

# **MISSISSIPPI VALLEY CONSERVATION AUTHORITY** KASHWAKAMAK LAKE DAM CLASS ENVIRONMENTAL ASSESSMENT **PUBLIC INFORMATION CENTRE** May 23, 2024







## PUBLIC INFORMATION CENTRE





**Conservation Ontario's Class Environmental Assessment** for Remedial Flood and **Erosion Control** 

NTARIO



#### **Review existing conditions**

Seek <u>public input / comments</u> & provide opportunities for public to <u>ask questions</u>

**Outline alternatives**, evaluation and recommended preferred alternative solution



# WATERSHED MANAGEMENT

## **Mississippi River**

- The Mississippi River system is composed of a complex network of rivers, streams, rapids and over 250 lakes located in Eastern Ontario.
- Managed system with a watershed area of 3765 km<sup>2</sup>.
- Several dams and weirs along the Mississippi River:
  - Mitigate drought and flooding (i.e., regulate flows and manage water levels); and
  - Maintain water levels throughout the watershed.

## Kashwakamak Lake

- Located in the upper reaches of the Mississippi River, within the Township of North Frontenac
  - Catchment area of 415 km<sup>2</sup>.
- One of several reservoir lakes that serve a critical storage function:
  - Alleviate flooding and drought, and
  - Maintains stable water levels on the lake.





## STUDY AREA







Main Kashwakamak Lake Dam Structure



Saddle Dam



# HISTORY OF KASHWAKAMAK LAKE DAM

- Designed and constructed as a lumber dam in the 1860s.
- Reconstructed in 1911 by private interests.
- Minor repairs completed between 1911 and 1988.
- MVCA assumed ownership in 1991.
- 1995-2016 various works carried out to reduce seepage and improve dam safety.
- In 2022, dam safety review identified the structure in deteriorated state and in poor to fair condition.
- 10-year Capital Plan updated to allow for the environmental assessment and dam renewal/replacement.







# CLASS ENVIRONMENTAL ASSESSMENT PROCESS

Stage 1	Stage 2	FINDINGS: Can Impacts be Avoided, Mitigated or Compensated?								
Environmental Assessment Process										
<b>Project Initiation</b>	Alternative Solutions	Yes	Uncertain	No						
Technical Process										
<ul> <li>✓ Prepare Problem Statement</li> <li>✓ Prepare Baseline Environmental Inventory</li> </ul>	<ul> <li>✓ Identify and Evaluate Alternative Solutions</li> <li>✓ Identify Impacts and Mitigation Measures</li> <li>Select Preferred Solution</li> <li>Conduct Detailed Analysis of Environmental Impacts</li> </ul>	<ul> <li>Prepare Project Plan</li> <li>Are all Concerns Addressed? (No Part II Order Requests)</li> </ul>	<ul> <li>Prepare Environmental Study Report (ESR)</li> <li>Are Impacts Deemed Acceptable?</li> </ul>	<ul> <li>Prepare Individual Environmental Assessment</li> <li>OR</li> <li>Reassess Program Option</li> </ul>						
		Consultation Process								
<ul> <li>✓ Notice of Intent</li> <li>✓ Establish Community Liaison Committee (CLC)</li> </ul>	<ul> <li>Host CLC meeting</li> <li>Engage public agencies, stakeholder, First Nations and general public</li> <li>Public Information Centre</li> </ul>	<ul> <li>Notice of Filing to Interested Persons/Parties</li> <li>Provide Notice of Project Approval &amp; Proceed to Construction</li> </ul>	<ul> <li>Publish Notice of Filing for Review</li> </ul>	<ul> <li>Continue Consultation as Required during Detail Design</li> </ul>						



Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects



## PROJECT PROBLEM STATEMENT



- The existing Kashwakamak Lake Dam is well beyond its design life.

- public uses and aesthetics.



The 2022 Dam Safety Review identified significant deterioration, especially the overflow weir.

A decision needs to be made on whether to decommission, repair, or replace the dam.

Selection of the Preferred Alternative must consider several constraints and opportunities such as public safety, riverine processes, flooding, climate change, cultural heritage, Indigenous rights, natural habitat,

The Preferred Alternative must address the problem while balancing study area constraints and opportunities, in order to best meet the needs of the various stakeholder groups and interested parties.



## CONSULTATION PROGRAM

Consultation completed to-date:

- May 25, 2023: Notice of Intent;
- August 24, 2023: Expression of Interest to join the Community Liaison Committee (CLC); and
- February 26, 2024: CLC Workshop Meeting #1.
- August 30, 2023: Invitation sent First Nations to participate in Marine Archaeological Assessment;
- September 11, 2023: Marine Archaeological Assessment field investigation;
- May 2, 2024: Notice of Public Information Session
- May 9 & 16, 2024: Notice of Public Information Session published in the North Frontenac News;
- April 18, 2024: Invitation sent to First Nations to participate in Stage 2 Archeological Assessment, and
- May 2, 2024: Stage 2 Archeological Assessment field investigation.



Community Liaison Committee

External Agencies (Federal & Provincial) First Nations

Local Residents, General Public, & Kashwakamak Lake Association

Mississippi Valley Conservation Authority

Egis

Stakeholders, Property Owners, Businesses, & Utilities

Township of North Frontenac

egis

# COMMENTS AND CONCERNS RECEIVED

## **Comments/Inquiries**

- Requests to stay involved with the study and be able to provide input;
- The current dam controls and maintains water levels for both safety and recreational/tourism purposes for hundreds of people who either live or own seasonal cottages on the lake.
- Has consideration been given to creating a power supply with the Kashwakamak Lake Dam which could become a revenue source.

#### Concerns

- Changes in water levels, as well as the ability of the proposed alternative to continue to mitigate flood and drought risk;
- When construction will commence and how water levels be impacted and controlled during the replacement of the dam, and
- Potential impacts of the dam on Manòmin (wild rice crops).







## **INVENTORY STUDIES**



Natural Heritage Assessment

- Existing Conditions Inventory
- Environmental Impact Assessment



- ✓ Marine Assessment





✓ Land Archaeological Assessment

Archaeological

✓ Cultural Heritage **Evaluation Report** 



Hydrology and Hydraulic Assessment

✓ Hydrology and Hydraulic Assessment (modeling)





Geotechnical Investigation

 $\checkmark$  Explore the subsurface conditions and documentation

## **Fish and Fish Habitat**

- Kashwakamak Lake is identified as having a cool/warmwater thermal regime.
- The lake, and the Mississippi River, provide permanent fish habitat and suitable spawning habitat.
- Significant fish habitat: sport fish and baitfish spawning immediately downstream of the Dam.
- Large population: Walleye, White Sucker, Bass, Northern Pike, baitfish and non-sport fish species.





Potentially Sensitive Fish Spawning Habitat



Approximate Dam Location Waterbody



## **Wetlands**

- No significant wetlands are present within the study area.
- Several small wetlands around the perimeter of the lake and downstream (Mud Lake Provincially Significant Wetland).

> Overwintering habitat for turtles - Blanding's Turtle.

- The Manòmin (wild rice crops) approximately 7.0 km downstream of the dam.
  - > Aquatic annual species of grass;
  - Cultural significance: Ardoch Algonquin First Nation, Alderville First Nation, and potentially other First Nations.
  - > Changes in water levels can have potential impacts on the wild rice crops.









## Vegetation

- Mixed Forest including species:
  - Eastern hemlock, Eastern white cedar American elm, American beech, white pine, red oak, and paper birch.
- Natural Heritage Information Centre identifies woodlands, however, does not identify the woodlands as being "significant".
- No invasive and/or noxious plant species were observed on site.
- No Butternut or Black Ash (SAR) were observed.









## Wildlife Habitat

- Significant Wildlife Habitat:
  - Bat Maternity Colonies, Birds, Turtle Wintering Area, Special Concern and Rare Wildlife Species, and Turtle and Lizard Nesting Habitat.
  - Mixed Forest provides suitable habitat:
- Rock structures (i.e., rocky outcroppings) snakes and lizards.









# SPECIES AT RISK (SAR)

## **Bats**

- High-quality maternity roosting trees (April -September 30):
  - Little Brown Myotis;
  - Northern Myotis, and
  - Tri-colored Bat.

## **Birds**

- Potentially suitable breeding habitat (i.e., nesting):
  - Red-headed Woodpecker;
  - Eastern Whip-poor-will, and
  - ➢ Wood Thrush.





#### LEGEND

- Approximate Dam Location
- Waterbody
- Study Area

Potentially Suitable SAR Bat Maternity Roosting Habitat

NHIC woodland



# SPECIES AT RISK (SAR)

## Herptiles

- Potentially suitable nesting and overwintering habitat:
  - Blanding's Turtle;
  - Midland Painted Turtle, and
  - Snapping Turtle.
- Rock features on the edge of lake provide suitable habitat:
  - Milksnake, and
  - Five-lined skink.





Snapping Turtle Observation Turtle Nest Location Approximate Dam Location Study Area Waterbody



# SOCIAL ENVIRONMENT AND LAND USE







# ARCHAEOLOGICAL & BUILT CULTURAL HERITAGE

## Land Archaeological

- Stage 1 Archaeological Assessment (June 6, 2023)
  - Study area exhibits archaeological potential.
- Stage 2 Archaeological Assessment (May 2, 2024)
  - Several First Nations showed interest in attending the field investigation.
  - > A small Indigenous site along the water's edge was identified.
  - > A Stage 3 Archaeological Assessment is currently be considered.





LEGEND

Project Layers

Study Area

Stage 1 Results



Area of archaeological potential; testing recommended

Field photographs; image location, orientation, and report image #



# ARCHAEOLOGICAL & BUILT CULTURAL HERITAGE

## Marine Archaeological

- A Stage 1 & 2 in-water Marine Assessment (September 11, 2023);
- No registered archaeological sites within one kilometer of the study area.
- Study area free of any archaeological features and concerns.

## **Built Cultural Heritage**

Dam does not retain any cultural heritage value or interest (CHVI) under the Ontario Heritage Act.









# GEOTECHNICAL INVESTIGATION

- Exploration of subsurface conditions (September 18 and 25, 2023)
  - $\succ$  Four (4) boreholes advanced into the subsurface;
  - Bedrock was observed at the ground surface and cored to the bottom of the boreholes;
  - Bedrock Carbonate Metasedimentary bedrock, and
  - > Slightly weathered and fractured with moderately close, horizontal to diagonal joints.
- Proposed design considerations:
  - Excavation for new dam to extend down to sound bedrock.
  - > Appropriate dewatering measures to effectively control the water levels in the lake during construction are to be implemented.







# EXISTING DAM STRUCTURES AND CONDITIONS

## **Main Dam Structure**

- Main Dam Structure: north and south abutment walls, three concrete piers forming the two sluiceways, and broad crested concrete weir.
- Based on previous dam inspection (2016) and the Dam Safety Inspection Report (2022):
  - Dam abutments have inadequate freeboard;
  - Overflow weir and abutments do not satisfy requirements for ice loading;
  - $\succ$  Outdated methods and materials;
  - > All concrete structures are in a deteriorated state and in poor to fair condition, and
  - Designed to an outdated HPC/IDF.







# SADDLE DAM CONDITIONS

## **Saddle Dam Structure**

- Saddle Dam located approximately 60 m to the north of the main dam and runs adjacent to access road.
- Prevents spillage of the lake, however, has inadequate freeboard.
- Failure of the dam would result in:
  - Limits access to the Dam, and
  - Access to perform emergency maintenance or operations during a significant storm event.
- Seepage and settlement was noted along the access road.
- Outdated methods and materials used to originally construct the dam.







## **OPERATION OF THE EXISTING DAM**

- In 16.9 m long overflow structure at elevation of 261.06 m.
- Two gates (~3 m width each) with timber stoplogs (0.3 m x 0.3 m).
- Manually operated gates with elevations ranging between 258.22 m to 261.22 m.
- Target water level for spring and summer ranges from 260.98 m to 261.28 m
- Target water level for winter ranges from 259.5 m to 259.7 m.





IAK LAKE DAM Base Cas	e			
		~		
No target range in spring due to the variability in timing of the spring runoff. Operations are undertaken to maintain levels between the upper & lower operating range limits while ensuring the various objectives are met.				
25-Jun 30-Jul DATE (weeks)	03-Sep Upper Target B	o8-Oct	12-Nov	17-Dec
e enter ranger range	- apport ranger in	unge ou		

egis

# HYDROLOGIC AND HYDRAULIC ASSESSMENT

## Hydrologic Assessment

- HEC-HMS numerical model for the Mississippi watershed.
- Flood frequency flows for the Kashwakamak Dam.
- Inflow hydrographs to Kashwakamak Lake.
- Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) estimates.
- Inflow hydrographs under a climate change scenario.





# HYDROLOGIC AND HYDRAULIC ASSESSMENT

## **Hydraulic Analysis**

- HEC-RAS numerical model of the dam and Mississippi River.
- Latest topo-bathymetric data (2022) LiDAR, 2023 survey).
- Incremental flood inundation study for various flood scenarios without and with dam breach.
- Hazard Potential Classification (HPC) of the dam determined to be "Moderate".
- Updated Inflow Design Flood (IDF).
- Updated freeboard for abutments and saddle dam.







# PROPOSED ALTERNATIVE SOLUTIONS

#### Alternative 1 – Do Nothing

No change made within the Study Area (status quo). No changes to the existing dams within the study area. No changes to existing conditions.

## Alternative 2a – Decommission the Existing Dam and Construct Passive Control System

Decommissioning of the dam and creating a passive water control system (such as an overflow weir).

## Alternative 2b – Decommission the Existing Dam and Reinstate Natural Watercourse

Decommissioning/full removal of the existing dam and reinstating a natural watercourse/channel.

## Alternative 3 – Rehabilitation of the Existing Dam

Rehabilitation of the Dam would consist of salvaging elements of the existing dam and preserving the structure in a stable state similar to the existing condition.

#### Alternative 4 – Replace the Existing Dams at the Same Location

Construction of a new dam within a similar alignment to that of the existing dam.

## **Alternative 5 – Construct New Dam Downstream**

Construct a new dam immediately downstream of the existing dam.





# EVALUATION CRITERIA

#### **Function/Technical**



- Hydraulic
   Function/Flooding and
   Drought
- Geomorphology/Sediment
   Transport
- Dam Safety
- Durability/ Service Life
- Climate Change
   Adaptation
- Implementation/Construct ability

#### **Cultural Environment**



- Archaeological Resources
- Built Heritage Resources and Cultural Heritage Landscapes



#### **Natural Environment**



- Fisheries/Aquatic Impacts
- Terrestrial Habitat (Wildlife and Vegetation)
- Species at Risk
- Existing Watercourses
   Quality and Quantity

#### **First Nations**



- Lands Rights
- Harvesting Rights (wild rice crops)

#### **Social Environment**



- Private Property Impacts
   During Construction and
   Commissioning
- Temporary/Permanent Property Agreements/ Acquisitions
- Recreational Impacts/Enhancement
- Tourism Impacts

#### **Economic Environment**



- Capital Costs
- Operational and Maintenance Costs

Category	Alternative 1 Do Nothing	Alternative 2a Decommission the Existing Dam and Construct Passive Control System	Alternative 3 Rehabilitation of the Existing Dam	Alternative 4 Replace the Existing Dam at the Same Location	Alternative 5 Construct New Dam Downstream
Functional / Physical	Not Preferred	Less Preferred	Less Preferred	Preferred	Preferred
Natural Environment	Less Preferred	Less Preferred	Preferred	Preferred	Less Preferred
Social Environment	Less Preferred	Not Preferred	Preferred	Preferred	Less Preferred
First Nations/Cultural Environment	Preferred	Less Preferred	Preferred	Preferred	Less Preferred
Economic Environment	Less Preferred	Preferred	Not Preferred	Less Preferred	Not Preferred
<u>Summary (Key</u> <u>Pros/Cons):</u>	<b>Not Recommended</b> – Does not address the PS.	<b>Not Recommended – Does</b> not address the PS.	<b>Not Recommended – Does</b> not address the PS.	Recommended – Addresses the PS.	Not Recommended – Addresses the PS.
Abbreviation Legend:PS – Problem StatementWMP - WatershedManagement PlanSAR – Species at RiskRanking:NotPreferredPreferredPreferred	<ul> <li>Pros:</li> <li>Existing conditions remain the same.</li> <li>Cons:</li> <li>Less resiliency to larger storm events (climate change).</li> <li>Continue to deteriorate.</li> <li>Continued risk of dam failure.</li> <li>Maintains current WMP until potential failure of the dam.</li> </ul>	<ul> <li>Pros:</li> <li>Relatively low/moderate cost.</li> <li>Property acquisition most likely not required.</li> <li>Cons:</li> <li>Reduction/limited ability to mitigate floods/droughts and maintain current WMP.</li> <li>Limited ability to fully adapt to Climate Change.</li> <li>High fluctuation in water levels.</li> <li>Potential impacts to the Manòmin.</li> <li>Temporary impacts due to construction activities (i.e. property, recreational, tourism, etc.).</li> </ul>	<ul> <li>Pros:</li> <li>Maintains current WMP.</li> <li>Maintains existing conditions.</li> <li>No significant change to water elevation and volume.</li> <li>Cons:</li> <li>Less resiliency to larger storm events (climate change).</li> <li>Continued risk of dam failure.</li> <li>Temporary impacts due to construction activities (i.e. property, recreational, tourism, etc.).</li> </ul>	<ul> <li>Pros:</li> <li>Maintains current WMP.</li> <li>Designed to accommodate larger storm events and adapt to climate change.</li> <li>Meet safety guidelines.</li> <li>Sensitive fish spawning habitat maintained.</li> <li>No long-term impacts to First Nation Lands including Manòmin.</li> <li>No permanent property impacts anticipated.</li> </ul> Cons: <ul> <li>Temporary impacts due to construction activities (i.e. property, recreational, tourism, etc.).</li> </ul>	<ul> <li>Pros:</li> <li>Maintains current WMP.</li> <li>Designed to accommodate larger storm events and adapt to climate change.</li> <li>Meet safety guidelines.</li> <li>No direct or indirect impacts to the recreational/tourism use of the lake.</li> <li>Cons:</li> <li>Requires larger structure.</li> <li>Significant cost.</li> <li>Additional property requirements/acquisition.</li> <li>Environmental Impacts.</li> <li>Unaltered lands and watercourse impacted by construction.</li> <li>Temporary impacts due to construction activities (i.e. property, recreational.</li> </ul>

## NEXT STEPS

- based on consultation;
- Solution;
- Prepare Conceptual Design for Technically Preferred Alternative Solution;
- Community Liaison Committee Meeting #2, and
- Prepare Project Plan and issue Notice of Filling (30-day review period).

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Continue consultation - governing agencies, CLC, First Nations, stakeholders, residents/cottagers and the public; • Update evaluation criteria and matrix, and confirm selection of Recommended Technically Preferred Alternative Solution

Conduct detailed analysis of environmental impacts and develop mitigation measures for Technically Preferred Alternative





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