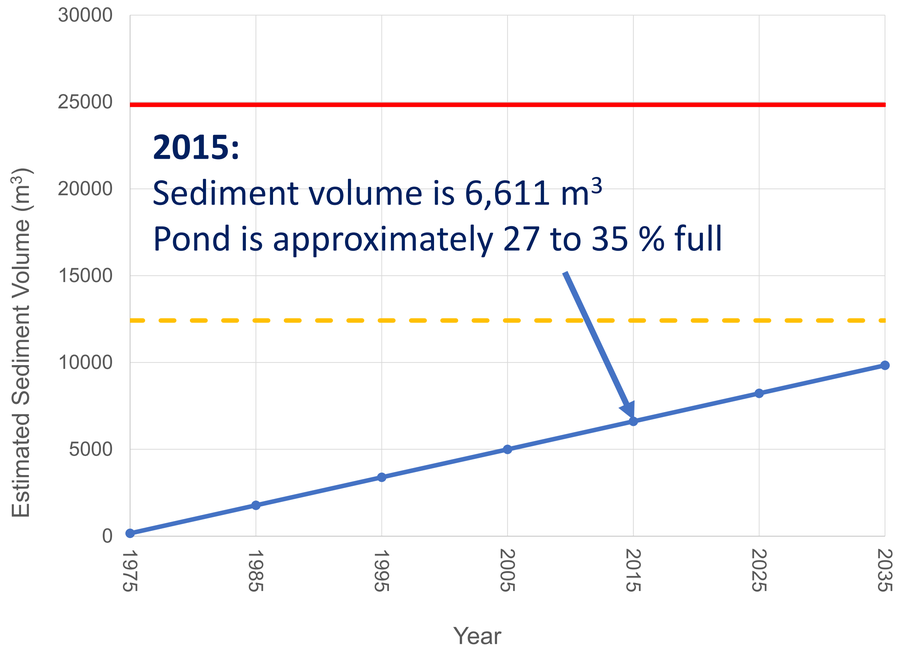
Sediment testing at the reservoir was completed in 2015. Results showed that a single tested parameter (cyanide) showed elevated concentrations as compared to Ministry of Environment standard tables. No further sediment testing was completed in 2022.

Sediment Information Highlights

Sediment Profile



Pond Capacity and Sediment Infilling Rate



100% of the Pond Volume

50% of the Pond Volume

Average sediment accumulation rate = 161 m³/year

UPPER THAMES RIVER CONSERVATION AUTHORITY

Public Information Centre
Embro Dam Class Environmental Assessment

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING

SITE CHARACTERIZATION (CONTINUED)

Aquatic Biology

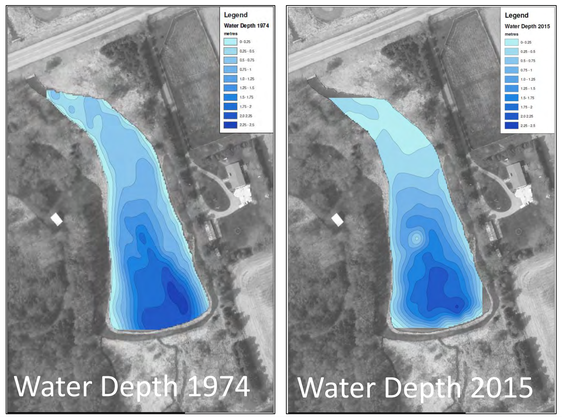
A characterization of aquatic life in the pond, as well as upstream and downstream of the pond was completed in 2015; this included an inventory of fish and benthic macroinvertebrates (bugs). Understanding the aquatic biology is critical to characterize the current impacts of the pond and dam, and potential impacts and opportunities for proposed alternatives.

Aquatic biology surveys completed in 2015 recorded 8 species of fish upstream of the pond, and 21 species downstream. Results from benthic invertebrate surveys rated the Youngsville Drain, upstream and downstream of Embro pond as having “fairly poor” water quality. No new aquatic biology data collection was completed in 2022.

Youngsville Drain was a key donor site for Brook Trout in 2010 for the Upper Thames Region CA brook trout stocking program. Fish stocking was conducted due to the estimated 70-80 percent population decline of Brook Trout in Southern Ontario and the sensitivity of the species. Due to its healthy brook trout population, the Youngsville Drain is critical to the conservation of Brook Trout for the Upper Thames watershed.

Brook Trout

Image Source: Mandrak and Crossman, 1992



Topographic and Bathymetric Survey of Pond

A topographic survey and bathymetric survey of the pond was completed, using GPS and total station, to establish physical constraints on potential alternatives for the dam and pond, as well as to develop concept designs. Survey was completed in 2015; no new survey data collection was completed in 2022.

The dam forms a reservoir of approximately 0.5 ha (length of ~ 190 m) with an estimated volume of 30,000 m^3. The dam has a height of approximately 4.5 m and freeboard of 1.1 m. Bathymetric surveys of Embro Pond showed that approximately 27-35% of the available pond volume has filled with sediment. The pond will continue to retain sediment transported from upstream drainage areas and require periodic dredging to maintain functional and aesthetic qualities.

Water Quality

Water quality sampling at the site involves collection of water samples during dry weather and wet weather conditions, at locations upstream and downstream of the dam, as well as within the pond. This provides insight to the impact of the current dam and pond on the watercourse, specifically on the ability of the watercourse to support aquatic life.

Water quality samples from 2015 showed the watercourse was within the range typically found in the Thames River watershed. The least, average, and maximum temperature differences from upstream to downstream were plus 0°C, 2.5°C, and 7.0°C respectively. No new water quality data collection was completed in 2022.

SITE CHARACTERIZATION (CONTINUED)

Hydrology

Hydrologic characterization of the site includes monitoring and rating of river flows upstream and downstream of the dam. An understanding of the site hydrology is required to inform the operational parameters so that potential alternatives can be generated, and to inform numerous other technical disciplines such as aquatic biology, water quality, and fluvial geomorphology.

Upstream drainage area to the Embro dam is 7 km^2. Based on monitoring undertaken in 2011, 2012, and 2015, Youngsville Drain contributes 3.5%, 12.4%, and 6.4% respectively, of the total flow measured downstream of Thamesford. It is predicted that Youngsville Drain has a high resiliency to drought/ low flow conditions due to geological and hydrogeological conditions.

Terrestrial Biology

The terrestrial biology of the site includes the range of vegetative and wildlife species that inhabit the site, as well as connectivity to adjacent natural areas and the significance of species found on site (i.e., Species at Risk, Endangered Species).

Understanding of the terrestrial biology of the site is required to establish and characterize the impacts of alternatives for the dam, and to recommend restoration and enhancement strategies for the site.

Terrestrial biology surveys were completed in 2015 and indicated that there are no sensitive plants, plant communities, birds or wildlife that would be threatened from changes to the environment in Embro Conservation Area. Results from a survey completed in 2022 indicated confirmed or candidate Species at Risk (SAR) see next board (Terrestrial Ecology – SAR Screening)

Social

The Embro Dam and pond are located within the Embro Conservation Area. The dam was built in the late 1950's and the Embro Conservation Area officially opened on October 26, 1959. Currently the Embro Conservation area (11.7 ha) is used for passive recreation and includes hiking trails, cross country skiing trails and picnic areas.

In July 2015, a "Memorial Tree Sign" was unveiled within the Embro CA. In a program run through the Township of Zorra, memorial trees purchased through UTRCA may be planted within the Conservation Area. About six memorial trees have been planted in the Embro CA in previous years.

SITE CHARACTERIZATION UPDATES

Fluvial Geomorphology

Fluvial geomorphology aims to understand the processes and functions of rivers and creeks, and their role in transporting sediment and providing habitat for aquatic life.

An understanding of the natural watercourse function around the pond is important to characterize impacts of potential alternatives, as well as the current impact of the pond and dam on river processes.

The geomorphic characterization was completed in 2016. A second visit was completed in November 2022 to revise and update existing conditions

Results of the 2022 investigation show that the channel downstream of Embro Dam is degrading, with increased width and depth when compared to the initial assessment.

Upstream of the road, the channel was reclassified as aggrading, with large deposits of fine sediment observed due to the backwater conditions created by the dam.

2015

Downstream of Dam

Looking Upstream from pond at Rd 84

Looking Upstream from Rd 84

2022

Looking Upstream from pond at Rd 84

Looking Upstream from Rd 84

Terrestrial Ecology – SAR Screening

A Species at Risk (SAR) Screening was completed using the information collected in 2015, as well as a reconnaissance level site visit completed in 2022, to assess the availability of SAR habitat within the study area.

Species listed as either Threatened (THR) or Endangered (END), as well as their habitat, are protected under the *Endangered Species Act (ESA)*. Species listed as Special Concern (SC) are not protected under the ESA; however, are protected under the Provincial Policy Statement and considered Species of Conservation Concern (SOCC) and Significant Wildlife Habitat (SWH).

Confirmed SAR: Barn Swallow (Hirundo rustica) (THR) was observed foraging

Candidate SAR: SAR Bats (END) Cavity trees were observed within the treed vegetation communities and may provide suitable habitat.

Confirmed SOCC: Snapping Turtle (Chelydra serpentina) (SC) was observed within the pond. Eastern Wood-Pewee (*Contopus virens*) (SC) was observed during breeding bird surveys completed in 2015, and Monarch (*Danaus plexippus*) was observed in 2015 within the study area.

ARCHAEOLOGICAL AND CULTURAL ASSESSMENTS

TMHC has completed a **Stage 1 Archaeological Assessment** and a **Cultural Heritage Assessment** for the site. Findings of the studies include the following:

Archaeological Assessment

A Stage 1 Archaeological Assessment was conducted in order to determine the archaeological potential of the study area; this includes identification of previously known archaeological sites, if any, and to provide recommendations for further assessment if necessary.

There was no prior archaeological assessments within 50m of the study area. There was no prior identified archaeological sites within 1 km of the study area. Archeological potential was assessed using soils, hydrology, and landform considerations.

The existing condition of the study site has a reduced archaeological potential due to sloped lands greater than 20 degrees, permanently wet lands, and extensive land alterations. In terms of archaeological potential, the Embro Dam study area is characterized by 2.09 ha (66.8% of study area) of archaeological potential and 1.05 ha (33.2% of study area) of land identified as areas of no archaeological potential.

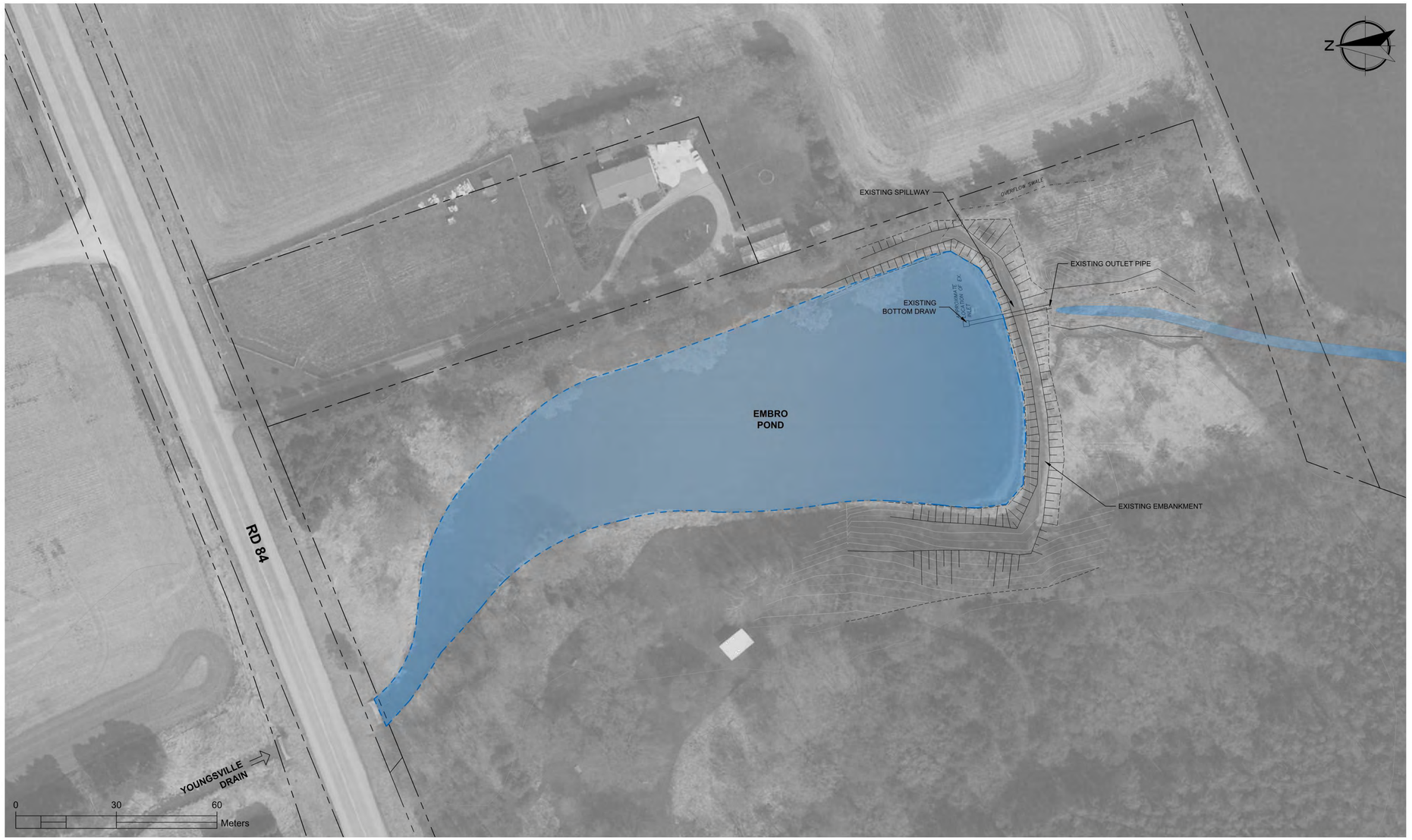
Cultural Heritage Assessment

As a result of public consultation in 2016, a Cultural Heritage Assessment was completed for the Embro Dam and pond.

A review of historical documents shows a pond and grist mill had existed in the area, these features have since been removed and are not visible on current site. The pond and dam at the study site had been constructed in the late 1950's to serve as a water supply and to serve as a recreational area within the newly established Embro Pond Conservation Area. Due to the recent construction of the Embro Dam and pond, and the lack of historic structures, cultural or visual significance, the Embro Dam was found to not meet the O.Reg 9/06 Cr and therefore is not considered a landmark.

ALTERNATIVE #1 – DO NOTHING

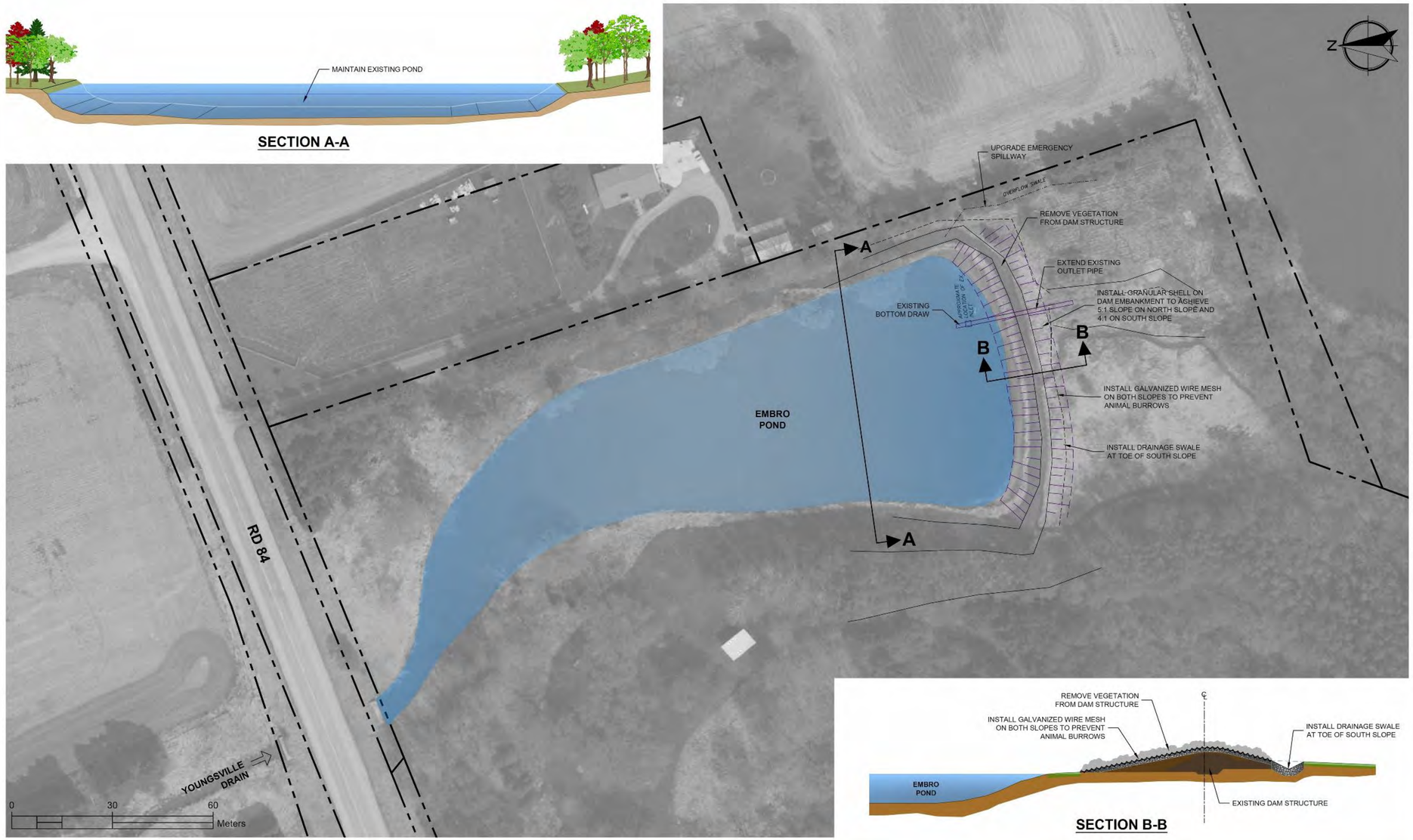
No intervention would be implemented



Advantages	Disadvantages
No immediate cost	Does not meet dam safety guidelines
Maintains current aesthetic	Has a risk of failure – this can impact the channel by flood, erosion and sediment and downstream private landowner
Maintains current area uses	Requires regular monitoring
Maintains habitat functions	Imposes an impediment to upstream fish passage and causes habitat fragmentation
	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport
	Will require future maintenance/cost
	Requires vigilance with respect to potential failure and emergency preparedness

ALTERNATIVE #2 - REPAIR/ RECONSTRUCT EXISING DAM

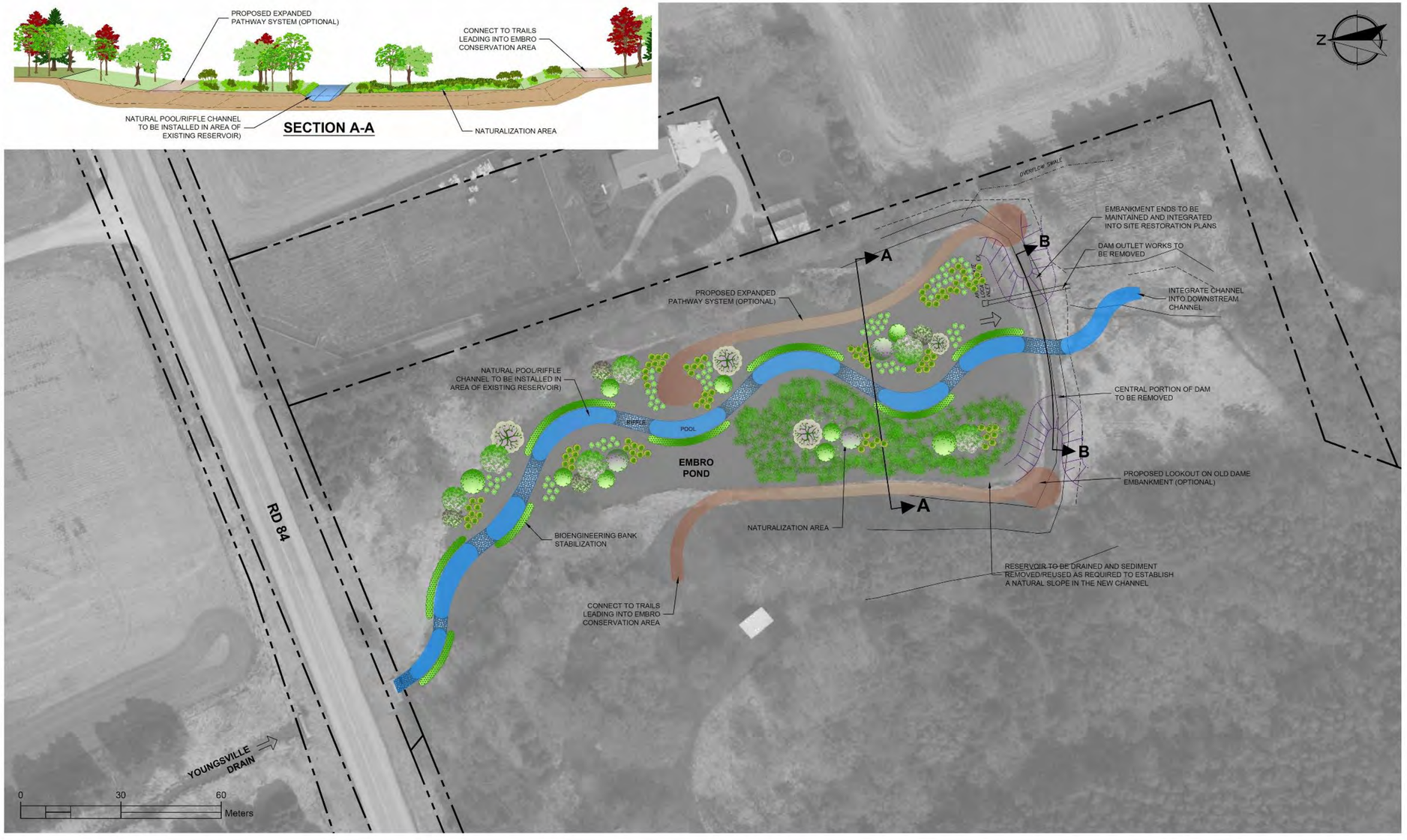
Construct Dam ‘Shell’, add rock protection, extend outlet pipe, provide emergency spillway



Advantages	Disadvantages
Complies with Dam Safety Guidelines	Moderate cost
Reduces risk of flooding to downstream private landowner	Continued operation and maintenance costs
Maintains current area uses	Imposes an impediment to fish passage and causes aquatic habitat fragmentation
Maintains current aesthetic and habitat functions	Increases water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport continuity

ALTERNATIVE #3 – REMOVE DAM AND CONSTRUCT NATURAL CHANNEL

Remove Dam, construct natural channel, provide landscape restoration



Advantages	Disadvantages
Removes risk of dam failure/ flooding	Imposes restoration costs (high)
Minimizes long-term operational costs	Does not reflect existing aesthetic (open water)
Provides recreational and educational potential	Has the risk of impacting shallow wells
Restores area to naturalized conditions and provides diverse fish habitat	Removes pond habitat
Enables sediment transport continuity	
Improves creek water temperature	
Provides access to an additional 2,460 m of channel habitat for downstream fish (e.g., Brook Trout), or approximately 8 times the current fish accessible length (300m) within Youngsville Drain for downstream fish.	

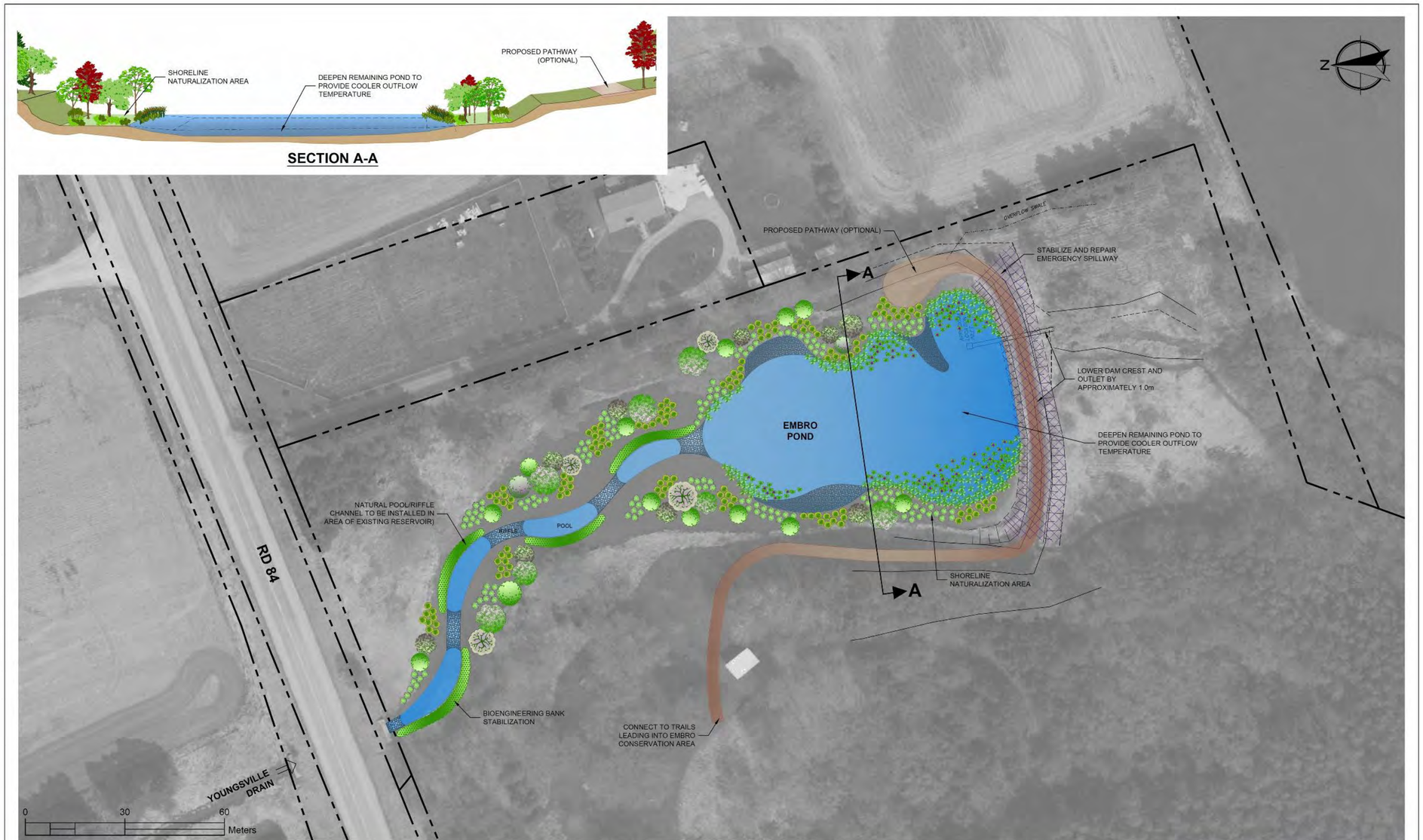
ALTERNATIVE #4 – REMOVE DAM AND CONSTRUCT OFFLINE POND(S) OR WETLAND(S)

Remove Dam, construct offline pond with less surface area as existing, create natural channel, provide landscaping

Advantages	Disadvantages
Minimizes long-term operational costs	Imposes restoration costs (very high)
Removes risk of dam failure/ flooding	Reduces pond surface area (water views)
Increases diversity in area (visual) and opportunity for educational signage	
Improves creek water temperatures	
Provides open water/pond habitat and diversity of aquatic habitat	
Provides access to an additional 2,460 m of channel habitat for downstream fish (e.g., Brook Trout), or approximately 8 times the current fish accessible length (300m) within Youngsville Drain for downstream fish.	
Enables sediment transport continuity	

ALTERNATIVE #5 – LOWER DAM CREST AND OUTLET AND NATURALIZE NEW POND PERIMETER

Lowers height of dam, provided less surface area as existing, create natural channel, provides landscape enhancements



Advantages	Disadvantages
Reduces magnitude of potential impacts in the event of breach/failure	Imposes restoration costs (high)
Partially maintains current aesthetic	Continued operation and maintenance costs
Provides diversity in landscape	Reduces pond surface area (water views)
Maintains pond habitat	Imposes an impediment to fish passage
Reduces solar heat gain compared to existing	Increases in water temperatures seasonally
	Accumulates sediment, will fill over time
	Impedes sediment transport

ALTERNATIVE CRITERIA AND EVALUATION

Each option is evaluated based on its technical effectiveness, environmental impact, socio-economic impact, and cost.

This alternative evaluation system ranks the proposed alternatives from least impactful (most preferred) (1) to most impactful (least preferred)(5).

Technical/Engineering	Natural Environment
Flooding Impacts/Enhancement Protection of Infrastructure Constructability Implementability Approvability	Aquatic Habitat Impacts/Enhancement Pond Habitat Impacts/Enhancement Terrestrial Habitat Impacts/Enhancement SAR Impacts/Enhancement Geomorphology/Sediment Transport Groundwater Impacts/Enhancement Water Quality Impacts/Enhancement

Social/Cultural	Economic
Impact to Private Property Impact to Public Safety Impact to Public Access Impact to Cultural/Heritage Features Recreational Impacts/Enhancement	Construction Costs Maintenance/Future Costs Availability of Funding

Scan me for more info!

Next Steps and Contact Information

- **Compile and review feedback from this Public Information Centre**
- **Complete ranking of criteria for each alternative based on updated study findings and public input**
- **Complete Project File report and submit to MECP for review and approval**
- **Establish community liaison committee**
- **Complete technical studies in support of detailed design for the preferred alternative**
- **Obtain regulatory agency approvals**

To provide feedback and comments to the project team, please send all correspondence to the project email address:

singhs@thamesriver.on.ca

For further information please contact:

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UPPER THAMES RIVER CONSERVATION AUTHORITY

Public Information Centre

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING

Class Environmental Assessment – Embro Dam

Public Input Form

The Class Environmental Assessment (EA) was initiated to address the concerns regarding spillway capacity and embankments' stability of the Embro Dam, which were identified as part of the Dam Safety Assessment (Acres, 2007). Potential alternatives will be identified and evaluated through the study to address the concerns.

The EA is being undertaken under the Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects document (June 2013). Any feedback and comments received will become a part of the public record for the project. Please provide your input below:

Criteria Weighting

The Environmental Assessment process requires alternatives to be evaluated based on four categories of criteria. The sum of weight of each category must add up to 100%. Given the project purpose and site considerations, what do you think is a fair weighting for each category (Note: no category can be assigned zero percentage)?

Criteria Category	**Weight (%)**
Technical Feasibility	
Natural Environment	
Social/Cultural Environment	
Economic	
Sum	**100**

Alternatives

Considering the evaluation criteria required to be assessed through the Environmental Assessment process, what I like and/or dislike about each alternative for the Embro Dam is as follows:

Alternative 1 – Do Nothing

Alternative 2 – Repair Dam

Alternative 3 – Remove Dam and Construct a Natural Channel

Alternative 4 – Remove Dam and Construct Offline Pond(s) or Wetland(s)

Alternative 5 – Lower Dam Crest and Outlet and Naturalize New Pond Perimeter

Alternative Evaluation

Each of the alternatives will be evaluated by ranking a set of criteria that were selected, based on requirements of the Conservation Ontario Class Environmental Assessment process. A numerical ranking system is used to evaluate the criteria of each alternatives with respect to improvements compared to existing conditions that will enable the problem statement to be addressed. A rank of 1 denotes least positive impact and 5 denotes a most positive impact. Two alternatives may receive the same ranking for a criteria if both are considered to be similar with respect to relative positive impact. If you would like to complete a ranking of the criteria, for each alternative – please complete the attached table.

General Comments:

Other things that have not been discussed but which the study team should consider?

Community Liaison Committee Participation

UTRCA is seeking expressions of interest from *interested persons, interest groups, Aboriginal communities or agencies* to be a part of a Community Liaison Committee (CLC). The purpose of CLC is to obtain additional *public input* concerning the planning and design process of the project, and to review information and provide input to the Conservation Authority throughout the process. Please check the following box if you are interested in being a part of CLC:

☐ Yes, I'm Interested

Please print your name and contact information below, and leave your completed Public Input Form at the front desk. You may also email your comments to singhs@thamesriver.on.ca.

Name: _____

Address & Postal Code: _____

E-mail Address: _____

Phone _____

Please submit comments by February 13, 2023

Thank you for your participation.

For further Information, or to join the project mailing list, please contact:

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Personal information on this form is collected under the authority of the Conservation Authorities Act and will be used for the purposes of the Embro Dam Class EA only. Questions about the collection of personal information should be directed to: General Manager, Upper Thames River Conservation Authority, 1424 Clarke Rd., London, Ontario. N5V 5B9 (519) 451-2800.

Embro CA Dam EA Evaluation Matrix

Scoring: See Notes

Criteria	Description	Alternative 1 Do Nothing	Alternative 2 Repair Dam	Alternative 3 Remove Dam and Construct a Natural Channel	Alternative 4 Remove Dam and Construct Offline Pond(s) or Wetland(s)	Alternative 5 Lower Dam Crest and Outlet and Naturalize New Pond Perimeter
TECHNICAL/ENGINEERING						
Flooding Impacts/Enhancement	Effectiveness of the alternative to manage or reduce flooding, or not cause negative impacts to flooding					
Dam Safety/Integrity	Effectiveness of the alternative to address dam safety requirements, reduce risk of failure					
Protection of Properties	Effectiveness of the alternative in mitigating risk (flooding, failure) to adjacent properties					
Constructability	Potential to construct the project using conventional, accepted construction and engineering practices					
Implementability	Potential to implement the alternative, based on common accepted management practise					
Approvability	Potential for regulatory agencies to grant approval for implementation					
	TOTAL CATEGORY SCORE					
	NORMALIZED CATEGORY SCORE (X% WEIGHTING)					
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)					
NATURAL ENVIRONMENT						
Aquatic (Creek) Habitat Impacts/Enhancement	Effectiveness of the alternative to enhance fisheries resources; fish diversity, food source, and fish passage					
Aquatic (Pond) habitat Impacts/Enhancements	Effectiveness of the alternative to enhance pond habitat (fish, fowl, wildlife) resources, diversity, food source					
Terrestrial Habitat Impacts/Enhancement	Potential for impact and/or enhancement to connectivity and terrestrial habitat (amphibian, avian, mammal) due to implementation of the alternative					
SAR Impacts/Enhancement	Potential for impact and/or enhancement to potential SAR in the project area					
Geomorphology/Sediment Transport	Effectiveness of the alternative to promote dynamic stability of channel processes and mitigate sediment impacts					
Groundwater Impacts/Enhancement	Potential for impact and/or enhancement to groundwater regimes in the project area (baseflow, recharge, water table, etc.)					
Water Quality Impacts/Enhancement	Effectiveness of the alternative to improve water quality, temperature, TSS, phosphorous, nutrient uptake					
	TOTAL CATEGORY SCORE					
	NORMALIZED CATEGORY SCORE (X% WEIGHTING)					
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)					
SOCIAL / CULTURAL ENVIRONMENT						
Impact to Private Property	Measure of the impact to adjacent private property (i.e., loss of property, access to property)					
Impact to Public Access	Measure of impact to public access (e.g., trails, recreation - picnic, fish, boat)					
Impact to Public Safety	Measure of the impact to public safety in the surrounding area resulting from the alternative					
Impact to Cultural/Heritage Features	Potential impact to existing cultural and/or heritage features in the project area					
Recreational Impacts/Enhancement	Measure of the impact to existing recreation and opportunities to enhance recreational activities in the project area					
	TOTAL CATEGORY SCORE					
	NORMALIZED CATEGORY SCORE (X% WEIGHTING)					
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)					

Embro CA Dam EA Evaluation Matrix

Scoring: See Notes

Criteria	Description	Alternative 1 Do Nothing	Alternative 2 Repair Dam	Alternative 3 Remove Dam and Construct a Natural Channel	Alternative 4 Remove Dam and Construct Offline Pond(s) or Wetland(s)	Alternative 5 Lower Dam Crest and Outlet and Naturalize New Pond Perimeter
ECONOMIC						
Construction Costs	Relative measure of the initial costs to install/construct the proposed works, including environmental mitigation, sediment management, etc.)					
Maintenance/Future Costs	Relative measure of the ongoing maintenance costs following implementation (or continued maintenance)					
Availability of Funding	Estimate of the availability for funding to implement the alternative					
	TOTAL CATEGORY SCORE					
	NORMALIZED CATEGORY SCORE (X% WEIGHTING)					
	CATEGORY RANKING (1 = most preferred; 5 = least preferred)					
	OVERALL NORMALIZED CATEGORY SCORE (100% WEIGHTING)					
	PREFERRED OVERALL RANKING (1 = most preferred; 5 = least preferred)					

Notes: Scoring ranks alternatives in their potential to address the criteria from a least positive to a most positive impact, 1 being the least positive and 5 being the most positive

The alternatives presented are envisioned as improvements to the existing conditions which are anticipated to address the problem statement

Negative impacts which may be involved in some alternatives, such as site disturbance, are temporary and are seen as mitigatable impacts