



MISSISSIPPI VALLEY CONSERVATION AUTHORITY

**KASHWAKAMAK LAKE DAM
CLASS ENVIRONMENTAL ASSESSMENT**

KASHWAKAMAK LAKE ASSOCIATION – ANNUAL GENERAL MEETING

PRESENTATION OVERVIEW



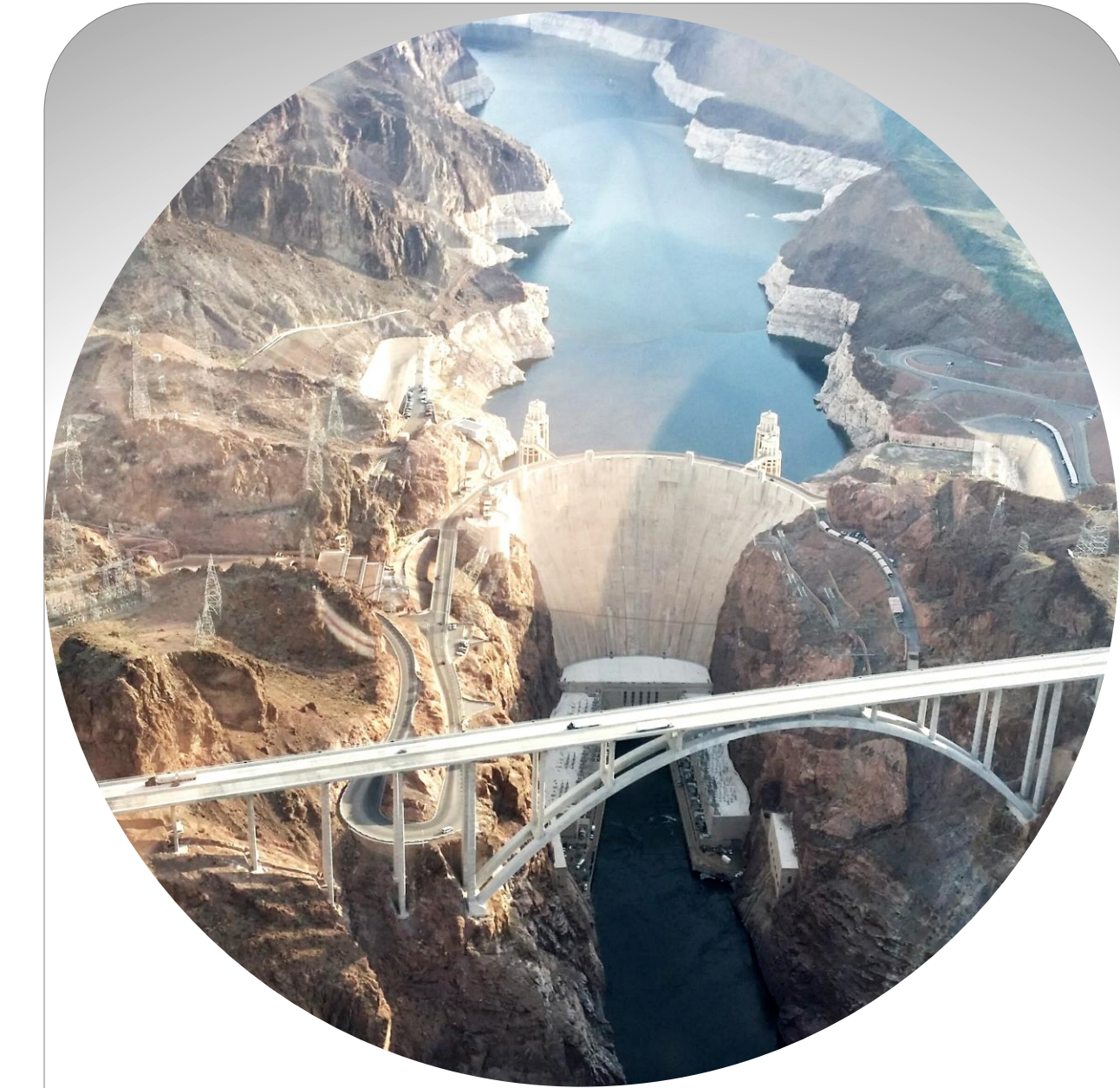
Brief overview of Class EA Study



Review existing conditions



Outline alternatives, evaluation and recommended preferred alternative solution

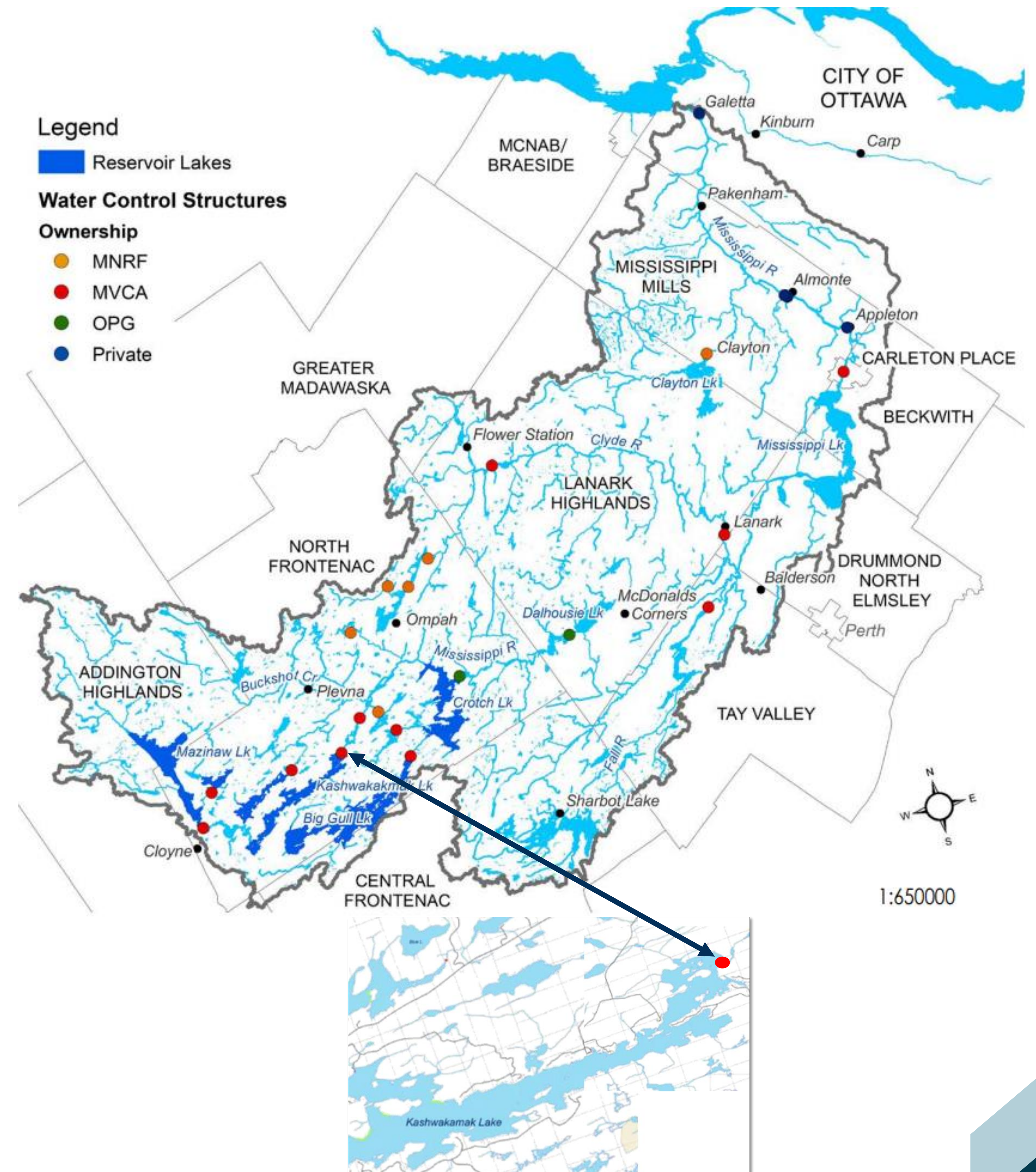


What to expect going forward



KASHWAKAMAK LAKE

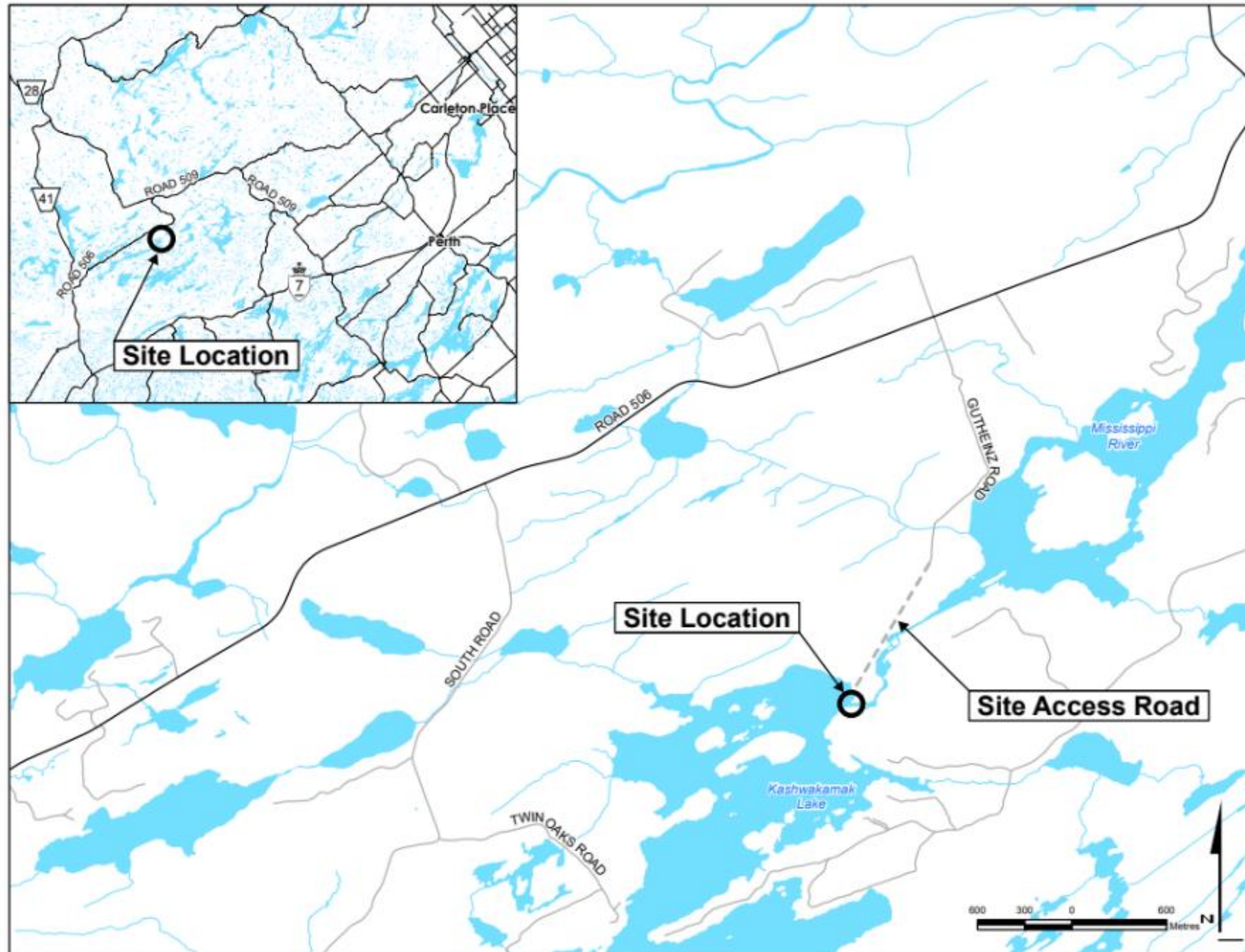
- Located in the upper reaches of the Mississippi River, within the Township of North Frontenac
 - Catchment area of 415 km².
- One of several reservoir lakes that serve a critical storage function:
 - Alleviate flooding and drought, and
 - Maintains stable water elevations on the lake.



Kashwakamak Lake Dam

Source: Mississippi River Watershed Plan (MVCA, 2021)

STUDY AREA

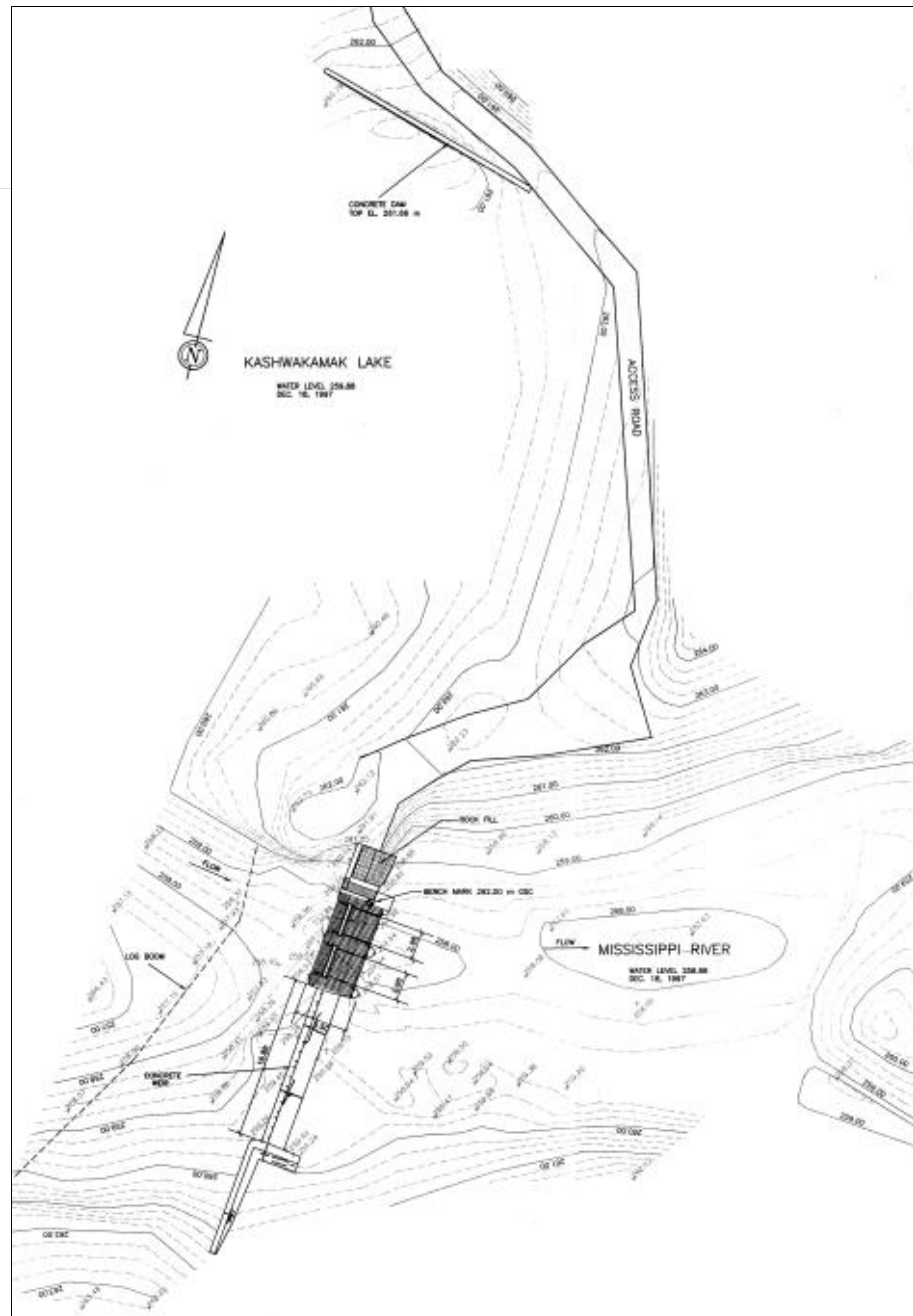


Main Kashwakamak Lake Dam Structure



Saddle Dam

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.
- Today, it is one of 6 dams capable of mitigating the impacts of floods and drought within the Mississippi River system.
- A 2022 Dam Safety Review found that the dam continues to show signs of deterioration, especially the overflow weir. Study recommended replacement within 5-years.
- 10-year Capital Plan updated to allow for the environmental assessment and dam renewal/replacement.

CLASS ENVIRONMENTAL ASSESSMENT



- A Class EA is a study done to identify and evaluate potential alternative solutions to a Remedial Flood or Erosion Control Project, and recommend a preferred solution
- Options are 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, public uses and aesthetics.
- 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.

INVENTORY STUDIES



Natural Environment Assessment

- ✓ Existing Conditions Inventory
- ✓ Environmental Impact Assessment



Archaeological and Cultural Heritage

- ✓ Land Archaeological Assessment
- ✓ Marine Archaeological Assessment
- ✓ Cultural Heritage Evaluation Report



Hydrology and Hydraulic Assessment

- ✓ Hydrology and Hydraulic Assessment (modeling)



Geotechnical Investigation

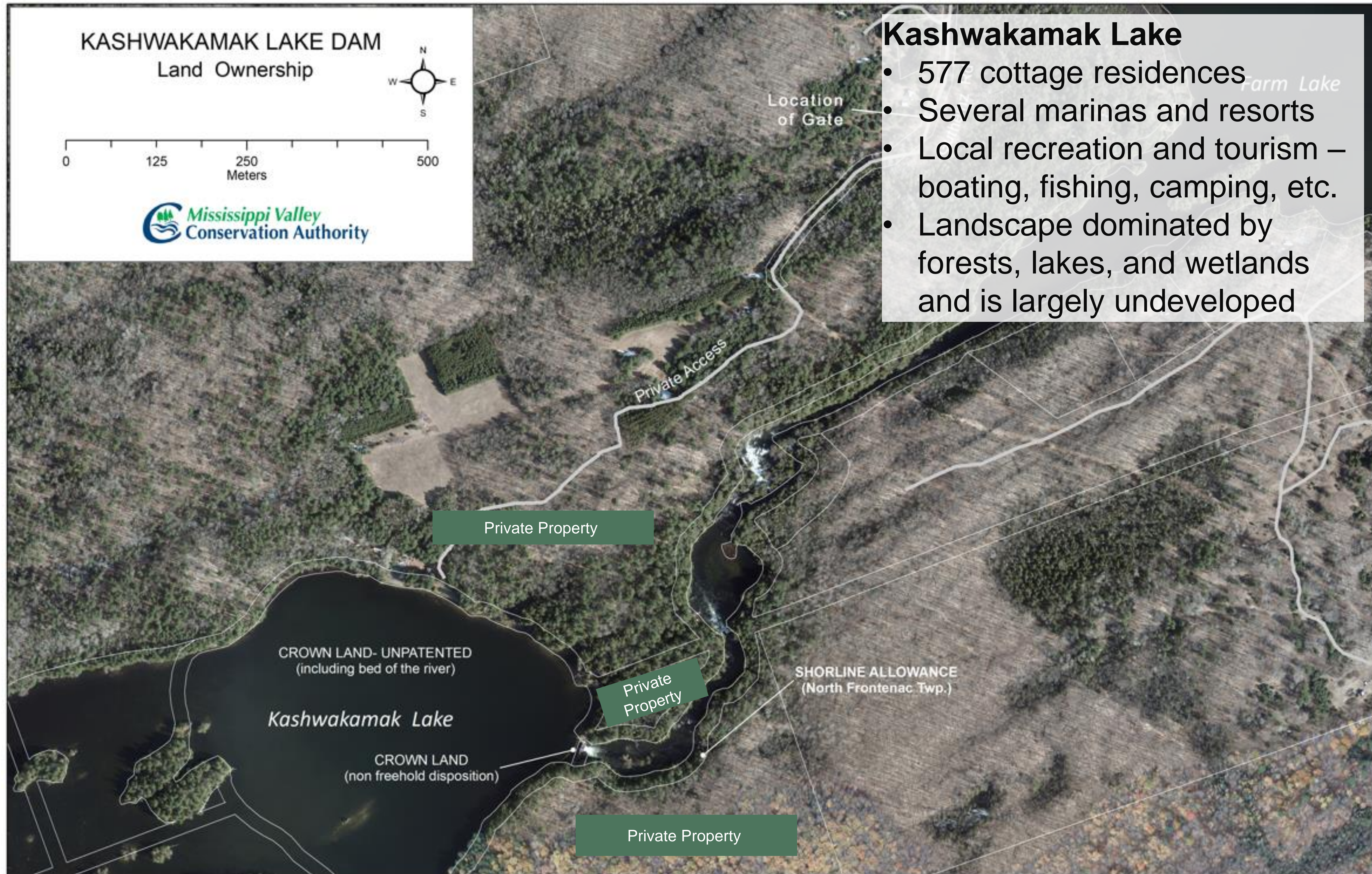
- ✓ Explore the subsurface conditions and documentation

NATURAL ENVIRONMENT

- Fish and spawning habitat for various species including walleye, white sucker, bass and Northern pike
- Small wetlands around the perimeter of the lake – no significant wetlands in study area
- Manòmin (wild rice) crops 7km downstream of dam – culturally significant to First Nations and sensitive to changes in water levels
- Study area surrounded by “woodlands”, no noxious or invasive species or Species at Risk identified in study area
- Significant Wildlife Habitat identified for bats, birds, turtles and lizards, and some Special Concern or Rare species



SOCIAL ENVIRONMENT AND LAND USE



Kashwakamak Lake

- 577 cottage residences
- Several marinas and resorts
- Local recreation and tourism – boating, fishing, camping, etc.
- Landscape dominated by forests, lakes, and wetlands and is largely undeveloped

ARCHAEOLOGICAL & BUILT CULTURAL HERITAGE

Land Archaeological Assessments

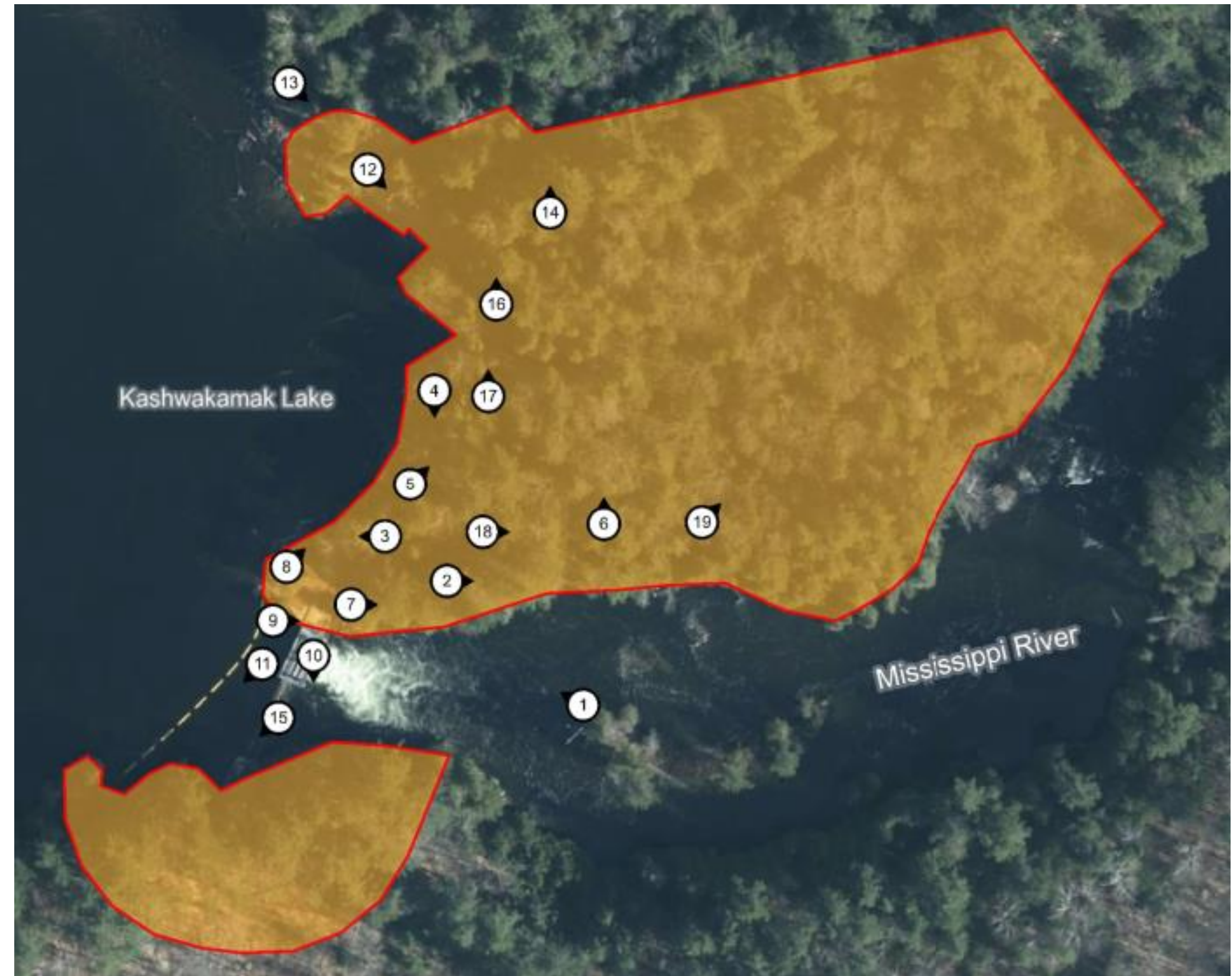
- Stage 1 – June 2023
 - Study area exhibits archaeological potential.
- Stage 2 – May 2024
 - A small Indigenous site along the water's edge was identified > Stage 3 assessment recommended.
- Stage 3 – to be completed this summer

Marine Archaeological Assessment

- Stage 1 & 2 – September 2023
 - No features or concerns identified within 1 km

Built Cultural Heritage Assessment

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



LEGEND

Project Layers

 Study Area

Stage 1 Results

 Area of archaeological potential; testing recommended

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

GEOTECHNICAL INVESTIGATION

- Exploration of subsurface conditions (September 2023)
 - Four boreholes to a maximum depth of 9 metres
 - Mostly bedrock – with some fractures
- 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.



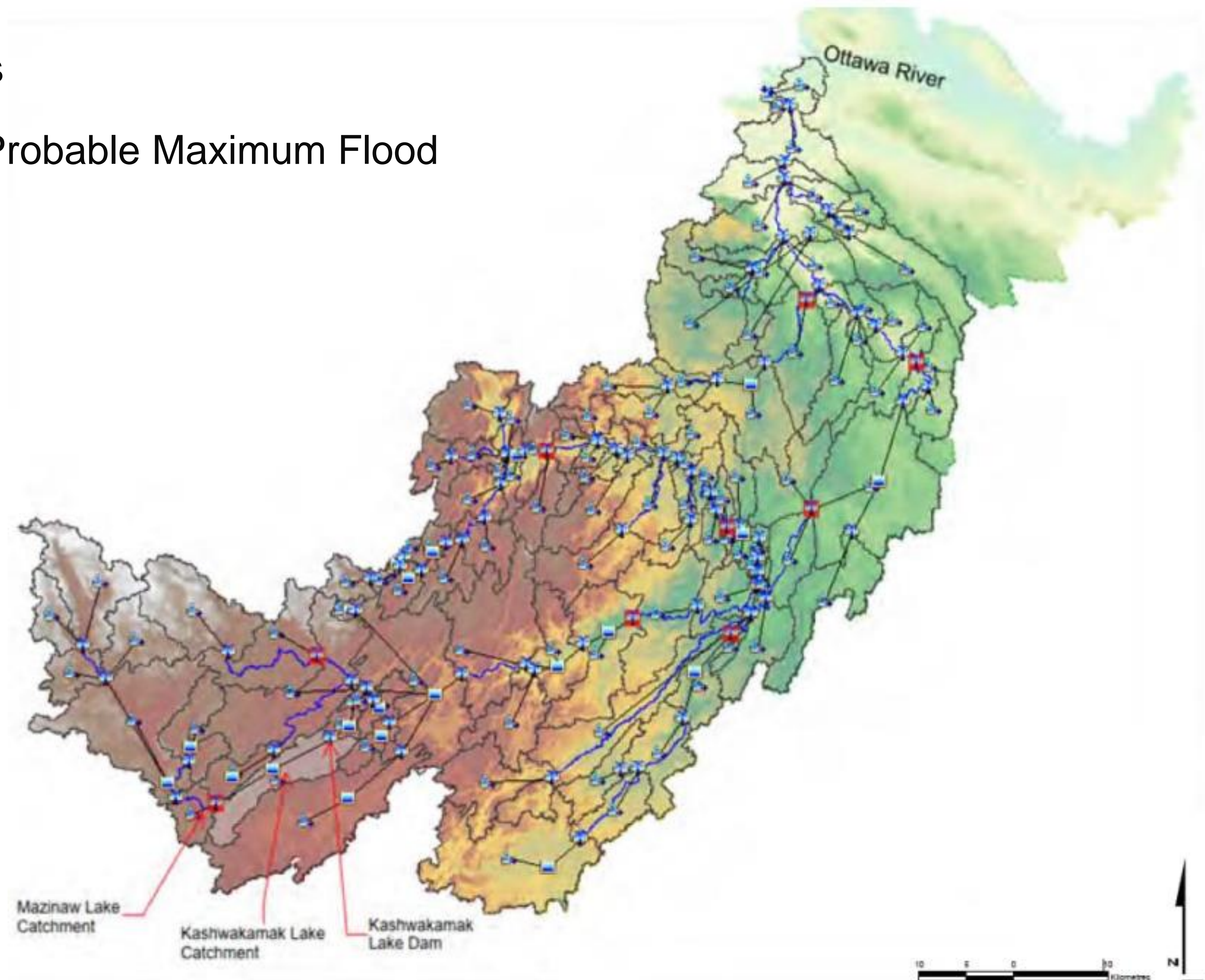
HYDROLOGIC AND HYDRAULIC ASSESSMENT

Hydrologic Assessment

- Flood frequency flows and inflow hydrographs
- Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) estimates.
- Climate change scenarios.

Hydraulic Analysis

- Flood inundation studies 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.



EXISTING DAM STRUCTURE AND CONDITIONS

Main Dam Structure

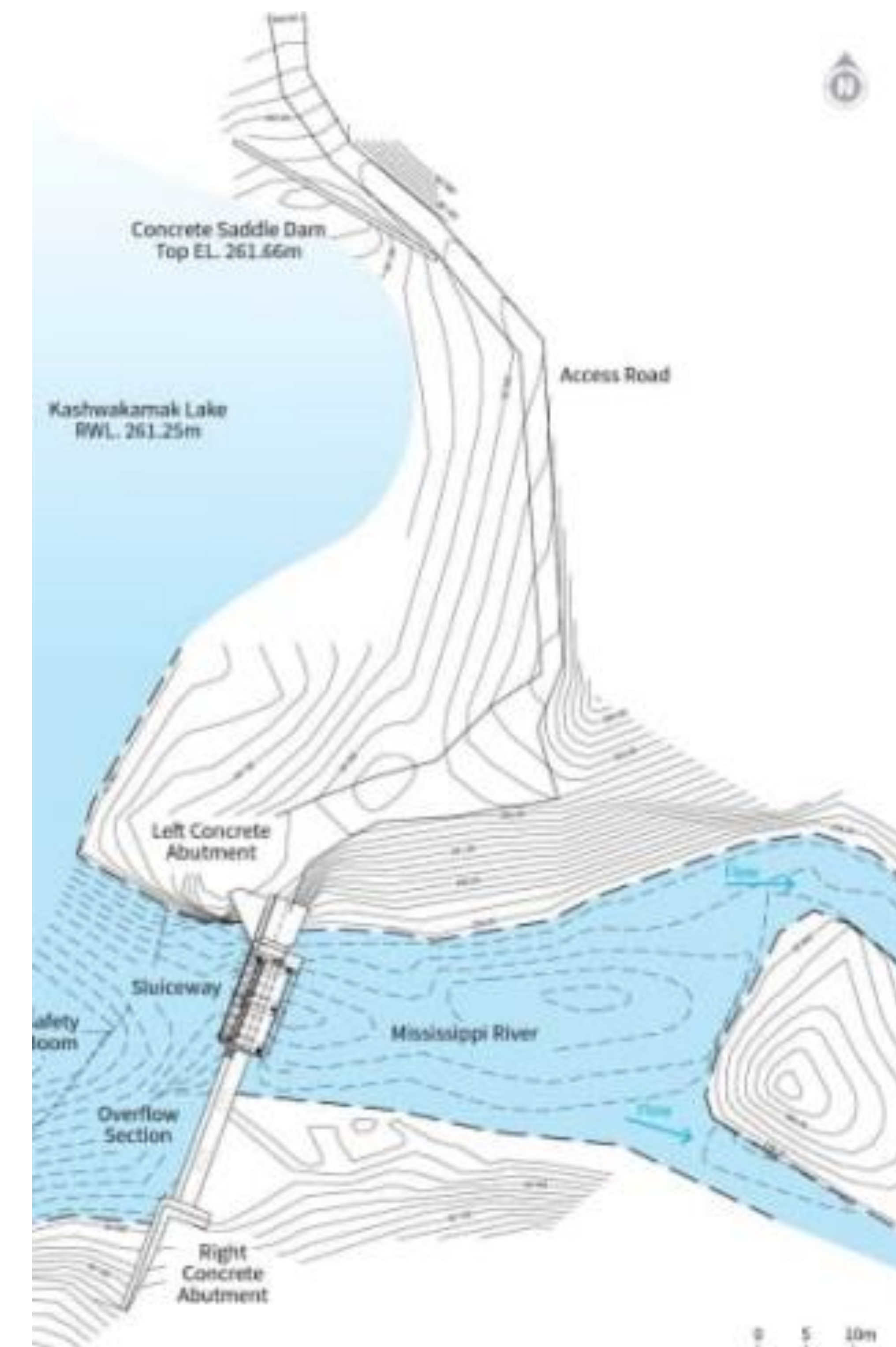
- North and south abutment walls, three concrete piers forming the two sluiceways, and a broad-crested concrete weir.
- Based on previous dam inspection (2016) and the Dam Safety Inspection Report (2022):
 - Dam abutments have inadequate freeboard;
 - Overflow weir and abutments do not satisfy requirements for ice loading;
 - 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

- 60 m north of the main dam and adjacent to access road.
- Prevents spillage of the lake.
- Failure of the dam would result in:
 - Limited access to the dam, and
 - Restricted 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.



PROPOSED ALTERNATIVE SOLUTIONS

Alternative 1 – Do Nothing

No change made to study area or existing dams.

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

Remove dam and replace with structure such as an overflow weir.

Alternative 2b – Decommission the Existing Dam and Reinststate Natural Watercourse

Remove existing dam and allow natural channel to develop.

Alternative 3 – Rehabilitation of the Existing Dam

Salvage elements of the existing dam and preserve the structure in a stable state similar to the existing condition.

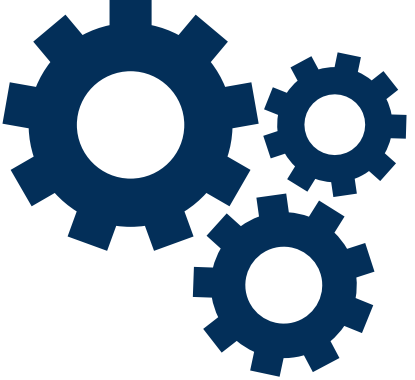





Alternative 4 – Replace the Existing Dams at the Same Location

Construct new dam with 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	Natural Environment	Social Environment
 <ul style="list-style-type: none"> ▪ Hydraulic Function/Flooding and Drought ▪ Geomorphology/Sediment Transport ▪ Dam Safety ▪ Durability/ Service Life ▪ Climate Change Adaptation ▪ Implementation/ Constructability 	 <ul style="list-style-type: none"> ▪ Fisheries/Aquatic Impacts ▪ Terrestrial Habitat (Wildlife and Vegetation) ▪ Species at Risk ▪ Existing Watercourses Quality and Quantity 	 <ul style="list-style-type: none"> ▪ Private Property Impacts During Construction and Commissioning ▪ Temporary/Permanent Property Agreements/ Acquisitions ▪ Recreational Impacts/Enhancement ▪ Tourism Impacts
Cultural Environment	First Nations	Economic Environment
 <ul style="list-style-type: none"> ▪ Archaeological Resources ▪ Built Heritage Resources and Cultural Heritage Landscapes 	 <ul style="list-style-type: none"> ▪ Lands Rights ▪ Harvesting Rights (wild rice crops) 	 <ul style="list-style-type: none"> ▪ Capital Costs ▪ Operational and Maintenance Costs

EVALUATION

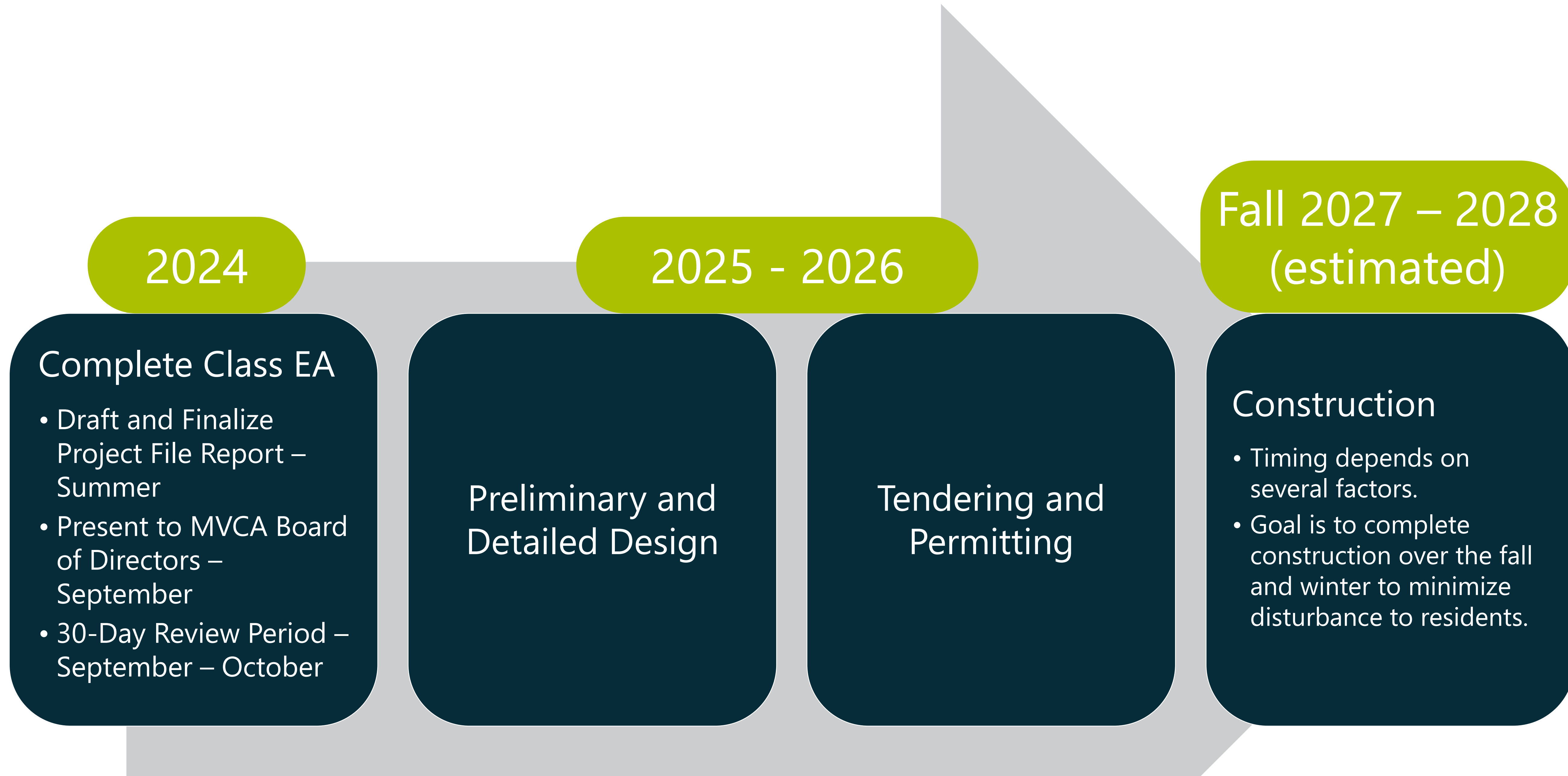
Category	Alternative 1 Do Nothing	Alternative 2a Decommission the Existing Dam and Construct Passive Control System	Alternative 3 Rehabilitation of the Existing Dam	Alternative 4 Replace the Existing Dam at the Same Location	Alternative 5 Construct New Dam Downstream
Functional / Physical	Not Preferred	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

PREFERRED SOLUTION

- **Replace Existing Dam at the Same Location**
- Anticipated to be similar to the current design – with upgrades
 - Higher safety standards – design and freeboard
 - Updated structural guidelines
 - New technologies for design and construction
- Seepage issues will be fixed, leading to performance improvements
- After conclusion of the Class EA and confirmation of the preferred alternative (including presentation and acceptance from MVCA Board), we can move forward to conceptual design



POTENTIAL TIMELINE FOR CONSTRUCTION



WHAT CAN YOU EXPECT?

- Earlier drawdown of Kashwakamak Lake in the fall to prepare for construction. Potentially 2027 - 2028 but depends on timing of other phases.
 - All landowners on Kashwakamak Lake will be notified in advance
 - Local marinas and storage facilities will be notified as well
- Ideally construction will take place over the fall and winter, with normal operation resuming in spring.
- Staging area will be confined to a small area near the dam
- Operation of water levels on the lake will be the same after construction is completed
 - Summer target levels will be easier to maintain with improved dam structure (no seepage!)
- Short-term impact to residents for long-term gain
 - Remove possibility for dam failure
 - New structure will be resilient to climate change (more frequent and intense storm events)
 - Improved dam performance

THANK YOU!



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