Harrington Dam
Class Environmental Assessment
Public Information Centre #3

Upper Thames River Conservation Authority
Harrington Hall and Library
October 20th, 2016 7:00 p.m. to 9:00 p.m.

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Overview

- Impetus of Project
- Class EA process
- Evaluation process
- Harrington dam evaluation
- Preferred alternative
- Impacts and mitigation
- Next Steps

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Introduction and Background

- Dam built in 1846
- UTRCA acquired dam in 1952
- Significant concerns related to the hydraulic capacity of Harrington dam, insufficient spillway capacity, spillway instability, and embankment instability
  - *Acres International. July, 2007.*
  - *Naylor Engineering Associates. September 2008.*

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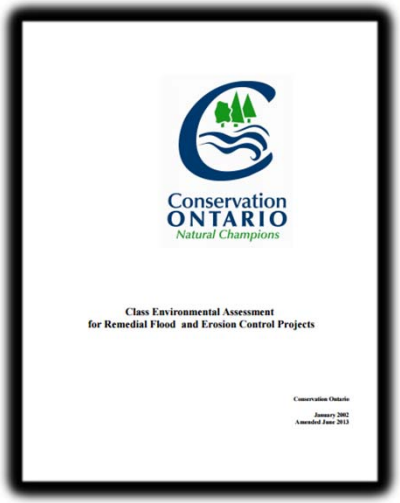
Study Process

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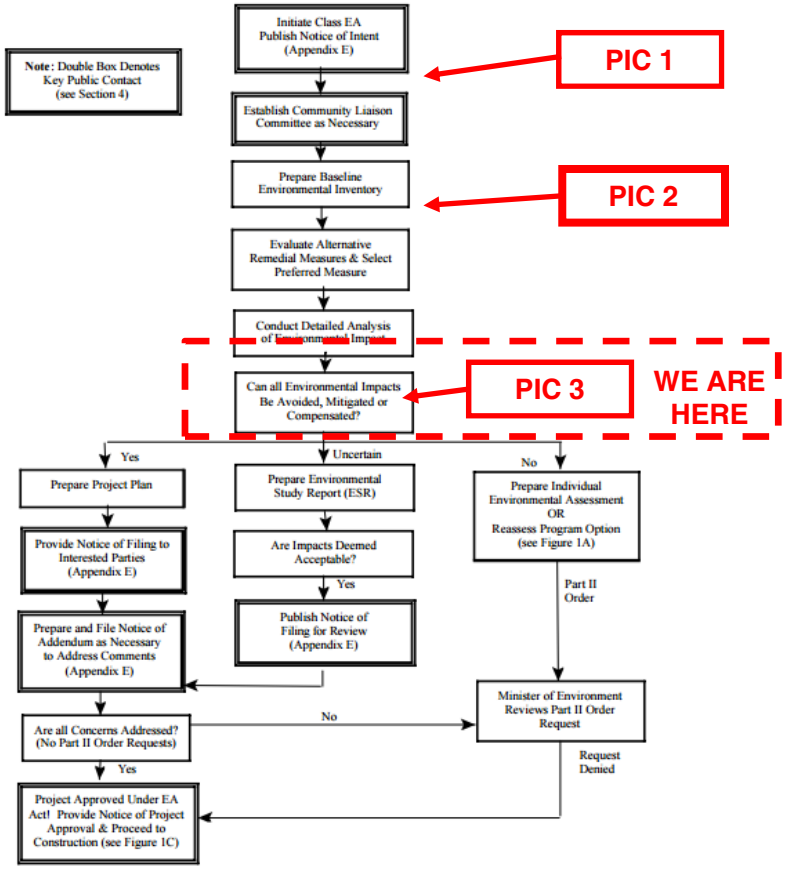
Class EA Process for Conservation Ontario (Remedial Flood and Erosion Control Works)

- 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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Class EA Process

- Problem identification/confirmation – PIC 1
- Baseline Inventory – PIC 2
  - Background review, field studies
- Alternative Identification _ PIC 2
  - Methods that can be used to address problem, mitigate impacts
- Alternative Evaluation – PIC 3
- Preferred Alternative – PIC 3
  - To mitigate/resolve the problem
  - Incorporate any feedback

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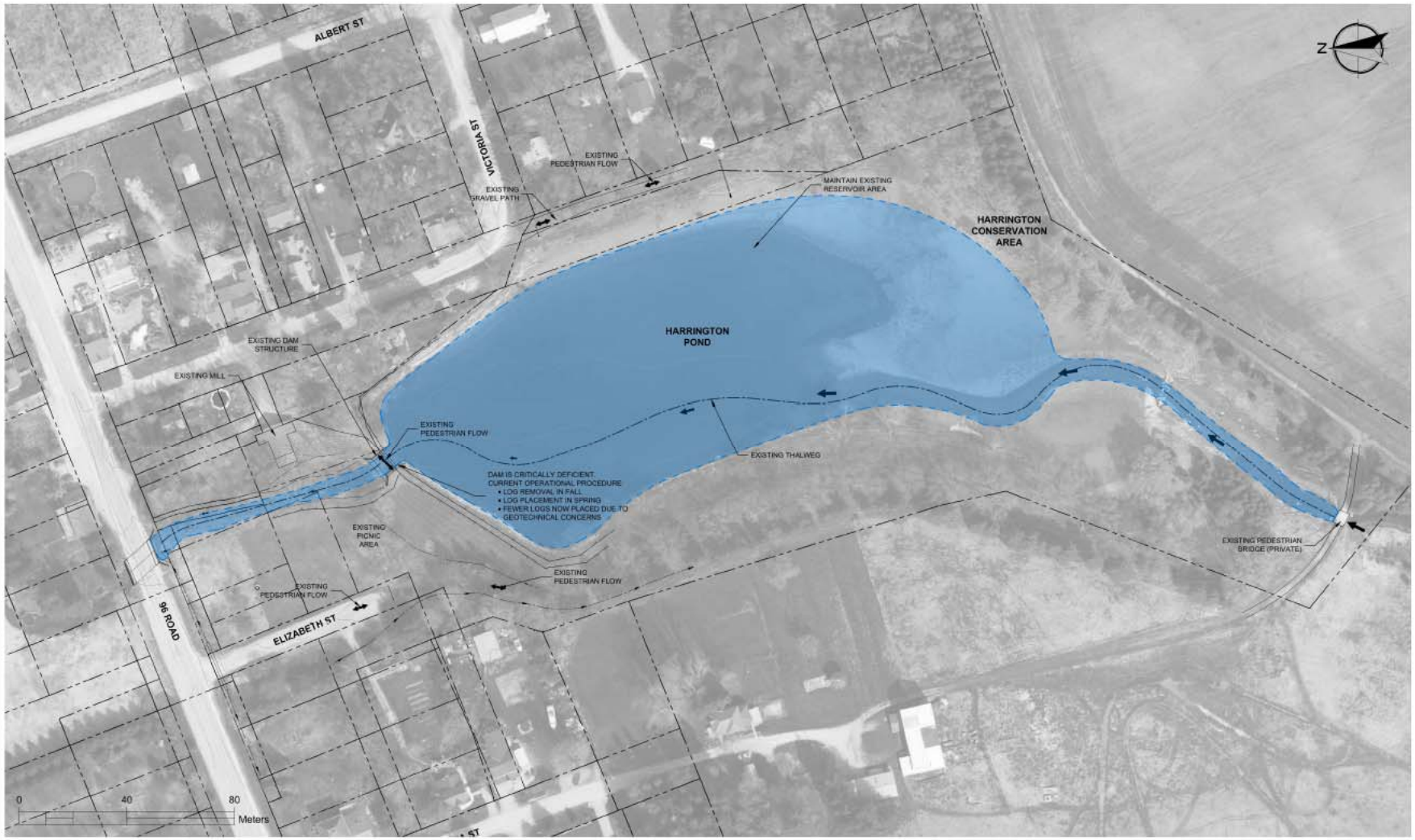
Alternatives

1) Do Nothing
2) Remove Dam and Install a Rocky Ramp
3) Remove Dam and Construct a Natural Channel
4) Remove Dam and Construct an Offline Pond and Natural Channel
5) Replace the Dam with a New Structure Downstream of the Existing Dam Location
6) Replace the Dam with an Earthen Dam of Lower Crest Elevation
7) Reconstruct the Existing Dam in Current Location with New Materials

Alternative 1 – Do Nothing



HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 1 - DO NOTHING

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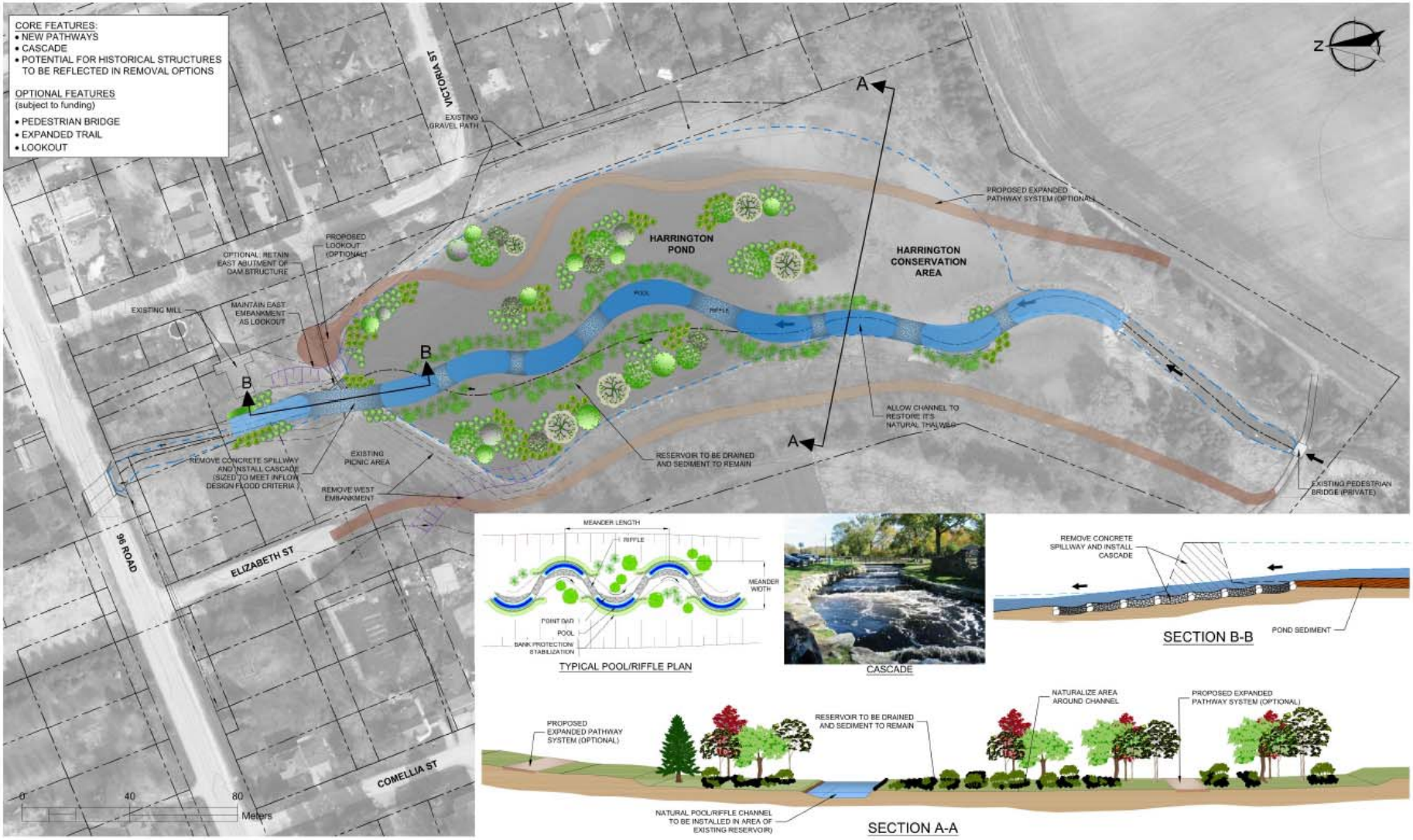
FIGURE 5-1

Alternative 2 – Remove Dam, Install Ramp



HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 2 - REMOVE DAM AND INSTALL ROCKY RAMP

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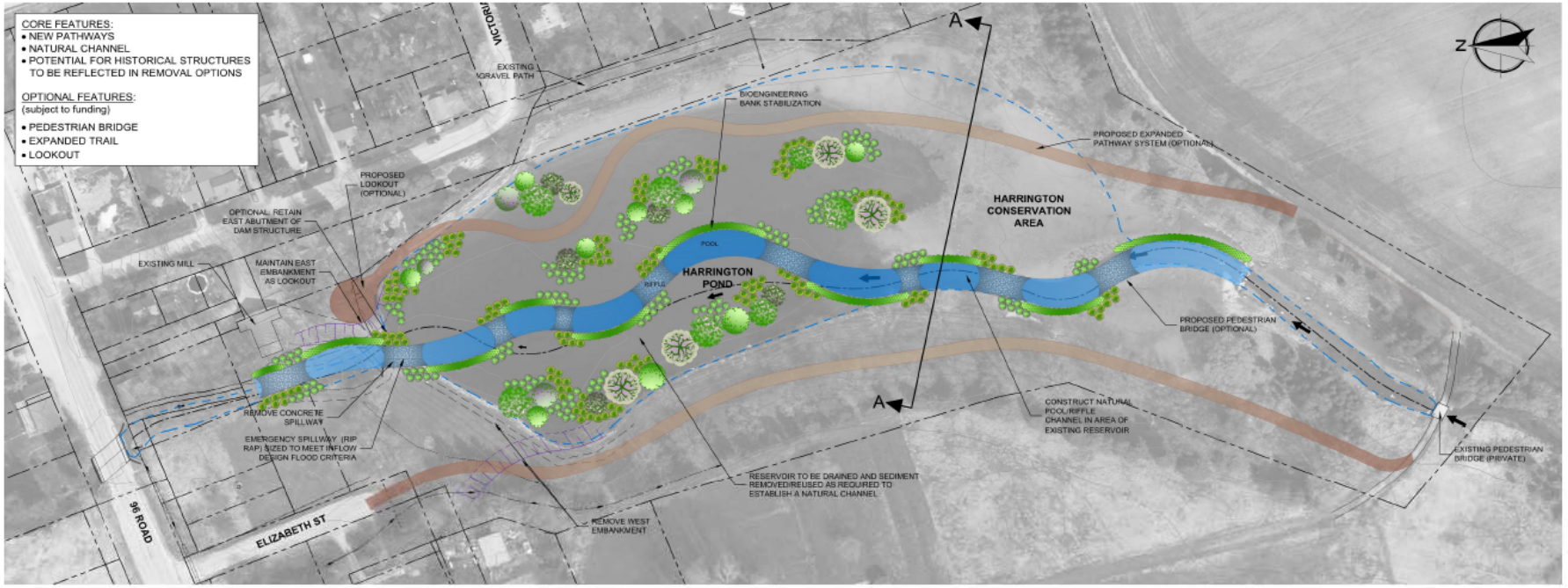
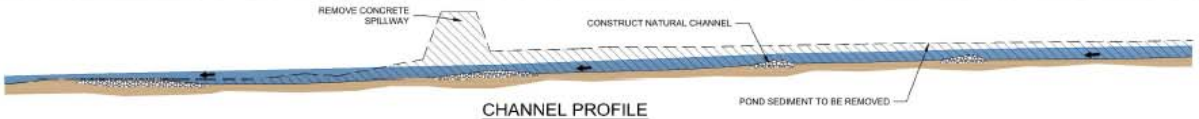
FIGURE 5-2

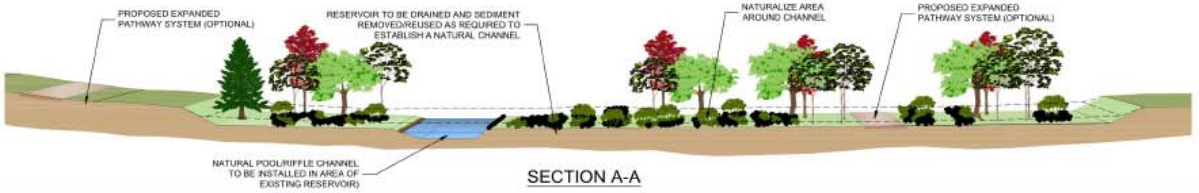
Alternative 3 – Remove Dam, Natural Channel



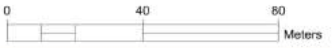
REALIGNED CREEK



CHANNEL PROFILE



SECTION A-A



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ALTERNATIVE 3 - NATURAL CHANNEL
REMOVE DAM AND CONSTRUCT NATURAL CHANNEL

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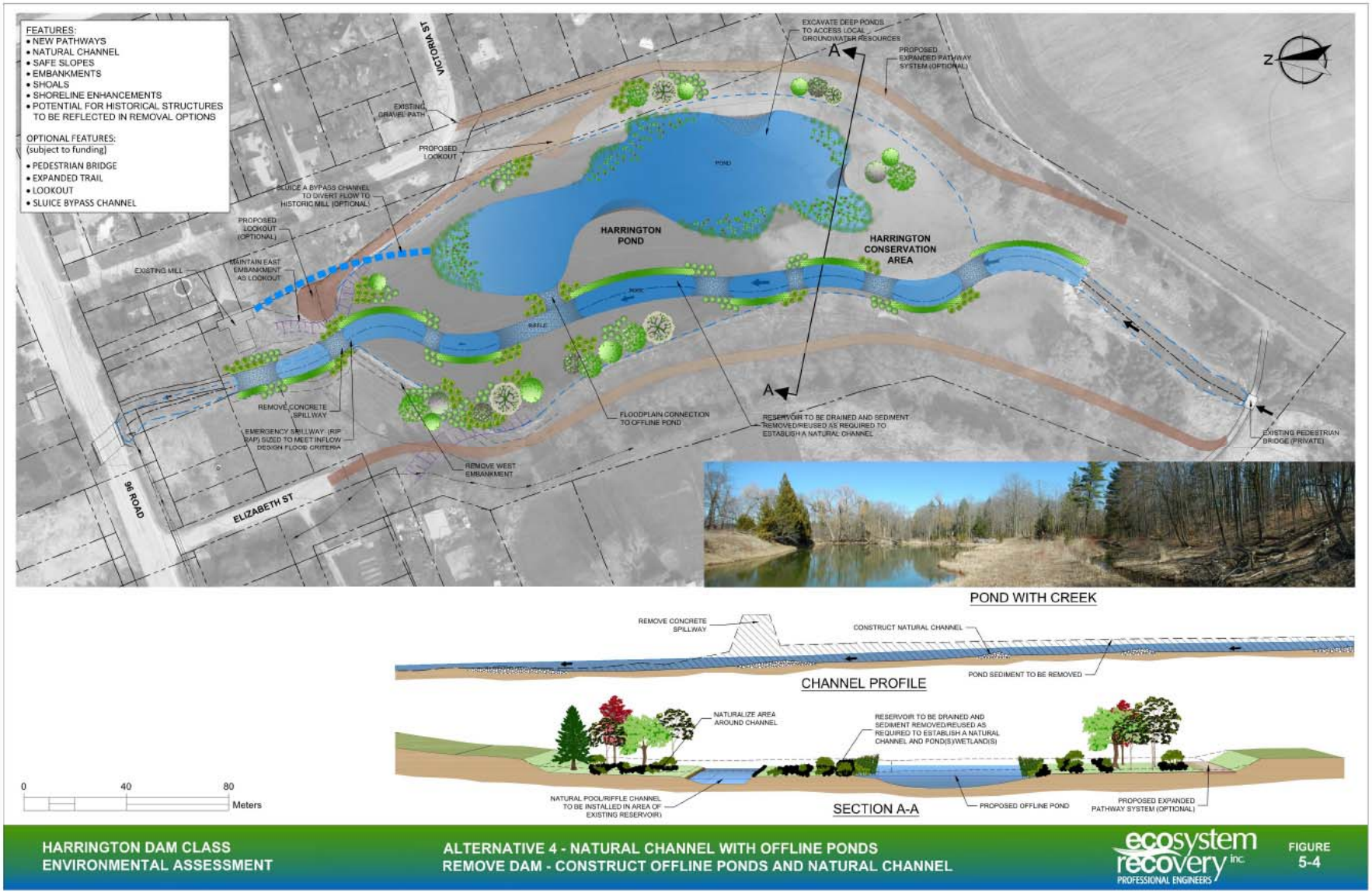
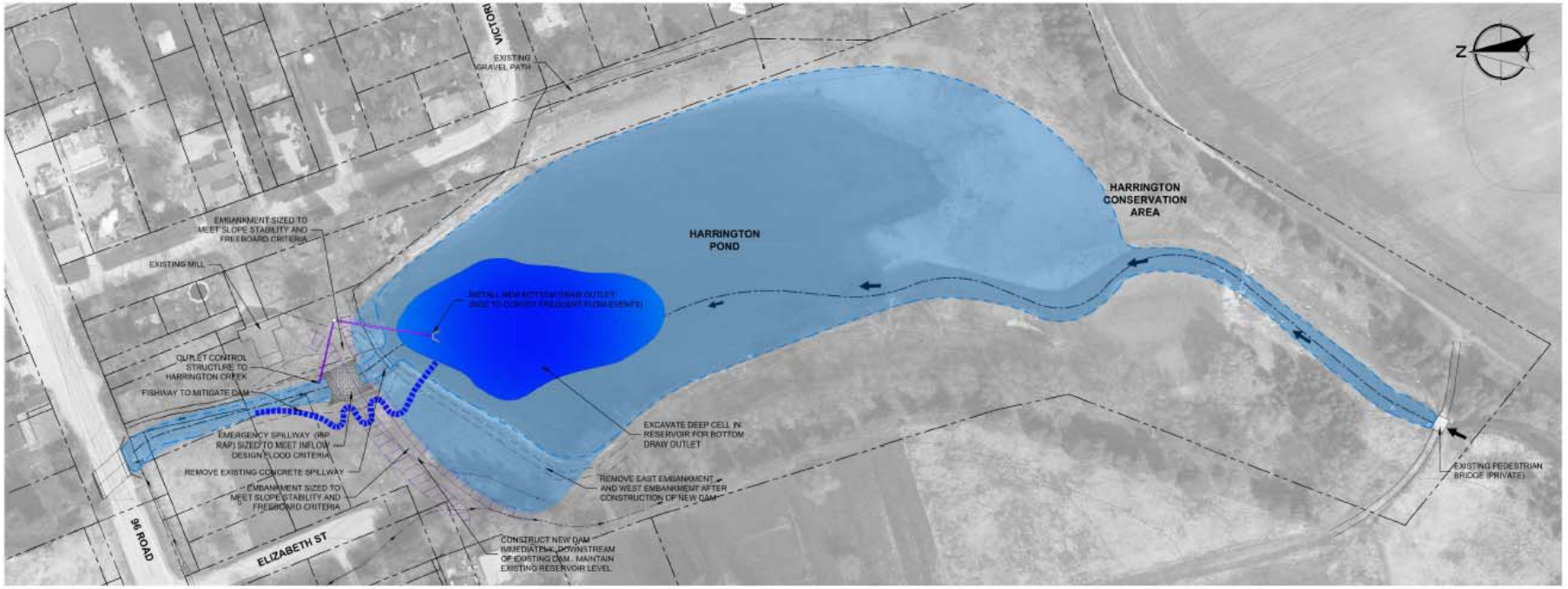
FIGURE 5-3

Alternative 4 – Remove Dam, Natural Channel, Off-line Pond



Alternative 5 – Replace Dam

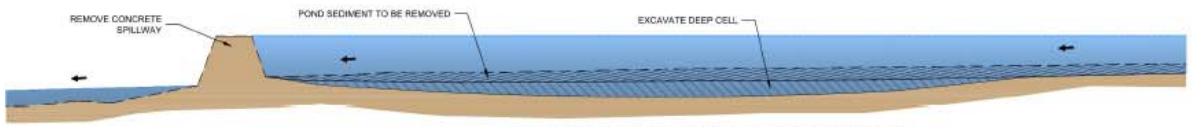


FEATURES:
- NEW PATHWAYS
- PEDESTRIAN CROSSING
- LOOKOUT
- NATURAL CHANNEL
- SAFE SLOPES
- EMBANKMENTS
- BOTTOM DRAW STRUCTURE
- POTENTIAL FOR HISTORICAL STRUCTURES TO BE REFLECTED IN REMOVAL OPTIONS
- FISH PASS STRUCTURE

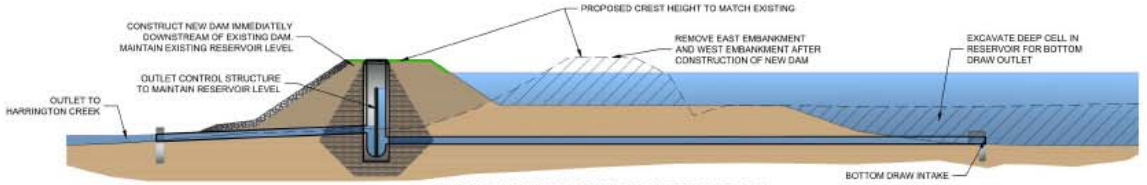
OPTIONAL FEATURES:
(subject to funding)
- PEDESTRIAN BRIDGE(S)
- EXPANDED TRAIL
- LOOKOUT

0 40 80 Meters

MEANDERING FISHWAY AROUND DAM



EXISTING CHANNEL PROFILE AND REMOVALS



SECTION THROUGH PROPOSED DAM

HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 5 - REPLACE DAM
REPLACE DAM WITH A NEW STRUCTURE DOWNSTREAM OF THE EXISTING DAM LOCATION

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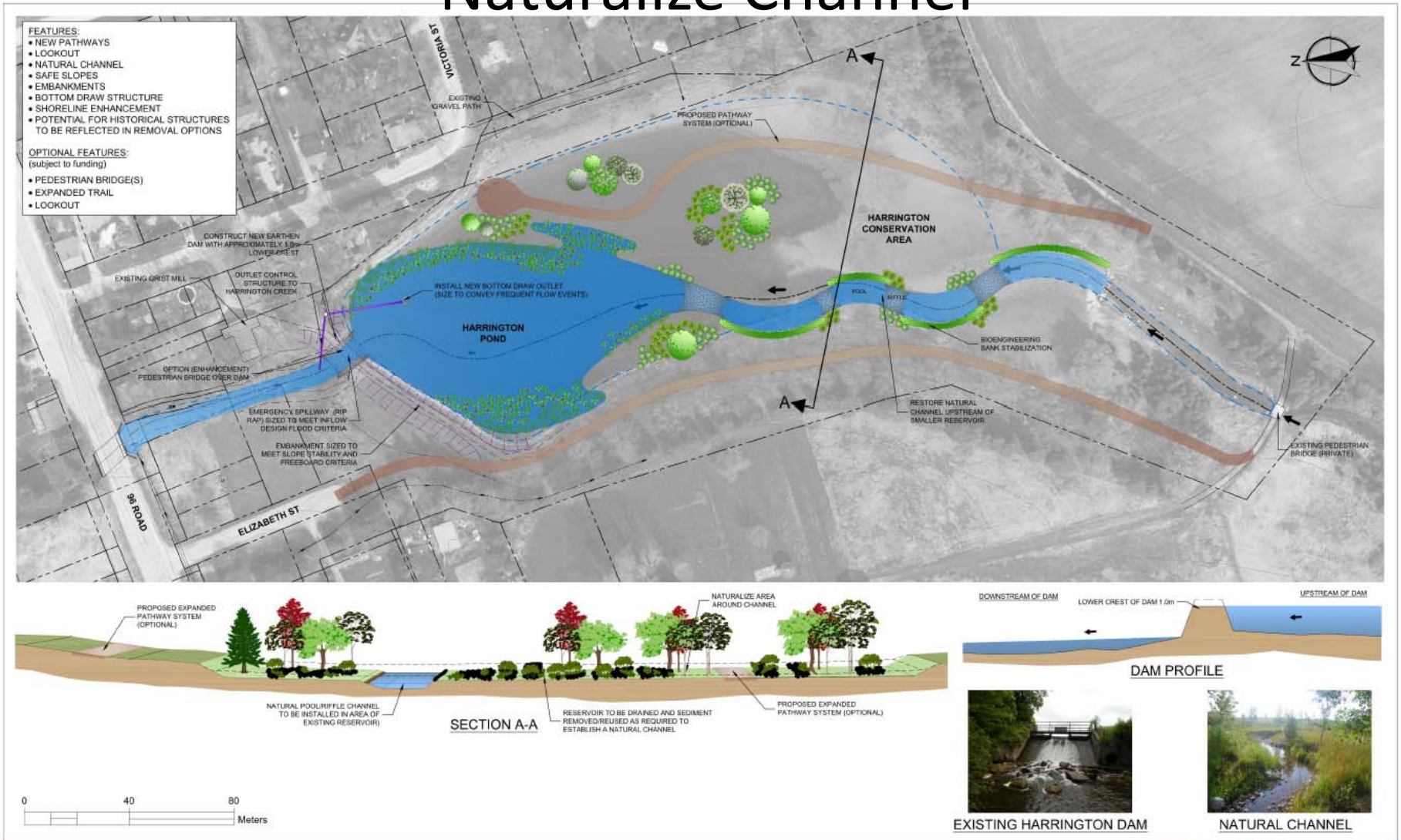
FIGURE 5-5

Alternative 6 – Lower Dam Crest, Naturalize Channel



HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 6 - LOWER DAM CREST WITH NATURAL CHANNEL
REPLACE DAM WITH AN EARTHEN DAM OF LOWER CREST ELEVATION

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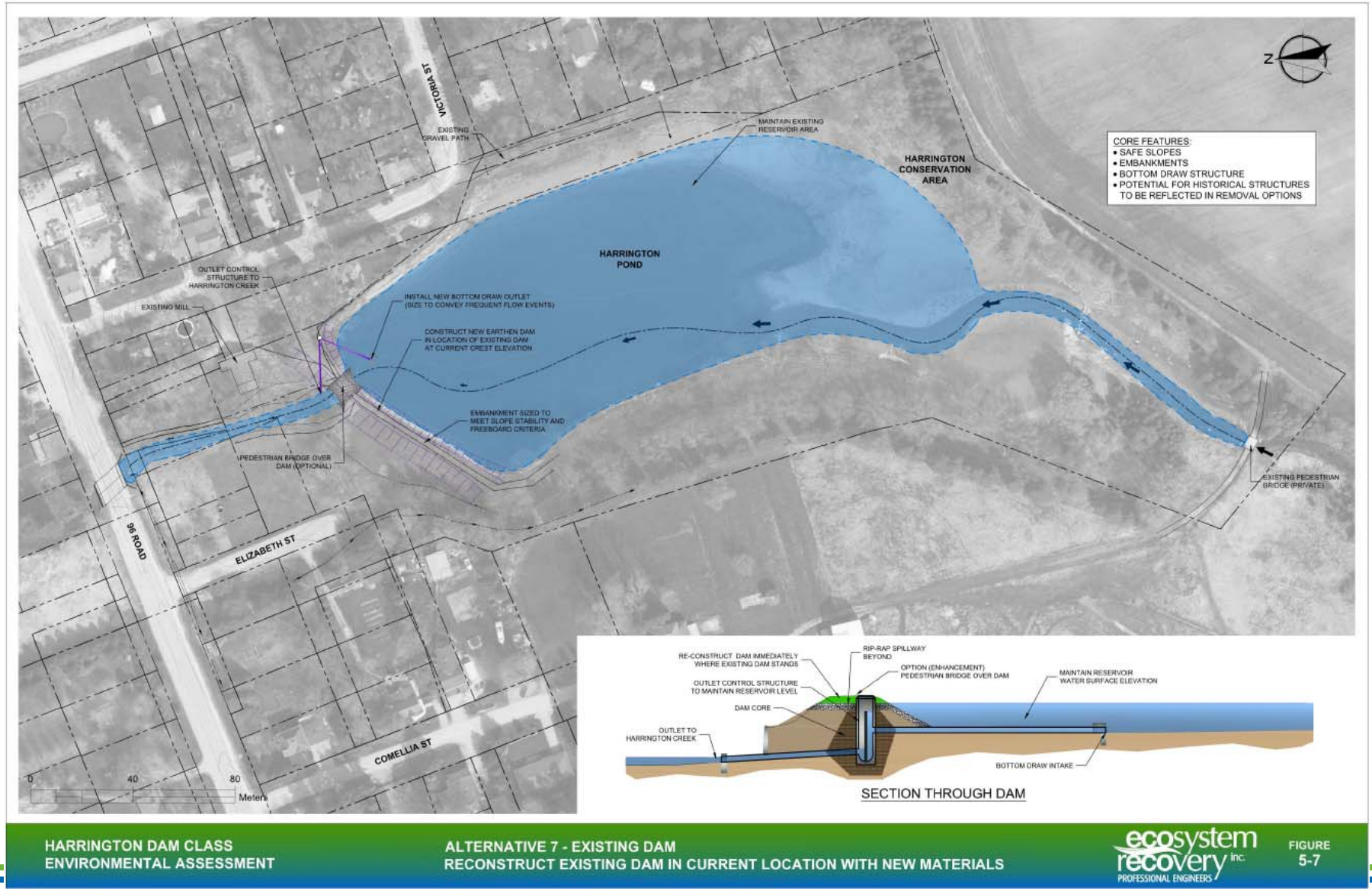
FIGURE 5-6

Alternative 7 – Reconstruct Existing Dam



HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

ALTERNATIVE 7 - EXISTING DAM
RECONSTRUCT EXISTING DAM IN CURRENT LOCATION WITH NEW MATERIALS

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FIGURE 5-7

Overview of PIC 2 Feedback

- Comments received by UTRCA (22):
  - Historical significance of area
  - Family histories
  - Recreation and education potential
  - Environmental concerns

Alternative	Responses
1. Do nothing	1
2. Remove dam and install rocky ramp	2
3. Remove dam and construct a natural channel	2
4. Remove dam and construct an offline pond and natural channel	2
5. Replace Dam with new structure downstream of existing dam	1
6. Replace dam with an earthen dam of lower crest elevation	0
7. Reconstruct the existing dam in current location with new materials	14

Evaluation Criteria for EA Projects

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

Evaluation Process

- Scoring Options:
  - Pie Chart 
  - Faces 
  - Numerical (least benefit to most benefit)
    - -1, 0, 1
    - 1, 2, 3
    - 1, 2, 3, 4, 5
- Category weighting:
  - All equal (25%)
  - Increased weighting to one or more components

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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)	$20,000 to $500,000	$5,000 – 20,000 per year
Alternative 2 Remove Dam, Construct Rocky Ramp	Dam removal, construction of grade control 'Rocky Ramp' , some sediment removal and site stabilization	$300,000 to $360,000	$1,500 to $3,000 per year
Alternative 3 Remove Dam, Construct Natural Channel	Dam removal, channel construction, sediment removal, site restoration	$600,000 to $800,000	$1,500 to $3,000 per year
Alternative 4 Remove Dam, Construct Offline Pond and Channel	Dam removal, channel construction, sediment removal, offline pond construction, site restoration	$800,000,to $1,000,000	$1,500 to $5,000 per year
Alternative 5 Replace Dam with New Earth Dam Downstream of Existing	Dam Removal, Excavation and installation of new core, bottom draw structure, sediment removal	$1,200,000 to $1,600,000	$5,000 to $35,000 per year. Dam retirement (75 yrs) costs $120,000[1]
Alternative 6 Replace Dam with New Earth Dam, lower crest	Dam Removal, Excavation and installation of new core, bottom draw structure, sediment removal	$1,100,000 to $1,500,000	$5,000 to $35,000 per year. Dam retirement (75 yrs) costs $120,000[1]
Alternative 7 Reconstruct Dam in Current Location	Dam Removal, Excavation and installation of new core, concrete dam, sediment removal	$1,800,000 to $2,100,000	$5,000 to $35,000 per year. Dam retirement (75 yrs) costs $120,000[1]

[1] dam retirement cost is based on 2016 estimate

Evaluation - Technical

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

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
TECHNICAL/ENGINEERING								
Dam Safety	Effectiveness of the alternative to address dam safety requirements, reduce risk of failure	1	4	5	5	3	3	4
Flooding Impacts/ Enhancement	Effectiveness of the alternative to manage or reduce flooding, or not cause negative impacts to flooding	1	3	5	4	2	3	2
Geomorphology/ Sediment Transport	Effectiveness of the alternative to promote dynamic stability of channel processes and mitigate sediment impacts	1	4	5	5	1	1	1
Protection of Infrastructure	Effectiveness of the alternative in mitigating risk to adjacent infrastructure (e.g., roads)	1	5	5	5	4	5	4
Constructability	Potential to construct the project using conventional, accepted construction and engineering practices	5	4	4	4	5	5	5
Implementability	Potential to implement the alternative, based on common accepted management practise	3	5	5	4	4	4	4
Approvability	Potential for regulatory agencies to grant approval for implementation	1	4	5	4	3	3	3
TOTAL CATEGORY SCORE		13	29	34	31	22	24	23
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		9	21	**24**	22	16	17	16
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	3	**1**	2	6	4	5

1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

Evaluation – Natural Environment

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

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
NATURAL ENVIRONMENT								
Aquatic (River) Habitat Impacts/ Enhancement	Effectiveness of the alternative to enhance fisheries resources; fish diversity, food source, and fish passage	1	4	4	5	2	2	3
Aquatic (Pond) habitat Impacts/ Enhancements	Effectiveness of the alternative to enhance pond habitat (fish, fowl, and wildlife) resources, diversity, food source	3	2	1	3	5	4	5
Terrestrial Habitat Impacts/ Enhancement	Potential for impact and/or enhancement to connectivity and terrestrial/wildlife (amphibian, mammal etc.) habitat due to implementation of the alternative	1	4	4	5	1	3	1
SAR Impacts/ Enhancements	Potential for impact and/or enhancement to SAR species	1	3	4	4	1	1	1
Groundwater Impacts/ Enhancement	Potential for impact and/or enhancement to groundwater regimes in the project area (baseflow, recharge, etc.)	3	3	4	4	3	4	3
Water Quality Impacts/ Enhancement	Effectiveness of the alternative to improve water quality, TSS, phosphorous, nutrient uptake	1	3	5	5	1	2	1
	TOTAL CATEGORY SCORE	10	19	22	26	13	16	13
	NORMALIZED CATEGORY SCORE (25% WEIGHTING)	8	16	18	**22**	11	13	11
	CATEGORY RANKING (1 = most preferred; 7 = least preferred)	7	3	2	**1**	5	4	5

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1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

Evaluation – Social/Cultural

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

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
SOCIAL / CULTURAL ENVIRONMENT								
Impact to Private Property	Measure of the impact to adjacent private property (i.e., loss of property, access to property, aesthetic)	3	4	3	3	4	4	4
Impact to Public Access	Measure of impact to public access (e.g., trails, recreation - picnic, fish, boat)	3	4	3	4	4	4	4
Impact to Public Safety	Measure of the impact to public safety in the surrounding area resulting from the alternative	1	3	5	4	3	3	3
Impact to Cultural/Heritage Features	Potential impact to existing cultural and/or heritage features in the project area	3	2	2	4	5	5	5
Recreational Impacts/ Enhancement	Measure of the impact to existing recreation and opportunities to enhance recreational activities in the project area	3	4	2	4	4	4	4
TOTAL CATEGORY SCORE		13	17	15	19	20	20	20
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		13	17	15	19	**20**	**20**	**20**
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	5	6	4	**1**	**1**	**1**

1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

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Evaluation - Economic

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

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
ECONOMIC								
Construction Costs	Relative measure of the initial costs to install/construct the proposed works, including environmental mitigation, sediment management, well mitigation etc.)	5	4	3	3	2	2	1
Maintenance /Future Costs	Relative measure of the ongoing maintenance costs following implementation (sedimentation)	1	3	4	4	2	2	2
Availability of Funding	Estimate of the availability for funding to implement the alternative	3	3	5	4	2	1	1
TOTAL CATEGORY SCORE		9	10	12	11	6	5	4
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		15	17	**20**	18	10	8	7
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		4	3	**1**	2	5	6	7

1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

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Evaluation Results: Equal Weighting

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
TECHNICAL/ENGINEERING								
TOTAL CATEGORY SCORE		13	29	34	31	22	24	23
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		9	21	24	22	16	17	16
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	3	1	2	6	4	5
NATURAL ENVIRONMENT								
TOTAL CATEGORY SCORE		10	19	22	26	13	16	14
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		8	16	18	22	11	13	12
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	3	2	1	6	4	5
SOCIAL / CULTURAL ENVIRONMENT								
TOTAL CATEGORY SCORE		13	17	15	19	22	22	22
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		13	17	15	19	22	22	22
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	5	6	4	1	1	1
ECONOMIC								
TOTAL CATEGORY SCORE		9	10	12	11	6	5	4
NORMALIZED CATEGORY SCORE (25% WEIGHTING)		15	17	20	18	10	8	7
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		4	3	1	2	5	6	7
	OVERALL NORMALIZED CATEGORY SCORE (100% WEIGHTING)	46	70	78	81	59	61	57
PREFERRED OVERALL RANKING (1 = most preferred; 5 = least preferred)		7	3	2	1	5	4	6

1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

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Evaluation Results: Altered Weighting

Criteria	Description	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
TECHNICAL/ENGINEERING								
TOTAL CATEGORY SCORE		13	29	34	31	22	24	23
NORMALIZED CATEGORY SCORE (20% WEIGHTING)		7	17	19	18	13	14	13
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	3	1	2	6	4	5
NATURAL ENVIRONMENT								
TOTAL CATEGORY SCORE		10	20	21	26	13	16	13
NORMALIZED CATEGORY SCORE (20% WEIGHTING)		7	13	14	17	9	11	9
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	3	2	1	5	4	5
SOCIAL / CULTURAL ENVIRONMENT								
TOTAL CATEGORY SCORE		13	17	15	18	22	22	22
NORMALIZED CATEGORY SCORE (40% WEIGHTING)		21	27	24	29	35	35	35
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		7	5	6	4	1	1	1
ECONOMIC								
TOTAL CATEGORY SCORE		9	10	12	11	6	5	4
NORMALIZED CATEGORY SCORE (20% WEIGHTING)		12	13	16	15	8	7	5
CATEGORY RANKING (1 = most preferred; 7 = least preferred)		4	3	1	2	5	6	7
	OVERALL NORMALIZED CATEGORY SCORE (100% WEIGHTING)	47	70	73	79	64	66	62
PREFERRED OVERALL RANKING (1 = most preferred; 5 = least preferred)		7	3	2	1	5	4	6

1 – Do Nothing
2 – Remove Dam, Rocky Ramp
3 – Remove Dam, Natural Channel
4 – Remove Dam, Nat. Channel and off-line pond
5 – Replace Dam with Earthen Dam Downstream of Existing
6 – Replace Dam with Earth Dam at Lower Crest
7 – Reconstruct Dam in Current Location

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Potential Impacts and Mitigation

- Technical (shallow groundwater wells)
  - Well inventory to be completed
  - Maintain local hydraulic head and/or drill deeper wells
- Environmental (removal of online pond)
  - Off-line pond to provide habitat for aquatic species (fish, fowl)
  - Include diversity of water depths and vegetation
  - Intercept groundwater (temperature and volume)
  - Receive flow from creek (volume, flushing)

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Potential Impacts and Mitigation

- Cultural history
  - Stage 2 Archaeological assessment
  - Where possible, replicate the landscape as a record of the time, place and use
    - Off-line pond, vegetation, and recreation potential
  - Explore mill demonstration potential
    - Sluice to convey water to mill
    - Off-line pond water volume/storage to support mill demonstration project
  - Replicate recreation opportunities
    - Angling, boating
  - Heritage interpretive signage

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Potential Impacts and Mitigation

- Recreational use
  - Maintain/enhance open water feature
  - Trails
  - Ramp (auditory aesthetic)
- Financial
  - Conservation authority funds
  - Township/Municipal contribution
  - Provincial funding sources

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Preferred Alternative Concept

WARD'S POND WITH CREEK (KITCHENER)

CHILIGO POND WITH CREEK (CAMBRIDGE)

CHILIGO POND (CAMBRIDGE)

0 40 80 Meters

HARRINGTON DAM CLASS ENVIRONMENTAL ASSESSMENT

EVALUATION OUTCOME
REMOVE DAM - NATURAL CHANNEL WITH OFFLINE POND

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Ward Pond - Kitchener

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Chiligo - Cambridge

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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:

harrington_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