



PROJECT PLAN
TEETERVILLE DAM CLASS ENVIRONMENTAL ASSESSMENT
TEETERVILLE, ONTARIO

Prepared for: **LONG POINT REGION CONSERVATION AUTHORITY**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

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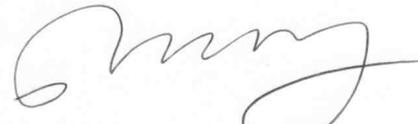
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EXECUTIVE SUMMARY

Introduction

The Teeterville Dam and Reservoir are located on Big Creek in the village of Teeterville, near the intersection of Teeterville Road and Teeter Street, in Norfolk County (Figure i). The LPRCA owns and is responsible for the maintenance and operations of the dam and a small, vegetated portion of the old embankment to the northwest, an area managed as the passive Teeterville Conservation Area. Norfolk County owns the Teeterville Road right-of-way including the bridge, road infrastructure, and lands abutting the dam and historic embankment immediately to the northeast.

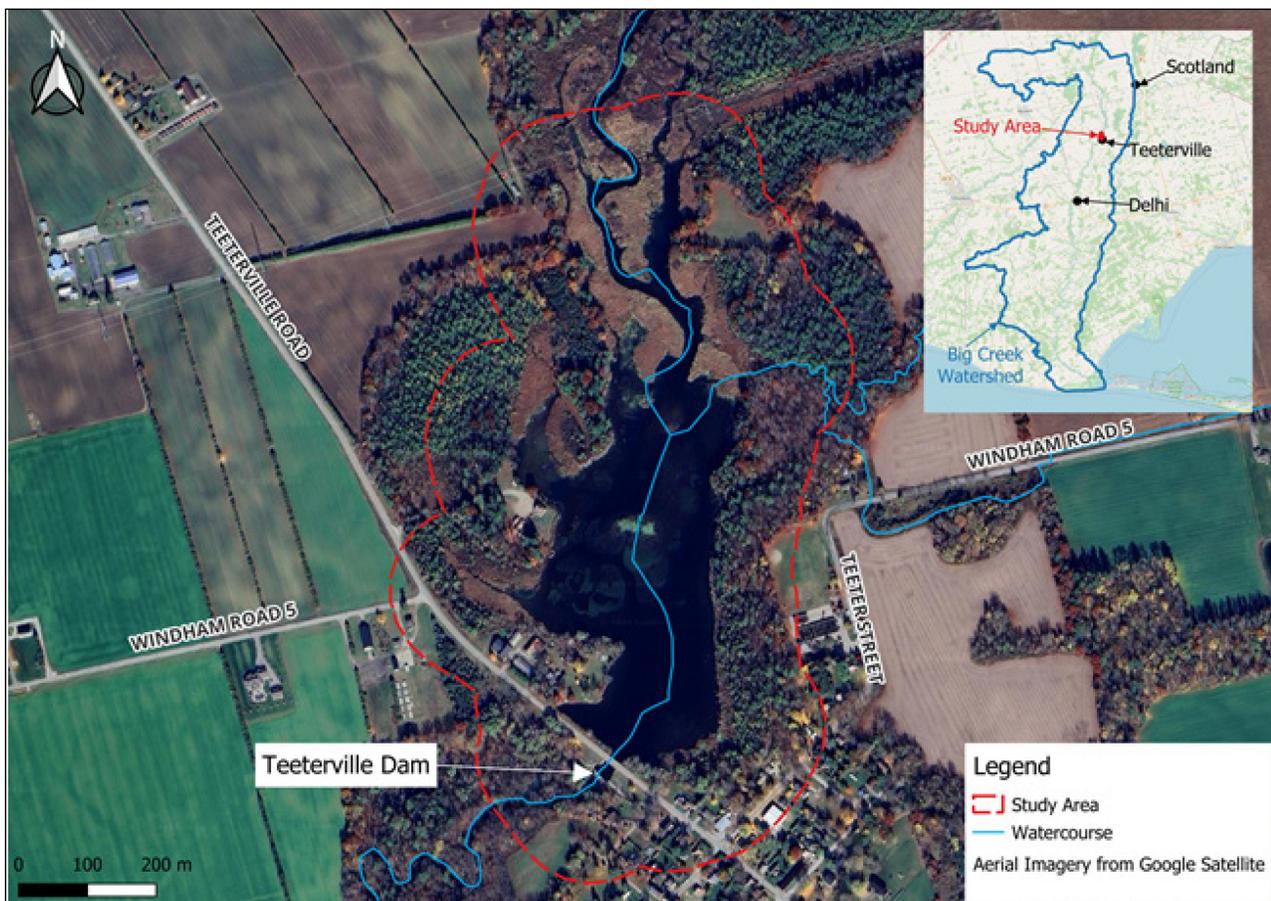


Figure i Teeterville Dam Assessment Study Area

Originally constructed to support the movement of timber and later to provide power to mills, including a grist mill and sawmill, a dam and reservoir have existed at, or near, the current site since the 1830s. Complete records confirming the date of the existing dam's construction are not available. An earthen berm and concrete spillway were constructed in 1915 after a flood destroyed the original wooden dam structure, with concrete abutments to support a Warren pony truss bridge added in 1917. Records from the Teeterville Women's Institute indicate that at least portions of the dam and concrete spillway were replaced in 1937 after another flood damaged the structure.

The structure was modified by the Big Creek Region Conservation Authority (predecessor of LPRCA) in 1962, adding three concrete piers to the downstream face to form four bays capable of holding stop logs atop the concrete structure, which increased the reservoir elevation by approximately 1 m. The steel truss bridge formed the road crossing associated with the dam until 1971, at which time a new municipal bridge was constructed immediately upstream, and the truss bridge was closed to vehicular traffic. Following closure of the bridge across the dam to vehicular traffic, the truss structure, a metal catwalk, and a series of platforms and gantries remained for another 50 years acting as a pedestrian crossing and providing access for LPRCA operations staff to remove/replace stop logs.

The most recent Dam Safety Review and Condition Assessment (DSR; AECOM 2016) undertaken for the Teeterville Dam identified that the dam structure currently has a “Low” Hazard Potential Classification (HPC) for both normal (Sunny Day) and flood conditions, primarily related to the limited incremental impacts to life safety, property, natural environment, and the cultural and built heritage of the area should the structure fail. As a “Low” HPC, the Inflow Design Flood (IDF) was “conservatively selected as the 100-year flood” (AECOM 2016).

Technical analyses completed as part of the dam stability and condition assessment, including an assessment of the dam’s structural integrity, a geotechnical assessment, and a hydrotechnical assessment indicated a need for remedial efforts. While the DSR concluded that the earthen embankment portion of the dam was generally safe, though potentially subject to internal piping/erosion, structural assessments related to the concrete abutments and piers found that **the dam does not meet federal and provincial safety criteria for sliding under all load cases and, as such, represents a risk of failure.** Given this assessment, operational adjustments were implemented by LPRCA with the objective of reducing the hydraulic pressure on the dam. Seasonal dam height adjustments, which historically had involved keeping two (2) stoplogs in place through winter/spring and four (4) stoplogs through summer/fall, were terminated with reservoir elevations held at lower winter operating levels since that time.

Given numerous identified structural deficiencies associated with the steel truss bridge structure that existed at that time, the DSR concluded that bridge elements providing access to the top of the dam structure represented “a potential liability and a danger to users” and recommended that its use be limited or phased out until such time as future rehabilitation or replacement is completed. Elements related to the steel truss bridge were removed in 2022.

Following the completion of the DSR, the LPRCA commissioned additional studies to inform and support remediation planning. The first in this regard, undertaken in 2017, involved a more comprehensive Sediment Management Plan (SMP; AECOM 2018) to help improve the understanding of existing conditions including a characterization of the quantity and quality characteristics of accumulated sediment within the reservoir, and to review and recommend methods for its monitoring and management moving forward.

Subsequent studies included the Teeterville Dam and Truss Bridge Heritage Evaluation (Stantec 2018) and advancing a detailed design for repairs and initiating associated provincial approvals processes (Stantec 2019a, 2019b, 2020). This work assessed possible dam repair options ultimately concluding that an approach involving the addition of concrete mass to the dam structure, on the existing concrete apron downstream of the existing vertical dam, represented a feasible alternative. The design-for-repairs work developed preliminary approaches to construction including construction phasing and sediment management strategies, and preliminary cost estimates. While consultation with provincial approval authorities was undertaken, and preliminary design and permitting packages submitted, the work stopped short of achieving final approvals.

As the LPRCA is a public agency, and any remediation works would be undertaken to address existing flood and erosion control issues, the project is required to follow the Conservation Ontario Class Environmental Assessment, as amended February 2024 (CO Class EA 2024). The objective of the CO Class EA study is to characterize the broad environment in which the project exists, and to identify and assess various rehabilitation, replacement, and removal options to address the problem statement (i.e., the known structural deficiencies) to meet the objectives of the LPRCA with respect to water management, public and worker safety, the risk of dam failure, the protection of natural heritage features, fish and wildlife management, water supply, and recreation aspects. Key to the CO Class EA process is the implementation of a comprehensive consultation program involving Indigenous communities, as well as agency and public stakeholders. In accordance with Section 3.7.2 of the CO Class EA, and per the result of the detailed analysis of the preferred alternative that indicates “no anticipated negative impacts or outstanding concerns by the Conservation Authority or reviewers”, this report has been completed as a Project Plan (PP).

Existing Conditions

As part of the CO Class EA, a review of background materials and site conditions was completed to define and confirm the problem statement for the undertaking, and to guide the development of potential alternative solutions. The characterization of existing conditions was completed through a review of background information, completion of targeted field investigations, other data collection, data analyses, and monitoring. This included a general assessment of the study area and investigations of Big Creek downstream and upstream of the dam, and within the reservoir. All existing conditions elements described in the following sub-sections characterizing the study area’s environment ultimately inform the generation and evaluation of alternatives that is the core of the project.

Hydrogeology

The study area is situated within the Norfolk Sand Plain, with hydrogeology characterized by a mix of sand and gravel deposits, providing relatively high permeability and good aquifer potential. These deposits are underlain by layers of silt and clay, which act as confining units and influence groundwater movement. The region generally has a shallow water table typical of the Norfolk Sand Plain. Most private water supply wells in the area are of shallow, sand point characteristic.

Sediment Within Reservoir

The Sediment Management Plan (AECOM 2018) concluded that the reservoir, having been in place for close to 200 years, is close to 70% full of primarily fine-grained depositional matter which, when considering moisture content and density, represents approximately 60,000 tonnes of fine solids. From a sediment quality perspective, the conclusion was that the sediment would be suitable for controlled release into the receiving Big Creek system, for re-use within the reservoir (e.g., along reservoir fringes as part of a dewater impoundment approach), or for application on agricultural lands.

Fluvial Geomorphology (Stream System)

As with most online reservoirs, the continuity of sediment transport within Big Creek is disrupted by the presence of the dam resulting in morphological changes within the system, creating a depositional environment at the inlet to, and throughout, the reservoir area and associated “starving” of such materials through reaches downstream of the dam. While such sediment deprivation can often lead to erosion within the downstream creek and may have had such impacts at the subject site historically, the reaches of Big Creek downstream of the dam are currently interpreted to have entered a state of relative equilibrium.

Water Quality

Water quality in Big Creek exhibits characteristics typical for a rural agricultural watershed with elevated concentrations of parameters such as nitrogen / nitrates, phosphorus, and chlorides, likely from fertilizer application and road salting, respectively. The most direct water quality impacts associated with the dam and reservoir relate to the warming impacts of the reservoir particularly through the hot, summer months due to solar radiation and higher ambient air temperatures. Analysis completed on observed average July temperatures over multiple years between 2015 and 2024 indicates that the impact is such that the thermal regime transitions from “cool-cold” to a “warmwater” condition from upstream to downstream of the reservoir, conditions detrimental to the native salmonid habitat.

Natural Heritage / Ecology

The study area includes natural heritage features such as provincially significant wetlands, significant woodlands, potential presence of species-at-risk (SAR) and species of conservation concern (SCC), and potential significant wildlife habitat (SWH). The Teeterville reservoir represents part of the BC11 Provincially Significant Wetland Complex while Big Creek downstream of the dam has been identified as significant salmonid habitat. Background and field assessment have confirmed 18 candidate or confirmed SAR / SCC within the study area, including four (4) birds, three (2) turtles, one (1) insect, and seven (7) mammals. Additionally, two flora species, black ash and butternut and one bird, Barn Swallow, were confirmed to be present during the field surveys.

Archaeology

A Stage 1 archaeological assessment focused on the area surrounding the dam was completed. The background research and visual property inspection confirmed that roughly half of the archaeological study area has experienced extensive disturbance and lacks integrity primarily related to the construction of Teeterville Dam, the previous Teeterville Road alignment and modern Teeterville Road, their built-up road embankments, a gravel laneway or path, and the structural remains of a grist mill which is depicted in historic mapping. The former mill race to the north is considered low-lying and wet. These areas were determined to not retain land-based archaeological potential and do not require further assessment. Low areas demonstrating permanently wet conditions, including areas of wetland, were noted along Big Creek and make up roughly one quarter of the archaeological study area. While these areas have low or no potential for land-based archaeological resources, the assessment concluded that, should future works require in-water works and associated impacts within the creek, a marine archaeological assessment may be required. The remaining 20% of the archaeological study area is grassed and treed and not obviously disturbed and thereby retains archaeological potential. These areas will require Stage 2 assessment in the form of a test pit survey at 5 m interval if impacts to this area are required as part of any construction associated with the implementation of the preferred alternative. Similarly, completion of a Marine Archaeological Checklist will be necessary as part of project implementation planning to identify, evaluate and protect such resources within Big Creek itself.

Built Heritage Resources and Cultural Heritage Landscapes

A heritage impact assessment, completed as part of this project, evaluated the study area against criteria set out in the OHA O.Reg. 9/06 (as amended by O.Reg. 569/22) and determined that the subject site and associated landscape including the reservoir and mill remnants met three of nine criteria (criteria 1, 7 and 8) for design and physical value and contextual value, and that construction activities associated with the implementation of the preferred alternative have the potential to cause direct and indirect impacts to the identified heritage attributes. The Heritage Impact Assessment (HIA) recommended mitigation strategies that include retaining the location and general configuration of the spillway and earthen berm, replacing or referencing heritage attributes previously lost or potentially impacted with the implementation of the preferred solution. Construction planning and vibration monitoring should be completed as part of any project implementation to minimize potential impacts to heritage attributes.

Socio-Cultural

The background review and public consultation activities undertaken as part of the project confirmed that the dam and reservoir are dominant features in the socio-cultural environment of the community offering numerous recreational opportunities including fishing, canoeing / kayaking, hunting, skating, wildlife observation / birding, and more. The Legion property, located on the west side of the study area, serves as a primary access point for such recreation and as a community gathering location with the reservoir as a focal point.

Another key characteristic of significance to the community is the reservoir’s function within the County’s emergency fire water system, providing ample supply in an ideal location relative to the nearby fire station.

Economic

While LPRCA owns the dam/reservoir, the implementation of any significant works would be a “special benefiting project” (i.e., a project undertaken by a CA that benefits a single municipality within their jurisdiction) and, as such, would involve a special levy to Norfolk County in the absence of, or in combination with, other revenue sources. Various other governmental and non-governmental funding sources might be accessed to support ultimate project implementation.

Generation and Evaluation of Alternative Solutions

Five (5) potential alternative solutions were identified to address the problem statement focused on addressing the dam’s instability concerns, including:

1. Do Nothing
2. Repair Existing Dam
3. Replace With New Dam
4. Remove Dam and Reinststate Watercourse
5. Remove Dam, Reinststate Watercourse, Create Offline Pond(s) / Wetlands(s)

The evaluation of potential positive or negative impact of each the potential alternatives was conducted using numerous criteria across the four broad environmental categories based on study area environmental characteristics and factors considered most relevant by the study team and/or the community, as follows:

- Technical / Regulatory – dam safety / failure risk, climate change (adaptation), constructability, approvability
- Natural Heritage – fish habitat, wildlife habitat, sensitive species (including SAR/SCC), climate change (mitigation), and geomorphology / sediment transport
- Social / Cultural – private property, fire protection / safety, public infrastructure / safety, cultural heritage, public recreation
- Economic – construction costs, maintenance / future costs

Feedback on the evaluation criteria and the relative weightings received through public consultation, in particular the Community Liaison Committee and Public Information Centres, and study team members confirmed that consideration of equal weighting across all categories and criteria was inappropriate, as some environmental characteristics were deemed more important than others. Aspects of the social / cultural and natural environments were considered of heightened importance, as compared to economic and technical / regulatory elements, and such was reflected in the

evaluation with social / cultural category set at 45% of the overall scoring, natural environment at 25%, and economic and technical/ regulatory considerations at 20% and 15%, respectively. No substantive objections were received on the final category weightings of alternative evaluation scoring.

A summary of the evaluation matrix is included as Table i. Premised on this evaluation Alternative 2 – Repair Dam was assessed as the overall preferred alternative, to be taken forward for detailed assessment and review by stakeholders as per the CO Class EA process (see Conclusion, below).

Table i Summarized Alternative Evaluation Table

CATEGORY	WEIGHTING	ALTERNATIVES				
		1	2	3	4	5
		Do Nothing	Repair Dam	Replace Dam	Remove Dam and Reinststate Watercourse	Remove Dam, Reinststate Watercourse, Create Offline Pond(s) / Wetland(s)
TECHNICAL/REGULATORY	15%	4.5%	8.3%	7.5%	12.4%	10.9%
NATURAL ENVIRONMENT	25%	9.7%	14.4%	14.4%	13.8%	20.3%
SOCIAL / CULTURAL	40%	22.0%	34.0%	34.0%	10.0%	16.0%
ECONOMIC	20%	7.0%	5.0%	3.0%	6.5%	3.0%
TOTAL EVALUATION SCORE	100%	43%	62%	59%	43%	50%
OVERALL RANKING		4	1	2	5	3

Public and Agency Consultation and Engagement

Over the course of the Class EA, a comprehensive consultation program was undertaken including notices, website postings, meetings, and communications with many interested persons from the community, Indigenous communities, governmental, and non-governmental organizations.

A Community Liaison Committee (CLC) was formed, comprised of a diverse representation from adjacent landowners and community residents, municipal staff, the LPRCA Board, non-governmental interest groups, such as the Ontario Federation of Anglers & Hunters, the Big Creek Anglers Association, and the Ontario Rivers Alliance, as well as members of the Study Team. The CLC met twice over the course of the project, and the CLC meetings were well-attended, engaged, and collaborative. Input received from the CLC assisted with the baseline characterization and was considered / informed the generation and evaluation of alternatives.

Two (2) similarly well-attended Public Information Centres (PICs) were held in February and June 2025, with Study Team members on hand to engage interested stakeholders in project related discussions. Public comment and feedback received during and after the PICs and CLC meetings was reviewed and used to inform the alternative evaluation process and refinement of the preferred alternative.

All public notices, PIC presentation materials, background materials, and guidance on the CO Class EA process were posted on the dedicated project website, hosted by LPRCA, to provide public access.

Detailed Environmental Assessment of Preferred Alternative

With the selection of the preferred approach confirmed, a more detailed study of potential environmental impacts was completed in accordance with the CO Class EA guidance (S. 3.7.1, CO Class EA 2024). Of the 65 screening criteria categories, nearly one-third of the screening criteria (21) were assessed as not applicable to the project, with the rest assessed as neutral (28) or slightly positive (16); no significant adverse residual effects are anticipated, subject to mitigation and monitoring. Those assessed as having a neutral impact were defined as such either because they exist in the area but are not expected to be impacted with the implementation of the preferred alternative (i.e., “non-impacted neutral”), or because there are both negative and positive impacts that have been assessed as cancelling each other out (i.e., “balanced neutral”).

Conclusion

An Environmental Assessment study, completed as per the CO Class EA process, was initiated by LPRCA to determine a preferred alternative to addressing identified deficiencies of Teeterville Dam related to the structure’s stability, as defined by provincial standards. The assessment of existing conditions through background review and field studies demonstrated numerous positive and negative impacts of the existing dam and reservoir on the broad environment within which it exists. Five (5) alternatives were assessed including the mandatory Do Nothing option, dam repair, dam replacement, and two variations that reflect a dam removal approach. Alternative 2 – Repair Dam was determined to be the preferred alternative.

Final publication of this Project Plan is anticipated in early 2026. Should the CO Class EA processes, including the 30-day public review period, be completed satisfactorily (i.e., comments addressed and Section 16 Orders, if any, appropriately managed) the Repair Dam alternative will be approved to proceed to implementation. Detailed design, permitting, and any further required studies could take place as early as 2026-2027 with construction in 2027-2028, with such steps being contingent on related approvals, funding, and applicable review provisions.

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1 Introduction

Montrose Environmental Solutions Canada Inc. (Montrose) has been retained by the Long Point Region Conservation Authority (LPRCA) to complete the Teeterville Dam Class Environmental Assessment (EA). The study has followed processes and requirements as outlined in the Conservation Ontario Class Environmental Assessment for the Remedial Flood and Erosion Control Project for the Teeterville Dam (CO Class EA; 2002, as amended 2024). In accordance with Section 3.7.2 of the CO Class EA, and per the result of the detailed analysis of the preferred alternative (ref. Section 8 of this document) that indicates “no anticipated negative impacts or outstanding concerns by the Conservation Authority or reviewers”, this report has been completed as a Project Plan (PP). Information from the previously completed Baseline Environmental Inventory (BEI; April 2025) report has been brought forward to inform this PP.

The Teeterville Dam has been the focus of numerous investigations over the last 10 years, most notably the Dam Safety Review and Condition Assessment (DSR; AECOM 2016), Sediment Management Plan (SMP; AECOM 2018), the Teeterville Dam Design for Repairs (Stantec 2019), ongoing temperature monitoring upstream and downstream of the pond (LPRCA 2015 to 2023), and benthic monitoring for Big Creek at Concession Road 2 (select years between 2006 to 2023). These and other background studies have been provided to the Study Team by the LPRCA and form the basis of the understanding of the project’s environment, supplemented by additional desktop and field assessments completed as part of the Class EA project.

The objective of this Project Plan report is to summarize the problem being addressed by the study, document information about the project’s environment, identify and evaluate the potential alternative solutions, outline considerations and rationale for selecting a preferred solution, document the consultation process undertaken including the public, Indigenous communities, and regulatory agencies, and complete a detailed environmental analysis of the preferred alternative and its intended implementation.

1.1 Study Area

The Teeterville Dam and Reservoir are located on Big Creek in the village of Teeterville, near the intersection of Teeterville Road and Teeter Street, in Norfolk County. The Study Team’s understanding is that the LPRCA owns and operates the flow control structure portion of the dam and a small, vegetated portion of the old embankment to the northwest, an area managed as the passive Teeterville Conservation Area. Norfolk County owns the Teeterville Road right-of-way including the bridge, road infrastructure, and lands abutting the dam and historic embankment immediately to the northeast. As is typical for many historic dams, it is understood that the LPRCA also owns lands in the reservoir area to an elevation consistent with the high-water level of the dam. To add certainty in this regard, the LPRCA has commissioned a boundary survey to define the extent of LPRCA property limits and, by extension, those of adjacent private properties. This work is being completed concurrently but

independently of the current EA work, with results not available at the time of this Project Plan’s completion.

There are several private residential properties fronting onto Teeterville Road/Teeter Street and backing onto the south side of the reservoir, with local institutional uses also in the immediate vicinity including the Royal Canadian Legion Branch 526 property on the west, and the Teeterville Public School to the east. Managed by the Long Point Basin Land Trust since 2016, the 2.8 ha Marshall Malcolm Wetland Reserve is a natural, undeveloped area immediately east of the lower section of the reservoir, nestled between the reservoir and the school properties. There is also a residential dwelling located approximately 40 metres southeast, immediately downstream of the dam; however, the dwelling’s lowest elevation appears to be above the reservoir water level. Figure 1 shows the study area of the Teeterville Dam.

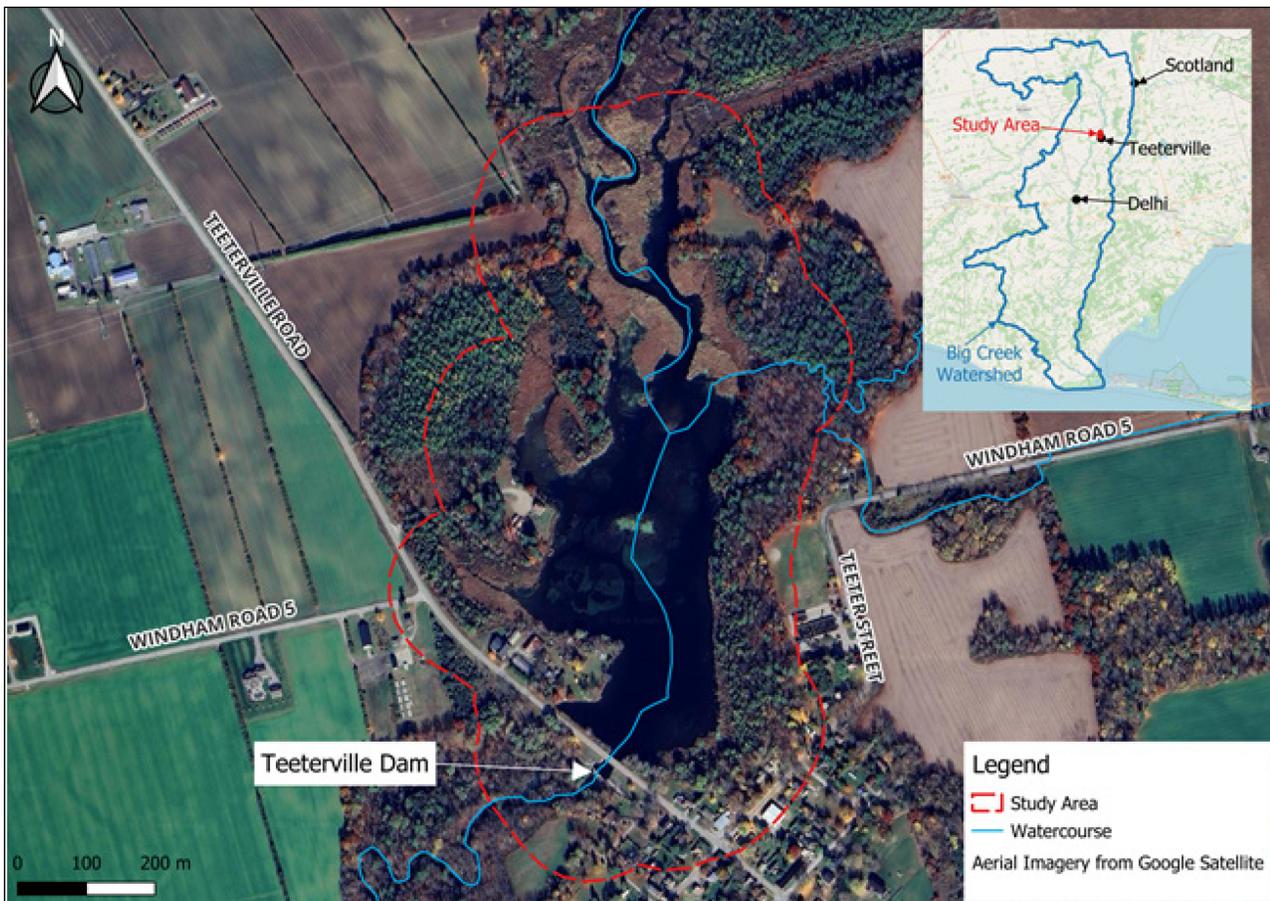


Figure 1 Teeterville Dam Assessment Study Area

Originally constructed to support the movement of timber and later to provide power to mills, including a grist mill and sawmill, a dam and reservoir have existed at, or near, the current site since the 1830s. Complete records confirming the date of the existing dam’s construction are not available. An earthen berm and concrete spillway were constructed in 1915 after a flood destroyed the original wooden dam structure, with concrete abutments to support a Warren pony truss bridge added in

1917. Records from the Teeterville Women's Institute indicate that at least portions of the dam and concrete spillway were replaced in 1937 after another flood damaged the structure.

The structure was modified by the Big Creek Region Conservation Authority (predecessor of LPRCA) in 1962, adding three concrete piers to the downstream face to form four bays capable of holding stop logs atop the concrete structure, which increased the reservoir elevation by approximately 1 m. The steel truss bridge formed the road crossing associated with the dam until 1971, at which time a new municipal bridge was constructed immediately upstream, and the truss bridge was closed to vehicular traffic. Following closure of the bridge across the dam to vehicular traffic, the truss structure, a metal catwalk, and a series of platforms and gantries remained for another 50 years acting as a pedestrian crossing and providing access for LPRCA operations staff to remove/replace stop logs. The truss bridge was removed in 2022 due to safety concerns.

Oriented in a general northwest-southeast direction, the earthen berm portion of the dam measures approximately 160 m, while the concrete spillway portion of the structure is approximately 31.5 m long. The dam consists of an upstream wall and downstream base slab supported by three piers and two abutments and there are concrete wingwalls beyond each end of the structure related to the bridge. The overall height of the dam from the top of the concrete base slab to the top of stop logs is approximately 3 m. The earthen berm height to the north and south of the concrete control structure is approximately 4 m high, with side slopes of approximately 2H:1V. Further details regarding the physical dam structure can be found in the DSR (2016). Reservoir levels are maintained by timber stop log controls in a four-bay spillway configuration structure at the south end of the reservoir. There are no flow controls below the level of the concrete sill that hold the stop logs, and the reservoir cannot be fully drained by gravity. A site photolog is provided in Appendix A.



Figure 2 Teeterville Dam – Downstream Face



Figure 3 Teeterville Reservoir – Looking Upstream from County Road 25

The 12.5 ha (+/-) reservoir created by the dam measures approximately 600 m long by 210 m wide, on average. The reservoir and associated marshy perimeter areas have created valuable wetland and near shore habitats for various sensitive species worthy of consideration, and the study area encompasses a large section of the BC11 Provincially Significant Wetland Complex. The area surrounding the dam and reservoir is mainly treed, with some residential, institutional, natural reserve and agricultural properties in the immediate vicinity as previously described.

Downstream of the dam, Big Creek has been identified as a significant salmonid cold-water stream habitat. While characterization of physical and ecologic conditions upstream of the reservoir is less comprehensive, previous monitoring has observed species indicative of cold-water conditions through these reaches. As an online structure with overflow stoplog controls, the dam represents a barrier to passage of fish and other aquatic species, particularly in the upstream direction, a condition which can represent both positive or negative impacts (e.g., limiting upstream migration of invasive / predatory or native populations, respectively).

1.2 Problem Identification and Project History

The Teeterville Dam and associated reservoir is one of 13 small dams and structures owned and operated by the LPRCA (as of 2025). In accordance with federal and provincial requirements for all dam owners, LPRCA routinely completes reviews of its structures to confirm compliance with current standards and/or identify any deficiencies requiring rectification. The most recent Dam Safety Review and Condition Assessment (DSR; AECOM 2016) undertaken for the Teeterville Dam identified that the structure currently has a “Low” Hazard Potential Classification (HPC) for both normal (Sunny Day) and flood conditions, primarily related to the limited incremental impacts to life safety, property, natural environment, and the cultural and built heritage of the area should the structure fail. As a “Low” HPC, the Inflow Design Flood (IDF) was “conservatively selected as the 100-year flood” (AECOM 2016).

Technical analyses completed as part of the dam stability and condition assessment, including an assessment of the dam’s structural integrity, a geotechnical assessment, and a hydrotechnical assessment indicated a need for remedial efforts. While the DSR concluded that the earthen embankment portion of the dam was generally safe, though potentially subject to internal piping/erosion, structural assessments related to the concrete abutments and piers found that **the dam does not meet federal and provincial safety criteria for sliding under all load cases and, as such, represents a risk of failure.** Given this assessment, operational adjustments were implemented by LPRCA with the objective of reducing the hydraulic pressure on the dam. Seasonal dam height adjustments, which historically had involved keeping two (2) stoplogs in place through winter/spring and four (4) stoplogs through summer/fall, were terminated with reservoir elevations held at lower winter operating levels since that time.

Given numerous identified structural deficiencies associated with the steel truss bridge structure that existed at that time, the DSR concluded that bridge elements providing access to the top of the dam structure represented “a potential liability and a danger to users” and recommended that its use be limited or phased out until such time as future rehabilitation or replacement is completed. Elements related to the steel truss bridge were removed in 2022.

Subsequent to the completion of the DSR, the LPRCA commissioned additional studies to inform and support remediation planning. The first in this regard, undertaken in 2017, involved a more comprehensive Sediment Management Plan (SMP; AECOM 2018) to help improve the understanding of

existing conditions including a characterization of the quantity and quality characteristics of accumulated sediment within the reservoir, and to review and recommend methods for its monitoring and management moving forward. Additional details on the findings of the SMP are summarized in Section 3.1.7 of this report, and the entire report can be found on the LPRCA’s project webpage.

Subsequent studies included the Teeterville Dam and Truss Bridge Heritage Evaluation (Stantec 2018) and advancing a detailed design for repairs and initiating associated provincial approvals processes (Stantec 2019a, 2019b, 2020). This work assessed possible dam repair options ultimately concluding that an approach involving the addition of concrete mass to the dam structure, on the existing concrete apron downstream of the existing vertical dam, represented a feasible alternative. The design-for-repairs work developed preliminary approaches to construction including construction phasing and sediment management strategies, and preliminary cost estimates. While consultations with provincial approval authorities was undertaken, and preliminary design and permitting packages submitted, the work stopped short of achieving final approvals.

Following a pause related, at least in part, to the COVID-19 global pandemic, planning for project implementation recommenced in late 2021 with discussions held between LPRCA and Norfolk County, as the latter is the special benefiting municipality for the specific project. Beyond an ability to access alternative funding sources at federal, provincial, non-governmental organization (NGO), or private levels, responsibilities for any project implementation funding would fall to the County. With costs estimated at approximately \$1 million at that time, senior County staff requested LPRCA to conduct additional assessments to ensure the preferability of the proposed repair approach, including reviews of elements such as the natural environment and a program of public consultation involving Indigenous communities, as well as agency and public stakeholders – effectively an environmental assessment.

The Conservation Ontario Class Environmental Assessment for Flood and Erosion Control Projects (CO Class EA; Conservation Ontario 2024) process is summarized in Section 2 of this report, a copy of which can be found on the LPRCA’s project website or through a general internet search.

The objective of the CO Class EA study is to characterize the broad environment in which the project exists, and to identify and assess various rehabilitation, replacement, and removal options to address the problem statement (i.e., the known structural deficiencies) to meet the objectives of the LPRCA with respect to water management, public and worker safety, the risk of dam failure, the protection of natural heritage features, fish and wildlife management, water supply, and recreation aspects. Key to the CO Class EA process is the implementation of a comprehensive consultation program involving Indigenous communities, as well as agency and public stakeholders.

2 Regulatory Framework

2.1 Legislative Network

The Ontario Ministry of Natural Resources (MNR), through the Lakes and Rivers Improvement Act (LRIA), regulates alterations, improvements, and repairs to existing dams. Under Section 16 of the LRIA, “no person shall alter, improve, or repair any part of a dam... unless the plans and specifications ... have been approved” by the MNR. Likewise, under Section 2(1)(b) of O. Reg. 454/96, MNR approval is required “to make alterations, improvements, or repairs to a dam that holds back water in a river, pond, or stream if these may affect the dam’s safety, structural integrity, the waters or natural resources”. Section 2(2) of O. Reg. 454/96 further specifies that LRIA Section 16 approval is required before a person “operates a dam in a manner different from that contemplated by previously approved plans and specifications approved by the Minister under Section 14 or 16 of the Act”. (O.Reg 454/96; Government of Ontario 2020).

Any works submitted for LRIA approval require supporting reports, analyses and calculations, and drawings that are completed by a Professional Engineer. LRIA approval may be issued if the proposed works meet the standards outlined in the various MNR/LRIA technical bulletins and guides including the Alteration, Improvements and Repairs to Existing Dams (MNR 2016), LRIA Administrative Guide (MNR 2017), and Dam Decommissioning and Removal (MNR 2011).

2.2 Ontario’s Environmental Assessment Act

The Teeterville Dam Class EA study is subject to the provisions of Ontario’s Environmental Assessment Act. The Act requires that, for any major public sector project that has the potential for significant environmental effects, an environmental assessment be undertaken prior to implementation to determine the ecological, cultural, economic, and social impact of the project.

The Act exists to “provide for the protection, conservation, and wise management of Ontario’s environment”. The Act mandates clear terms of reference, focused assessment hearings, ongoing consultation with all parties involved including public consultation and, if necessary, referral to mediation for decision. Environmental assessment is a key part of the planning process and must be completed before decisions are made to proceed on a project.

To comply with the requirements of the Act, two types of environmental assessment processes can be applied to projects:

- **Individual Environmental Assessment:** This process includes the development of a project-specific terms of reference that are submitted for review and approval to the Minister of the Environment. This process is typically applied to large, unique or complex projects that do not have precedents that demonstrate a predictable and manageable environmental impact.

- **Class Environmental Assessment:** This process applies to routine projects that have predictable and manageable environmental effects and follow terms of reference that have been previously approved for certain types of projects.

2.3 Conservation Ontario Class Environmental Assessment Process

Conservation Ontario (CO) has developed the Class Environmental Assessment for Remedial Flood and Erosion Control Projects (Conservation Ontario 2024) document to specify a planning and design process which ensures that environmental effects are considered when undertaking remedial flood and erosion control projects.

According to the subject Class EA document, a remedial flood and erosion control project includes those undertaken by conservation authorities which are required to protect human life and property from impending flood or erosion problems.

The CO Class EA process, graphically summarized in Figure 4, includes the following primary tasks:

- Initiate the Class EA and publish Notice of Intent
- Establish a Community Liaison Committee as necessary
- Prepare a BEI including the characterization of existing conditions, such as hydraulics, natural environment (terrestrial, aquatic and wildlife ecology) and geomorphology
- Develop and evaluate alternative remedial measures and select the preferred measure
- Conduct a detailed analysis of environmental impacts
- Prepare study report documentation in a PP or Environmental Study Report (ESR)
- File a Notice of Completion and publish the PP or ESR for 30-day public review period, addressing comments received as appropriate
- File Notice of Project Completion

The current project has been completed in accordance with the most recent amendments (February 2024) CO Class EA document.

2.3.1 Section 16 Order (aka Part II Order)

If, for unforeseen reasons, a concern is raised in the 30-day review period following the posting of the Notice of Completion that cannot be resolved through consultation or negotiation, the Conservation Authority shall consider elevation of the documentation level of the project report (e.g., from PP to ESR). Alternatively, a person may request that the Minister issue a Section 16 Order (formerly Part II Order) declaring that the undertaking is a Part II.3 project (and thus requiring that a proponent comply with Part II.3 of the EAA before proceeding) or imposing conditions in addition to those in the Class EA, if the order may prevent, mitigate or remedy adverse impacts to constitutionally protected Aboriginal and treaty rights.

Further details on the Section 16 Orders are provided in the CO Class EA manual (Conservation Ontario 2024), which can be found at:

https://conservationontario.ca/fileadmin/Class_EA_for_Remedial_Flood_and_Erosion_Control_Projects_February_2024_.pdf

and/or the Ministry's website, here:

[Class environmental assessments: Section 16 Order | ontario.ca.](#)

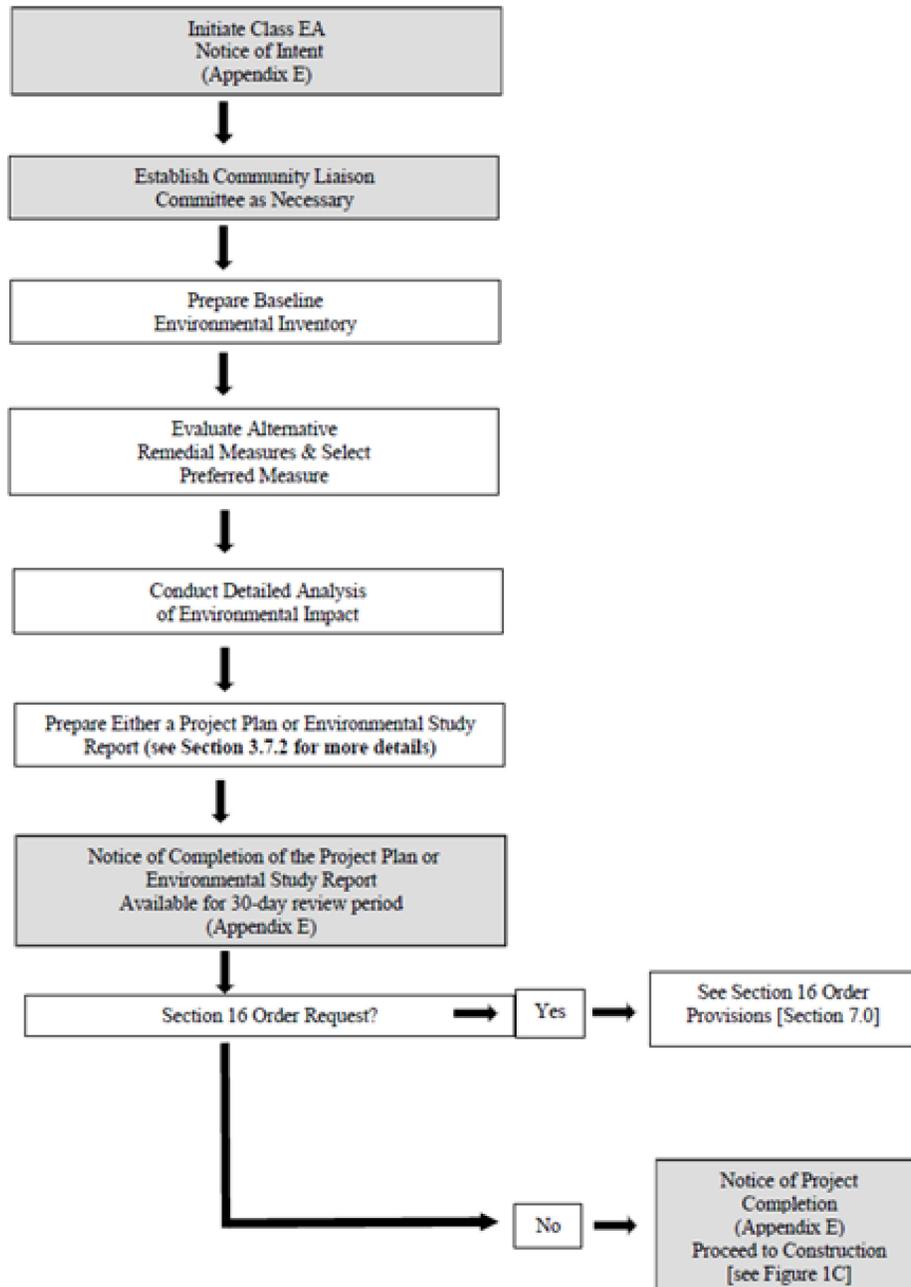


Figure 4 CO Class EA Process for Remedial Flood and Erosion Control Projects (Conservation Ontario 2024)

2.4 Natural Heritage Legislation Policy

There are numerous agencies involved in implementing legislation, regulations and policies related to natural heritage aspects including the LPRCA, Norfolk County, the Ontario Ministry of Environment, Conservation and Parks (MECP), the Ontario MNR, and the federal Department of Fisheries and Oceans Canada (DFO). Table 1 provides a summary of the legislation and guidelines relevant to this project.

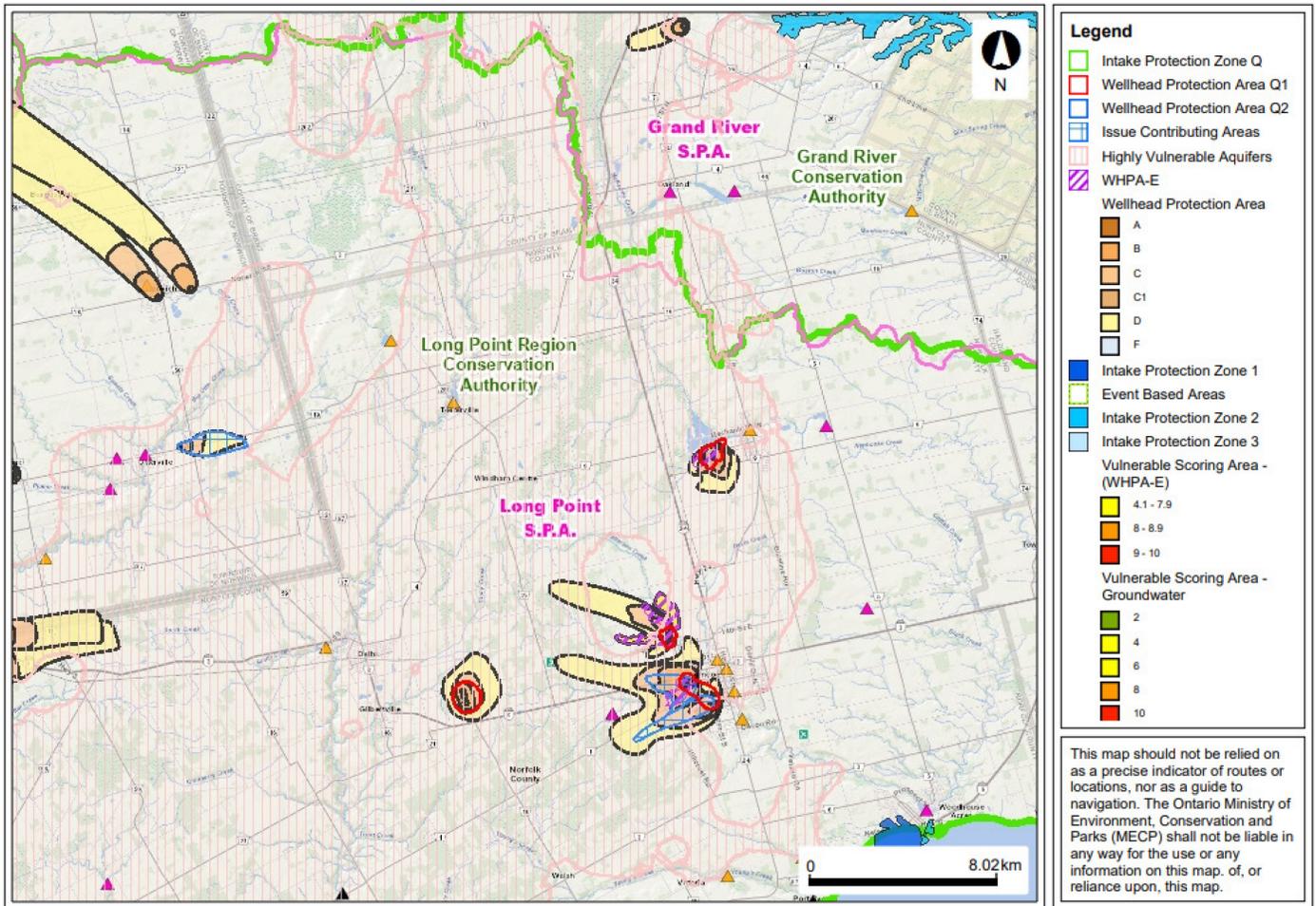
Table 1 Applicable Natural Heritage Legislation, Regulations, and Policies

Legislation	Policies and Regulations / Guidelines	Summary of Contents
Species at Risk Act (SARA; 2002)		<p>SARA incorporates several prohibitions to protect Species at Risk, providing recovery strategies for Extirpated, Endangered or Threatened species, as well as managing species of special concern (Government of Canada 2016). On private or provincially owned lands, only aquatic species listed as Endangered, Threatened, or Extirpated and migratory birds listed on Schedule 1 are protected under SARA, unless ordered by the Governor in Council or for those species that have critical habitat identified. Schedule 1 migratory birds where critical habitat has also been identified require consideration under SARA. Should a species also be listed under the provincial Endangered Species Act (ESA; see below), where the ESA provides equal or greater protection, the ESA takes precedence.</p> <p>Applicability to Project: Both aquatic and terrestrial species at risk have been identified within the Big Creek watershed.</p>
Fisheries Act (1985, amended 2019)	Fish Protection Policy Statement (2013)	<p>The <i>Fisheries Act</i> outlines the framework for the management and regulation of fisheries and the conservation and protection of fish and fish habitat within the fishing zones of Canada, all waters in the territorial sea of Canada, and all internal waters of Canada.</p> <p>The most recent revision (2019) restores protections to both fish and fish habitat by prohibiting the harmful alteration, destruction, or disruption (HADD) of fish habitat and prohibiting the death of fish. Environmental recommendations and mitigation measures are to include the provision of timing windows, to avoid the death of fish or the HADD of fish habitat. Any proposed works that may result in either require a Request for Review submitted to the DFO.</p> <p>Applicability to Project: Any activities that may impact watercourses within the study area will require a Request for Review from the DFO.</p>
Migratory Bird Convention Act (MBCA; 1994, amended on 2017)	Migratory Birds Regulation (MBR; 2022) Migratory Bird Sanctuary Regulations (2022)	<p>The MBCA affords protection to birds listed under Article 1 of the Migratory Birds Convention. General prohibitions protect migratory birds, their nests, and their eggs, and prohibits the deposition of harmful substances in waters and other areas frequented by them.</p> <p>The MBR clarifies the nest protection timelines for 18 species that are listed on Schedule 1. These timelines include a waiting period until the nest can be deemed abandoned and subsequently removed. The waiting period for these 18 species remains in effect even if the nest is unoccupied. Nest protection for all other species which are not listed in Article 1 remains the same, with nest removal occurring once the young have fledged.</p> <p>Vegetation removal for the project should occur outside of the Migratory Bird window of April 1 to August 31 of any year.</p> <p>Applicability to Project: All vegetation removal should occur outside of the Migratory Bird nesting window of April 1 to August 31 of any year to avoid disturbing active nests.</p>
Lakes and River Improvement Act (LRIA; 1990, last amended December 2019)	LRIA Administrative Guide (2017) and associated Technical Bulletins, including: <ul style="list-style-type: none"> • Classification and Inflow Design Flood Criteria (2011) • Dam Decommissioning and Removal (2011) • Geotechnical Design and Factors of Safety (2011) • Spillways and Flood Control structures (2011) • Structural Design and Factors of Safety (2011) • Alterations, Improvements and Repairs to Existing Dams (2016) 	<p>The LRIA provides the (MNR) with the legislative authority to govern the design, construction, operation, maintenance, and safety of dams in Ontario. The LRIA Administrative Guide (2011) and supporting technical bulletins are designed to provide an overview of the LRIA application and approval process to construct, alter, improve, repair, or decommission water control infrastructure in Ontario and detailed technical guidance on the design, operation, and management of dams.</p> <p>Applicability to Project: As the governing legislation for dam-related concerns in the province, the LRIA and associated technical guidance direct all aspects of the project from establishing the safety standards to be achieved through to permitting the implementation of any eventual alternative approach to problem resolutions, whether such include remediation, rebuilding, or decommissioning.</p>
Planning Act (1990, amended 2024)	Provincial Planning Statement, 2024 (MMAH 2024) Provincial Policy Statement, 2020 (MMAH 2020) Natural Heritage Reference Manual (NHMR; MNR 2010) Significant Wildlife Habitat Technical Guide (SWHTG; OMNR 2000) Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015)	<ul style="list-style-type: none"> • The Provincial Planning Statement (PPS) provides policy direction on provincial matters of interest related to land use planning and development. It sets the policy framework for regulating development and use of land and is issued under the authority of Section 3 of the Planning Act. • The PPS (2024), which is intended to update the PPS 2020, was implemented in October of 2024. The PPS 2024 does not include any notable changes to natural heritage policies but does include minor policy changes with respect to development projects and energy generation. • Section 4.1 of the PPS outlines policies that provide legislative protection for the natural environment. These policies include the exclusion of development and site alteration within PSWs, habitat of Endangered or Threatened species, fish habitat, as well as within SWH, significant woodlands, significant valleylands, ANS, or adjacent lands "...unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions" (MMAH 2020). The NHRM was developed to provide technical guidance for implementing the natural heritage policies of the PPS. • The NHRM and SWHTG outline protection of natural heritage features within Ontario including significant wetlands, woodlands, and wildlife habitat. <p>Applicability to Project: Numerous natural heritage features are found within the study area such as wetlands, watercourses, and woodlands.</p>

Legislation	Policies and Regulations / Guidelines	Summary of Contents
Endangered Species Act (ESA) (2007, amended 2020)	Ontario Regulations: <ul style="list-style-type: none"> • 230/08 • 242/08 • 829/21 • 830/21 • 832/21 	<p>The ESA provides conservation and protection of species in Ontario. Species listed as Endangered or Threatened under the ESA are afforded legal protection from harm and harassment. The ESA also prohibits damage or destruction of habitat of Endangered or Threatened species. Habitat protection for a species can be general or subject to the specific provisions of a habitat regulation as set out in O. Reg. 832/21.</p> <p>Applicability to Project: The ESA applies to all SAR species within provincial lands protected under the ESA. Any impacts to these species or their habitats protected under the ESA would require a permit. The study area may contain habitat for SAR species.</p>
Fish and Wildlife Act (1997, amended 2021)	Ontario Regulations: <ul style="list-style-type: none"> • 670/98, 668/98, 666/98 • 667/98, 665/98, 664/98, 663/98 Ontario Regulation 669/98: Wildlife Schedules (1997, amended 2020)	<p>The Fish and Wildlife Act affords protection for some species of birds, amphibians, reptiles, and mammals in Ontario. Some bird species which are not afforded protection under the MBCA are afforded protection under the Fish and Wildlife Act.</p> <p>Applicability to Project: There may be suitable habitat within the study area for some of these species, such as raptors or fur bearing mammals. Environmental management considerations should include timing windows for vegetation clearing and for construction.</p>
Conservation Authorities Act (1990, amended 2022)	O. Reg. 41/24: Prohibited Activities, Exemptions, and Permits	<ul style="list-style-type: none"> • The Conservation Authorities Act empowers conservation authorities to regulate development within hazardous lands, wetlands, river or stream valleys; within areas that are adjacent to the shoreline of the Great Lakes; inland lakes subject to flooding, erosion, or dynamic beach hazards; as well as any activities that interfere with an existing watercourse or wetland. On April 1, 2024, portions of the Conservation Authorities Act were repealed and substituted, including but not limited to Part VI (Section 28 and Section 29) and Part VII. • On April 1, 2024, O. Reg. 41/24 was enacted under the Conservation Authorities Act, which supersedes previous Conservation Authority specific Regulation's of Development, such as LPRCA's O. Reg. 178/06. O. Reg. 41/24 includes updated definitions for key terms; an updated list of prohibited activities, or activities that would require permission; clarification on the pre-consultation requirements for permits; and updates to floodplain and regulated area mapping standards. Notably, the regulated areas surrounding wetlands has been updated to a standard 30 m regulation limit for all wetlands (including PSWs and wetlands greater than 2 ha in size). <p>Applicability to Project: A portion of the study area is located within the jurisdiction of the LPRCA (regulated under O. Reg. 41/24. Any works within the regulatory limit may require a permit.</p>
Municipal Acts and Regulations		
Norfolk County Official Plan (2018, amended 2023)	N/A	<ul style="list-style-type: none"> • The Norfolk County Official Plan was adopted by municipal Council on January 31, 2018. A consolidated version of the official plan came into effect on January 1, 2023, which incorporates several amendments. • The purpose of the plan is to provide a policy framework to direct future growth, development and change within the County while ensuring a strong economy and agricultural base. The plan will manage growth and development within the County until 2036. <p>Applicability to Project: The study area is located within Norfolk County and is subject to the policies outlined in its Official Plan. Within the study area, a number of provincially, regionally, and locally significant features are present including wetlands, woodlands, valleylands, and a significant natural area.</p>

2.5 Source Water Protection

A review of source water protection information, as contained within the provincial Source Protection Information Atlas (MECP 2023) was completed and determined that there are no Wellhead Protection Areas within the vicinity of the study area, though the entirety of the area associated with the glaciolacustrine deposits of the Norfolk Sand Plan is identified as highly vulnerable aquifer (HVA) zone, where the subsurface material offers limited protection from contamination resulting from surface activities.



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Map Created: 1/2/2025
Map Center: 42.92531 N, -80.40917 W

Figure 5 Source Water Protection Mapping in Teeterville Area

3 Baseline Environmental Inventory

The following sections provide a detailed characterization of the study area of the dam and its environs, including assessments of the existing physical, biological, cultural, socioeconomic, and engineering/technical environments. All baseline characterizations contained herein are carried forward to form the basis for comparison of alternative solutions, as summarized in Section 5 of this report.

3.1 Physical Environment

3.1.1 Physiography and Surficial Geology

The surficial geology of an area provides the boundary materials into which a watercourse develops. Properties of the surficial geology determine surface runoff potential, infiltration capacity, erodibility, and, ultimately, channel form which are established through the interaction between these materials and the area's rainfall/runoff.

The study area is primarily within the Norfolk Sand Plain physiographic region characterized as glaciolacustrine deposited sediments, primarily consisting of coarse-grained sand with some finer textured sands and silt deposited from glacial lakes (Chapman and Putnam 1984). The sand plain is considered a low relief, highly pervious region. The headwaters of Big Creek itself is within a corridor of older and modern alluvial deposits comprised of clay, silt, sand, and gravel (OGS 2010) that extends through most of the western portion of the LPRCA's jurisdiction. The sand plain ranges in thickness from less than a metre to over 25 m in isolated areas (Barnett 1982). The deep bedrock in the area is over 30 m below ground surface and comprises Devonian limestone of the Onondaga Formation.

3.1.2 Drainage Network & Watershed

Teeterville Dam is located on Big Creek, within the village of Teeterville. The drainage area to the dam and reservoir is approximately 204 km² with the main channel extending 40 km upstream of the dam at an average slope of 0.2%. Within the upstream watershed, over 78% of the land is classified as agricultural, 10% as wetlands, 8% as treed (e.g., deciduous and mixed tree forests, plantations/hedgerows), with just over 3% (6.7 km²) of the watershed area having been developed. The area is topographically characterized as generally low relief hills with well-defined valleys created by Big Creek and minor tributaries through the sandy soils.

Downstream of the dam, Big Creek continues to flow southwest approximately 20 km to Delhi and another 60 km (total drainage area of 715 km²) before discharging to Lake Erie near Port Rowan, Ontario. Numerous smaller tributaries join along the creek's route between Teeterville and its outlet at the lake.

The headwater areas of the Big Creek watershed initially flow easterly before turning south after crossing County Road 25 (Middle Townline Road), just south of Harley, Ontario. No significant valley

has been created within the creek corridor above the dam because of the relatively small runoff volume from the sandy landscape. This corridor characteristic begins to change around Teeterville; however, becoming entrenched, deepening itself to over 20 m at Delhi and remaining to its outlet.

3.1.3 Hydrology

As described above, much of the Big Creek watershed is located on the Norfolk Sand Plain, with an associated high infiltration/low runoff hydrologic regime through much of the contributing watershed that sustains high groundwater baseflow conditions. The headwaters of the watershed are within till moraine and till plain which would generate a higher runoff response than that of the sand plains, as well as conveying finer particles downstream where they have historically been captured within the reservoir (ref. Section 3.17). The substantial infiltration within the native sand of the watershed results in a very dampened, low surface runoff volume response, even from significant, infrequent storms. Most of the observed maximum annual flows observed at the Water Survey of Canada gauge upstream (WSC 02GC011, Big Creek Near Kelvin) are coincident with spring freshet events and likely involve snowmelt only or rain-on-snow flow events on frozen or reduced infiltration ground conditions in the mid-winter to spring period. Of the 33 maximum annual flow records (1964-1978, 2006-2023), only a single year (2021) experienced an annual maximum peak flow outside of the December to May period, and only two of those were in May (2014 and 2017).

The most current hydrologic modelling for the Big Creek watershed was completed by Montrose in 2024 as part of a broader update to all watersheds within the LPRCA's jurisdiction. The model update integrated the latest topography, soils, and land use mapping, and included a conversion from the Guelph All-Weather Sequential Events Runoff (GAWSER) hydrologic modelling platform, which had been used since 2006 (updated in 2019), to that of the Hydrologic Engineering Centre's Hydrologic Modeling System (HEC-HMS) platform, and calibration to recent rainfall events. The updated review of watershed hydrology completed by Montrose in 2024 also included a statistical review of historic gauged flow data on all stations with recent, long-term (20+ year) datasets, a group that includes Water Survey of Canada gauges on Big Creek at Kelvin (02GC011) and Near Delhi (02GC006).

Table 2 provides a summary of peak flow estimates by return-period as determined through the updated single-station flood frequency analysis (SSFFA) and HEC-HMS hydrologic modelling (Matrix 2024), as compared to various other sources. The GAWSER-derived flows are from the *Long Point Region Watershed Hydrologic Model* (Table 3.3.2, S & A 2006). The DSR-derived 1:100-year return period flows (AECOM 2016) were established using the PCSWMM modelling platform and were compared against flows completed using different statistical methods and data from nearby Water Survey of Canada (WSC) gauge stations, such as "Big Creek Near Delhi" (02GC006) and "Big Creek Near Kelvin" (02GC011), with flows pro-rated using the single-station transfer method to a drainage area equivalent to that of Teeterville Dam. The SSFFA flows for Teeterville were similarly derived using pro-rating methodology as outlined in Watt et al., 1989.

Table 2 Peak Flow Estimates at Teeterville

Return Period (year)	Peak Flow (m ³ /s)					
	SSFFA	HEC-HMS	GAWSER	Moin & Shaw (OFAT III)	Statistical Analysis (HYDAT)	PCSWMM
	Matrix 2024		S & A 2006	DSR 2016		
1.25		-	13.8	-	-	-
2	36.5	20.4	23.4	30.0	38.2	-
5	53.0	36.2	35.8	45.3	56.0	-
10	63.0	44.39	47.5	56.3	66.6	-
20	72.0	55.8	58.9	67.4	76.2	-
25	74.8	59.3	62.8	-	79.1	-
50	83.0	67.6	73.9	78.7	87.8	-
100	90.8	76.9	85.5	89.8	96.2	93.7

Notes: “-“ = no value

The modelled peak flow estimates are generally comparable, with the calibrated hydrological model estimates (Matrix 2024) being slightly lower than those predicted by S&A (2006) and the DSR for all return periods. Given the up-to-date nature of the flow estimation results, no additional modelling is considered required at this time and the values cited herein, as well as the updated land use mapping, will suffice for the preliminary evaluation of the alternative solutions. Should return-period flow values become specifically relevant to analysis or reporting within the current EA process, the SSFFA-derived flows will represent the most appropriate IDF's for the purposes. While the available modelling and flow estimate information is considered appropriate and applicable to the current study, there may be a need to complete additional modelling and/or refinements to support detailed design and implementation of any alternative moving forward.

3.1.4 Hydraulics

Hydraulic modelling of the Big Creek system in the vicinity of the dam has been most recently completed as part of the dam break analysis within the DSR work (AECOM 2016). This work included the creation of a new, unsteady state HEC-RAS model using topographic data from a Digital Elevation Model (DEM; 20 m grid) and 1.0 m contours, dam outflow characteristics based on design drawings, new survey information for the five watercourse crossings immediately downstream of the dam, and additional crossing information for the Delhi area taken from an existing, historic HEC-2 model.

The dam break analysis was completed to confirm the dam HPC and IDF, based on the greatest incremental losses that could result from dam failure. The extent of the analysis investigated conditions from the dam to a point approximately 24 km downstream at the railway bridge in Delhi. The analysis was conducted under two scenarios: failure under normal conditions (Sunny Day) and failure under flood conditions.

The simulation for failure under normal Sunny Day conditions resulted in a very small flow rate (0.37 m³/s) and no buildings are located within the associated flood inundation area. There is no potential for loss of life and minimal economic loss under this failure condition. The simulation for failure under flood conditions indicated little difference in flood inundation limits between the 100-year flood event and a dam failure under the same event conditions, with no incremental increase in loss of life, economic losses, environmental losses, and cultural built heritage losses.

The lack of incremental impacts associated with dam failure is a result of both the relative lack of flood control offered by the dam, leading to failure flows that are very similar to those under non-failure conditions, and as importantly (if not more so), the lack of buildings and people within the inundation zones downstream. As these conditions would be expected to persist into the future, no matter the outcome of the current Class EA, there is no expected need to update or further advance knowledge of hydraulic conditions through downstream reaches within the current study. Similar to that noted above for hydrology, while the available hydraulic modelling is considered appropriate and applicable to the current study, there may be a need to complete additional modelling and/or refinements to support detailed design and implementation of any alternative moving forward.

3.1.5 Hydrogeology

A review of the MECP well records near the study area was completed to help characterize the hydrogeological setting of the dam and reservoir. The study area is situated within the Norfolk Sand Plain, with hydrogeology characterized by a mix of sand and gravel deposits, providing relatively high permeability and good aquifer potential. These deposits are underlain by layers of silt and clay, which act as confining units and influence groundwater movement. The region generally has a shallow water table typical of the Norfolk Sand Plain.

3.1.6 Fluvial Geomorphology

A scoped fluvial geomorphic assessment of approximately 3.5 km of the Big Creek system was completed in proximity to Teeterville Dam. The assessment included a desktop review of relevant background reports and air photo analyses (current and historical) to gain an understanding of the study area. A field investigation was completed to document existing conditions and processes currently influencing the Big Creek. Results from the fluvial geomorphic assessment will provide insight into ongoing processes and issues that should be considered within the evaluation and assessment of any proposed works in the area.

Historical Channel Conditions

A sequence of historical aerial images was obtained from the University of Toronto (1954), Norfolk County (1964), Southwestern Ontario Orthophotography Project (SWOOP; 2006), and ESRI (2018). The review of historical aerial photography provides insight into changes that have occurred within the watershed, to the drainage network, and within the immediate study area. A summary of key

observations from the historical aerial imagery is provided in Table 3; an outline of historical planforms is shown on Figure 4, and the historical air photographs and LiDAR are included within Appendix C.

Along with historical imagery, Digital Terrain Models (DTM) developed from LiDAR-derived topographic data sets can highlight changes in the topographic landscape that can also contribute to the historical understanding of the channel. A review of LiDAR from OMAFRA (2016) reveals that Big Creek has historically been very mobile within the valley corridor. Historical (relic) meanders, cutoff channels, bar formations, and valley wall contacts are visible, and show that the channel has occupied all parts of the valley, both upstream and downstream of the dam (note: historic planform is often not visible within the reservoir due to LiDAR's limitations with water). Where prominent meander scars (i.e., historic meanders that have migrated or been infilled) are visible, they appeared similarly sized to the current channel geometry and had a similar meandering planform, identified by historic point bar development.

Field Assessment of Existing Conditions

The field assessment was completed on November 13, 2024, with the objective of characterizing Big Creek in the reaches upstream and downstream of Teeterville Dam. The assessment extended 400 m downstream of the Teeterville Dam, and from Country Road 19 to a point 525 m downstream, with additional spot checks completed around the reservoir and remaining study area.

A “channel reach” is typically defined as a length of channel that exhibits similar form, function, and characteristics which imply relative consistency in the interaction of controlling influences on channel geometry (i.e., the effective flow, the physiography which determines slope, and the boundary materials) within the reach. Reach boundaries were verified, or adjusted, as appropriate during the field assessment. Delineation of reaches enables spatial organization of data and observations. A map of the study area and reach breaks is shown in Figure 6.

Reach 1 occupies the channel downstream of the dam and extends 400 m downstream of the outlet. Reach 2 spans the length of the reservoir. Reach 3 spans the depositional area upstream of the reservoir that may be inundated at high-water levels, for approximately 450 m. Reach 4 occurs within the forested area upstream of the reservoir, of which only the upper 525 m was assessed.

Due to limited access to private properties around the site, the field program focused on two of the reaches (Reaches 1 and 4) that were delineated during the desktop assessment, as described above. Photographs providing a visual overview of existing conditions are included within Appendix C.

An overview of reach characteristics is provided in the following sub-sections. The channel was assessed walking from downstream to upstream, with reference to right and left banks in this orientation (i.e., looking upstream).

Table 3 Historical Observations from Air Photographs

Year	Key Observations
1954	<ul style="list-style-type: none"> • Area surrounding the Big Creek study area is predominantly agricultural with a sparsely wooded riparian corridor ranging between 140 m and 600 m wide. • The planform shows a regular meander sequence with a wavelength frequency of approximately 150 m and a uniform amplitude of 30 m upstream (north) of Teeterville Dam. • Downstream of the dam site (note: road crossing and old-configuration dam), the channel remains meandering, but with decreased wavelength (200 to 300 m, 35 to 50 m amplitude). • Minor creek encroachment has occurred around Teeterville but consists predominantly of small clearings or agricultural fields outside of the floodplain.
1964	<ul style="list-style-type: none"> • Construction of the modified Teeterville Dam was completed at the time of the air photograph, with water levels appearing close to current levels. • There appears to be some additional residential development on properties on the southeastern and southwestern edges of the reservoir, where the existing Royal Canadian Legion (Branch 526) and elementary school are located now (November 2024) along with some minor housing development within Teeterville; much of the broader surrounding landscape remains agricultural or under forest cover. • Vegetation in the riparian corridor remains as was the case in 1954. • The channel planform upstream of the backwatered conditions caused by the reservoir remains similar in configuration to 1954 conditions and through the reach downstream of the dam.
2006	<ul style="list-style-type: none"> • No major changes to the surrounding land uses around Teeterville, the reservoir, or the channel within the study area. • The channel downstream of the reservoir has increased in sinuosity, with the channel now occupying the full width of the available valley floor and abandoning part of the occupied channel from 1954. • Migration has continued upstream of the reservoir, with most bends increasing in radius, and an increase in length in previously straight sections of channel. • Some development of depositional islands and vegetation clusters in the upper portions of the reservoir and along the shallower edges.
2018	<ul style="list-style-type: none"> • No significant changes to the surrounding land uses near the creek or reservoir. • The channel upstream and downstream of the reservoir remains relatively stable, with only minor natural adjustment to the channel planform. • The reservoir has continued infilling, with edge of water traces showing reductions in open water area and an increase in more established vegetated bars and islands, with some tributary channels becoming undefined. • Transition area between the reservoir water limits and the upstream creek has become multi-threaded, with many flow paths around sedimentary bars.

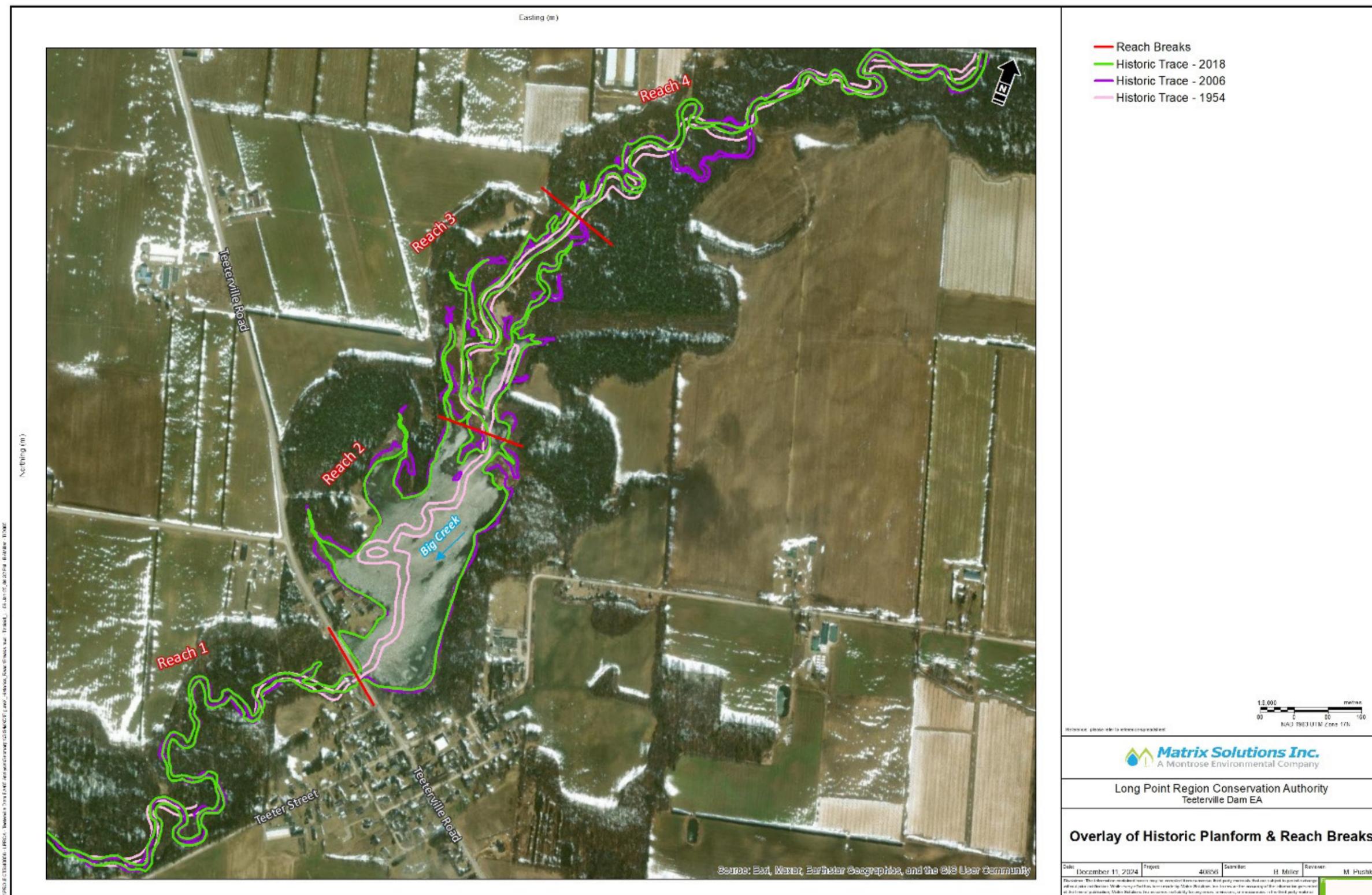


Figure 6 Overlay of Historical Planforms and Reach Breaks

Rapid Assessment and Reach Characteristics

Semi-quantitative and qualitative rapid assessments, including the Rapid Geomorphic Assessment (RGA; MOE 2003) and Rapid Stream Assessment Tool (RSAT; Galli 1996) were completed for Reach 1 and Reach 4 (Figure 4). These assessment tools provide a relative means to evaluate channel stability/sensitivity (RGA) and stream health (RSAT).

The RGA is a semi-quantitative technique developed by the Ontario Ministry of the Environment (MOE 2003) to document indicators of channel instability. Observations are quantified using an index that identifies channel sensitivity based on the presence or absence of aggradation, degradation, channel widening, and planform adjustment at the reach scale. Overall, the index produces values that indicate whether the channel is stable or “in regime” (score of less than or equal to 0.20), transitional or stressed (score of 0.21 to 0.40), or adjusting (score of 0.41 or greater). Results of the RGA assessment for the study reaches are summarized in Table 4 and discussed along with the subsequent reach descriptions.

The RSAT uses a broader, more qualitative assessment of the bankfull channel to assess the overall health and function of a reach from a biological and water quality perspective. The indicators assessed in the RSAT technique are scored on a scale of 1 to 10 (with 10 being the better score), and cumulative scores providing an overall indication of stream health (<20 Low, 20 to 35 Moderate, >35 High). This approach is useful for assessing geomorphic conditions as the physical and biological features of a healthy stream are also generally indicative of geomorphic function.

During the rapid field assessments, bankfull channel indicators were identified and dimensions were measured. In natural, dynamically stable streams, the bankfull channel area often represents the maximum conveyance capacity of the channel before flow spills into the floodplain; the discharge at this stage is referred to as the bankfull discharge. Bankfull discharge flows are also associated with the channel forming flow. Field indicators of bankfull flow elevation include obvious breaks or inflections in the cross-section profile, the top elevation of point bars, and changes in vegetation. Disturbances to the flow and sediment regime of a system may result in adjustments to the bankfull channel. For example, increased flows may result in channel enlargement and entrenchment. Results of the RSAT assessment for the study reaches are summarized in Table 5 and discussed in subsequent reach descriptions.

Reach 2 spans the length of the inundated, non-channelized portion of the reservoir (Figure 4) and, as such, RGA and RSATs were not applicable for this reach and excluded from the Table 4 and Table 5 summaries. Reach 3 was not evaluated due to the limited access available to the site through private property and have also been excluded from the Table 4 and 5 summaries.

Table 4 Summary of Rapid Geomorphic Assessment Scores

Reach	Factor Value				Stability Index	Condition ⁽¹⁾
	Aggradation	Degradation	Widening	Planimetric Adjustment		
Reach 1	0.14	0.10	0.40	0	0.16	In Regime
Reach 2	Not Applicable					
Reach 3	Unevaluated					
Reach 4	0.29	0.13	0.40	0	0.21	Transitional

(1) Results reflect conditions observed on November 13, 2024.

Table 5 Summary of Rapid Stream Assessment Scores

Reach	Factor Value						Overall Score ⁽¹⁾	Condition
	Channel Stability	Scour/ Deposition	Instream Habitat	Water Quality	Riparian Condition	Biological Indicators		
Maximum Score Possible	11	8	8	8	7	8	50	-
Reach 1	7	5	6	6	6	6	36	High
Reach 2	Not Applicable							
Reach 3	Unevaluated							
Reach 4	7	7	5	6	6	6	37	High

(1) Results reflect conditions observed on November 13, 2024.

Reach 1 – Downstream of Dam

Reach 1 was defined as the portion of Big Creek downstream of the dam. While the reach continues further downstream, only the upper 400 m immediately downstream of the dam was assessed. The reach had a meandering planform within the assessed area, with a bed profile consisting of riffles and pools.

The channel setting was consistent throughout the assessed portion of the reach, with Big Creek occupying a natural forested valley with limited channel disturbance. The valley was well vegetated with trees intermixed with shorter herbaceous vegetation, and the adjacent floodplain was relatively accessible. Bank materials generally consisted of sand and gravel, with areas of exposed till in the bed and banks observed within the scour pool downstream of the dam. The profile for Reach 1 was extracted from a LiDAR DTM, which presented Reach 1 as having a slope of 0.07% (Figure 7).

Within Reach 1, bank erosion was common, with many undercut banks where material had been removed from the lower portions of the bank observed. Undercut banks were measured to a maximum of 1.7 m deep, with the deepest identified along an outside meander bend. Woody debris was present within the channel throughout the reach, consisting of fallen trees from the adjacent eroding banks. The large woody debris accumulations were observed to be redirecting flows and contributing to the creation of deeper scour pools.

The channel within Reach 1 had an average bankfull width of 16.6 m, with the wetted width being similar to bankfull width due to the near vertical banks. The reach had an average bankfull depth of 1.56 m, and an average water depth of 0.58 m at the time of the field assessment (November 13, 2024). The deepest section, with a water depth of 0.9 m, was in the pool immediately downstream of the dam. The substrate within the channel was predominately very coarse sand to very coarse gravel (1.5 cm to 6 cm diameter), while riprap and coarser cobbles had been placed along the banks and bed near the dam outlet. Some lateral and point bars were present within the reach, typically consisting of coarse sand in areas of lower energy such as behind debris or large stones, or inside meander bends.

The rapid assessments completed for this reach gave an RGA stability score of 0.16 (i.e., “in regime”), with its primary mode of adjustment being widening. This reach also received a RSAT score of 36 (High), which classifies the reach as having good health within the RSAT scoring structure.

Reach 2 – Teeterville Reservoir

Representing Reach 2, the length of the inundated reservoir area, from the dam to the upstream extent of backwater influence, is approximately 600 m. This length will vary depending on water level and may include some of the upstream creek (Reach 3) during periods of elevated backwater.

The banks of the reservoir appeared stable; the shoreline was well vegetated with cattails and other reeds, sheltering the bank material. Sedimentation was noted to be occurring within the reservoir, particularly along the outer edges of the reservoir and in the upstream extents, where vegetated islands were becoming established. Deposits were visible just below the water surface and many soft, unconsolidated bars were observed along the banks of the reservoir.

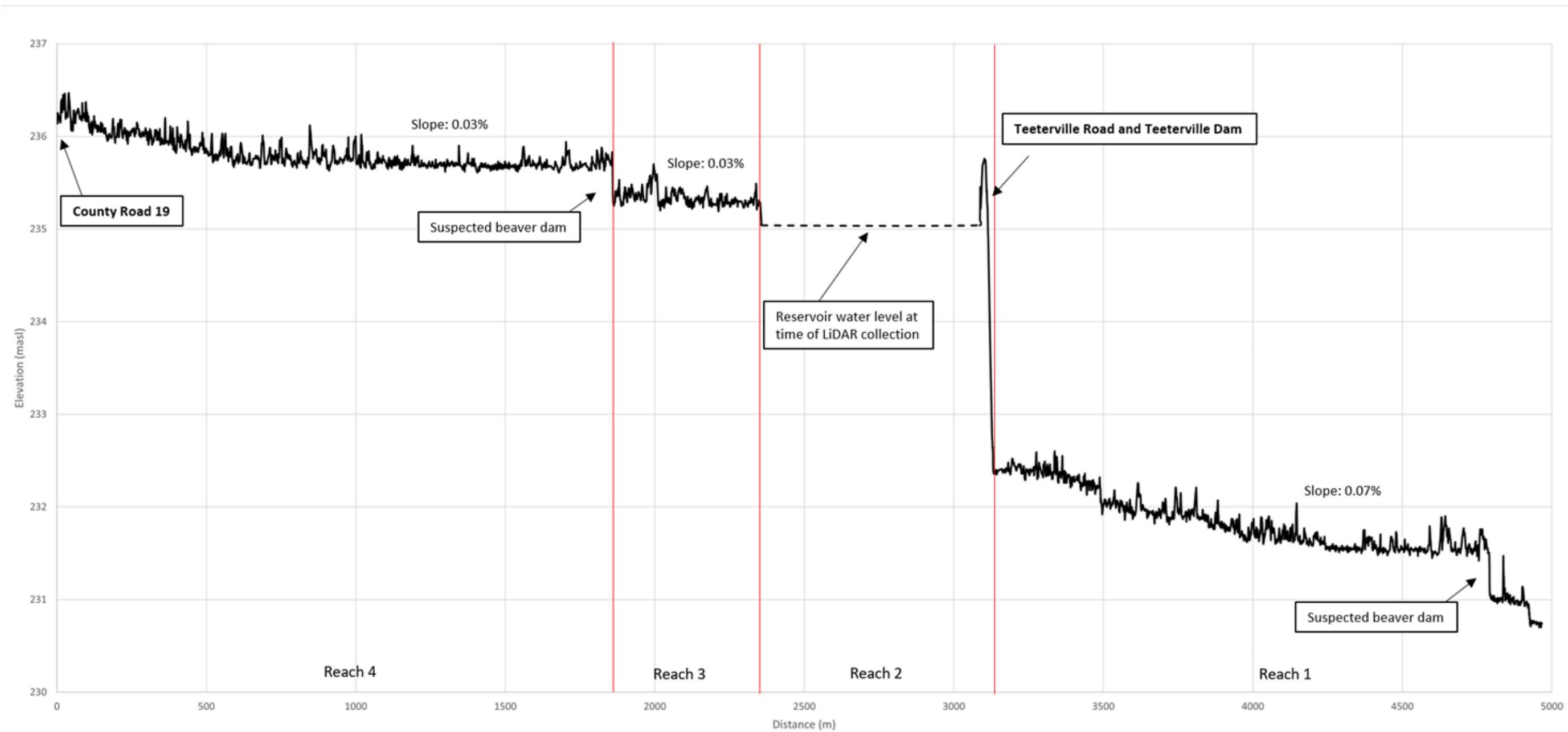


Figure 7 Creek Profile Assessed at Teeterville Dam (derived from LiDAR)

Reach 4 – Forested Creek Upstream of Reservoir

Reach 4 exists in a forested area, extending from the upstream end of the reservoir-impacted area to Cty. Rd. 19, a length of approximately 1,500 m. Due to limited access to the site, only the upper 525 m was assessed. This reach was unconfined, with relatively flat topography within the floodplain and limited channel disturbance observed. During the assessment, it was noted that a large beaver dam had been constructed approximately 30 m downstream of Cty. Rd. 19, creating approximately 0.5 m deep backwater conditions which extended upstream of the road crossing, and serving as the upstream limit of the assessment.

The profile within the assessed area consisted of riffles and pools. The banks contained cut banks (vertical, eroded banks along the outside of a meander) and point bars at the channel bends, as well as undercutting along outer banks. Within the reach, the banks were predominantly sand, with suspended armour layers of gravel visible along the lower portions of the banks. Due to the presence of the suspended armour layers, the channel substrate consisted primarily of sand and gravel, with occasional small cobbles. Sand deposits were noted along the point bars within the reach, along with sand bedforms forming along the shallower sections of channel. The channel profile was extracted from a LiDAR DTM; the slope of the reach is 0.03%, as shown in Figure 5.

During the field assessment, the channel was measured to have an average bankfull width of 13 m. Water depths were variable, with some pools exceeding 1.0 m deep, while shallower sections were 0.15 m. Bankfull depths averaged 1.75 m to the top-of-bank. Woody debris was common within the channel, sourced from the riparian trees, but did not cause any blockage, and often did not span the entire creek width.

The rapid assessments completed for this reach gave an RGA stability score of 0.20 (i.e., transitional), with its primary mode of adjustment being widening. This reach also received a RSAT score of 37, which is indicated high health in the RSAT scoring framework.

Channel Processes

With a dam and reservoir having been in place for approximately 200 years, channel processes within Big Creek have been artificially modified, affecting the creek upstream and downstream of the dam.

Due to the change in energy typically caused by such impoundments, the continuity of sediment transport is disrupted, resulting in morphological changes within the system, creating a depositional environment at the inlet to, and throughout, the reservoir area. The depositional process and fluctuating water levels within the reservoir is physically expressed as a multi-threaded planform at the interface between upstream creek and reservoir; the wide depositional area is due to the historic seasonal variation of the reservoir footprint. Over time, the continual deposition of sediment within the reservoir results in a decrease in water storage within the reservoir. This can be seen within the

historical air photograph assessment, where the bars and islands within the reservoir have shown growth over the assessed period.

Reach 1, downstream of the dam, exhibits some minor impacts due to the dam and the sediment-starved characteristic of flows, but appears to have currently entered a state of relative equilibrium. From the dam outlet, high-energy, low sediment laden water enters the channel. The high energy characteristic is due to the change in hydraulic head between the reservoir water level and the creek. Erosion immediately downstream of a dam outlet should be expected under such conditions and is anecdotally indicated by the hand-placed stone protection observed along the plunge pool and the increase in channel width immediately downstream of the dam. Further downstream, the channel has developed a very sinuous planform within the available floodplain, to an extent greater than observed in the 1954 air photograph (Appendix C). This increase in sinuosity can be driven through the combination of the low slope and sediment-starved water acting on the sandy banks (i.e., more erodible), whereas a higher slope channel would tend to create a straighter channel due to increased stream power.

An historical cutoff channel is visible in the LiDAR imagery (Appendix C), approximately 80 m downstream of the dam outlet and plunge pool, where the channel has disconnected old meanders, which may also be a result of the decreased sediment load. However, as noted previously, historical channels visible within the LiDAR had a similar width to those observed today. The imagery also confirmed that sinuous channels have occupied the valley previously with many meander scars visible, along with cutoff channels and potential oxbow features. With the comparison between the historic and existing conditions, along with the results of the RGA stating this reach is “In Regime”, the channel may have gone through a period of adjustment with the modifications of the dam in 1962, but has since adjusted to the new conditions and currently exists in a stable state within the valley, similar to the pre-dam setting.

3.1.7 Sediment Quantity/Quality

A SMP was completed in 2018 (AECOM 2018) to help improve the understanding of existing conditions including a characterization of the quantity and quality characteristics of accumulated sediment within the reservoir, and to review and recommend methods for its monitoring and management moving forward. As part of that project, a survey of the basin and chemical testing of the sediment was completed.

Sediment Quantity

To estimate sediment quantities accumulated within the pond, the study involved a bathymetric survey of the reservoir using a combination of GPS and sonar technologies to capture data on the existing top of the sediment layer and, with the help of a “pointed rod advanced through sediment to refusal”, an assumed native ground level beneath the sediment. This data was used to generate

bathymetric surfaces of both underlying native topography and sediment layers, from which were derived plans and profiles through the reservoir and estimates for water and sediment volumes. AECOM reported that the total accumulated sediment volume amounted to approximately 160,000 m³ of the total reservoir volume of approximately 224,000 m³, indicating that 70% of the reservoir is filled with sediment. An assessment of the physical characteristics of the sediment, most notably the percentage of particles greater than 75 µm, determined that approximately 64% of the accumulated volumes was comprised of fine sediment. Further, taking into account the moisture content and density of the samples, it was estimated that 60,000 tons of fine solids were accumulated in the reservoir.

Sediment Quality

To characterize the quality of sediment within the reservoir, the SMP included laboratory analysis of ten sediment samples collected and analyzed over the 2016-2017 period. The relative quality of the sediment was assessed against MOECC standards for four samples, taken from locations where accumulation was expected to be higher, including:

- complete metals scan
- volatile organic compounds (VOCs)
- petroleum hydrocarbons (PHCs; in the range of F1 to F4) and BTEX
- polycyclic aromatic hydrocarbons (PAHs)
- organochlorinated pesticides
- grain size and bulk density
- pH, base, neutral, and acid extractables

With the objective of gaining insight into the possible source of the accumulated sediments and transport behaviour, additional characterization was completed on six of the samples for other parameters, including:

- fats, oil, and grease (FOG)
- inorganics (including TSS, TOC, Ammonium & ammonia-N, nitrate & nitrite-N, TKN, TP, available phosphorus, available potassium)
- E. coli

While a couple samples showed concentrations of individual parameters in excess of background sediment concentrations (e.g., one sample with slightly elevated arsenic) or the guidelines for agricultural uses (e.g., one sample showed elevated Benzo(a)pyrene), the general average and conclusion are that the sediment is suitable for controlled release into the receiving Big Creek system, for re-use within the reservoir (e.g., along reservoir fringes as part of a dewater impoundment approach), or for application on agricultural lands.

3.1.8 Water Quality

The Big Creek watershed is impacted by intensive agriculture, particularly specialty crops such as tobacco and ginseng, which often involve significant fertilizer application. While the Long Point Region Watershed Characterization Report (2008) indicates that Big Creek is not a major contributor of nutrients or non-filterable residue (NFR) to Lake Erie compared to other Long Point Region watersheds, its water quality is still impacted by these land uses. Natural features, such as several wetlands within the watershed, partially regulate flow, reduce flow intensity, and act as sediment sinks, mitigating sediment transport to Lake Erie (Stone 1993).

The nearest Provincial Water Quality Monitoring Network (PWQMN) station to the Teeterville Dam (ID: 16012401202 [24012]) is located approximately 5 km upstream at Conc 2, Windham Twp, south of Kelvin. The data from this station reveals the upper Big Creek region exhibits the high concentrations of nitrogen and chloride compared to the lower Big Creek, with nitrogen levels exceeding the Canadian guideline of 2.93 mg/L. While Venison Creek and the lower Big Creek region show higher concentrations of phosphorus and NFR. The elevated nitrate concentrations in upper Big Creek are likely due to intensive agricultural practices and fertilizer application in this area.

The southern portion of the watershed has a higher percentage of forest cover and less intensive agricultural land use. The town of Delhi is the only major urban centre that operates its own water pollution control plan (WPCP) within the watershed and is located downstream of Teeterville. Elevated phosphorus levels in the lower watershed likely result from cumulative upstream inputs, including effluent from the Delhi WPCP, ongoing fertilizer application, and higher NFR concentrations also observed in this downstream area.

Temperature

Water temperature data for both above and below the Teeterville Dam for the years 2015-2023 were provided by LPRCA. This data is typically acquired through the summer / early fall period, but with variable start and end dates on a year-to-year basis. This data demonstrates routine and relatively significant warming impacts, most notably through summer periods, as the creek flows through the shallow reservoir and is subjected to solar radiation and heat exchange with the warmer ambient air. On average, water temperatures are 3 to 5°C cooler above the reservoir compared to below the dam. Table 5 summarizes the average above and below dam water temperatures for each year.

A more discretized example of the thermal impact of the reservoir on a single season (2022) is shown on Figure 6 and illustrates that, in addition to a significant average impact, there are also extended periods where increases are even greater, in the order of 8 to 10°C for weeks at a time, and that peak temperatures downstream of the dam in the 23 to 25°C range are not uncommon. Analysis completed on observed average July temperatures over multiple years between 2015 and 2024 indicate that the

impact is such that the thermal regime, as classified by Jones and Schmidt (2019), transitions from cool-cold to a warmwater condition from upstream to downstream of the reservoir.

A review of available data from the period prior to and following the revised operating regime of the dam/reservoir (pre-2016 and post-2016, respectively) indicate no significant change in the negative warming impact of the dam and reservoir regardless of the increased depth of the prior operating regime (i.e., before LPRCA stopped installing stoplogs and maintaining higher reservoir levels).

Table 5 Average Big Creek Water Temperatures Above and Below Dam (2015-2023)

Year	Average Above Dam Temperature (°C)	Average Below Dam Temperature (°C)
2015	16.5	20.2
2016	17.5	23.1
2017	17.1	19.6
2018	18.7	21.3
2019	17.6	20.6
2020	16.1	21.4
2021	17.9	20.6
2022	14.0	21.7
2023	16.4	19.6

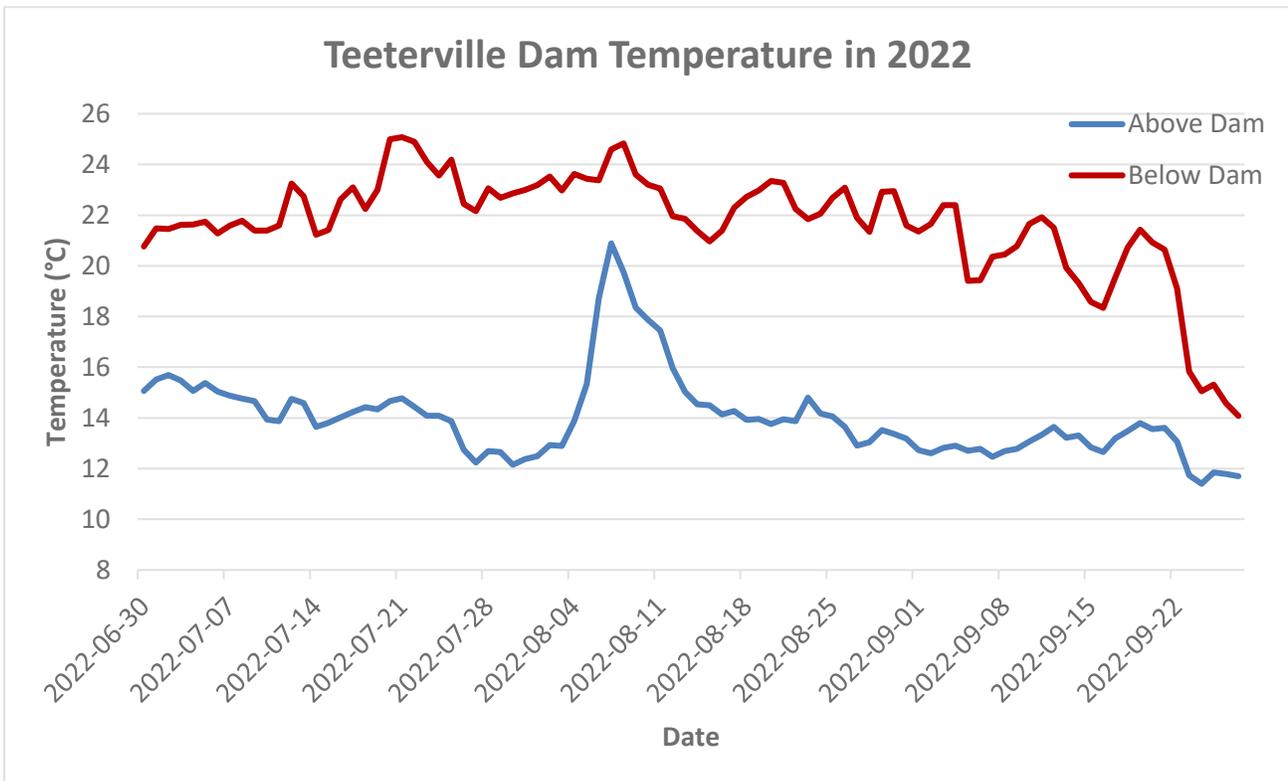


Figure 8 Temperature Data Above and Below Teeterville Reservoir – 2022 Summer Season

3.2 Biological

3.2.1 Background Review – Methodology

A desktop background review was conducted to collect information regarding natural heritage features and wildlife within the study area. This included a review of numerous atlases, databases, and aerial imagery, as listed in Table 6, as well as the Norfolk County Official Plan. A complete list of species obtained from the background review can be found in Appendix D.

Table 6 Background Review Materials

Source	Citation	Information Reviewed
Land Information Ontario (LIO)	OMNR 2000	Natural heritage features data layers
Ontario GeoHub	MNRF 2024a	Natural heritage features data layers
Aquatic Species at Risk Map	DFO 2024	Aquatic Species at Risk map
Natural Heritage Information Centre (NHIC)	MNRF 2024b	Data records for the study area
Ontario Breeding Bird Atlas (OBBA)	Birds Canada et al. 2024	Species records for the study area
Ontario Butterfly Atlas	TEA 2024a	Species records for the study area
Ontario Moth Atlas	TEA 2024b	Species records for the study area
Ontario Reptile and Amphibian Atlas	Ontario Nature 2024	Species records for the study area
Important Bird Areas	Bird Studies Canada 2023	Data records for the study area
eBird	Cornell Lab of Ornithology 2024	Species records for the study area
Ontario Mammals, iNaturalist	CAS 2024a	Species records for the study area
iNaturalist	CAS 2024b	Species records for the study area
Local Resident	Tim Goodale 2025	Species records for the study area

A request for wetland evaluation records for the Teeterville Reservoir PSW (BC-11) was submitted to the Ministry of Natural Resources - Aylmer District office (MNR) on October 7, 2024. A response from MNR was received on October 8, 2024, with a copy of the wetland evaluation, as well as an additional species at risk (SAR) record.

3.2.2 Background Review – Results

Through a review of the sources listed in Table 6, the following natural heritage features were identified within the study area:

- provincially significant wetlands
- significant woodlands
- potential SAR and species of conservation concern (SCC) presence
- potential significant wildlife habitat (SWH)
- LPRCA regulation boundary

These features are illustrated in Figure 9.

Wetlands

Wetlands are defined by the MNR as “Lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants” (MNR 2022). These lands include ecosystems such as marshes, swamps, fens, bogs, and open water communities.

One Provincially Significant Wetland (PSW), the Teeterville Reservoir Wetland (BC-11), was identified within the study area using LIO mapping. The MNR provided the wetland evaluation completed for the feature (OMNR 2006), which is summarized as follows:

- Encompasses 165 ha spread across 7 individual wetland units, consisting of various swamp and marsh vegetation communities.
- Hydrologically, the wetland complex consists of both riverine and palustrine site types and contributes to groundwater recharge and nutrient trapping.
- Soils primarily consist of clay-loam, with some humic-mesic as well.
- Economically valuable products such as wood products, commercial fish, bullfrogs, snapping turtles, and furbearers are present within the wetland.
- The wetland experiences anthropogenic use such as hunting, fishing, nature enjoyment, and moderate localized disturbance. The wetland is adjoined to the settlement of Teeterville, which has a population less than 2,500.
- The shoreline vegetation was described as emergent.
- No breeding, migration, or feeding habitats for SAR were identified within the wetland.
- No provincially significant wildlife species were present.

- Yellow pond lily (*Nuphar advena*), a provincially significant plant species was indicated as present within the wetland.
- No regionally or locally significant species were identified.
- The wetland was assessed to provide winter cover for wildlife, suitable habitat for waterfowl breeding, significant spawning and nursery habitat for fish species, and significant fish migration and staging habitat.

Since the Teeterville Reservoir Wetland (BC-11) is designated as provincially significant, the land located within 120 m is considered Adjacent Land by the Norfolk County OP. PSWs are classified as Provincially Significant Features in the Norfolk County OP, and as such, they have specific policies that apply to them. The impacts of any proposed activities will need to be assessed if they occur within the PSW or its Adjacent Land.

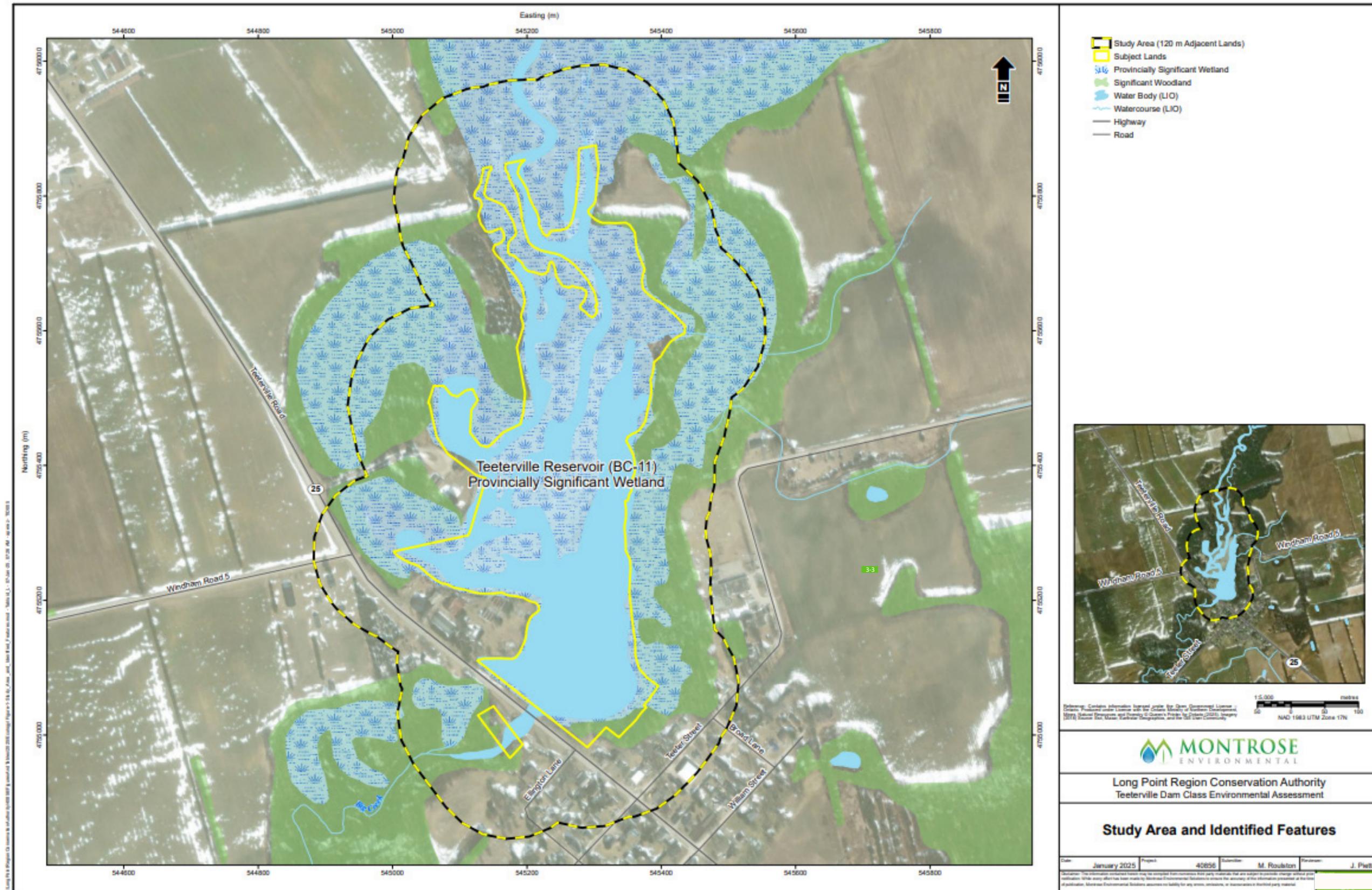


Figure 9 Study Area and Identified Features

Significant Woodland

Six woodlands were identified within the study area using LIO mapping. The woodlands surround the Teeterville Reservoir Wetland on all sides. As per the Norfolk County OP, these woodlands are classified as significant. Further, all land located within 10 m of the Significant Woodland's dripline is considered Adjacent Land under the OP. Significant Woodlands are classified as Natural Heritage Features by the Norfolk County OP, and as such, they have specific policies that apply to them. The impacts of any proposed activities will need to be assessed if they occur within the Significant Woodland or its Adjacent Land.

Significant Valleylands

The study area contains Significant Valleylands associated with Big Creek which are regulated by the LPRCA. Adjacent Lands to valleylands are defined as the stable top-of-bank, as determined by the LPRCA. Significant Valleylands are classified as Natural Heritage Features by the Norfolk County OP, and as such, they have specific policies that apply to them. The impacts of any proposed activities will need to be assessed if they occur within the Significant Valleylands or their Adjacent Lands.

Significant Wildlife Habitat

The presence of potential candidate SWH was assessed by using the Significant Wildlife Habitat Technical Guide (SWHTG; OMNR 2000), and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (the Ecoregion 7E Schedules; MNRF 2015).

The findings of the background review were cross referenced with the criteria provided in these documents to identify the potential presence of SWH. The following SWH types have the potential to occur within the study area:

- waterfowl stopover and staging areas (terrestrial and aquatic)
- bat maternity colonies
- waterfowl nesting area
- turtle nesting areas
- amphibian breeding habitat (woodland and wetland)
- marsh breeding bird habitat
- terrestrial crayfish
- special concern and rare wildlife species
- amphibian movement corridors

Species at Risk

A habitat screening was conducted to determine the potential occurrence of SAR within the study area. SAR are defined as species that are listed as Extirpated, Endangered, Threatened, or Special Concern under O. Reg 230/08 of the Endangered Species Act, 2007 (ESA). Extirpated, Endangered, and Threatened species and their habitats are protected under the ESA. Special Concern species do not receive habitat protections under the ESA but are still considered since their habitat is considered Significant Wildlife Habitat (SWH) under the 2024 PPS.

A background records review was completed to create a list of potential SAR species within the subject lands and the 120 m adjacent lands. This list was developed using publicly available resources and community-based ecological monitoring databases. Once the list was compiled, a screening exercise was completed to determine the presence of suitable habitat for each SAR identified as potentially occurring within the subject lands, based on known preferred habitat characteristics for each species as well as field observations. The following species were included within the SAR screening:

- Species listed as either Threatened (THR) or Endangered (END) under the ESA.
- Species of Conservation Concern (SCC), which include those listed as SC under ESA, species listed as threatened or endangered under the federal Species at Risk Act, 2002 (SARA) that are not protected under the ESA, SCC receive protection under the NHRM, and their habitat is considered SWH.
- Species listed under SARA are only protected on federal land, as part of projects that are otherwise being permitted by a federal agency and includes aquatic SAR. SARA also requires consideration for any migratory bird listed on Schedule 1 where critical habitat has been identified; however, should the species also be listed under ESA and provides equal or greater protection, the ESA take precedence.

Based on the results of the background review, a total of 27 SAR were flagged as potentially occurring within the study area. This includes 9 birds, 2 plants, 5 herpetofauna, 2 insects, and 9 mammals. One SAR, the Blanding's turtle has been reported in the area by locals and is considered a locally important species. A comprehensive list of SAR that could potentially be found within the study area is included in Appendix D, and a refined list of confirmed and candidate SAR based on the results of Montrose field surveys can be found below in Section 3.2.3.4.

Vegetation Communities and Plants

A total of 67 plant species were flagged as potentially occurring within the study area. One SAR and three regionally rare plants were identified as potentially occurring within the study area. The SAR species flagged was black ash (*Fraxinus nigra*), which is listed as Endangered under the ESA (2007). The regionally rare species that were flagged included Canada yew (*Taxus canadensis*), prairie sedge (*Carex prairea*), and Northwest Territory sedge (*Carex utriculata*).

Additionally, the following vegetation communities are present within the study area as per the MNR wetland evaluation. These communities are summarized in Table 9. Of these communities, eight have 1 to 3 vegetation forms, nine have 4 to 5 vegetation forms, and three have 6 or more vegetation forms.

Table 7 Vegetation Types Present within the Study Area

Wetland Code	Wetland Type	Vegetation Communities Present (In Order of Decreasing Dominance)
M1	Narrow-leaved Emergent Marsh	Narrow-leaved emergents, tall shrubs, robust emergents, groundcover (herbs)
M1w	Floating Plant Marsh	Floating plants
M2	Narrow-leaved Emergent Marsh	Narrow-leaved emergents, tall shrubs, robust emergents, groundcover (herbs), free-floating plants, floating plants
M3	Robust Emergent Marsh	Robust emergents
M4	Robust Emergent Marsh	Robust emergents, narrow-leaved emergents, groundcover (herbs), floating plants
M5	Robust Emergent Marsh	Robust emergents, narrow-leaved emergents, tall shrubs, broad-leaved emergents
M6	Robust Emergent Marsh	Robust emergents, narrow-leaved emergents, broad-leaved emergents, free-floating plants, floating plants
S1	Coniferous Swamp	Coniferous trees, groundcover (herbs)
S2	Coniferous Swamp	Coniferous trees, groundcover (herbs), moss
S3	Coniferous Swamp	Coniferous trees, deciduous trees, groundcover (herbs)
S4	Coniferous Swamp	Coniferous trees, tall shrubs, groundcover (herbs)
S5	Coniferous Swamp	Dead coniferous trees, tall shrubs, groundcover (herbs)
S7	Deciduous Swamp	Deciduous trees, tall shrubs, groundcover (herbaceous)
S9	Coniferous Swamp	Coniferous trees, deciduous trees, tall shrubs, groundcover (herbs)
S12	Deciduous Swamp	Deciduous trees, coniferous trees, tall shrubs, groundcover (herbs)
S13	Deciduous swamp	Deciduous trees, tall shrubs, groundcover (herbs), moss
S15	Tall Shrub Swamp	Tall shrubs, robust emergents, narrow-leaved emergents, floating plants
S18	Deciduous Swamp	Deciduous trees, coniferous trees, tall shrubs, groundcover (herbs), moss
S19	Deciduous Swamp	Deciduous trees, coniferous trees, tall shrubs, narrow-leaved emergents, groundcover (herbs)
S20	Coniferous Swamp	Coniferous trees, deciduous trees, tall shrubs, groundcover (herbs), narrow-leaved emergents, moss

Aquatic Habitat

Big Creek is a cold-water stream which provides important habitat for brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*). In the LPRCA's 2023 Watershed Report Card, Big Creek received a grade of "C" (fair) in surface water quality, forest conditions, and wetland cover (LPRCA 2023). A summary of water quality characterization, with an emphasis on temperatures, is included within Section 3.1.8.

The DFO does not identify aquatic SAR within the study area or immediately upstream of it. The LIO mapping tool lists 26 fish species that occur within the study area. One of these species, the American Brook Lamprey (Lethenteron appendix) is a SCC. These species are listed in Table 8.

While the DFO does not identify any aquatic SAR within the study area, nine (9) SAR are found within Big Creek approximately 11 km downstream of the Teeterville Reservoir. These species are summarized in the Teeterville Dam Safety Review (AECOM 2016) and are listed in Table 9.

While field inventories and reports on Big Creek and its tributaries were completed by OMNR through the 1970s and 1980s, studies that would have provided useful historical context to the current work, it is understood that these may have been lost as part of the OMNR office move from Simcoe to Aylmer in 2012. Non-published and/or anecdotal information gathered throughout the compilation of the baseline inventory information gathering provides additional insights related to species conditions including:

Downstream of the dam

- LPRCA biologists have noted that the impacts of non-native, competing species are a concern between Quance Dam and Teeterville Dam. As part of a survey around 1997, healthy and abundant populations of Brook Trout were found in the Big Creek tributaries through this reach including Outlet Creek, Brandy Creek, Deerlick Creek, Bookton Creek, etc. Subsequently re-sampling in 2017 / 2018 identified only a single Brook Trout, though large numbers of young-of-the-year Rainbow Trout and some Brown Trout were observed. Since the fish ladder was established and the fishing club has been moving adult Rainbows above Quance Dam, the Brook Trout populations have collapsed. (LPRCA / P. Gagnon email, 2025-02-11)
- Public stakeholders have noted recollections of sensitive species as listed in Table 8, above, including Eastern Sand Darter, Pugnose Shiner, and Northern Brook Lamprey.

Within the reservoir

- Public stakeholders have advised that the reservoir historically supported a thriving largemouth bass fishery but that, since the dam has been held at its former lowered winter holding level year-round (starting in 2017), the predominant species encountered within the reservoir is carp.

Table 8 Land Information Ontario (LIO) Fish Records Within Study Area

Common Name	Latin Name
American Brook Lamprey	<i>Lethenteron appendix</i>
Blacknose Shiner	<i>Notropis heterolepis</i>
Blackside Darter	<i>Percina maculata</i>
Bluntnose Minnow	<i>Pimephales notatus</i>
Brassy Minnow	<i>Hybognathus hankinsoni</i>
Brook Stickleback	<i>Culaea inconstans</i>
Brook Trout	<i>Salvelinus fontinalis</i>
Brown Trout	<i>Salmo trutta</i>
Central Mudminnow	<i>Umbra limi</i>
Common Shiner	<i>Luxilus cornutus</i>
Creek Chub	<i>Semotilus atromaculatus</i>
Emerald Shiner	<i>Notropis atherinoides</i>
Fathead Minnow	<i>Pimephales promelas</i>
Hornyhead Chub	<i>Nocomis biguttatus</i>
Johnny Darter	<i>Etheostoma nigrum</i>
Largemouth Bass	<i>Micropterus salmoides</i>
Mottled Sculpin	<i>Cottus bairdii</i>
Northern Hog Sucker	<i>Hypentelium nigricans</i>
Northern Pearl Dace	<i>Margariscus margarita</i>
Northern Redbelly Dace	<i>Chrosomus eos</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Rainbow Darter	<i>Etheostoma caeruleum</i>
Rainbow Trout	<i>Oncorhynchus mykiss</i>
Rock Bass	<i>Ambloplites rupestris</i>
Western Blacknose Dace	<i>Rhinichthys atratulus</i>
White Sucker	<i>Catostomus commersonii</i>

Table 9 Aquatic SAR Downstream of Study Site

Common Name	Latin Name
Eastern Sand Darter	<i>Ammocrypta pellucida</i>
Grass Pickerel	<i>Esox americanus vermiculatus</i>
Lake Chubsucker	<i>Erimyzon sucetta</i>
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>
Pugnose Shiner	<i>Notropis Anogenus</i>
River Redhorse	<i>Moxostoma carinatum</i>
Silver Chub	<i>Machrybopsis storeriana</i>
Silver Lamprey	<i>Ichthyomyzon unicuspis</i>
Warmouth	<i>Lepomis gulosus</i>

Upstream of the reservoir

- LPRCA biologists have indicated no known fish assessments above the reservoir but that electrofishing some of the drains entering the creek in these reaches has identified Mottled Sculpin, a coldwater indicator species (LPRCA / P. Gagnon email, 2025-02-11)
- Some experienced and knowledgeable public stakeholders have noted recollections of Brook Trout in the upper headwater tributaries, observed “during the Big Creek Stream inventories”, and more contemporary observations of a “resident Brown Trout and native Speckled (Brook) Trout upstream of the Dam” as reported by avid anglers. (G. Deyne, reply to CLC#1 questionnaire)
- Other commenters of similar first-hand experience and knowledge indicated a conflicting experience, though one that is admittedly somewhat dated, noting a lack of any prior knowledge or experience with Brook Trout above the reservoir and that “pretty much every tributary in that stretch is a municipal drain and is highly degraded by periodic disturbance (drain clean out) and general agricultural impacts (sediment and nutrients). Some of them may be cold enough to support a small sculpin population but they are basically pooched and will likely remain so under current land use conditions.” Big Creek near Vanessa was noted as having decent water temperatures and was heavily stocked with rainbow trout in the 70s, with populations declining again out once that stocking program was terminated. (L. Halyk, 2025-03-11 e-mail)

3.2.3 Field Survey

Montrose staff conducted two field visits on October 24, 2024 and June 10, 2025 to complete ELC, a vegetation inventory, wildlife incidentals, and general site observations and notes.

As part of the October field visit, Montrose employees assessed the western side of the reservoir that was accessible via the Legion property, the southern side of the reservoir both upstream and downstream of the dam structure at Teeterville Road, and the eastern side of the reservoir along the fenceline of Teeterville Public School. These same areas were investigated during the June field visit, in addition to a few new areas: the forest north of the Legion property, Marshall Malcom Nature Reserve lands, and the forest north of Teeterville Public School.

3.2.3.1 Ecological Land Classification

Ecological Land Classification for southern Ontario was established in 1994 to manage natural resources and the information about those resources. ELC provides a uniform and consistent methodology to identify, describe, name, map, manage, and conserve important landscape patterns and communities.

The ELC communities observed by Montrose staff during the field survey or aerial imagery analysis were characterized and mapped using the ELC system for southern Ontario (Lee 1998).

Any locations within the study area that were not accessible to staff during the field visit were classified using desktop aerial imagery analysis. Thirteen (13) ELC communities and 178 vegetation species were identified within the study area. The coefficient of conservatism for the site was 4.48 and the floristic quality index was 54.35. Two SAR trees, butternut (*Juglans cinerea*) and black ash (*Fraxinus nigra*), and one provincially significant plant species, yellow pond lily (*Nuphar advena*), were recorded across the study area.

The study area consisted of a mixture of forest, wetland, and cultural habitats. The cultural habitats were relatively small and found on the edges of the other natural communities and around the dam structure. Forested communities, both deciduous and mixed, were present on the eastern and western sides of the reservoir. The reservoir itself is a wetland community with shallow standing water and abundant floating-leaved aquatic vegetation.

The ELC communities are summarized below in Table 10 and graphically displayed on Figure 10; communities mapped using desktop analysis are indicated with hashing. A full list of the vegetation species observed in each community can be found in Appendix D.

Table 10 Ecological Land Classification Communities Observed

ELC Code	ELC Community Type
CUM1-1	Dry-Moist Old Field Meadow
CUT1	Mineral Cultural Thicket
CUW1	Mineral Cultural Woodland
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOM4	Dry-Fresh White Cedar Mixed Forest
FOM6-2	Fresh-Moist Hemlock-Hardwood Mixed Forest
FOM7-1	Fresh-Moist White Cedar-Sugar Maple Mixed Forest
FOM7-2	Fresh-Moist White Cedar-Hardwood Mixed Forest
MAS2-1	Cattail Mineral Shallow Marsh
OAO	Open Aquatic
SAF1-1	Water Lily-Bullhead Lily Floating-leaved Shallow Aquatic
SWM1-1	White Cedar-Hardwood Mineral Mixed Swamp
SWT2-5	Red-osier Mineral Thicket Swamp

Notes: ELC - Ecological Land Classification

Dry-Moist Old Field Meadow (CUM1): This community was located on the western side of the reservoir at the Legion property. It was bound by the reservoir to the east and mowed lawn and cultural thicket to the west. Herbaceous species such as tall goldenrod (*Solidago altissima*), spotted Joe-pye-weed (*Eutrochium maculatum*), and reed canary grass (*Phalaris arundinacea*) dominated this community. Shrub species such as American red raspberry (*Rubus idaeus*), red-osier dogwood (*Cornus sericea*), and staghorn sumac (*Rhus typhina*) were also common. No tree species were present within this community.

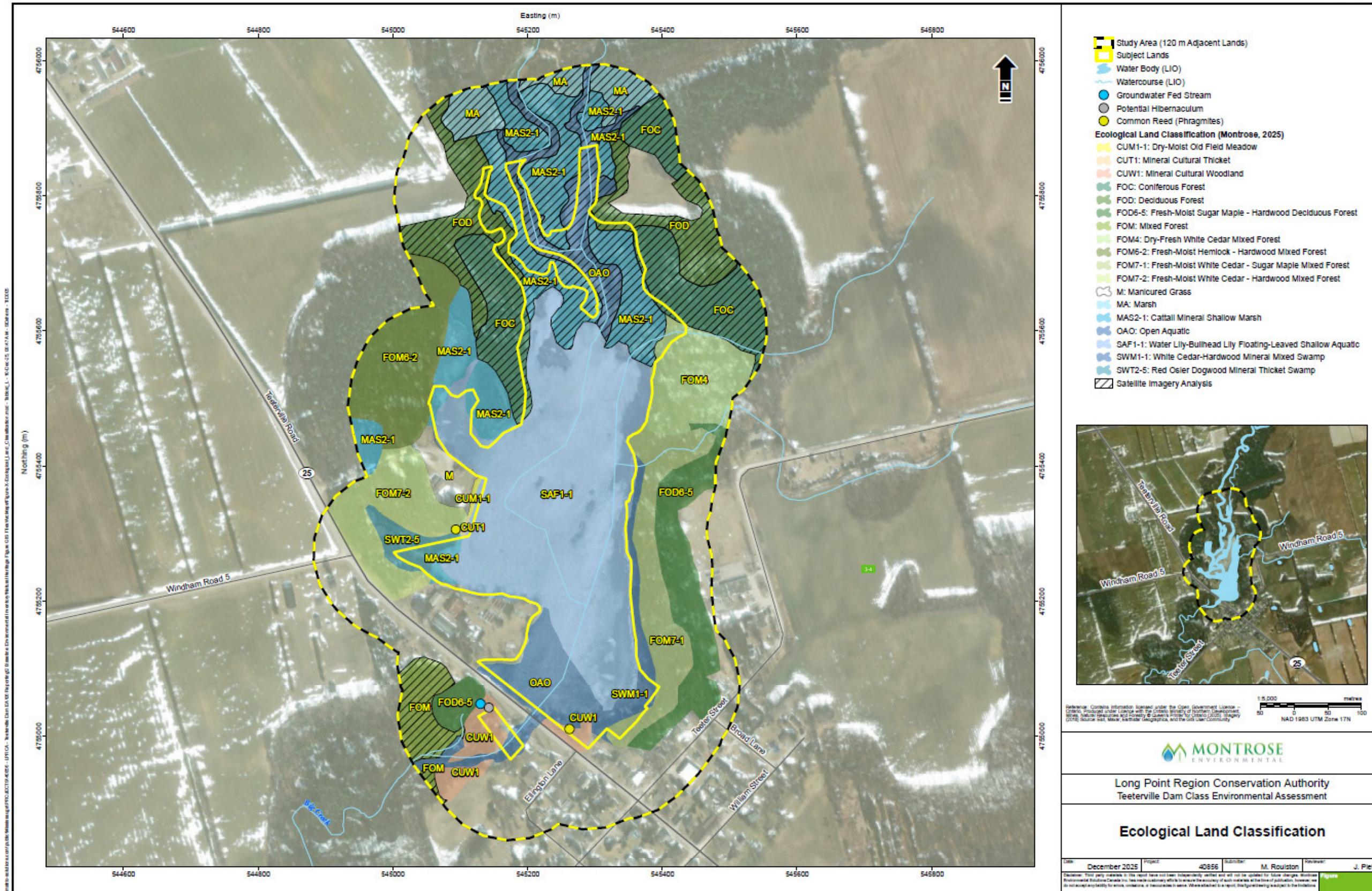


Figure 10 Ecological Land Classification

Mineral Cultural Thicket (CUT1): This community was found on the western side of the reservoir at the Legion property. It was bordered by mixed forest, cultural meadow, and mowed lawn. Shrub species such as rose (*Rosa* sp.), red-osier dogwood, and ninebark (*Physocarpus opulifolius*) were all common. Tree cover was sparse and consisted of species such as eastern white cedar (*Thuja occidentalis*), sugar maple (*Acer saccharum*), and black cherry (*Prunus serotina*). The herbaceous layer in this community was included tall goldenrod, stinging nettle (*Urtica dioica* ssp. *dioica*), and fleabane (*Erigeron* sp.).

Mineral Cultural Woodland (CUW1): This community type was found in three separate locations across the study site.

The first location (CUW1a) was on the western side of the reservoir at the Legion property, bordering the parking lot. Eastern white cedar, red oak (*Quercus rubra*), and blue beech (*Carpinus caroliniana*) were all common tree species. Large shrub species such as common buckthorn (*Rhamnus cathartica*), autumn olive (*Elaeagnus umbellata*) and ninebark were also common. The herbaceous species in this community consisted of reed canary grass, heart-leaved aster (*Symphotrichum cordifolium*), and goldenrod (*Solidago* sp.).

The second location (CUW1b) was found just south of the dam structure, surrounding Big Creek. Tree species in this community included sugar maple, black walnut (*Juglans nigra*) Norway maple (*Acer platanoides*), American elm (*Ulmus americana*), and willow (*Salix* sp.). The shrub layer was dominated by red-osier dogwood, riverbank grape (*Vitis riparia*), and black raspberry (*Rubus occidentalis*). Common herbaceous species included Virginia virgin's bower (*Clematis virginiana*), giant goldenrod (*Solidago gigantea*), calico aster (*Symphotrichum lateriflorum*), reed canary grass, ground-ivy (*Glechoma hederacea*), and spotted joe-pye-weed.

The third location (CUW1c) was located just northwest of the dam structure, bordering the south side of the reservoir. Tree species such as trembling aspen (*Populus tremuloides*), black walnut, willow, and Norway maple were all dominant throughout. The shrub layer consisted of gray dogwood (*Cornus racemosa*), autumn olive, and riverbank grape. There was a large patch of invasive European reed (*Phragmites australis* ssp. *australis*) in the herbaceous layer. Coltsfoot (*Tussilago farfara*) was also very common in this layer.

Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5): This community type was found in two locations across the study area.

The first location (FOD6-5a) was southwest of the dam structure, bordering the west side of the cultural woodland. Sugar maple was the dominant tree species in this community, with black cherry, American elm, and Norway maple also being present. The shrub layer consisted of round-leaved dogwood (*Cornus rugosa*), European privet (*Ligustrum vulgare*), ninebark, and black raspberry. Herbaceous plants included goldenrod, calico aster, wood avens (*Geum urbanum*), and dame's rocket (*Hesperis matronalis*).

A small groundwater-fed channel leading into Big Creek was found in the central region of this community. Vegetation within the channel included horsetails (*Equisetum* sp.), lesser clearweed (*Pilea fontana*), and lesser duckweed (*Lemna minor*), which formed a mat over the surface.

The second location (FOD6-5b) was on the east side of the reservoir, along the fenceline for Teeterville Public School. The canopy was dominated by sugar maple, along with various other trees such as ironwood (*Ostrya virginiana*), black cherry, yellow birch (*Betula alleghaniensis*), and red oak. The shrub layer consisted of gray dogwood, northern spicebush (*Lindera benzoin*), and chokecherry (*Prunus virginiana*). Herbaceous species included Canada wild ginger (*Asarum canadense*), Jack-in-the-pulpit (*Arisaema triphyllum*), marginal wood fern (*Dryopteris marginalis*), wild geranium (*Geranium maculatum*), eastern woodland sedge (*Carex blanda*), two-leaf miterwort (*Mitella diphylla*), and Canada mayflower (*Maianthemum canadense*). Additionally, two SAR, butternut (*Juglans cinerea*) and black ash (*Fraxinus nigra*), were found within this community.

Dry-Fresh White Cedar Mixed Forest (FOM4): This community was located on the eastern side of the study area, north of Teeterville Public School. A mixture of coniferous and deciduous trees such as eastern white cedar, sugar maple, red oak, and eastern hemlock (*Tsuga canadensis*) were prominent in the canopy. Common shrub species in this community included round-leaved dogwood and northern spicebush. A mixture of herbaceous species was present such as bracken fern (*Pteridium aquilinum*), partridgeberry (*Mitchella repens*), jack-in-the-pulpit, and Pennsylvania sedge (*Carex pensylvanica*). Most of the community was dry, except for the western edge bordering the reservoir which was moist.

Fresh-Moist Hemlock-Hardwood Mixed Forest (FOM6-2): This community was present on the western side of the study area, immediately north of the Legion property. Wet pockets were observed in depressions and along the edges of the community where it borders cattail shallow marshes. A mixture of coniferous and deciduous trees such as eastern white cedar, eastern hemlock, white pine, yellow birch, trembling aspen, red maple, and black cherry were prominent in the canopy. Shrubs included ninebark, northern spicebush, red-osier dogwood, and Tartarian honeysuckle (*Lonicera tatarica*). Herbaceous species were comprised primarily of ferns and sedges. Fern species included cinnamon fern (*Osmundastrum cinnamomeum*), northeastern lady fern (*Athyrium filix-femina* var. *angustum*), sensitive fern (*Onoclea sensibilis*), and bracken fern. Common sedges included Pennsylvania sedge, greater bladder sedge (*Carex intumescens*), bristly sedge (*Carex comosa*), and woolgrass (*Scirpus cyperinus*).

Fresh-Moist White Cedar-Sugar Maple Mixed Forest (FOM7-1): This community was located on the eastern side of the study area, immediately west of FOD6-5b community that borders Teeterville Public School. Coniferous species such as eastern white cedar were beginning to become more prominent, alongside deciduous species such as sugar maple, yellow birch, green ash (*Fraxinus pensylvanica*), and black ash were prominent throughout the community. Shrubs included northern spicebush, round-leaved dogwood, and dwarf raspberry (*Rubus pubescens*). Common herbaceous species included skunk

cabbage (*Symplocarpus foetidus*), wild sarsaparilla (*Aralia nudicaulis*), coltsfoot, Pennsylvania sedge, and marginal wood fern.

Fresh-Moist White Cedar-Hardwood Mixed Forest Type (FOM7-2): This community was found on the western side of the study area at the Legion property. It was bound by Teeterville Road to the west and swamp thicket to the east. Eastern white cedar, yellow birch, ironwood, and eastern cottonwood (*Populus deltoides* ssp. *deltoides*) were all common throughout the canopy. The shrub layer was dominated by northern spicebush, gray dogwood (*Cornus racemosa*), riverbank grape, and chokecherry. Herbaceous species included tall goldenrod, blue-stemmed goldenrod (*Solidago caesia*), sensitive fern, northeastern lady fern, calico aster, early meadow-rue (*Thalictrum dioicum*), and drooping wood sedge (*Carex arctata*).

Cattail Mineral Shallow Marsh (MAS2-1): This community was located on the western side of the study area, directly north of the driveway entrance to the Legion. Cattails (*Typha* sp.) dominated the community, with other herbaceous species such as reed canary grass, softstem bulrush (*Schoenoplectus tabernaemontanii*), and bristly sedge also being common. Shrub and tree cover were limited and consisted of primarily dead snags and small willow shrubs (*Salix* sp.).

Open Aquatic (OAO): This community was located at the southern tip of the reservoir, directly north of the dam structure, and consisted of standing water with no vegetation cover.

Water Lily-Bullhead Lily Floating-leaved Shallow Aquatic (SAF1-1): This community was dominant throughout the reservoir itself. Standing shallow water covered the community. Near the banks of the reservoir, the substrate was sandy/silty but appeared to become mucky further toward the central region. There were many stumps and logs throughout the community which could serve as good turtle basking habitat. Floating-leaved aquatic plants such as yellow pond lily (*Nuphar advena*), which is a provincially significant plant species, dominated the community. Small amounts of lesser duckweed were also present closer to the banks. There appeared to be a marsh-like area within the central region of the community, however it was not accessible for close inspection. The marsh-like area appeared to be dominated by broad-leaved emergent plants such as cattails, softstem bulrush, and northern blue flag iris (*Iris versicolor*).

White Cedar-Hardwood Mixed Mineral Swamp (SWM1-1): This community was located on the eastern side of the study area, between the reservoir and FOM7-1 community. This community was very wet, with pockets of standing water in depressions and many mucky areas. Dominant tree species included eastern white cedar, silver maple (*Acer saccharinum*), black ash, and red maple. The shrub layer consisted of northern spicebush, round-leaved dogwood, and dwarf raspberry. Herbaceous species included skunk cabbage, yellow goldthread (*Coptis trifolia*), fowl manna grass (*Glyceria striata*), awl-fruited sedge (*Carex stipata*), and two-leaved toothwort (*Cardamine diphylla*). There were also a variety of ferns such as cinnamon fern, New York fern (*Thelypteris noveboracensis*), and sensitive fern.

Red-osier Mineral Thicket (SWT2-5): This community was located on the western side of the study area within the Legion property. The ground was very moist with pockets of deeper standing water scattered amongst small mounds of vegetation. The shrub layer was dominated by red-osier dogwood, with rose also being common. Tree cover was quite sparse and consisted of eastern white cedar and yellow birch. Herbaceous plants included marsh fern (*Thelypteris palustris*), wrinkle-leaf goldenrod (*Solidago rugosa* ssp. *rugosa*), swamp milkweed (*Asclepias incarnata*), spotted jewelweed (*Impatiens capensis*), purple loosestrife (*Lythrum salicaria*), and various sedges such as bristly sedge, bottlebrush sedge (*Carex hystericina*), and lake sedge (*Carex lacustris*).

3.2.3.2 Wildlife Observations

As presented in Table 11, Montrose staff observed and recorded 18 species of wildlife during field visits, including 36 birds, 4 amphibians, 1 turtle, 2 insects, and 5 mammals.

One species, Barn Swallow (*Hirundo rustica*) is listed under the ESA as Special Concern. Barn Swallows were observed foraging around the Legion property during the June field visit. No nests were observed.

Midland Painted Turtles (*Chrysemys picta marginata*) were observed basking throughout the reservoir during the June field visit. Additionally, evidence of turtle nesting was observed at the Legion property, with some nests appearing to have been predated.

Table 11 Wildlife Observed - October 24, 2024

Common Name	Latin Name	ESA Status	SARA Status
Avian			
American Crow	Corvus brachyrhynchos	-	-
American Goldfinch	Spinus tritis	-	-
American Robin	Turdus migratorius	-	-
Baltimore Oriole	Icterus galbula	-	-
Barn Swallow	Hirundo rustica	SC	THR
Belted Kingfisher	Megaceryle alcyon	-	-
Black-capped Chickadee	Poecile atricapillus	-	-
Blue Jay	Cyanocitta cristata	-	-
Canada Goose	Branta canadensis	-	-
Cedar Waxwing	Bombycilla cedrorum	-	-
Chipping Sparrow	Spizella passerina	-	-
Common Grackle	Quiscalus quiscula	-	-
Common Yellowthroat	Geothlypis trichas	-	-
Dark-eyed Junco	Junco hyemalis	-	-
Double-crested Cormorant	Phalacrocorax auritus	-	-
Downy Woodpecker	Picoides pubescens	-	-
European Starling	Sturnus vulgaris	-	-
Gray Catbird	Dumetella carolinensis	-	-
Great Blue Heron	Ardea herodias	-	-
Great Egret	Ardea alba	-	-
House Wren	Troglodytes aedon	-	-
Indigo Bunting	Passerina cyanea	-	-
Mallard	Anas platyrhynchos	-	-
Mourning Dove	Zenaida macroura	-	-
Northern Cardinal	Cardinalis cardinalis	-	-
Northern Flicker	Colaptes auratus	-	-
Northern Rough-winged Swallow	Stelgidopteryx serripennis	-	-
Red-bellied Woodpecker	Melanerpes carolinus	-	-
Red-eyed Vireo	Vireo olivaceus	-	-
Red-winged Blackbird	Agelaius phoeniceus	-	-
Rose-breasted Grosbeak	Pheucticus ludovicianus	-	-
Song Sparrow	Melospiza melodia	-	-
Swamp Sparrow	Melospiza georgiana	-	-
Tree Swallow	Tachycineta bicolor	-	-
Trumpeter Swan	Cygnus buccinator	-	-
Yellow Warbler	Setophaga petechai	-	-
Herpetofauna			
American Bullfrog	Lithobates catesbeianus	-	-
American Toad	Anaxyrus americanus	-	-
Green Frog	Lithobates clamitans	-	-
Midland Painted Turtle	Chrysemys picta marginata	-	SC
Northern Leopard Frog	Lithobates pipiens	-	-
Insects			
Eastern Tiger Swallowtail	Papilio glaucus	-	-
Red Admiral	Vanessa atalanta	-	-
Mammals			
Easter Chipmunk	Tamias striatus	-	-
Woodchuck	Marmota monax	-	-
Grey Squirrel	Sciurus carolinensis	-	-
Mustelid sp.	Mustelidae sp.	-	-
White-tailed Deer	Odocoileus virginianus	-	-

Notes:

END - Endangered

ESA - Endangered Species Act

SARA - Species at Risk Act

SC - special concern

THR - Threatened

3.2.3.3 Significant Wildlife Habitat

Based on the results of the two field visits, the study area has the potential to contain candidate or confirmed SWH. The potential for SWH was assessed by comparing field observations with criteria from the SWHTG; OMNR 2000), and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (the Ecoregion 7E Schedules; MNRF 2015). The Ecoregion 7E Schedules describe five categories of SWH for Ecoregion 7E, including:

- Seasonal Concentration Areas of Animals: areas where certain wildlife species occur annually in large aggregations at specific times (e.g., during migration).
- Rare Vegetation Communities: contain plant species communities that are rare to the ecoregion.
- Specialized Habitats for Wildlife Considered SWH: contain rare habitats that wildlife populations depend on, especially for breeding and nesting.
- Habitats for SCC Considered SWH: includes SCC species, species that are locally or regionally rare and are declining, or other species with conservation concerns.
- Animal Movement Corridors: corridors that allow the movement of wildlife from one habitat type to another.

The SWH types that have been confirmed or have the potential to occur within the study area are presented in Table 12.

Table 12 Significant Wildlife Habitats Potentially Present Within the Study Area

Significant Wildlife Habitat Type	Associated Habitat
Seasonal Concentration Areas of Animals	
Waterfowl Stopover and Staging Areas (Aquatic)	Candidate - SAF1-1 community within the reservoir.
Bat Maternity Colonies	Candidate - Suitable cavity trees were identified within the FOD6-5 and FOM7-2 communities
Specialized Habitats for Wildlife Considered SWH	
Waterfowl Nesting Areas	Candidate - MAS2-1 and SWT2-5 communities within 120 m of the reservoir
Turtle Nesting Areas	Confirmed - Multiple turtle nests were observed at the Legion property during the June 10, 2025 field visit.
Amphibian Breeding Habitat (Woodland & Wetland)	Candidate - Pools within the FOD6-5 and FOM7-2 communities, and SAF1-1 and MAM2/MAS2-1 communities
Marsh Breeding Bird Habitat	Candidate - MAS2-1 and SAF1-1 communities.
Special Concern and Rare Wildlife Species	Confirmed - Barn swallows (SC) were observed foraging around the Legion property, and yellow pond lily (S3) was observed in the SAF1-2 community.
Animal Movement Corridors	
Amphibian Movement Corridors	Candidate - ELC communities near the reservoir and communities associated with water (FOD6-5, FOM7-2, SAF1-2, MAM2/MAS2-1). Can only be confirmed once amphibian breeding habitat is confirmed.

3.2.3.4 Species at Risk

The results of both field investigations were used to refine the list of SAR with the potential of occurring within the study area. The following rankings were used to assess potential habitat within the study area:

- **Not-Candidate:** The site lacks the necessary size, geographic location, or other features required for SAR habitat.
- **Candidate:** The site contains candidate habitat features, as identified during the site visit and through aerial photography interpretation. Background records identified the species within 10 km of the study area.
- **Confirmed:** The site contains habitat features, as identified during previous field visits, project team site visits, and through aerial photography interpretation. The SAR was observed within 2 km of the study area.

Table 13 summarizes the species with confirmed or candidate habitat within the study area. This includes four (4) birds, three (3) turtles, one (1) insect, and seven (7) mammals. Additionally, two flora species, black ash (*Fraxinus nigra*) and butternut (*Juglans cinerea*) and one bird, Barn Swallow (*Hirundo rustica*), were confirmed to be present during the field surveys. The identified black ash and butternuts are depicted in Figure 11, and Barn Swallows were observed foraging at the Legion property. Species that were assessed as “not candidate,” as well as rationale for the assessment can be found in the full SAR screening provided in Appendix D.

Table 13 Species at Risk Probability Within Study Area

Common Name	Latin Name	ESA Status	SARA Status	Probability of Occurrence and Suitable Habitat
Avian				
Barn Swallow	Hirundo rustica	SC	THR	Confirmed - Barn Swallows were observed foraging around the Legion property on the June 10, 2025 field visit. Potential nesting habitat in nearby manmade structures.
Chimney Swift	Chaetura pelagica	THR	THR	Candidate - Potential roosting habitat in cavity trees or nearby urban structures. Potential foraging habitat over the SAF1-1 and OAO communities.
Eastern Wood-pewee	Contopus virens	SC	SC	Candidate - Suitable habitat present within the FOD, FOM, and CUW communities.
Prothonotary Warbler	Protonotaria citrea	END	END	Candidate - Associated ELC communities present onsite, as well as cavity trees for nesting near standing water.
Wood Thrush	Hylocichla mustelina	SC	THR	Candidate - FOD and FOM greater than 1 ha present within the study area. Preferred tree species for nesting present.
Flora				
Black Ash	Fraxinus nigra	END	No Status	Confirmed - Suitable wet forest and swamp habitats present within the study area. Over Seven black ash trees were observed during field surveys in the eastern FOD6-5, FOM7-2, and SWM1-1 communities.
Butternut	Juglans cinerea	END	END	Confirmed - Suitable habitat within the forested habitats. Multiple butternuts were observed in the eastern FOD6-5 community during field surveys, as well as one in the mowed area next to the dam structure.
Herpetofauna				
Blanding's Turtle	Emydoidea blandingii	THR	END	Candidate - Potential habitat within the SAF1-1 community.
Northern Map Turtle	Graptemys geographica	SC	SC	Candidate - Suitable habitat present within the SAF1-1 community, which had mucky substrates, abundant vegetation, and numerous suitable basking spots.
Snapping Turtle	Chelydra serpentina	SC	SC	Candidate - Suitable habitat present within the SAF1-1 community, which has sandy banks, soft bottoms, and floating vegetation.
Insects				
Monarch	Danaus plexippus	SC	END	Candidate - Milkweed was observed in multiple communities across the study area.
Mammals				
Eastern Red Bat	Lasiurus borealis	END	No Status	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Hoary Bat	Lasiurus cinereus	END	No Status	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Little Brown Myotis	Myotis lucifugus	END	END	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Northern Myotis	Myotis septentrionalis	END	END	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Silver-haired Bat	Lasionycteris noctivagans	END	No Status	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Tri-colored Bat	Perimyotis subflavus	END	END	Candidate - Suitable roosting habitat was identified throughout the forested communities.
Woodland Vole	Microtus pinetorum	SC	SC	Candidate - Suitable forest habitat with deep litter and herbaceous vegetation present within the study area.

Notes:
 ESA – Endangered Species Act
 SARA – Species at Risk Act
 END – Endangered
 THR – Threatened
 SC – Special Concern

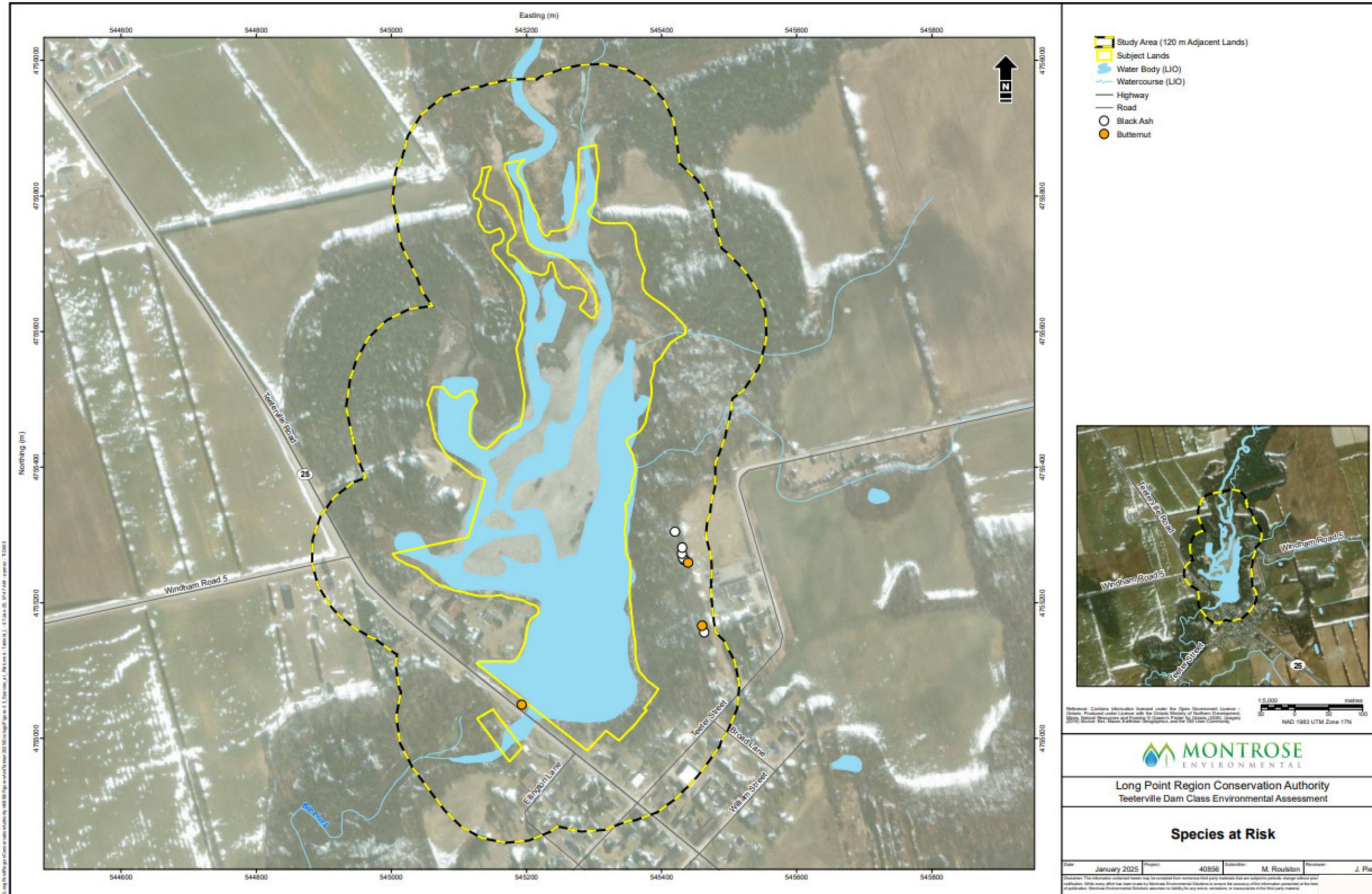


Figure 11 Species at Risk Observed within Study Area

3.3 Cultural

3.3.1 Archaeology

As part of the Study Team, TMHC completed a Stage 1 archaeological background study (Appendix E). This section contains a short summary of the work completed and the study's relevant conclusions and recommendations.

The background review work included a review of current land use, historic and modern maps, past settlement history for the area, and a consideration of topographic and physiographic features, soils, and drainage. It also involved a review of previously registered archaeological resources within 1 km of the project area and previous archaeological assessments within 50 m.

The background study indicated that the property had potential for the recovery of archaeological resources due to the proximity (i.e., within 300 m) of features that signal archaeological potential, namely:

- A water source (Big Creek)
- Early industry (numerous mills)
- An area of early nineteenth century settlement (Teeterville)
- Mapped nineteenth-century structures (grist mill, water sawmill, church, and residential structures)
- Mapped nineteenth-century thoroughfares (Teeter Street, Simcoe Street [Teeterville Road], Water Street [Ellington Lane], John Street [Abbie Lane], George Street [Seaton Street], Palmer Street, William Street, and Chapel Lane)
- Registered heritage properties

The Stage 1 background research and visual property inspection has confirmed that portions of the project area have experienced extensive disturbance and lack integrity (52.3%; 0.34 ha). This disturbance primarily relates to the construction of Teeterville Dam, the previous Teeterville Road alignment and modern Teeterville Road, their built-up road embankments, a gravel laneway or path, and the structural remains of a grist mill which is depicted in historic mapping. A former mill race to the north is considered low-lying and wet (4.6%; 0.03 ha). These areas were determined to not retain land-based archaeological potential and do not require further assessment.

Low areas demonstrating permanently wet conditions (24.6%; 0.16 ha), including areas of wetland, were noted along Big Creek. While these areas have low or no potential for land-based archaeological resources, the assessment concluded that, should future works require in-water impacts within the creek, the Marine Archaeological Potential Checklist should be reviewed and filled out to determine whether a marine archaeological assessment is required.

Portions of the project area that are grassed and treed are not obviously disturbed and retain archaeological potential (18.5%; 0.12 ha). These areas will require Stage 2 assessment in the form of a test pit survey at 5 m interval if impacts are planned.

The project area is also the location of an early grist mill and sawmill, which first opened circa 1830 and changed ownership multiple times, until finally being purchased and demolished by P.J. MacMillan in 1944 before selling the land to Big Creek Conservation Authority (Teeterville Women's Institute 1959). Despite this, it is possible that some evidence of the milling industry on the property remains intact, as noted by the potential foundations and mill race remnants identified during the property inspection.

Beyond the site itself, the archaeology assessment noted that “according to PastPortal (accessed October 1, 2024) there are two registered archaeological sites within 1 km of the project area.” The closest registered site, located approximately 830 m to the north and said to date from the Early Woodland period, “consists of a diffuse scatter of 42 lithic artifacts and was discovered in 1989 by Archaeological Services Inc.”

The recommendations of the Stage 1 assessment are subject to the conditions laid out in that report and to the Ministry of Citizenship and Multiculturalism's (MCM) review and acceptance of it into the provincial registry.

3.3.2 Built Heritage Resources and Cultural Heritage Landscapes

Prior to the current EA study, a Cultural Heritage Evaluation Report (CHER) was completed by Stantec Consulting Ltd. (Stantec 2019) as part of an engineering services review supporting a design for repair of the dam. The CHER concluded that the dam and truss bridge had Cultural Heritage Value or Interest (CHVI) based on its design/physical, historical/associative, and contextual attributes. Because there was no formal requirement for a CHER at that time, Stantec provided recommendations and mitigation options rather than a recommendation that a Heritage Impact Assessment (HIA) be undertaken. As part of the current project, an HIA was completed by TMHC Inc., a summary of which is included below (indented text is direct quotes from the HIA, unless denoted by square brackets). The entirety of the HIA, including additional detail and references embedded within the summary below, can be found in Appendix F.

A Brief History of the Area

Early Indigenous Settlement

Early Indigenous populations in Norfolk County arrived at least by 12,000 to 10,000 years ago, coincident with the end of the last period of glaciation. Indigenous peoples would have crossed the landscape in small groups (i.e., bands or family units) searching for migratory game species. In this area, caribou may have provided the staple of the diet, supplemented

by wild plants, small game, birds, and fish. As more localized, resource-rich environments developed Indigenous groups were able to sustain themselves in smaller and smaller areas. This period of Indigenous settlement is referred to by archaeologists as the Archaic Period (8000 BCE – 1100 BCE).

Indigenous communities continued to adapt to environmental changes especially as deciduous trees gradually replaced coniferous forests in southern Ontario. These adaptations are reflected in archaeological evidence dating to the Woodland Period (950 BCE-1650 CE), which is marked by the development of pottery, far-ranging trading networks, new housing technologies, and eventually the adoption of agriculture. Villages from this period are typically associated with the Attawandaron (Neutral), a confederacy of Iroquoian peoples who occupied large parts of southern Ontario when European missionaries and explorers first arrived.

Historic Indigenous Settlement

In the early 17th-century Jesuit missionaries lived among the Wendat in the Georgian Bay, Lake Simcoe area. From there, Jesuit missionary Jean de Brébeuf is reported to have ventured further south along the Lower Thames in 1640-41 in hopes of establishing the “Mission of the Angels.” Seventeenth and early-18th century historic accounts also describe the presence of several historic-era Indigenous villages in nearby Kent County. These villages were associated with the Attawandaron. Before 1650, the Attawandaron confederacy occupied a significant portion of the southern part of southwestern Ontario, between Lake Ontario and the Niagara Peninsula, extending westward to London. After the Wendat exodus from their Lake Simcoe homelands, the Attawandaron also relocated to east of the Grand River. After continued hostilities with the Haudenosaunee, the Attawandaron were eventually dispersed, with many families adopted into Haudenosaunee and Wendat settlements elsewhere. By this time the Haudenosaunee had pushed northward from their traditional homelands in New York State and had established settlements along the north shore of Lake Ontario and in other parts of southern Ontario. They continued to exert control over trading networks and hunting grounds, leading to conflicts with local Anishinaabe communities.

An alliance between the French and the Three Fires Confederacy (namely the Ojibwa, Odawa, and Potawatomi nations) helped solidify efforts to oppose the Haudenosaunee. In the face of this opposition, the Haudenosaunee left southwestern Ontario around 1700 and returned to New York State, leading to the Great Peace of Montreal in 1701. Following the departure of the Haudenosaunee, southwestern Ontario was settled by various Three Fires Confederacy groups including the Potawatomi and Ojibwa (including the Chippewa and Mississauga). The Mississaugas of the Credit River (now the Mississaugas of the Credit First

Nation) assumed responsibility for a large territory extending from the Oak Ridges Moraine in the north, across Lake Ontario, to the northern shores of Lake Erie, inclusive of the Study Area.

Subsequent land surveyors' records mention extensive settlements along the Lower Thames River and the Grand River with trails running between these areas. Less is known of the historic Indigenous settlements in Norfolk County although Sulpician priests François Dollier de Casson and René de Bréhant de Galinée, are said to have wintered with the Mississaugas along the banks of Lake Erie at what is now Port Dover in 1669-70. A memorial cairn later erected at the site marks Brant Hill, where the priests were said to have planted a cross declaring the land under ownership of the French king. The broader Lake Erie environs were also visited sporadically by early French missionaries and explorers, possibly including Louis Joliet in 1669 and Pierre de Charlevoix in 1721.

After entering into the Between the Lakes Treaty, the Mississaugas of the Credit were joined by Haudenosaunee groups tied to Joseph Brant. The treaty's purpose was to help facilitate the granting of a tract of land along the Grand River in the late 18th century to these Haudenosaunee groups (later known as the Six Nation of the Grand River) in recognition of their support of the British during the American Revolutionary War.

Study Area and Subject Site

The Teeterville Dam was first constructed in 1830 by Joseph Vivian to facilitate the movement of lumber along Big Creek. George Teeter purchased the property from Vivian in 1855 and constructed a grain shed and residence north of the dam. By 1860, Teeter had started construction on a sawmill and had enlarged and rebuilt the dam. In 1863, the Teeterville community constructed a grist mill through a raising "bee" whereby members of the community participated as a team to raise the large framework of the structure.

Upon Teeter's death in 1869, his son William took over operations of the saw mill and his son Henry took over operations of the Teeter Mills, a grist mill (Figure 12). Mill ownership and operations on or near the site changed hand multiple times between 1886 and 1944, at which point P.J. MacMillan purchased the mill, which he then demolished, and sold the property to Big Creek Conservation Authority (later the LPRCA).

Flooding of Big Creek

Documented flooding of Big Creek dates to 1796 when surveyor William Hambly observed flooding in March and November. Another surveyor, Mahlon Burwell, observed Big Creek to be "very high" in 1809 and a travelling missionary, Reverend Thomas Green, noted a bridge on Talbot Street in Delhi had been entirely washed away by a spring freshet. Specific to the south end of the Study Area, a severe storm in September 1878 caused damage to structures

in Teeterville including the mill property. The flooding caused the dam and the wooden bridge to fail and flooded the mill, casting away lumber piles, sheds, and a car track.

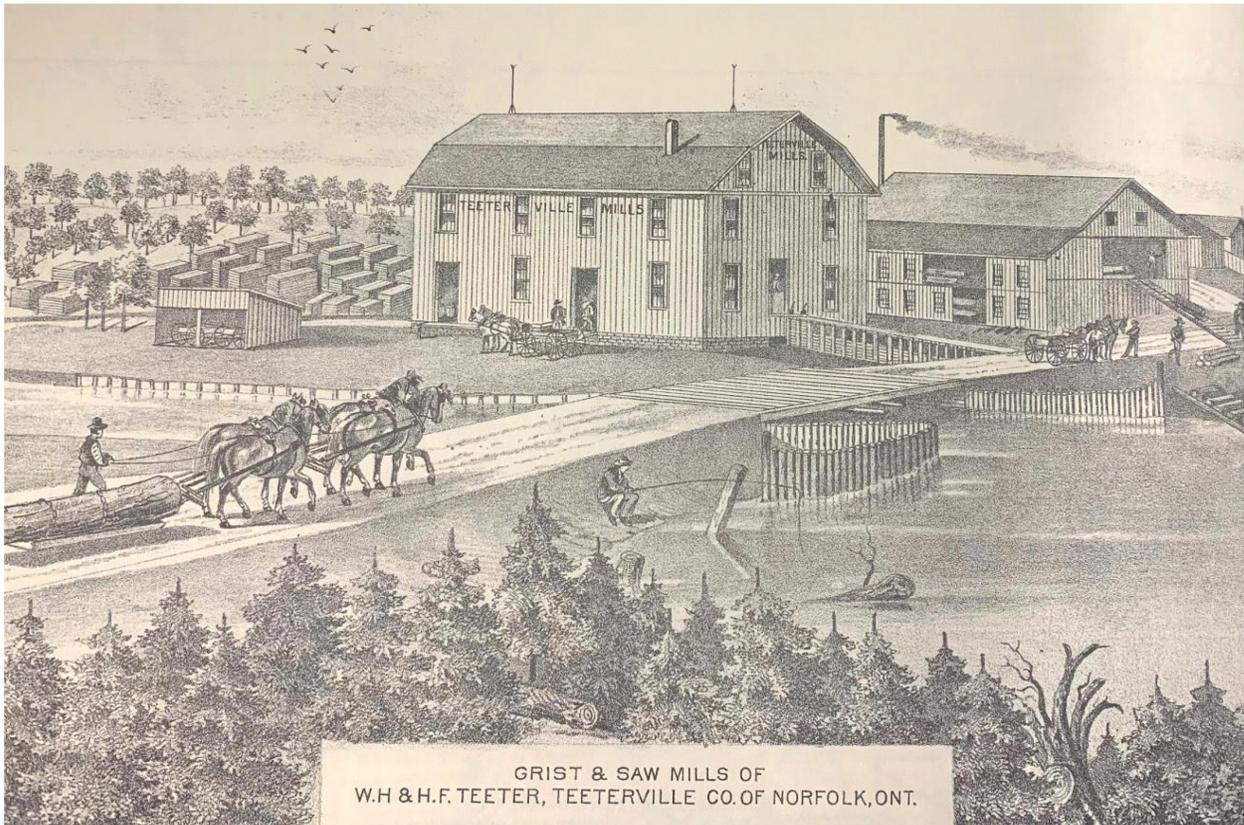


Figure 12 Teeterville Mills and Dam and Bridge (1870s)

In June 1892, the dam was again lost to flooding. It is likely that the dam was replaced with a two-basin spillway with a two-span wooden truss bridge above (Figure 13). In 1915, when this iteration of the dam was destroyed in a flood, it was replaced by an earthen berm dam with a concrete spillway in the location of the contemporary dam. In the Fall of 1917, concrete abutments were constructed in preparation for the single-span Warren pony truss bridge that was constructed in the Spring of 1918 by the Sarnia Bridge Company (Figure 14).

Flooding in 1937 destroyed the earthen berm and the concrete spillway, prompting the blasting of a ditch to save the mills from further damage. It is unclear if this dam was repaired following the flood or was fully replaced; however, it is likely that much of the dam’s current configuration dates to this era.

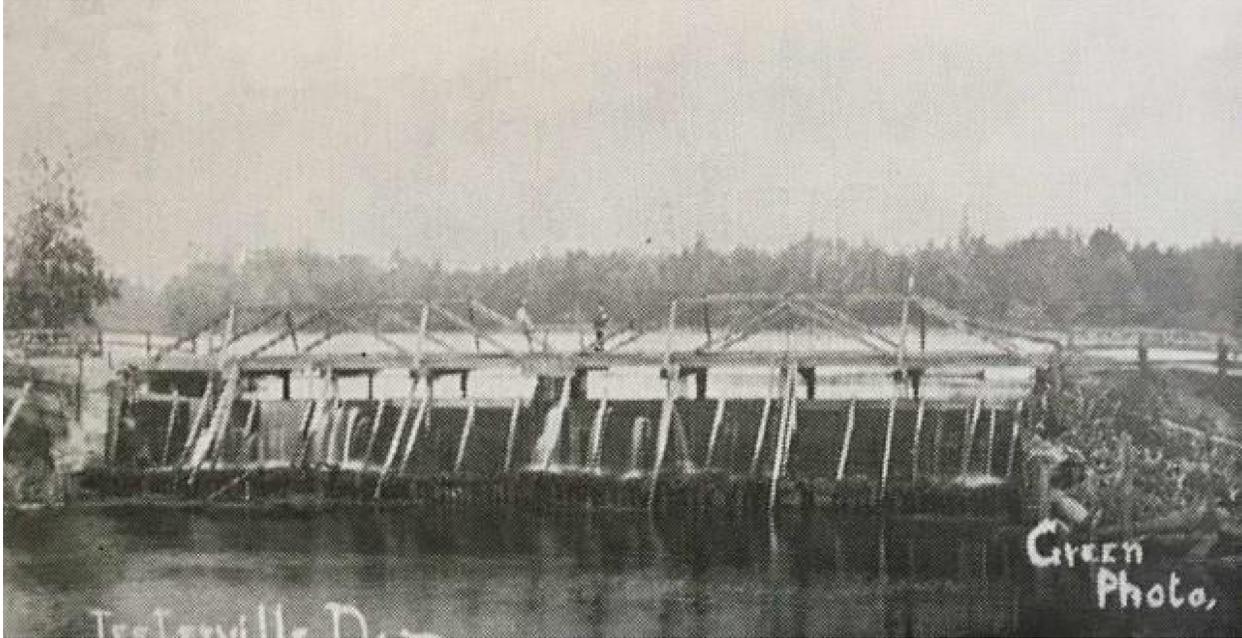


Figure 13 Teeterville Dam and Bridge (c. 1880-1915)

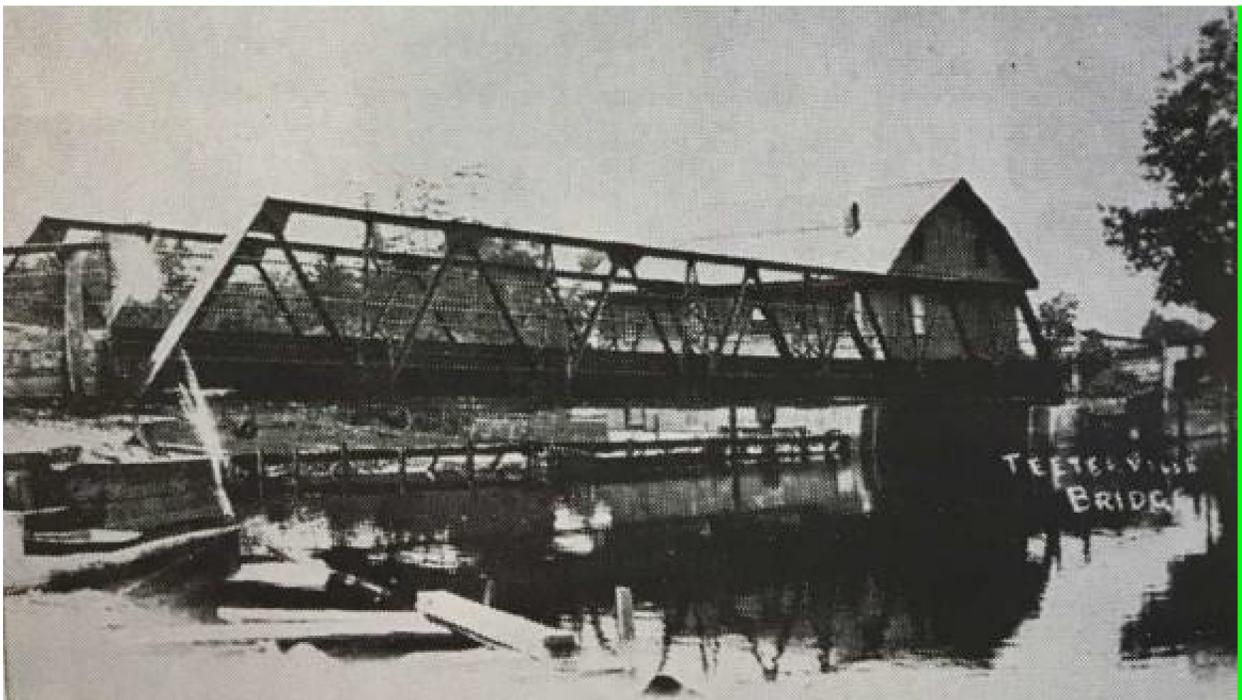


Figure 14 Teeterville Dam and Truss Bridge (c. 1916-1944)

Previous Cultural Heritage Assessment

Work completed by Stantec (2019) evaluated the dam and bridge structures for CHVI against the nine criteria of O.Reg. 9/06 (now amended by O.Reg. 569/22) to assess whether features have design or physical value, historical or associative value, or contextual value. Owing to safety concerns identified in the Stantec work, the Warren truss bridge was removed in 2022. Summary conclusions from the CHVI assessment relative to the current study (i.e., the remaining dam) are that:

- Design or Physical Value: The dam is representative of common designs, specifically in Norfolk County, where at least four other dams with earthen berms and concrete spillways exist. The materials and construction methods utilized in the dam are common and it does not exhibit a high degree of craftsmanship or artistic merit. The quality of execution and technical skill of the dam is typical of dams built during the late nineteenth and early twentieth century period.
- Historical or Associative Value: The dam has direct associations with the activity of milling that was instrumental to the early development of Teeterville. Following destruction of earlier dams due to flooding, the current structure was likely built by the owners of the mill in 1915, the Edgeworth family, who were prominent citizens in the community. However, the structure does not offer new knowledge or a greater understanding of Teeterville's history or culture and the designer of the structure is unknown.
- Contextual Value: The dam is physically linked to its surroundings as a functioning dam and, as a former part of a complex milling operation, is historically linked as well. Although historically linked, the character of the area is not unique or definable as the structure is set within a rural community containing a wide variety of similarly purpose-built structures. Despite being relatively familiar, the dam does not form a prominent part of the landscape and is not visually memorable or easily discernible within the landscape. As such, it was assessed that the dam does not represent a landmark, for the purposes of O. Reg. 9/06.

Current Assessment

As part of the initiation of current EA work, TMHC has completed an additional historical overview review and initial assessment of cultural heritage aspects relating to the area and the dam. The work includes to compilation of historical summaries of the Teeterville area in general, and the study area in particular, for the period of Indigenous occupation through to European settlement through to current day, as summarized above. Given the recency of the Stantec work, and the lack of substantive change between O.Reg. 9/06 and the amended version, O. Reg. 569/22, the current work has not comprehensively re-assessed the cultural heritage value or interest of the structure.

Following industry practices that were typical until recently, the Stantec report focused predominantly on tangible and largely built features related to settler and colonial histories. The site history, as described therein, commenced with the initial survey of Windham Township in 1797 and proceeded through the various ownership, site uses / development, and major events (e.g., fires / floods) of the 19th and 20th centuries, as described above. The more recent industry approach, and that adopted within TMHC 2025, expands the assessment of cultural heritage to include a summary of Indigenous history in both the broad geographic region and the Norfolk County study area, including pre-European and post-settler timeframes. Specific historic and cultural summaries are included regarding the communities identified as having the greatest potential to be affected by the proposed project, the Mississaugas of the Credit First Nation and the Six Nations of the Grand River. In its historical summary of Teeterville and the dam post-settlement, the TMHC report largely mirrors the Stantec work.

In addition to the expanded cultural history perspective, the current assessment of CHVI is broader than that completed previously, as the scope of that work was limited to specific elements. As a design for repair with limited potential for larger-scale impacts, the CHVI assessment focused on the dam and bridge infrastructure alone and was not concerned with other features of cultural heritage value and interest that are of importance to the current environmental assessment. The EA process is required to identify and assess various approaches to resolving the study's problem statement and some of these could have more far-ranging impacts, such as impacts to the reservoir. While the bridge and dam infrastructure elements may not meet some of the regulatory requirements for cultural heritage designation, such does not necessarily follow for other elements. Through public consultation exercises undertaken as part of the EA, it is apparent that the reservoir itself is considered to have substantial cultural value and interest to the community.

The TMHC evaluation of the dam and study area against O.Reg. 9/06 criteria (as amended by O.Reg. 569/22), reproduced from Section 8 of the HIA, is included as Table 14. With respect to these criteria, the property at 3821 Teeterville Road was found to meet three of the nine criteria for its design and contextual value. Additional discussion is included within the complete report, attached as Appendix F.

Table 14 Teeterville Dam O.Reg. 9/06 Evaluation (as Amended by O.Reg. 569/12) (TMHC 2025)

Criterion	Summary of Response
1. The property has design value or physical value because it is a rare, unique, representative or early example of a style, type, expression, material or construction method.	<p>Yes; while common, the dam on the Subject Site is a representative example of an earthen bank and concrete four-bay spillway. Initially constructed in 1915 and destroyed in 1937, the dam was likely reconstructed in the late 1930s. Minor modifications occurred in the early 1960s, and the superstructure of the Warren truss bridge was removed in 2022. Only the concrete abutments and railings of this structure remain.</p> <p>Furthermore, only small portions remain in the broader Study Area of what may have comprised the foundation of the former adjacent grist mill. These remaining components do not demonstrate a rare, unique, representative or early example of a style or type of mill, or an expression of early mill.</p>
2. The property has design value or physical value because it displays a high degree of craftsmanship or artistic merit.	<p>No; the concrete spillway on the Subject Site does not display a high degree of craftsmanship or artistic merit.</p> <p>Within the broader Study Area, the remnant concrete foundations northwest of the dam which were likely part of the grist mill that was demolished in 1944 do not display a high degree of craftsmanship or artistic merit in relation to the former mill operations on the property.</p>
3. The property has a design value or physical value because it demonstrates a high degree of technical or scientific achievement.	<p>No; neither the concrete spillway nor the remnant concrete foundations northwest of the dam, which were likely part of the grist mill that was demolished in 1944, demonstrate a high degree of technical or scientific achievement relative to its temporal and spatial setting.</p> <p>These features also do not demonstrate a high degree of technical or scientific achievement in the use of concrete as a building material which became prevalent by the early 20th century.</p>
4. The property has historical value or associative value because it has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community.	<p>No; the dam, the remaining concrete bridge abutments and railings, and mill foundations do not hold significant historical value or associative value to the former mill operators on the Subject Site including the Teeter family, Henry McKnight, the Edgeworth family, and N. J. H. Green.</p> <p>The structures on the Subject Site and landscape of the broader Study Area have undergone significant change in the 20th century. The sawmill was destroyed in a fire in 1912 and the concrete spillway was destroyed in a 1937 flood. In 1944, the grist mill was demolished and in the early 1960s, the current stop log control structure was added. The realignment of Teeterville Road and construction of the 1971 bridge altered the configuration of the southwest terminus of the mill pond. The superstructure of the truss bridge was removed in 2022. Subsequent overgrowth northwest of the dam has diminished most traces of the former sluice, mill race, and mill.</p>
5. The property has historical value or associative value because it yields, or has the potential to yield, information that contributes to an understanding of a community or culture.	<p>No; the dam does not hold significant historical value or associative value, nor does it have the potential to yield information that contributes to the 19th and early-to-mid-20th century milling that occurred on this property. The current dam was likely constructed in the late 1930s after a flood destroyed an earlier dam. The sawmill was destroyed by fire in 1912 and the grist mill was demolished in 1944.</p> <p>The limited remnants of the former grist mill foundation do not contribute to an understanding of a community or culture.</p> <p>Within the broader Study Area, the presence of the mill pond and creek do not yield, or have the potential to yield, information that is demonstrative of the former milling operations on the property as, the concrete spillway was destroyed in a 1937 flood, the current stop log control structure was added in the early 1960s, the realignment of Teeterville Road and construction of the 1971 bridge altered the configuration of the southwest end of the mill pond and the superstructure of the truss bridge was removed in 2022.</p> <p>There exists little to no opportunity to demonstrate the former milling operations on the property since most tangible remnants of this prior industrial landscape have been removed, altered, or substantially diminished.</p>
6. The property has historical value or associative value because it demonstrates or reflects the work or ideas of an architect, artist, builder, designer, or theorist who is significant to a community.	<p>No; the dam on the Subject Site does not reflect the work or idea of a builder, designer, theorist and/or engineer who is significant to a community.</p> <p>The 1962 designs of consulting engineers Cryslar, Davis & Jorgensen, Limited of Willowdale, Ontario appear to have been limited to the addition of stop log hoists to the Teeterville Dam.</p> <p>The limited extent of the remaining elements comprising the former grist mill foundation and substructure of the former truss bridge is insufficient to reflect the work or idea of a builder, designer, theorist and/or engineer.</p>
7. The property has contextual value because it is important in defining, maintaining or supporting the character of an area.	<p>Yes; while the area southwest of the mill pond has evolved from its 19th century history to the present, the sum of the parts comprising the property (including the mill pond, the location of the dam and spillway, and the areas recent recreational use) helps to define, maintain and support the character of the mill pond's history and contribution to the context of the Teeterville community.</p> <p>While the individual components of the current spillway and earthen berm are not significant in terms of design, the configuration and location of these components is important in defining, maintaining and supporting the character of the area.</p>
8. The property has contextual value because it is physically, functionally, visually or historically linked to its surroundings.	<p>Yes; although the Subject Site is no longer functionally linked to its surroundings because of the destruction of the saw mill in 1912, the original 1915 dam in 1937, and the grist mill in 1944, the location and configuration of the late 1930s spillway and earthen berm is physically and historically linked to the mill pond and Big Creek, both of which remain physically intact and provide a physical, functional, visual, and historical linkage to the Teeterville community.</p>
9. The property has contextual value because it is a landmark.	<p>No; although the Subject Site is currently part of the Teeterville Conservation Area and thereby serves a recreational and community purpose, the Study Area is not a landmark.</p>

3.4 Socioeconomic

An initial understanding of the socioeconomic environment within which the project exists was gained through the course of reviewing available background documentation and, as importantly, in completing initial public consultation activities.

Teeterville is a small, rural hamlet of primarily residential character surrounded by a rural, agricultural landscape. The dam and reservoir are located immediately adjacent to the village and on the main thoroughfare (Teeterville Road / County Road 25).

Though references are somewhat limited (e.g., <https://teetervilemuseum.ca/historic-information/>, <https://wikimapia.org/22996050/Teeterville>), it is understood that the village population is approximately 125-150 persons. Land uses in the area consist primarily of single-family homes and farm properties. Recent property sales data (2024-2025) indicate that property values in the area range from approximately \$450,000 to \$650,000. The agricultural land use extends beyond the vicinity of the dam, with intensive agriculture of mainly speciality crops such as tobacco and ginseng, cultivated fields, pastureland, and woodlots.

3.4.1 Recreation

Key community institutional facilities in the area include the Teeterville Public School, the Teeterville Pioneer Museum (recently closed), and the Royal Canadian Legion Branch 526.

Backing directly onto the reservoir and generally offering open access, the Legion property plays a direct and important role in linking the community to the reservoir for recreational activities such as nature watching, canoeing / kayaking, skating, and angling. Numerous public comments received to-date have highlighted the annual Father's Day Carp Derby, hosted by the Teeterville Firefighters Association at the Legion property, as a community event of significant social importance.

The reservoir and surrounding areas are understood to have supported an active seasonal hunting program largely focused on waterfowl and deer, no doubt since its original creation and through to current day. Through public comments, it is understood that Delta Waterfowl, a not-for-profit duck hunter's organization, installed public waterfowl blinds on the ponds in 2023.

As discussed previously in Section 3.1.5, there are no municipal water or sanitary services in the vicinity; water and sewage services are provided through private wells and onsite septic systems.

3.4.2 Infrastructure - Surface Water

A review of the MECP's Permit To Take Water (PTTW) database identified a number of historic, agricultural surface water takings from the reservoir, but only a single one remains active at this time, namely Permit 0433-AQGGGR2, a private taking classified as agricultural – field and pasture (MOECC 2017). Through consultation with the Permit holder / landowner, it is understood that the intent of this PTTW is as an irrigation water supply source for adjacent fields. The operation of the associated pumping system is not currently feasible owing to physical conditions in the reservoir, including a combination of the reduced water levels implemented since 2017 to reduce hydraulic stresses on the dam structure and sediment accumulation within this area of the reservoir. It is understood that efforts were undertaken in 2017 to recreate a deeper pool area within the reservoir to support pumping operations, but that such was ineffective owing to the fine and mobile nature of the reservoir sediment, limiting the ability to maintain a pool of sufficient depth to support pumping over time.

Two other active surface water PTTWs exist in the vicinity (8227-BDRHR5 and 7006-9X3R7A), with both identified as drawing from Big Creek itself.

Beyond provincial permitted takings, the Teeterville reservoir also serves as a key water supply source for the Norfolk County Fire Department (NCFD) (firefighting or other emergency uses are exempt from PTTW requirements). A rated, dry hydrant located adjacent the old road alignment on the southeast side of the dam, connects to a raw water intake within the reservoir, providing a reliable, easily accessible, high-capacity emergency water source for NCFD's Fire Station #4, located just east of the reservoir on Teeter Street. The dry hydrant / intake is routinely tested for functionality and used for operational training and fire response use on an as-needed basis. As with any mechanical system it undergoes occasional maintenance to reduce the impact of siltation, for example, and occasional upgrades / modifications (e.g., intake pipe lowering) to manage changing conditions such as the impact associated with the bridge removal and year-round lowering of water levels starting in 2017.



Figure 15 Active MECP Permits-to-Take-Water Near to the Study Area

The Teeterville reservoir dry hydrant is one in a system of approximately 26 dry hydrants that form part of NCFD’s broader fire protection system that services the rural areas of the County. The system of dry hydrants is distributed across the County with many associated with smaller irrigation or purpose-built ponds located immediately adjacent municipal road rights-of-way, often measuring less than 0.5 ha (1.25 ac.) surface area. This system of dry hydrants and ponds, along with the strategic location / distribution of associated fire stations, has been assessed to offer sufficient protection to the community to be accredited as a Superior Tanker Shuttle Service (SSTS; Fire Underwriters Survey 2023). In addition to the obvious physical benefits of providing a source of readily available emergency water supply for the locally surrounding area, the SSTS accreditation has the less obvious, but consequential benefit of helping keep fire insurance premiums lower for many property owners.

As a larger-than-typical (by volume) supply source for the County, and one that is centrally located within the fire district, the Teeterville Pond dry hydrant represents a vital resource for firefighting operations.

3.4.3 Infrastructure - Groundwater

Water well records downloaded from provincial data sources

(<https://www.ontario.ca/page/wellrecords>) indicate 35 water well records within a 1 km radius from the Teeterville Dam Reservoir, as outlined in a polygon of interest and related well record data provided in Appendix B. The records indicate the overburden is predominantly sand and gravel with occasional clay layers interspersed. A general summary of the well data is as follows:

- All wells are founded in the overburden.
- All wells are for “water supply”, with 3 exceptions noted as “abandoned” (2) or “replacement” (1).
- All wells are identified as for “domestic”, “public”, or “municipal” use, with 6 exceptions noted as “irrigation” (3), “livestock” (1), or “other” (2).
- All wells tested (3 are listed as “untested”) are identified as “fresh” water, with 1 exception (the “livestock” well noted above) identified as “sulphur” (the detailed drilling log indicates “fresh tinted with sulphur”).
- Of the 31 wells for which casing depths are reported, only 2 are installed at significant depth (>30 m [100 ft]).
- The average top and bottom of screening for the 29 shallower wells is at 7.9 m and 9.7 m (26 ft and 32 ft), respectively, with an average depth of water found at 4.3 m (13 ft) bgs.
- The average elevation of the bottoms of the shallower wells is approximately 231 m amsl. The average static water elevation for wells located near the reservoir is approximately 238 m amsl.

Lacking official well records with the province, it is understood that all other private supply wells in the vicinity of the project are shallow, sand point systems, of a similar character to those of the shallow wells described above. These wells, generally ubiquitous in the Norfolk Sand Plain, typically consist of a small-diameter casing (e.g., 2.5 to 5 cm [1 to 2 in.]) that are driven or jetted into the ground to access shallow aquifer supplies. Discussions and correspondence with private landowners completed as part of the current project’s background review provide anecdotal data that these are typically installed in the 5 to 6 m (16 to 20 ft) depth range.

The Teeterville Dam raises the water table around the reservoir’s edge compared to its natural state. Since 2017, the water level in the reservoir has been maintained at its winter holding level at approximately 235.6 m amsl on the upstream side of the dam, while the stream below the dam is at about 232.6 m amsl. This suggests the dam may have increased the water table by

approximately 3.0 m at its downstream limits, a value that would be reduced, ultimately to 0.0 m, at the top end of the reservoir.

Beyond the background review of readily available information, additional groundwater investigations were not considered as part of the current study; however, monitoring for potential impacts to water levels, quantity or quality may be required as part of future detailed assessments and project implementation.

3.4.4 Economic

As with any potentially significant public project, the availability of funding to support the implementation of any potential alternative is a significant consideration. While LPRCA owns the dam/reservoir, the implementation of any significant works would be a “special benefiting project” (i.e., a project undertaken by a CA that benefits a single municipality within their jurisdiction) and, as such, would involve a special levy to Norfolk County in the absence of, or in combination with, other sources. In addition to municipal taxpayer sources, there are various other governmental and non-governmental funding sources that might be accessed to support ultimate project implementation. While some programs are designed to support a broad range of projects, others are tied to preferred outcomes. It is expected that multiple programs will be reviewed for applicability based on the preferred alternative selected, and funding pursued through the design and implementation stages.

3.5 Engineering/Technical

3.5.1 Dam Conditions – Structural/Geotechnical

The dam has been the subject of various studies within the last decade, most notably involving a Dam Safety Review and Condition Assessment (DSR; AECOM 2016) that included an assessment of structural integrity, a geotechnical assessment, a hydrotechnical assessment, including dam break analysis and inundation mapping, HPC assessment and selection of the IDF as per provincial guidance, as well as an assessment of quantity and quality of the sediment accumulation within the reservoir.

The geotechnical assessment (Thurber 2016) completed on the earthen berm portion of the dam as part of the DSR included a visual inspection to assess signs of downstream seepage and verify structural stability and a limited intrusive investigation consisting of one borehole through the roadway immediately south of the dam.

Visual observations included the following:

- No evidence of seepage or sinkholes was observed between the road embankment and the berm.

- No evidence of sinkholes or seepage was identified on the downstream side of the berm on either side of the spillway structure.
- The downstream slope on the east side of the structure was vegetated with shrubs and tall grass.
- The northwest downstream slope showed evidence of erosion from runoff at the crest of the slope and seepage between the concrete wingwall and pier as shown on Figure 4. A loss of material, thought to be the result of surface runoff, was also observed at the downstream wingwall on the northwest side.

A single, 11.3 m deep borehole was drilled immediately south of the concrete spillway structure and characterized the stratigraphy as a surficial layer of asphalt underlain by a sand fill. Native silty sand was encountered below the fill and was further underlain by a layer of sandy silt. A groundwater monitoring well installed in the borehole and monitored over 2 months (October to November 2015) indicated an average groundwater level of approximately 233.3 m.

The geotechnical investigations concluded that the earthen embankment portion of the dam was generally safe, though potentially subject to internal piping/erosion. The stability assessments related to the concrete abutments and piers found that the dam does not meet federal and provincial safety criteria for sliding under all load cases including usual load (summer), usual load (winter) and unusual load (IDF). The DSR reported that the use of soil anchors could sufficiently increase the safety criteria as a rehabilitation alternative, however, there is uncertainty with the unknown structure properties and condition of the existing structure.

Beyond the more substantive stability issues identified above, the DSR identified additional elements as requiring of repair that are typical for dams of this vintage, as summarized on Table 15.

Despite the routine maintenance requirements and more substantive structural concerns identified within the DSR, as summarized above, subsequent efforts undertaken by Stantec (2018-2020) assessed possible dam repair options, ultimately concluding that an approach involving the addition of concrete mass to the dam structure, on the existing concrete apron downstream of the existing vertical dam, represented a feasible alternative.

Table 15 Teeterville Dam Existing Conditions (AECOM 2016)

Component	Design and Material	Condition and Issue (AECOM 2016)
Bridge	Steel truss for pedestrian and operator access	Severe corrosion of steel on the bolts, nuts, plates, and truss component connected to the bearings; pack rust and severe section loss; Some anchor bolts deformed; some surface corrosion. Bottom chord members were in poor condition with medium to severe corrosion and light to medium pitting of the members; some very severe section loss. Northerly three stringers were fully exposed and not supporting any decking. No coating to protect steel.
Dam	Earthen berm with concrete appurtenances	Concrete abutments had medium to severe disintegration, medium scaling and spalling, and narrow to wide horizontal cracking with efflorescence staining. Severe disintegration and numerous narrow horizontal cracking (with vegetation through the cracks) on the west abutment below the bridge. Concrete piers downstream had light honeycombing, light to severe spalling, light to medium delamination, medium to severe erosion and exposed reinforcing steel at the base of the centre and west pier.
Spillway	Vertical concrete wall acting as a sharp crested overflow weir	Localized poor condition areas with light to medium erosion, localized light to medium spalling/delamination, and light to medium disintegration.
Downstream Slab	Concrete	Drilling indicated concrete was in fair to good condition. Slab construction on rock fill which is not ideal. Base slab was undermined along a large portion of the south end.

4 Alternative Solutions

As part of the CO Class EA process, consideration of a reasonable range of alternatives to addressing the problem statement is required, a requirement met herein through the development and consideration of a variety of possible alternative solutions including the mandatory Do-Nothing, repair of the existing dam structure, full dam replacement, and two decommissioning alternatives with variable in-reservoir characteristic. Summaries, including descriptions of the anticipated approach and broad environmental impacts, be they positive, negative or neutral, are provided in the following sections and conceptually illustrated on Figures 16 to 20.

4.1 Alternative 1: Do Nothing

As the name implies, the “do nothing” alternative involves no physical or operational changes being implemented to address the problem statement specific to structural safety issues at the dam and would have no impact on the existing conditions outlined in Section 3.

Implementation of the do nothing option would mean that the structure would remain

out-of-compliance with provincial and federal dam management guidelines and would continue to deteriorate representing an increasing risk of failure. While not addressing the problem statement and, therefore, not representing a realistically acceptable option for this project, consideration of the “do nothing” alternative is a mandatory requirement of the CO Class EA process and serves as a benchmark for comparison of other alternatives.

The existing aesthetic and current uses would remain with the reservoir continuing to hold water, warming it through the summer months, continuing to disrupt the natural sediment transport regime and fish passage characteristics typical of a free-flowing watercourse system. Sediment accumulation processes within the upstream reaches of the reservoir will continue, though an equilibrium “flow-through” condition, with influent volumes matching effluent volumes over time, is thought to have been reached.

Given the structural concerns associated with the dam structure, water levels would continue to be maintained at the lower, winter holding elevations, without the possibility of additional stop log additions in the summer months as per historic operations. The need to hold at winter operating levels reduces recreational opportunities within the reservoir as shallower depths limit boating access and fishing, reduces the overall reservoir wetland footprint, and negatively impacts the operations of the County’s dry hydrant at this location, an important element in the broader emergency fire water supply system.

While prior analysis (AECOM 2016) has demonstrated little potential for downstream risk to life and property from a dam failure, such an occurrence would be expected to yield environmental damages downstream. Large quantities of currently impounded sediment would be released into the environment in such an unmanaged event, and the County’s dry hydrant / emergency fire water supply source at this location would be lost until an alternative could be found.

The do nothing alternative does not specifically address climate change adaptation or other mitigation considerations. Anticipated climate change impacts, such as the increasing frequency and magnitude of extreme flood events and increasing air temperatures are not addressed and may be potentially exacerbated as the dam structure will continue to weaken over time and negative thermal water quality impacts become magnified. Further, shallow reservoirs are considered greenhouse gas emitters, as methane produced by anaerobic decomposition of vegetation and organic matter is released to the atmosphere. A potential positive climate change adaptation benefit to the reservoir’s retention is as an emergency source of irrigation supply in times of drought.

While the recreational opportunities associated with the reservoir are numerous and roundly seen as a public/social benefit, there are associated risks to public safety (e.g., drowning). Physical and anecdotal evidence (e.g., stories recounted by residents) illustrate a history of

routine public interaction with the structure and reservoir that represents a risk that would be substantively reduced with a dam removal alternative.

While prior analysis (AECOM) has demonstrated little potential for downstream risk to life and property from a dam failure, such an occurrence would be expected to yield significant environmental damages. Large quantities of sediment currently impounded within the reservoir would be mobilized and released into the environment in such an unmanaged event, and the County's dry hydrant / emergency fire water supply source at this location would be lost until an alternative could be found. Impacts associated with unmanaged failure of the dam are considered unacceptable, thus Alternative 1: Do Nothing is considered unfeasible. While the capital costs of doing nothing are minimal, the direct and indirect costs of an unmanaged failure are considered potentially very significant.

Maintaining current operational protocols, regular monitoring would continue to be completed with routine minor works and periodic major works, undertaken as necessary to provide ongoing stabilization of the dam. With the retention of a shallower pond depth, additional efforts and costs will also be incurred in maintaining reliable functionality of the County's emergency fire water supply source (i.e., sediment-free). Formal dam assessments including HPCs and dam safety reviews (DSRs) would continue to be required. The risk of dam failure would persist with associated environmental consequences (e.g., minor flooding, watercourse erosion, and unmanaged sediment movement). The liability to the LPRCA in the event of a dam failure would not be reduced, and may increase, potentially adding to insurance costs.

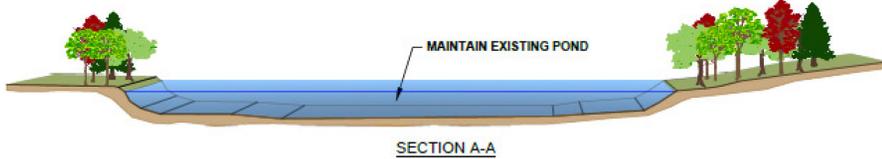
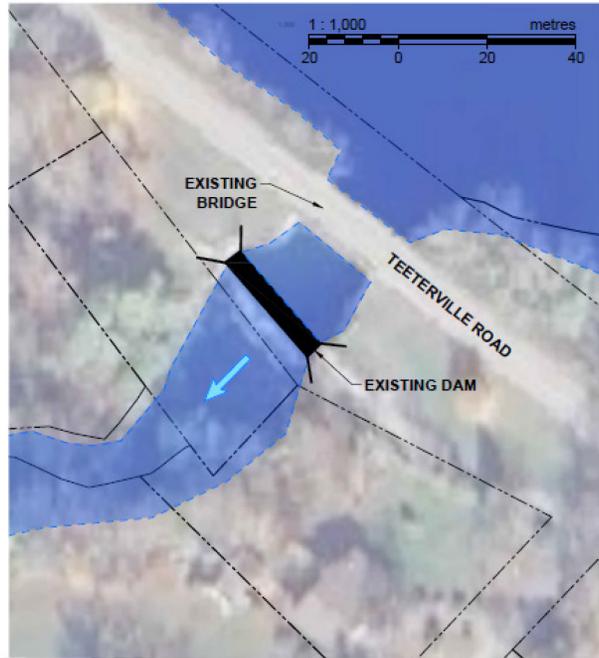


Figure 16 Alternative 1 – Do Nothing

4.2 Alternative 2: Repair Dam

The DSR (AECOM 2016) and subsequently the Teeterville Dam Design for Repairs (Stantec 2019) report identified a series of repair and maintenance items, as well as additional studies, monitoring responsibilities, and required approvals. The repair elements relate directly to the mitigation of the structure's stability risks and operational issues and are considered to represent the works required under Alternative 2. The full extent of repairs would need to be further reviewed to ensure compliance with current federal and provincial dam safety guidelines but, as per the previous studies cited above, would primarily include:

- Replacement of the dam access and control infrastructure that was removed in 2022 owing to safety concerns, for use in future stoplog operations. As part of this element, it is expected that public pedestrian access (i.e., steel bridge) of a similar aesthetic to that historically in place, would be included to reflect considerations of cultural heritage and historic public use of the area.
- Repair concrete on wingwalls, piers and abutments.
- Undertake stability improvements to the dam structure following Stantec's "Option A" involving the addition of additional concrete mass within the existing spillway area and grouting of the void below the base slab of the spillway and underlying subgrade.

A potential addition to the Stantec design for repairs would include the introduction of a new low-flow sluice / valve control as part of the dam's flow control capabilities. This low-flow control would be positioned through the existing concrete wall at an elevation near the existing spillway invert with the aim of improved operational flexibility, supporting potential future operations such as dam drawdown for larger repairs, easier stoplog removal / replacement, and/or periodic, controlled sediment flushing activities from the area immediately upstream of the structure to support maintenance of the fire water supply source (i.e., retain a deeper, sediment-free pool around the system's intake). While the core dam repair elements identified above would not necessarily require sediment removal upstream of the dam structure, implementation of a low-level outlet as described here would be required.

The repair/reconstruct alternative would be effective at mitigating the risks associated with potential dam failure but would be expected to incur significant capital costs (\$1.9 M) and retain ongoing operational costs (\$1.9 M over 100 years). While the capital costs of repair would be less than those of a full replacement (see Alternative 3), the long-term operational costs would be expected to be higher as repairs are almost inherently less robust over long-time periods than a newly engineered and constructed structure. A more fulsome discussion of the cost estimation considerations is included in Appendix H.

Though subject to further detailed design and implementation planning, the construction approach outlined by Stantec was relatively straightforward and low impact as it relates to the need for isolation of the working area and water control. The existing sediment buildup immediately upstream of the dam is such that a low-level sandbagging approach was envisioned, diverting flows into a portion of the watercourse channel while work proceeds “in the dry” in the remaining portion. It was suggested that there should be no need to drain or otherwise impact the reservoir during construction, an important consideration from a natural environment perspective. It is understood that the approach to repairing the dam has been previously discussed with MNRF and, given the limited potential for negative environmental impacts during construction, at least as compared to a dam decommissioning or full replacement alternatives, should represent a simpler approval process.

Formal dam assessment processes including DSRs would continue to be required in the future. The risk of dam failure and associated environmental consequences (e.g., flooding, erosion, unmanaged sediment movement) and associated liability for the LPRCA would be significantly reduced but not eliminated.

The existing aesthetic and current uses would generally remain with the reservoir continuing to hold water, but permitting the return to seasonal stoplog operation with a deeper pool provided through the summer months. Retaining a reservoir would continue to yield similar positive and negative impacts as under existing conditions. The provision of open water recreational opportunities and the emergency fire water supply source would be retained and improved, with the ability to return to a deeper reservoir pool through summer periods.

Flows in Big Creek would continue to be warmed through the summer months and a barrier to upstream fish passage would remain. Sediment accumulation processes within the upstream reaches of the reservoir will continue, though an equilibrium “flow-through” condition, with influent volumes matching effluent volumes over time, is thought to have been reached. Dredging of the accumulated sediment is not necessarily a requirement of the repair dam alternative implementation but could be undertaken if desired and finances permit. Such undertakings, particularly if the dredged material is to be transported and disposed of offsite, have become more complex and costlier in recent years as the processes and regulation of excess soil management has become more comprehensive and restrictive.

As with the do nothing alternative, the recreational opportunities associated with the reservoir are numerous and roundly seen as a public/social benefit but also retain associated risks to public safety (e.g., drowning). Physical and anecdotal evidence (e.g., stories recounted by residents) illustrate a history of routine public interaction with the structure and reservoir that represents a risk that would be substantively reduced with a dam removal alternative.

Implementation of the repair dam alternative can partially address climate change adaptation or mitigation considerations, associated with the predicted increases in the frequency and magnitude of extreme flood events, as the risk of failure associated with such condition is reduced. However, the predicted climate change impact of increasing air temperatures would not be addressed with the retention of a dam structure / shallow reservoir and known thermal water quality impacts. Further, as noted earlier for the do nothing alternative, shallow reservoirs are considered greenhouse gas emitters as methane produced in the anoxic bottom sediments bubbles free and is released to the atmosphere, a characteristic that would remain. A potential positive climate change adaptation benefit to the reservoir's retention is as an emergency source of irrigation supply in times of drought.

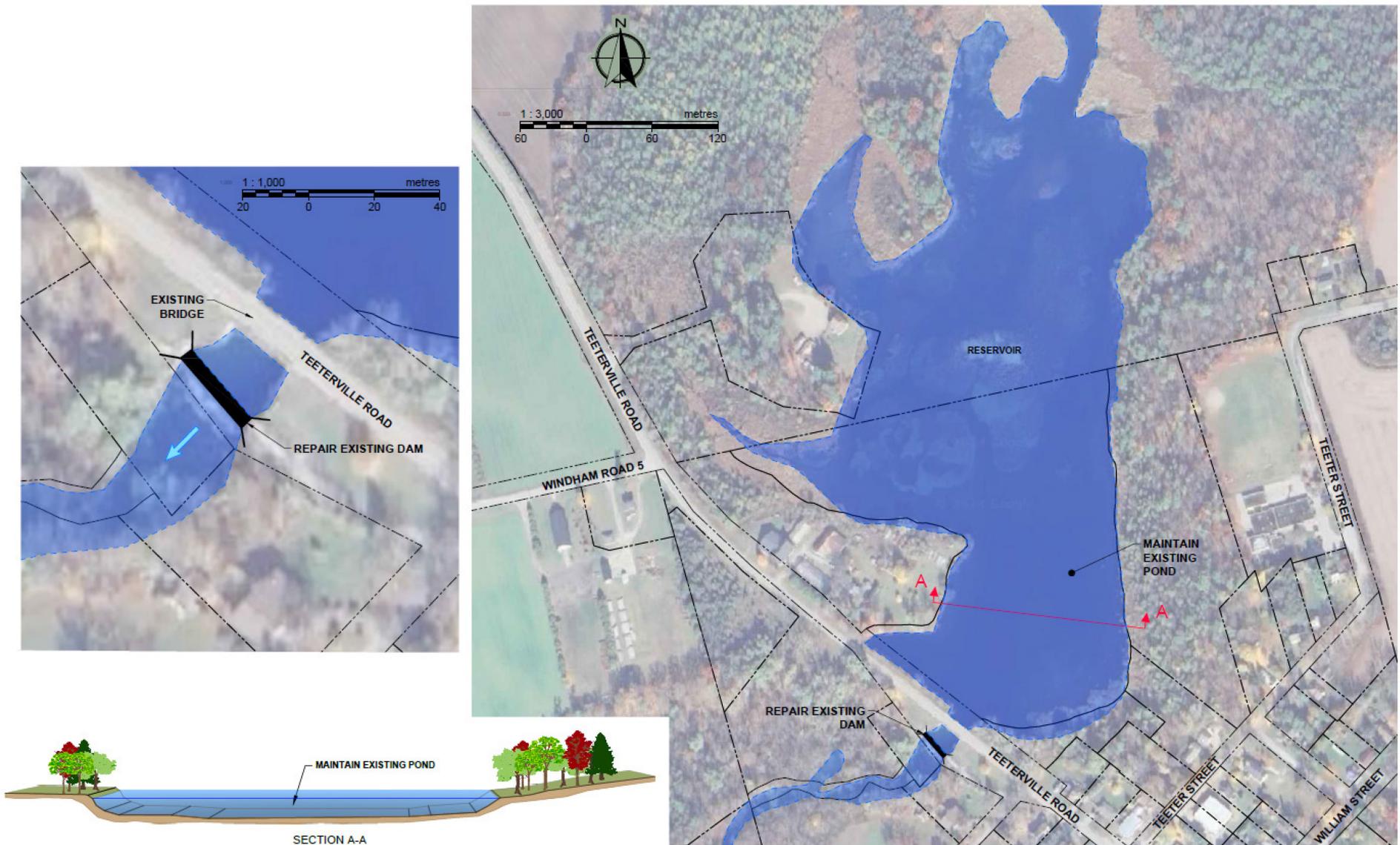


Figure 17 Alternative 2 – Repair Dam

4.3 Alternative 3: Replace Dam

The replace dam alternative involves the complete removal of the existing dam and reconstruction of a new, fully engineered structure of similar characteristics – i.e., earthen berm with concrete flow control structure. The historic road alignment / earthen embankment no longer provides substantive structural benefits to the dam, with this functionality having been replaced by the County Road 25 embankment immediately upstream. Therefore, it is assumed that replacement efforts would be primarily limited to the concrete structure with some earthen embankment work required in the immediate vicinity of the existing concrete abutment limits, tied northerly into the current road embankment.

The flow control structure design of a replacement dam would be expected to replicate the historic approach of stoplog controls, with the addition of a low-flow sluice / valve control near to the existing spillway invert to improve operational flexibility, supporting potential future operations such as dam drawdown for larger repairs, easier stoplog removal / replacement, and/or periodic, controlled sediment flushing activities to support maintenance of the County's fire water supply source (i.e., retain a deeper, sediment-free pool around the system's intake).

A replacement dam is also expected to include, as part of the new operator access infrastructure, the reinstatement of pedestrian access (i.e., bridge) of a similar aesthetic to that historically in place, to reflect considerations of cultural heritage and historic public use of the area.

Advantages and disadvantages of the replace dam alternative largely mirror those outlined of the repair dam alternative, as outlined in Section 4.2. The replace dam alternative would be effective at mitigating the risks associated with dam failure but would be expected to incur significant capital costs (\$3.2 M) and retain ongoing operational costs, albeit lower than the repair dam's operational costs (\$750 k over 100 years).

Given the need to fully remove the existing dam structure during construction, the approach to work area isolation and water control would be more impactful and costly than anticipated under the Repair Dam alternative. An approach using a sheet pile coffer dam upstream of the location of the existing dam to create isolated, "dry" working areas would likely be required, representing higher cost, longer construction period, and more disturbance of in situ materials. Exposing the accumulated sediment layer to flows when a dam is not in place (i.e., post-removal of existing, but pre-construction of replacement) would represent a higher risk of potential material disturbance and discharge downstream. A more intensive program of sediment control would be required to support construction of the Replace Dam than would for the Repair Dam option.

Given the magnitude of the construction program, as compared to simply repairing the dam, the Replace Dam alternative would represent a higher design cost and, it would be reasonable to expect, a more rigorous regulatory review and approvals process.

Formal dam assessment processes including DSRs would continue to be required in the future. As compared to the do nothing alternative, the risk of dam failure and associated environmental consequences (e.g., flooding, erosion, unmanaged sediment movement) and associated liability for the LPRCA would be significantly reduced but not eliminated. A more fulsome discussion of the cost estimation considerations is included in Appendix H.

The existing aesthetic and current uses would generally remain with the reservoir continuing to hold water, but permitting the return to seasonal operation with a deeper pool provided through the summer months. Retaining a reservoir would continue to yield similar positive and negative impacts as experienced under existing conditions. The provision of open water recreational opportunities and the emergency fire water supply source would be retained and improved, with the ability to return to a deeper reservoir pool through summer periods.

Flows in Big Creek would continue to be warmed through the summer months and a barrier to upstream fish passage would remain. Sediment accumulation processes within the upstream reaches of the reservoir will continue, though an equilibrium “flow-through” condition, with influent volumes matching effluent volumes over time, is thought to have been reached. Large-scale dredging of the accumulated sediment throughout the reservoir is not necessarily a requirement of the replace dam alternative implementation but could be undertaken if desired and if finances permit. Such undertakings, particularly if the dredged material is to be transported and disposed of offsite, have become more complex and costlier in recent years as the processes and regulation of excess soil management has become more comprehensive and restrictive. While large-scale dredging of sediment accumulated within the reservoir is not required, the removal of volumes from the area between County Road 25 and the existing dam structure, or at least between the upstream coffer dam and the dam location would likely be required to support construction. Sediment clean-out in this area would also benefit the County’s dry hydrant, emergency fire water intake.

As with the do nothing alternative, the recreational opportunities associated with the reservoir are numerous and roundly seen as a public/social benefit but also retain associated risks to public safety (e.g., drowning). Physical and anecdotal evidence (e.g., stories recounted by residents) illustrate a history of routine public interaction with the structure and reservoir that represents a risk that would be substantively reduced with a dam removal alternative.

Implementation of the replace dam alternative can partially address climate change adaptation or mitigation considerations, associated with the predicted increases in the frequency and magnitude of extreme flood events, as the risk of failure associated with such condition is reduced. However, the predicted climate change impact of increasing air temperatures would not be addressed with the retention of a dam structure / shallow reservoir and known thermal water quality impacts. Further, as noted earlier for the do nothing alternative, shallow reservoirs are considered greenhouse gas emitters as methane produced in the anoxic bottom sediments bubbles free and is released to the atmosphere, a characteristic that would remain. A potential positive climate change adaptation benefit to the reservoir's retention is as an emergency source of irrigation supply in times of drought.

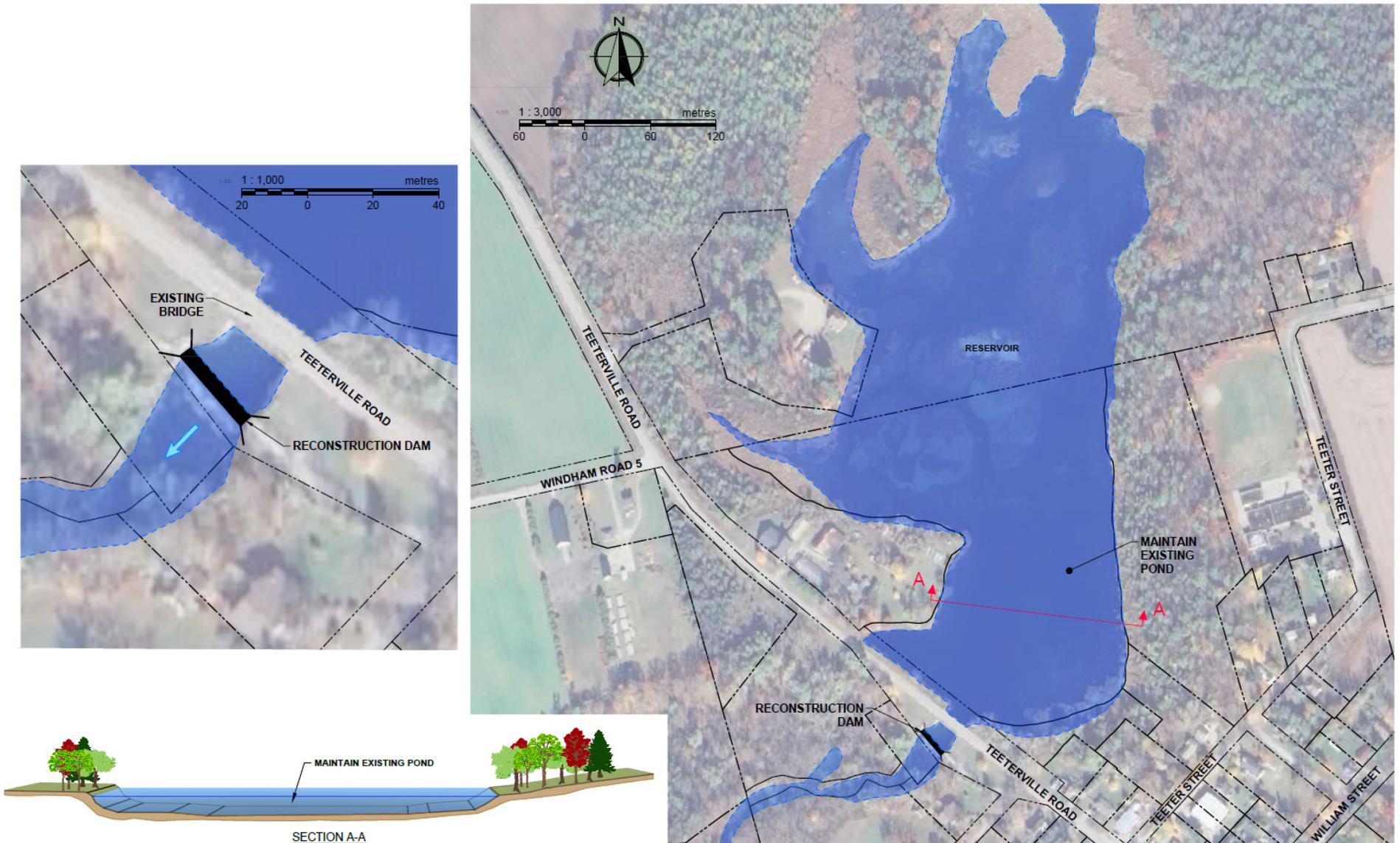


Figure 18 Alternative 3 – Replace Dam

4.4 Alternative 4: Remove Dam and Reinststate Watercourse

As its main component, Alternative 4 involves the decommissioning and complete removal of all concrete (abutments, sill, spillway) and flow control (stop logs) elements, and the reinstatement of a natural watercourse through the area of the existing dam and reservoir. The implementation of Alternative 4 would eliminate the potential for dam failure and would be expected to represent a formal “decommissioning” of the dam, as defined in provincial guidance, though regulatory confirmation by MNR would be required as part of detailed design and permitting of this alternative.

The decommissioning of the flow controls would be undertaken over an extended period, estimated as 2 to 3 years or more, to limit potential remobilization and offsite transport of an adverse volume of accumulated sediments from within the existing reservoir to the downstream watercourse. The riparian floodplain area within the existing ponded limits, beyond the watercourse, would be allowed to naturally return to a terrestrial wetland habitat condition, as the seed bank and nutrients stored in the sediment become exposed to the atmosphere and sunlight. The drying of the sediment, the creation of vegetated ground cover, which dissipates energy from incident precipitation, and the accumulation of a soil stabilizing root mass, would all serve to add resistance to most erosive forces.

The reach of the watercourse through the existing reservoir would be permitted to slowly develop its own planform, bankfull channel, and longitudinal slope configuration without, or with limited, human intervention. As the realignment would be achieved through natural processes, the alignment shown on Figure 19 is largely notional but has been established based on the understanding of natural (pre-reservoir) topography of the area. Some stabilization measures may be required in the near-to-mid-term should geomorphological adjustments be considered unstable. Augmentation of substrate may be necessary should expected native material (e.g., gravel/cobbles) not be present under the reservoir sediment to provide desired instream habitat. Similarly, should reservoir sediment not sufficiently retain an appropriately stabilized watercourse, further localized restoration on banks and overbanks may be necessary. A program of monitoring and watercourse stabilization would likely be required through the transition reach from a point just upstream of County Road 25 through the existing dam location to mitigate against head-cutting of the accumulated sediment within the reservoir.

The permanent loss of lentic, or still water, fish habitat in the reservoir and the replacement of that habitat with a naturalized watercourse with lotic (flowing water), or fluvial habitat features represents a direct loss of fish habitat area, but the elimination of barriers to fish passage and the reconnection of upstream and downstream habitats is often viewed as an inherent benefit or even a driving factor within such projects.

This alternative provides an opportunity to diversify terrestrial habitat, enables a continuity of sediment transport within the watercourse, reconnects upstream and downstream instream aquatic habitat and eliminates the negative impact on creek temperatures created through the existing shallow reservoir. Though not explicitly included in the alternative concept, opportunities for public recreation enhancement could be developed the future, likely taking advantage of the communities' strong relationship with the area as evidenced throughout the EA process. If interest and funding were available, additional walking pathways/boardwalks, pedestrian bridges over the new channel, and lookout points could be established to further connect the community to the new terrestrial wetland environment. Any sediment that requires dredging or that is mobilized and captured may be re-used onsite, where feasible, to create riparian habitat diversity.

Implementation of Alternative 4 addresses climate change adaptation / mitigation considerations through the decommissioning of flow control elements, the elimination of a standing water body, and the development of additional terrestrial wetland habitat. With an ability to convey even larger flows than the existing dam provides, the alternative also mitigates potential impacts associated with anticipated increases in the frequency and magnitude of extreme flood events. The predicted climate change impact of increasing air temperatures would also be addressed as the "heat sink" represented the shallow water body is removed and replaced with vegetated growth, which also adds watercourse shading, helping to maintain lower stream temperatures. Finally, the elimination of the shallow reservoir and replacement with riparian wetland will convert the reservoir from that of a greenhouse gas "emitter" characteristic, with methane generated in the anoxic sediment layers, to that of a "sink", as the vegetation sequesters carbon from the environment.

Implementation of a dam removal alternative would significantly change the aesthetic of the surrounding area; an impact roundly identified as negative by almost all public consultation participants. A dam and reservoir have been in place in this location for almost 200 years and is a predominant feature of the physical and cultural landscape of the area.

Any alternative that involves lowering or eliminating the reservoir includes the potential for impacts on groundwater conditions locally. As a coldwater fishery known for its ample spawning habitats, which are often indicative of groundwater discharge areas, it is reasonable to expect that the native (non-reservoir) groundwater flow pattern would be toward the watercourse. However, with a reservoir in place for more than 200 years, the groundwater table has likely been maintained at an artificially increased elevation within the ponded limits and locally beyond. The net effect of lowering the reservoir as part of any dam removal alternative could be a local drawdown of groundwater tables within the perimeter natural areas and on adjacent properties, possibly to an extent that groundwater-dependent species and / or private shallow, sand-point water supply wells may incur negative impacts. Preliminary

high-level analysis conducted as part of this Class EA has suggested the effect would be relatively minor, with conservative estimates of the potential water table reduction in the order of 1 m at locations 100-200 m from the creek's centreline, and less as distance from the creek increases. While such an impact on private wells would be considered negative, it is considered readily observable through monitoring during the extended drawdown period and directly mitigated through the deepening of existing wells or drilling of new wells into the deeper overburden, as needed, to ensure an adequate domestic supply. The potential for impact on groundwater-dependent edge species is more difficult to quantify and/or mitigate.

Though decommissioning of the structure itself is expected to be more straightforward and less expensive than dam repair or replacement over both capital and operational timeframes, a significant cost associated with this alternative's implementation is the loss of the County's emergency fire water supply source with the reservoir's removal and the requirement for mitigation through replacement. This would require finding and purchasing or leasing land (approx. 0.3 to 0.4 ha [0.75 to 1.0 ac.]) nearby and constructing a new purpose-built supply pond. Beyond property acquisition, related capital costs associated with this element are assumed to include site preparation, pond excavation, impermeable liner, installation of supply well and dry hydrant infrastructure, and associated civil works (heavy duty driveway, signage, fencing [if necessary], etc.). The total capital cost estimate for this alternative is \$1.7 M, whereas the long-term operational costs are significantly reduced to \$200k. A more fulsome discussion of the cost estimation considerations is included in Appendix H.

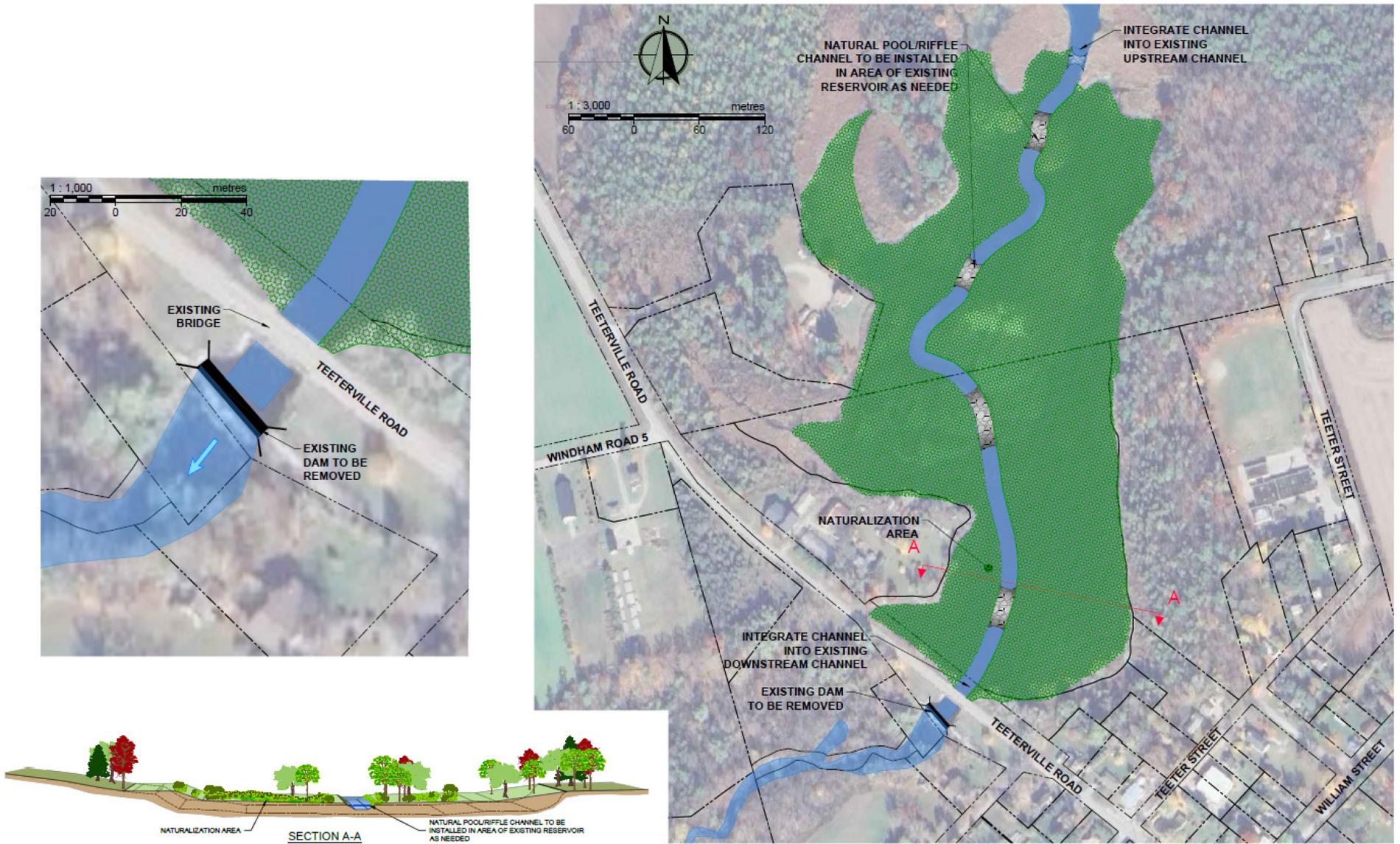


Figure 19 Alternative 4 – Remove Dam and Reinststate Watercourse

4.5 Alternative 5: Remove Dam, Reinststate Watercourse, Create Offline Ponds / Wetlands

Alternative 5 is very similar to Alternative 4, with the difference being the addition of constructed, riparian, lentic habitat features such as wetlands or wet ponds in strategic locations. All other aspects of Alternative 4 including the dam decommissioning works, the re-naturalization of a meandering watercourse and reconnection of downstream and upstream aquatic habitats, and the passive approach to riparian terrestrial wetland stabilization remain the same. Given this similarity in alternatives, Section 4.4 provides the common summary of the anticipated approach to implementation, permit and approvals processes, and advantages and disadvantages of a general decommissioned dam approach as compared to those alternatives that retain the dam/reservoir characteristic. Discussion within this section focuses on the differences between Alternatives 4 and 5, and the advantages/disadvantages of those differences related to each approach.

As with Alternative 4, the implementation of Alternative 5 would result in the permanent reduction in lentic fish habitat currently present in the reservoir and the replacement of that habitat with a naturalized watercourse with constructed habitat features characteristic of those in lotic environments. Unlike Alternative 4, however, there is a greater area of fish habitat compensation with the addition of the riparian wet ponds / wetlands that would be able to replace some of the lost habitat. The addition of wetlands/wet ponds is an opportunity for wider ecological diversity, providing conditions for species that might utilize standing water habitat. Species such as turtles that require deeper pools and related overwintering habitat are known to exist within the area and a carefully planned and implemented reservoir drawdown/habitat creation program would be required to accommodate their presence. An approach including an extended drawdown (2 to 3 years) and concurrent habitat replication would provide the opportunity for these species to relocate locally within the reservoir area. The lentic characteristic of the existing reservoir is known to support a variety of important species, so the replication of similar functionality is suggested as an advantage that Alternative 5 provides over Alternative 4.

Stakeholder consultation and cultural heritage review indicated a strong preference toward maintaining an open water feature so the inclusion of wetlands / wet pond, especially if located in the vicinity of the dam, could represent a “middle ground” between the retain dam / remove dam alternatives. Though obviously not identical, such an approach would provide at least a partial vista as has been in place for some 200 years.

In terms of disadvantages, the construction of such features would represent an added capital cost that is not part of Alternative 4. It is reasonable to expect that all sediment dredged to

construct a wet pond(s) or wetland(s) can be retained onsite and used to create riparian habitat diversity in terrestrial wetland landscape features. The ability to retain and use dredged material on the property would eliminate a significant cost often inherent in sediment management, i.e., sampling, testing, transport, and offsite disposal. However, costs associated with designing, tendering, and contracting such works remain and are not insignificant potentially representing half of the capital cost of this alternative's implementation. There may be alternative approaches identified through implementation planning that could lessen the associated impacts, such as accessing municipal staff/equipment or community group resources to complete some or all of the works. Further, the inclusion of such dedicated habitat could provide access to other funding sources that support such efforts (e.g., Ducks Unlimited) that might otherwise be unavailable. Regardless, for the purposes of alternative comparison, it is reasonable to assume that the implementation of Alternative 5 would represent more effort and a higher cost than that of Alternative 4. The total capital cost estimate for this alternative is \$3.6 M, whereas the long-term operational costs (\$400k) are lower than those of a "retain dam" alternative but higher than the strictly creek reinstatement alternative (#4). A more fulsome discussion of the cost estimation considerations is included in Appendix H.

Alternative 5 addresses most of the same climate change adaptation/mitigation considerations listed for Alternative 4 related to the ability to effectively manage more extreme flow events and reduced thermal impacts. However, it could be considered slightly less effective in this regard given that the introduction of shallow, standing water features on the landscape will have the potential to simultaneously add to greenhouse gas emissions from anoxic sediment conditions and reduce greenhouse gas sink benefits of increased vegetation.

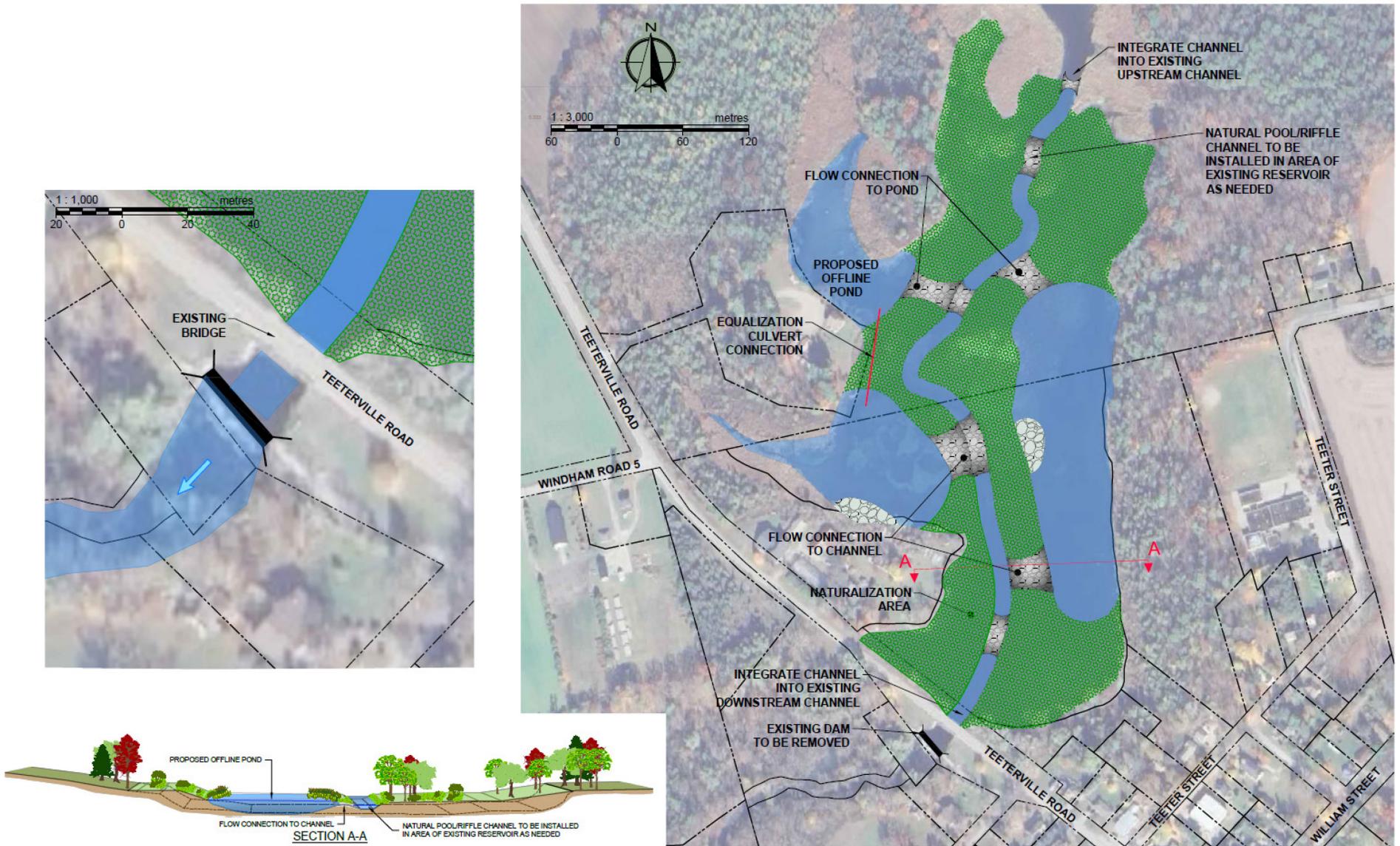


Figure 20 Alternative 5 – Remove Dam, Reinstatement Watercourse, Create Offline Ponds / Wetlands

5 Evaluation of Alternatives

The general advantages and disadvantages of each alternative were qualitatively introduced within the discussion in Section 4. This section documents the more systematic, rigorous, quantitative approach undertaken through this Class EA to ensure a transparent, logical, understandable, and defensible alternative evaluation process. The scoring framework developed for this project, as described below, functions as a decision support tool that is intended as complementary to, but not a replacement for, professional judgement and consultation outcomes.

Categories and Criteria

The evaluation of each of the alternatives was accomplished systematically by establishing appropriate evaluation categories and criteria and completing a comparative evaluation process of their relative impact, either positive, negative or neutral. The consultant team led by Montrose, the LPRCA, key stakeholders and public all provided input into the final evaluation process used in this study.

Each alternative was assessed against a range of evaluation criteria, all of which fall within the broad categories describing the study's "environment", as outlined within the Class EA guidance documentation. The four environmental categories include the:

- technical/engineering environment
- natural heritage environment
- social / cultural environment
- economic environment

Within each category there are multiple criteria, or different aspects of potential impact to the environment associated with a given alternative. The criteria assessed within each environmental category are described in more detail in Table 17.

Weighting of Categories and Criteria

In some EA studies, a particular environmental category may be considered more significant than another. For example, should the natural environment be particularly sensitive, it may be weighted higher than social/cultural, or the opposite could be the case in areas where the local community is particularly sensitive to these concerns. To this end, the weighting of the four broad environmental categories was initialized at 25% each (i.e., equally weighted), with an openness to revisions should stakeholder discussions through the consultation process have indicated such a preference.

Feedback received from the public and Study Team members throughout the study confirmed that aspects of the social / cultural and natural environments were considered of heightened importance as compared to economic and technical / regulatory elements, and that an adjustment in weighting was justified. As total weighting across categories must equal 100%, an increase in one category must have an offsetting reduction in other categories. In the current study, aspects of technical / regulatory concern and economics were reduced to counter the heavier weighting applied to social / cultural aspects. A slightly greater reduction was assessed for the technical / regulatory given that the “impacts” associated with potential implementation of any of the alternatives would be relatively similar across all options in this regard (e.g., each would require engineering design and regulatory approvals). To this end, the social / cultural category was increased to 40%, natural environment retained at 25%, and economic and technical/engineering considerations reduced to 20% and 15%, respectively.

Approach to Scoring Impacts of Alternatives Against Criteria

There are many different approaches to alternative impact evaluation available, with the selection of the approach deemed most appropriate for a specific project left to the discretion of the proponent and Study Team. The approach adopted for this study uses a simple numerical basis for evaluation in contrast to commonly used symbology such as circles, which often range from empty to partially or wholly filled in.

With five alternatives available for comparison, integer rankings for a given alternative’s relative impact ranged from -2 to +2, with the extremes representing the most negative and positive impacts, respectively. For criteria where the alternatives were deemed to have sufficient differences, they were assigned independent values; for example, an alternative that was slightly more negative than another was simply assigned a score of 1 unit lower. Equivalent rankings were assigned where two or more alternatives were evaluated as having a similar or common level of impact or preferability.

The full matrix of categories, criteria, weightings, and scoring is included as Table 18, with Table 19 providing a summary of the rationale for scores as assigned. The evaluation matrix received input from each of the discipline leads involved in this study based on their knowledge of the study setting and its characteristics.

Once each category score was calculated by normalizing/weighting the individual criteria scores, these were summed/weighted to derive an overall score, with the top score ranked as most preferred.

Public input received through the consultation process, discussed further in Section 6, was also considered through the evaluation process with adjustments to scoring implemented, accordingly.

Table 16 Alternative Evaluation Categories, Criteria, and Relative Weightings

Category 1: Technical/Engineering (15% of total score)			
Criteria	Weighting Within Category	Description	Net Weighting Within Overall Project ¹
Dam Safety / Failure Risk	40%	Effectiveness at addressing dam safety requirements / reduce risk of failure	6.0%
Climate Change (Adaptation)	25%	Effectiveness at reducing vulnerability / enhancing adaptability to climate change (increased flooding, droughts, temperatures)	3.8%
Constructability	25%	Ease with which project can be completed using conventional, accepted construction and engineering practices	3.8%
Approvability	10%	Potential for regulatory agencies to support project / grant approval for implementation; ease and timeliness of approvals	1.5%
Category 2: Natural Environment (25% of total score)			
Criteria	Weighting Within Category	Description	Net Weighting Within Overall Project ¹
Fish Habitat	25%	Impact on creek habitat and species protection, diversity, food sources, and fish passage	6.3%
Wildlife Habitat	25%	Impact on habitat, resources, diversity, food sources for wildlife other than fish (e.g., fowl, amphibian, avian, mammal)	6.3%
Sensitive Species (incl. SAR/SCC)	25%	Impact on and/or enhancement for observed or potential SAR/SCC	6.3%
Climate Change (Mitigation)	20%	Effectiveness at helping combat climate change	5.0%
Geomorphology/Sediment Transport	5%	Effectiveness at promoting dynamic stability of channel processes and mitigation of sediment impacts	1.3%
Category 3: Social / Cultural (40% of total score)			
Criteria	Weighting Within Category	Description	Net Weighting Within Overall Project ¹
Private Property	20%	Potential for impact to private property (i.e., loss of property / functionality, impact to property valuation, groundwater impacts)	8.0%
Fire Protection / Safety	20%	Potential for impact to fire water supply	8.0%
Public Infrastructure / Safety	20%	Potential for impact to public safety related to dam /reservoir; potential for impact to County Road 25	8.0%
Cultural Heritage	20%	Potential for impact to existing cultural and/or heritage features	8.0%
Public Recreation	20%	Potential for impact to recreational uses within the study area	8.0%
Category 4: Economic (20% of total score)			
Criteria	Weighting Within Category	Description	Net Weighting Within Overall Project ¹
Construction Costs	70%	Initial costs to install/construct the proposed works, including environmental and infrastructure impact mitigation, sediment management, etc.	14.0%
Maintenance/Future Costs	30%	Ongoing maintenance costs following implementation on a time frame of 100 years, the estimated lifespan of a replaced dam	6.0%

1. “Net Weighting Within Overall Project” is the product of a categories weighting and the specific criteria weighting within that category. The relatively low value attributed to each criterion highlights the multitude of considerations (i.e., criteria) being assessed and that any decision on a given alternative’s overall impact and/or relative preferability is not the result of a single or even a few criteria.

Table 17 Detailed Alternative Evaluation Matrix

Additional text describing terms used within this analysis / on this table provided on following page

		Alternative 1 Do Nothing	Alternative 2 Repair Dam	Alternative 3 Replace Dam	Alternative 4 Remove Dam and Reinststate Watercourse	Alternative 5 Remove Dam, Reinststate Watercourse, Create Offline Pond(s) / Wetland(s)
TECHNICAL/ENGINEERING						
Category Weighting	15%					
	Criteria Weighting					
Dam Safety / Failure Risk	40%	-2	0	1	2	2
Climate Change (Adaptation)	25%	-2	-1	0	2	1
Constructability	25%	2	1	-2	0	-1
Approvability	10%	0	2	1	0	1
Criteria Weighting Check	100%					
TOTAL WEIGHTED CRITERIA SCORE FOR THE CATEGORY		-0.80	0.20	0.00	1.30	0.90
TOTAL WEIGHTED SCORE FOR THE CATEGORY SCORE (%)		4.5%	8.3%	7.5%	12.4%	10.9%
NATURAL ENVIRONMENT						
Category Weighting	25%					
	Criteria Weighting					
Fish Habitat Impacts	25%	-2	-1	-1	1	2
Wildlife Habitat Impacts	25%	1	2	2	-1	1
Sensitive Species Impacts (incl. SAR/SCC)	25%	1	2	2	-1	1
Climate Change (Mitigation)	20%	-2	-2	-2	2	1
Geomorphology/Sediment Transport	5%	-1	-1	-1	1	1
Criteria Weighting Check	100%					
TOTAL WEIGHTED CRITERIA SCORE FOR THE CATEGORY		-0.45	0.30	0.30	0.20	1.25
TOTAL WEIGHTED SCORE FOR THE CATEGORY SCORE (%)		9.7%	14.4%	14.4%	13.8%	20.3%
SOCIAL / CULTURAL ENVIRONMENT						
Category Weighting	40%					
	Criteria Weighting					
Private Property Impacts	20%	1	1	1	-1	0
Fire Protection / Safety	20%	1	2	2	-1	-1
Public Infrastructure / Safety Impacts	20%	-2	1	2	1	1
Cultural / Heritage Impacts	20%	1	1	0	-2	-1
Public Recreational Impacts	20%	0	2	2	-2	-1
Criteria Weighting Check	100%					
TOTAL WEIGHTED CRITERIA SCORE FOR THE CATEGORY		0.20	1.40	1.40	-1.00	-0.40
TOTAL WEIGHTED SCORE FOR THE CATEGORY SCORE (%)		22.0%	34.0%	34.0%	10.0%	16.0%
ECONOMIC						
Category Weighting	20%					
	Criteria Weighting					
Construction Costs	70%	0	-1	-2	-1	-2
Operations and Maintenance (O&M) Costs	30%	-2	-1	0	0	0
Criteria Weighting Check	100%					
TOTAL WEIGHTED CRITERIA SCORE FOR THE CATEGORY		-0.60	-1.00	-1.40	-0.70	-1.40
TOTAL WEIGHTED SCORE FOR THE CATEGORY SCORE (%)		7.0%	5.0%	3.0%	6.5%	3.0%
Category Weighting Check (must equal 100%)	100%					
OVERALL WEIGHTED SCORE (ALL CATEGORIES)		-0.27	0.47	0.36	-0.30	0.01
OVERALL WEIGHTED SCORE (ALL CATEGORIES)(%)		43%	62%	59%	43%	50%
OVERALL RANKING (1 = most preferred; 5 = least preferred)		4	1	2	5	3

Some of the terms used in Table 18 are discussed in the following:

Categories and their Weighting and **Criteria and their Weighting** have been described previously in this report section and summarized on Table 17.

Criteria Scoring - The score for a given alternative is based on an assessment of possible negative and positive impacts as it relates to a particular criterion and, to a lesser extent, a relative ranking of impact as compared to the other alternatives. In that an alternative could represent a negative impact or a positive impact, the range of scoring was set as between -2 and +2, with the range of available scores providing 5 integer steps to permit differentiation between all alternatives should such be applicable, that is, should all 5 alternatives represent different levels of impact. To compare against more common measuring scales (e.g., 0-100%), an assessed score of -2 would equate to a score of 0%, 0 would be 50%, and +2 would be 100% of the value assigned to that criterion.

Total Weighted Criteria Score for the Category - This value is determined as the sum of each of the criteria in a category multiplied by their respective weighting. It is a normalizing of the criteria scoring, meaning that the value for a particular alternative in a particular category ranges from a minimum of -2 to a maximum of +2.

Total Weighted Criteria Score for the Category (%) - This value is the Total Weighted Criteria Score for the Category assessed as a fractional percentage of the category's overall weighting - e.g., for a category weighted at 20% overall, total weighted scores of -2, 0, or 2, would yield values of 0%, 10%, or 20%, respectively.

Overall Weighted Score (All Categories) - This value is determined as the sum of each of the Total Weighted Criteria for the Category multiplied by its respective category weighting. It is a normalizing of the category scoring, meaning that the value ranges from a minimum of -2 to a maximum of +2.

Overall Weighted Score (All Categories) (%) - This value is determined as the sum of the Total Weighted Scores for the Categories (%) and is out of 100%.

Table 18 Alternative Ranking Rationale

Category 1: Technical/Engineering	
Criteria	Scoring Rationale
Dam Safety / Integrity	<p>Do Nothing offers no benefit and is least preferred.</p> <p>Alt 2 and 3 - A repaired / replaced dam offers the opportunity to improve dam safety / integrity against structural failure but, as with any dam, remains at least a potential failure risk. It is reasonable to expect that a new dam (Alt 3) offers the opportunity to provide greater stability / reduced risk than that of a repaired dam (Alt 2). Hence, Alt 3 is more preferred from dam safety / integrity perspective than is Alt 2.</p> <p>Alt 4 and 5 essentially eliminate dam safety concerns as hydrostatic or hydrodynamic pressures are eliminated, and hence these are most preferred.</p>
Climate Change (Adaptation)	<p>Alt 1 – Do Nothing structure is a risk of failure especially under high flows and known to have a negative impact on water temperatures through solar heating of the shallow reservoir, both conditions that would be exacerbated through a warming climate with more extreme high flow events and higher air temperatures. On the contrary, retention of a reservoir in any of the dam retention alternatives maintains a volume of water that offers some protection against short-term drought conditions as local agricultural users could access the reservoir for irrigation supply purposes. The Do Nothing alternative represents the largest potential negative impact and is, therefore, least preferred.</p> <p>Alt 2 and 3 - A repaired dam will effectively have the same capacity to pass larger flows that might be experienced under an extreme flow event conditions whereas a reconstructed dam (Alt 3) offers the potential to provide increased discharge capacity. Both alternatives maintain the reservoir in a similar characteristic as currently exists complete with similar negative thermal impacts which might be expected to be increased with a warming climate. Assuming a reservoir 0.40 m (2 stop logs) deeper than current status quo offers more volume potentially available in times of drought - this is not an intended function of the dam / reservoir, but rather a byproduct. The net result is that Alt 3 is slightly more positive impact potential than Alt 2, based on resistance to failure and potential additional under extreme events.</p> <p>Alt 4 and 5 further enhance extreme flow conveyance capacity and eliminate associated failure risk through decommissioning of the structure, though both effectively eliminate potential drought mitigation capacity through elimination of the reservoir. Thermal impacts associated with the shallow online water body would be largely eliminated. Alt 5 will be slightly less preferred in this regard as it maintains ponded areas that could discharge warmed water under elevated flow conditions.</p>
Constructability	<p>Alt 1 - Do Nothing is considered most preferred as there is no associated construction and is, therefore, simplest.</p> <p>Alt 2 - A preliminary plan to implement the repair dam solution was developed within Stantec’s 2019/2020 design and is relatively straightforward, able to be completed without draining the reservoir and with minimal water control requirements. While there is no <u>requirement</u> to implement the alternative as per Stantec’s design, it does provide a reasonable frame of reference for evaluation purposes herein. Within this preliminary strategy, no work is proposed upstream of the dam beyond temporary sandbagging which, with temporary coffer dams installed downstream, would create a dry working environment to support phased construction efforts on the downstream side of the structure. Of the “do-something” alternatives being evaluated, Alt 2 is considered the simplest from a constructability perspective and, therefore, most preferred of Alts 2-5.</p> <p>Alt 3, including a full dam replacement, represents the most impactful from a constructability perspective given the need for works on/around the existing structure and complete rebuild.</p> <p>Alt 4 - Though decommissioning / removal may intuitively be considered simpler than construction, the time required (2-3 years) and extent of flow and sediment management control required to implement this alternative in an environmentally responsible manner yields a slightly higher impact score / lower preferability as compared to Alt 3.</p> <p>Alt 5, requiring of wetland / wet pond area creation through dredging (hydraulic or mechanical), would include all the elements of Alt 4 and the additional feature creation, yielding a slightly higher impact / lower preferability ranking.</p>
Approvability	<p>Agency approvals, beyond those provided by the LPRCA and Norfolk County, will be required for almost any work on or around the dam or reservoir. Depending on the activities proposed, other approvals could be required from the Ministry of Environment Conservation and Parks (MECP), the Department of Fisheries and Oceans (DFO), the Ministry of Natural Resources (MNR), the Ministry of Citizenship and Multiculturalism (MCM), and others. Engagement with Indigenous communities should also continue through implementation with any plan ultimately requiring of support.</p> <p>Alt 1 - No approvals are required to implement the Do Nothing so consider neutral, though structure remains out of compliance with federal / provincial dam safety standards.</p> <p>Alt 2- Repairing the dam is considered least impact (most preferred) from an approvability perspective given that the structure already exists. It is understood that the design work and agency liaison efforts previously undertaken (Stantec 2019/2020) provide some level of existing support or at least familiarity. Further, the lack of impacts on the SAR habitat within the reservoir, the relatively low potential for negative impact on fisheries that could trigger significant DFO concerns, and the lack of significant disturbance on surrounding area are assumed to limit concerns related to archaeology or cultural heritage attributes.</p> <p>Alt 3 – A dam replacement would require an elevated level of review and approvals across the range of agencies given level of disturbance required to support implementation, and the removal of cultural heritage features around the dam structure even if replaced in a more-or-less like-for-like form and function. As compared to Alt 4 and 5, however, the retention of the reservoir in Alt 3 (and Alt 1 and 2) would largely maintain or improve the PSW complex of the reservoir, alleviating anticipated concerns related to sensitive species habitat.</p> <p>Despite the associated reduction in standing water habitat, it is expected that most approval agencies would also support either of the alternatives that involve dam decommissioning (Alt 4 and 5), with a preference for the retention of pond/wetland as in Alt 5 due to SAR habitat associated with the existing reservoir feature, some of which is related to the standing body of water</p>

Table 19 Alternative Ranking Rationale (cont'd)

Category 2: Natural Environment	
Criteria	Scoring Rationale
Fish Habitat Impacts	<p>Alts 1, 2 and 3 retain the dam structure which represents a permanent barrier to upstream fish passage. Barriers to fish passage are often seen as negative impacts as they can restrict species movement from downstream to upstream or vice versa. Negative thermal impacts on downstream receivers associated with solar and atmospheric warming will also continue with the retention of a pond. Retention of a pond does provide habitat for species that prefer standing water versus a flowing system. At current shallow operating levels, it is understood that this is generally limited to carp, but the slightly deeper summer regimes possible with Alt 2 and 3 and the associated reintroduction of seasonal stoplog operability (or similar), could return the bass fishery cited as historic characteristic by stakeholders familiar with such conditions.</p> <p>Generally representing the opposite impacts described above, Alts 4 and 5 remove the dam barrier and reinstate a flowing creek with coarse substrates, riffle and pool habitats, and allow for free passage of all fish species. The elimination of the shallow pond would mitigate the thermal impacts that currently exist but also remove the standing water habitat that has been in place for some 200 years. In that it retains elements of standing water habitat, Alt 5 likely offers something of a compromise between the retain dam / remove dam alternatives with pond habitats created with variable depth and shoreline features.</p>
Wildlife Habitat Impacts	<p>The current extent of ponding representing amphibian (e.g., frogs), reptile (i.e., turtles), and waterfowl habitat is maintained with Alt 1 and slightly increased under Alts 2 and 3 with the return to seasonal stoplog operation and associated additional depth and perimeter / area of inundation.</p> <p>Alt 4 will remove all pond feature habitat, and wildlife functions associated with a standing water body will be reduced considerably, meaning turtle and amphibian species may need to find suitable habitat elsewhere. Waterfowl that use the area for migration stopovers may not return to this location.</p> <p>Alt 5 will reduce the areal extent of pond habitat but provide an opportunity to increase diversity in pond habitat through the design and incorporation of a variety of habitat elements including variable depth, shoreline contouring, structure placement and native riparian vegetation. Turtle and amphibian habitat will be created, and ponded waters will provide stopover habitat for migratory waterfowl to some extent.</p>
Sensitive Species Impacts (incl. SAR / SCC)	<p>Alts 1, 2 and 3 retain the dam and reservoir, with water levels slightly higher seasonally in Alt 2 and 3, resulting in a minor increase in depth and slight increase in pond perimeter. While not achieving the thermal impact improvements benefiting downstream species that Alts 4 & 5 may, the retention of standing water characteristics as represented by Alt 1, and slight improvement in such represented by Alt 2 and 3, favours these approaches over those that partially or fully eliminate the ponded area.</p> <p>Alt 4 removes the reservoir and would be most likely to negatively impact Blanding's turtle (THR/END), Northern Map Turtle (SC) and Snapping Turtle (SC) through loss of habitat and possible the Black Ash through reduction in wet conditions. Other SAR species (birds, bats) would not be impacted by this change.</p> <p>Alt 5 will provide created pond habitat for SAR turtle species and could be designed to include overwintering habitat, basking logs and other habitat structure for SAR and SCC which would replicate the types of habitat that exist in a reservoir, however there will be a reduced areal extent of ponded waters.</p>
Climate Change (Mitigation)	<p>Alt 1, 2, and 3 - Shallow reservoirs are considered greenhouse gas emitters, as methane produced in the anoxic bottom sediment bubbles free and is released to the atmosphere. Retention of a dam, even if slightly deepened through seasonal stoplog operations that become reinstated under Alt 2 and 3, maintain the existing characteristics and, as such, these 3 Alts are considered to have the most negative impact under this criterion.</p> <p>Alt 4 eliminates the shallow standing water characteristic altogether while Alt 5 retains some in the form of offline wetlands / wet ponds. Both offer the additional positive benefit of increasing the extent of carbon sequestering terrestrial vegetation, with Alt 4 providing slightly more benefit in this regard than Alt 5 and, therefore, ranking as slightly more preferred.</p>
Geomorphology/Sediment Transport	<p>Alt 1, 2, and 3 that include retention of a dam structure continue to represent an impediment to a natural sediment transport regime, a condition partially off-set by the fact that the reservoir is currently considered full to the point of equilibrium between settling and resuspension.</p> <p>Alts 4 and 5 that remove the dam outlet flow structure will return the watercourse system to a more natural sediment transport regime following stabilization. Implementation of these alternatives will require temporary impact mitigation efforts in the form of an extended duration drawdown of the reservoir to allow stored sediment to consolidate and become vegetated, and management of potentially mobilized materials through capture (e.g., sediment traps) and removal. While the re-naturalized channel within the reservoir area would be left to find its own planform, adaptive management techniques such as augmentation with gravel and/or grade control points, may also become necessary to ensure channel stability.</p>

Table 19 Alternative Ranking Rationale (cont'd)

Category 3: Social/Cultural	
Criteria	Scoring Rationale
Private Property Impacts	<p>Alternatives that retain the reservoir pond at current or historic levels (i.e., Alts 1, 2, and 3) should have no impact on long-term groundwater levels as compared to existing conditions and retain the perceived property value benefit of the pond. Alts 2 and 3, with their ability to retain seasonally higher water levels than Alt 1 are considered a more positive impact (i.e., more likely to benefit the existing PTTW on the west side of the pond).</p> <p>Alts 4 and 5 that reduce the reservoir levels to natural creek levels, or to that of new riparian wetlands /wet ponds, would not be expected to have significant impacts on groundwater levels, but would require monitoring in nearby wells before, during and after implementation to develop an understanding of baseline conditions and confirm any observed impacts or lack thereof, representing a potential time and cost impact. Any negative impacts on wells would require mitigation, likely in the form of deepening or re-drilling to ensure adequate supply. Any groundwater impacts are understood to be mitigable but do involve time and cost considerations.</p> <p>While there may well be potential purchasers who prefer the aesthetic of an Alt 4 or 5, the predominant opinion expressed through public consultation in this EA process is indicative of a preference for an open water reservoir.</p>
Fire Protection / Safety	<p>Retention of the dam structure maintains the emergency fire water supply at its current location and general volume. With the added seasonal depth of permanent pool enabled under Alts 2 and 3, there is a slight preferability in these options as compared to Alt 1 that would require maintaining the lower ponding elevation that has been in place since the 2016 DSR's completion.</p> <p>The dam decommissioning options of Alts 4 and 5 would require mitigation in the form of finding and constructing an alternative source nearby. Further negative impacts associated with an alternative source is that these, while no doubt sufficient to maintain the minimum requirements of the County's STSS certification, they would never be capable of providing the volumes that exist within the reservoir.</p>
Public Infrastructure / Safety Impacts	<p>Do nothing (i.e., Alt 1) retains the largest potential for dam failure. Alts 1, 2 and 3 retain the dam and reservoir and, thus, the risk of public interaction with the structure and the pond, and all associated safety hazards. Alts 2 and 3 provide an opportunity to enhance the control measures implemented around the dam structure itself to restrict direct public interactions (e.g., fencing, signage). Alts 4 and 5, in removing the dam structure would largely eliminate associated interaction and risks.</p> <p>Notwithstanding the likelihood of increased recreational usage associated with a deeper reservoir through the summer and fall seasons, Alts 2 and 3 are considered to represent a reduced impact on drowning risk as the deeper pool would arguably make it easier to swim to safety than might be the case under the shallow depths of Alt 1. It is unclear whether standing on the soft, unconsolidated bed material would prove possible in either water depth condition (summer or winter holding levels).</p> <p>Alts 4 and 5 remove the dam and associated failure / public interaction risks and substantively reduce drowning risks associated with the reservoir.</p>
Cultural / Heritage Impacts	<p>None of the alternatives would be likely to have a direct impact on the remaining cultural heritage elements related to early industry (i.e., milling remnants) which are located beyond the immediate area of the dam. Most alternatives, except Alt 3 representing a full reconstruction, would maintain the existing dam embankment and at least some of the elements of the existing control structure, though the dam decommissioning of Alts 4 and 5 would involve the removal of more of the dam's infrastructure.</p> <p>Alts 1, 2, and 3 most closely retain the cultural landmark status of the dam and reservoir as a dominant feature on the landscape. With no potential for impact on the cultural heritage elements of the dam structure itself, Alt 1 is assessed as slightly more preferred than Alt 2 in that the latter would include construction work and a revised aesthetic on the downstream face of the dam and spillway area. While architectural elements could no doubt be included in the implementation of a reconstructed dam (Alt 3), it is likely that little of the existing structure would be able to be incorporated.</p> <p>Through public consultation efforts completed as part of the project, the importance of the reservoir itself on the cultural psyche of the community has been repeatedly emphasized. The reservoir is unquestionably the most visible landscape feature in the community given its size, natural aesthetic, location on the main thoroughfare and at one of the key community gathering sites (the Legion), and as a focal point for numerous community events. As such, the dam decommissioning options (Alts 4 and 5) are assessed as having the largest negative impact as it relates to this factor, with Alt 4 scoring less preferable of the two given the complete elimination of any open, standing water areas.</p>
Public Recreational Impacts	<p>Multiple recreational uses of the reservoir were consistently reiterated throughout the project's public consultation process. Further, numerous comments have suggested that the consistent holding of the reservoir levels at what was historically only the winter level since the DSR recommended the practice change in 2016, has negatively impacted recreational potential in many ways. Shallower depths of water through prime recreational periods are limiting to canoe / kayak potential and have created conditions where carp have become predominant over what was historically an active bass fishery. From this it follows that Alts 2 and 3 are assessed as having the highest positive impact on recreational opportunities, with Alt 1 having a neutral impact (no change in recreational opportunities) and, therefore, less preferred. Alt 2 is assessed as slightly more positive than Alt 3 as the latter may have temporal impacts on the reservoir associated with construction – i.e., the loss of recreational opportunities during construction.</p> <p>Alts 4 and 5 offer different recreational opportunities in the form of potential formal or informal trail systems within the riparian wetland area of a reconfigured reservoir, with Alt 5 retaining open water ponded areas for continued use by many of the species that draw wildlife observation enthusiasts, though these would be smaller than that of a full reservoir. Further, the removal of the fish barrier represented by the dam would reconnect upstream and downstream watercourses and increase spawning habitat, offering additional angling opportunities. In its retention of both flowing water and standing water characteristics, Alt 5 could be considered an ideal compromise from an angling perspective, offering habitat suitable for more species variety. Notwithstanding the potential beneficial and different opportunities, however, public opinion suggests that the dam retention alternatives are significantly less preferable in terms of the type of recreation the community desires. As such, both Alts 4 and 5 are assessed as less preferred than Alts 1, 2, and 3.</p>

Table 19 Alternative Ranking Rationale (cont'd)

Category 4: Economic	
Criteria	Scoring Rationale
Construction Costs	<p>Despite representing an unacceptable solution, Alt 1 is scored as least impact (i.e., neutral) by virtue of having no immediate cost associated with its implementation.</p> <p>Capital cost estimates for the repair dam alternative (Alt 2) were developed by Stantec as part of a detailed design process undertaken in 2020. Considering an assumed increase in construction costs owing to inflation and that some aspects of the earlier identified work have already been completed (e.g., the removal of the historic steel truss bridge), the capital costs associated with this alternative represent a middle ground between Alt 1 and the larger scale undertakings of Alt 3 or 5.</p> <p>Alt 4, including a gradual decommissioning of the dam is estimated at similar capital cost to Alt 2. While the removal of the dam structure itself is much less expensive than a repair, there are mitigation costs associated with the replacement of the emergency fire water supply source, watercourse stabilization efforts, and a well monitoring program for local private systems.</p> <p>The full dam replacement represented by Alt 3 is expected to represent the highest capital cost for design and implementation of the structure itself.</p> <p>Alt 5 includes all the direct costs of Alt 4 plus the additional cost of creating new, large, pond features in the riparian floodplain wetlands, so is substantively more expensive, in line with that of replacing the dam.</p>
Maintenance/Future Costs	<p>For the purposes of alternative comparison on a consistent basis, a 100-year timeframe was selected as representative of the potential life span of a new dam (Alt 3).</p> <p>Ongoing maintenance costs associated with the Do Nothing approach are expected to be the highest as the infrastructure will require immediate and ongoing attention, not to mention the potential costs associated with environmental liability in the event of a failure.</p> <p>A dam that is repaired or reconstructed (Alts 2 and 3, respectively) is infrastructure that will require some ongoing level of maintenance over time and in perpetuity as the structure ages, complete with associated costs, though less than if the structure were left alone. A reconstructed dam (Alt 3) would be expected to require less ongoing cost than a repaired dam (Alt 2). The engineered lifetime of a repaired dam will be less than a rebuilt dam leading to higher average O&M costs that also includes another episode of substantial capital outlay at least once over a 100-year period. The ownership of a dam, whether new or repaired, also includes routine costs associated with aspects such as seasonal flow control operations, routine inspections / maintenance, annual insurance premiums, and less frequent activities such as dam safety reviews (every 10 years for a low hazard potential structure). Given the above, Alts 2 and 3 are assessed as having the largest impact / least preferability of the “do something” alternatives.</p> <p>Alt 4 that eliminates the dam and reservoir and establishes a watercourse / riparian area is estimated to represent the lowest operational costs as the watercourse and riparian system stabilize and become largely self-managing. Potential costs associated with routine inspections and minor maintenance and/or specific tasks such as management of invasive species (e.g., phragmites) is to be expected.</p> <p>Beyond the costs identified for Alt 4, the offline wet features added to Alt 5 will likely require ongoing maintenance such as periodic sediment removal over time to ensure the features continue to provide the open water habitat of appropriate depth. There will no doubt be some localized watercourse restoration works required over time with both Alts 4 and 5 to help maintain watercourse stabilization but, in either case, it is expected that such efforts would diminish over time as the system stabilizes naturally. Unlike most human-built systems, an engineered or naturalized watercourse is “weakest” immediately after construction, growing naturally more resilient over time.</p>

6 Public and Agency Consultation and Engagement

The involvement of the broad community including residents, governmental and non-governmental agencies, other public stakeholders, Indigenous communities, and any others who may be potentially affected by a project, is an integral part of the Class EA process. The purpose of the Class EA study consultation process is to provide an opportunity for all interested persons, Indigenous communities, and agencies to gain an understanding of the study process and the overall environmental context in which the project exists, to contribute to the process for the development and selection of alternatives, and to provide feedback and advice at important stages. Specifically, the objectives of the consultation efforts are to generate awareness of the project and provide opportunities for involvement throughout the planning process, and to facilitate constructive input from public and agency stakeholders at key points in the Class EA process.

Input received through the public consultation process informed the selection of a preferred alternative through improving the baseline characterization of the project environment, highlighting relative importance of environmental categories (e.g., socio-cultural), and in the ranking of alternatives against individual criteria.

A summary of the consultation activities undertaken for this Class EA is provided in this section.

6.1 Project Website

The LPRCA established and hosted a public facing webpage throughout the project (<https://www.lprca.on.ca/teeterville-dam-class-environmental-assessment/>) that provides a summary of the project and relevant documentation for public review. The webpage clearly described the public consultation process, the opportunities for direct or indirect participation, and the roles and responsibilities of interested persons. Links were provided to background documentation, guidance on the Class EA process, and public consultation materials such as Notices and Public Information Centre (PIC) materials, and project reporting, including the Baseline Environmental Inventory Report and this Project Plan.

6.2 Notice of Intent

A Notice of Intent (NOI) was prepared to inform private and public stakeholders of the project's initiation and rationale, the guiding process (i.e., the CO Class EA), to provide contact information for Montrose and LPRCA staff. The notice was posted on the project's website, emailed to all individuals, Indigenous communities, and agencies on the stakeholder contact list (2024-10-24), mailed in hard copy to all residents directly adjacent to the Study Area (approx. 32 properties) and others who might be directly affected by the project, and published in the Norfolk & Tillsonburg News (2024-10-31).

6.3 Indigenous Engagement

With support from the consulting team, engagement with Indigenous communities was undertaken primarily via the LPRCA, as the proponent of the study. Per MECP direction, the Indigenous communities identified as potentially affected by the proposed project included the Mississaugas of the Credit First Nation (MCFN) and Six Nations of the Grand River (both Elected and Haudenosaunee Confederacy Chiefs Council (HCCC) / Haudenosaunee Development Institute (HDI). A complete documentary record of correspondence is included within Appendix G and summarized as follows:

6.3.1 Mississaugas of the Credit First Nation

- 2024-10-24 - email from LPRCA to MCFN including the NOI, and outline of the project's anticipated engagement program and a description of the Community Liaison Committee (CLC) and an invitation to engage with the Study Team. No response received.
- 2025-02-07 – email from LPRCA to MCFN including the Notice of Public Information Centre #1 (NOPIC #1) and outlining the event's role in the broader project consultation program. No response received.
- 2025-06-16 - email from LPRCA to the MCFN including the Draft Stage 1 Archaeology Report (TMHC 2025), Teeterville Dam and Truss Bridge Evaluation report (Stantec 2019), and Heritage Context and Existing Conditions report (TMHC 2025) with a request for review and comment. Reply received on the same day confirming receipt and circulation to appropriate departments and that comments would be forthcoming.
- 2025-07-25 – MCFN provided comments on archaeology and heritage reports. MCFN Archaeology Unit offered no comments or concerns. MCFN Heritage and Cultural Unit offered comments requesting edits to explicitly link the Lakes Treaty, No. 3 to the MCFN and clarification revisions to nomenclature of Indigenous communities and geography being referenced to improve the report's accuracy and flow.
- 2026-02-27 – Notice of Completion (NOC), including links to the LPRCA's dedicated project webpage, advising of the report's completion, EA-related timelines, and Section 16 Order processes issued to MCFN.

6.3.2 Six Nations of the Grand River (Elected)

- 2024-10-24 - email from LPRCA to SNGR (Elected) including the NOI, and outline of the project's anticipated engagement program and a description of the CLC and an invitation to engage with the Study Team. Response received same day from SNGR (Elected; Peter Graham) indicating a desire for consultation on the project, for inclusion on document circulation when available, but advising of unlikely participation on the CLC.

- 2025-02-07 – email from LPRCA to SNGR (Elected) including the Notice of Public Information Centre #1 (NOPIC #1) and outlining the event’s role in the broader project consultation program. No response received.
- 2025-06-16 - email from LPRCA to SNGR (Elected) including the Draft Stage 1 Archaeology Report (TMHC 2025), Teeterville Dam and Truss Bridge Evaluation report (Stantec 2019), and Heritage Context and Existing Conditions report (TMHC 2025) with a request for review and comment. Replies received confirming receipt.
- 2026-02-27 – Notice of Completion (NOC), including links to the LPRCA’s dedicated project webpage, advising of the report’s completion, EA-related timelines, and Section 16 Order processes issued to SNGR (Elected).

6.3.3 Six Nations of the Grand River (HCCC/HDI)

- 2024-12-02 – email sent to Haudenosaunee Development Institute (HDI) including the NOI, a notice of the project website, and solicitation of interest in joining the project CLC and an invitation to engage with the study team. Response received the following day (2024-12-03) indicating that HDI would like to participate in ecological surveys with the project consulting team.
- 2025-02-07 – email from LPRCA to SNGR (HCCC/HDI) including the Notice of Public Information Centre #1 (NOPIC #1) and outlining the event’s role in the broader project consultation program.
- 2025-02-12 – email from SNGR (HCCC/HDI) indicating a desire to be involved in any ecological surveys pending for this project as well as construction monitoring.
- 2025-04-22 – email from LPRCA to SNGR (HCCC/HDI) advising of upcoming ecological field surveys (June 10, with flexibility) and requesting coordinating with HCCC/HDI. Response received the following day confirming HCCC/HDI’s desire to participate and indicating a direct follow-up with consulting team to coordinate. A second follow-up email of same day (2025-04-23) requested a list of administrative information be provided by LPRCA for invoicing purposes.
- 2025-05-06 – email from Montrose to SNGR (HCCC/HDI) following up on upcoming ecological surveys and looking to coordinate dates / times. Response received same day, directed to LPRCA, following up on status of agreement required to support invoicing related to involvement in field surveys.
- 2025-06-16 - email from LPRCA to SNGR (HCCC/HDI) including the Draft Stage 1 Archaeology Report (TMHC 2025), Teeterville Dam and Truss Bridge Evaluation report (Stantec 2019), and Heritage Context and Existing Conditions report (TMHC 2025) with a request for review and comment. No reply received.

- 2025-06-20 – email from SNGR (HCCC/HDI) following up on status of ecological field / monitoring surveys. LPRCA confirmed to Montrose on 2025-06-23 that an agreement with HCCC/HDI was not signed.
- 2025-06-23 – email from LPRCA to Montrose confirming following up on status of ecological field / monitoring surveys. LPRCA confirmed to Montrose on 2025-06-23 that an agreement with HCCC/HDI was not signed.
- 2026-02-27 – Notice of Completion (NOC), including links to the LPRCA’s dedicated project webpage, advising of the report’s completion, EA-related timelines, and Section 16 Order processes issued to SNGR (HCCC/HDI).

6.4 Community Liaison Committee

Through the project website, NOI, and other introductory correspondence, the Study Team solicited interest from a range of stakeholders including Indigenous Peoples and Nations, neighbouring property owners, members of the local Teeterville community/interest groups, NGOs, and municipal representatives to form a CLC. Representing a primary avenue of consultation for a CO Class EA, the CLC is a group of stakeholders with knowledge and interest in the study area and the project, and the desire and willingness to participate in an active, contributory role. The purpose of the CLC is to obtain public input concerning the planning and design process of the project, and to review information and provide input to the Study Team throughout the process.

Coordinated by the Study Team and LPRCA staff, the CLC for the project included a diverse representation of interests from 11 - 14 stakeholders including 4 – 5 neighbouring residents/landowners; representation from NGOs such as the Royal Canadian Legion and Long Point Basin Land Trust (neighbouring landowners), the Ontario Federation of Anglers and Hunters, and the Ontario Rivers Alliance; an LPRCA Board member; and representation from the County Heritage & Cultural Committee.

The CLC convened twice during the project, through in-person meetings held in the evening in Simcoe at which presentations were made by the Study Team. Presented content generally included the reason for undertaking the study, an overview of the CO Class EA process and the CLC’s important role within that process, the broad context of the study environment under consideration, the alternative solutions under consideration and, in the second of the two gatherings, the approach taken to the alternative evaluation and the selection of a preliminary preferred alternative.

The CLCs were a two-way, open, and collaborative dialogue with much input and exchange of ideas, questions posed and discussed. The potential for impacts associated with the implementation of the alternatives and the approaches to their mitigation were a focal point. Though a subjective conclusion, based in part on verbal feedback and written comments, the general opinion of the Study Team is that the CLC members felt engaged, gained a good understanding of the Class EA process and the project

details, added valued input and perspectives to the project, and were in general agreement with the conclusions.

Records of CLC activities, including presentations and minutes from each of the meetings are included within Appendix G.

6.5 Public Information Centres

PICs are another primary method through which Class EA studies ensure consultation and engagement with the broader interested public. PICs are undertaken with the objective of presenting the project material to the public in an open and transparent forum, communicating important project details, engaging in dialogue to answer questions and soliciting input/feedback on the process, aspects considered, and preliminary results.

For this project, two PICs were undertaken to address the Class EA process requirements given the anticipated level of public interest in the study's outcome, in addition to the provision of related information online (ref: Section 6.1) and the active engagement achieved through the work of the CLC (ref: Section 6.4).

Public Information Centre #1

PIC #1 was held at the Simcoe Recreation Centre on February 19, 2025, and was structured as an open-house, drop-in format with study team members in attendance to liaise with attendees. A Notice of PIC was published on the project's dedicated website (<https://www.lprca.on.ca/teeterville-dam-class-environmental-assessment/>), in the Norfolk & Tillsonburg News and Simcoe Reformer on February 6, 2025, and via direct email to all agencies and individuals on the project stakeholder list.

The intent of the PIC was to act as a forum for two-way information exchange, with the Study Team presenting information gathered as part of the background review and initial CLC meeting and soliciting any additional input from attendees to support or add to the existing body of knowledge. The presentation included 17 boards (ref: Appendix G3-2) displaying information such as:

- Project Background and Problem/Opportunity Statement
- Conservation Ontario Class Environmental Assessment process
- Characterization of the project's existing environment including technical, social/cultural, natural, and economic aspects
- An initial set of conceptual alternative solutions and the considerations and criteria anticipated to form the basis of their evaluation
- A summary of anticipated next steps in the project process and Study Team contact information

Eight project team members from Montrose, Scheckenberger & Associates, and LPRCA staff hosted the PIC and were available for discussion and to address questions and concerns from attendees. The PIC was well attended with a total of 92 people, including one Norfolk County councillor, recording their attendance on the event sign in sheet.



Figure 21 Public Information Centre, 2025-02-19

A general comment sheet was available to attendees to complement in-person discussions and provide the opportunity to formally document any input they wished to have addressed and/or included in the public record. Beyond providing comments in the moment, attendees were encouraged to email comments to the Study Team after-the-fact, if preferred. Formal written responses, in the form of completed comment sheets or emails, were provided by 29 members of the public most of whom attended the PIC. The questionnaires and email correspondence received corroborated and enhanced the Study Team’s understanding of the project’s environment. While the intent of the PIC was primarily as an information exchange forum with no evaluation of alternatives presented, most comments also adopted a very strong advocacy stance in favour of a “saving the dam” option, citing a range of environmental and social considerations. A summary of key items raised is as follows:

- Commenters expressed concern over potential lowering of groundwater table and the potential for negative impacts on private water wells, especially as most in the area are known to be of shallow, sand point characteristic.
- The ecologic importance of the reservoir in supporting a vibrant wetland-based ecosystem catering to a wide variety of flora and fauna species, of both permanent and migratory characteristic.
- Many highlighted the importance of the reservoir as a key element of social connectivity in the area with the various Legion-affiliated events, most notably the firefighters annual fishing derby.
- Many cited the value of retaining the reservoir as an element in the NCFD’s emergency fire water supply system.

- Beyond the importance of the reservoir as supporting social group activities, many cited important individual connections to the area through years and, occasionally, lifetimes of interactions with the area.

A copy of the PIC presentation materials, completed sign-in sheets, completed questionnaires and email correspondence directly related to PIC#1 can be found in Appendix G.

Public Information Centre #2

PIC #2 was held at the Simcoe Recreation Centre on June 12, 2025, and was structured as an open-house, drop-in format with study team members in attendance to liaise with attendees. A Notice of PIC was published on the project's dedicated website (<https://www.lprca.on.ca/teeterville-dam-class-environmental-assessment/>), in the Simcoe Reformer (May 13, 2025) and Norfolk & Tillsonburg News (May 15, 2025), and via direct email to all agencies and individuals on the project stakeholder list.

As with PIC#1, the intent of PIC #2 was to act as a forum for two-way information exchange, with the Study Team presenting information gathered as part of the background review and CLC meetings, to describe the alternative solutions considered and their detailed evaluation and present the preliminary preferred approach. Input was solicited from attendees to support or add to the consideration and evaluation of alternatives. The presentation included 22 boards (ref: Appendix G3-3) displaying information such as:

- Project Background and Problem/Opportunity Statement
- Conservation Ontario Class Environmental Assessment process
- Characterization of the project's existing environment including technical, social/cultural, natural, and economic aspects
- Conceptual alternative solutions and the considerations and criteria forming the basis of evaluation
- Details on the evaluation approach, preliminary scoring, and confirmation of preliminary preferred alternative
- A summary of anticipated next steps in the project process and Study Team contact information

Seven project team members from Montrose, Scheckenberger & Associates, and LPRCA staff hosted the PIC and were available for discussion and to address questions and concerns from attendees. The PIC was well attended with a total of 69 people, including one Norfolk County councillor, recording their attendance on the event sign in sheet.

A general comment sheet was available to attendees to complement in-person discussions and provide the opportunity to formally document any input they wished to have addressed and/or included in the public record. Beyond providing comments in the moment, attendees were encouraged to email comments to the Study Team after-the-fact, if preferred.

Formal written responses in the form of completed comment sheets were provided by 5 members of the public, all of whom attended the PIC. All responses supported the conclusion of repairing the dam and preserving the reservoir wetland as the preferred alternative.

A copy of the PIC presentation materials, completed sign-in sheets, and completed questionnaires can be found in Appendix G.

6.6 Agency Consultation

Owing to the type of project and the environment within which it exists, multiple governmental agencies have direct or indirect requirements for engagement, permitting and/or approvals. To ensure that all were notified of the project and engaged as necessary, the following agencies were included on the project's "stakeholder list" and copied on the project NOI and/or consulted throughout the project:

- LPRCA Board
- Norfolk County Staff and Council
- Conservation Ontario (CO)
- Ministry of the Environment, Conservation and Parks (MECP)
- Ministry of Natural Resources (MNR)
- Ministry of Citizenship and Multiculturalism (MCM)
- Department of Fisheries and Oceans Canada (DFO)

Beyond the NOI, highlights of specific correspondence and/or consultation, copies of which are included within Appendix G, included:

- 2024-10-25 – MNR email correspondence and a copy of the guidance document *MNR Southern Region Information Package – For External Proponent Environmental Assessments (October 2024)*, in response to NOI of 2024-10-24, providing direction and guidance regarding the MNR's role as a commenting agency and interests related to EAs within the Ministry's mandate.
- 2024-11-04 - MECP email correspondence, in response to NOI of 2024-10-24, providing direction and guidance regarding the project's responsibilities related to Indigenous engagement and numerous other areas of interest under their jurisdiction and related reporting requirements and processes.
- 2024-11-21 – MCM letter of acknowledgement re: receipt of NOI and outlining MCM's interests in the project as relating to archaeological resources, built heritage resources, and cultural heritage landscapes.
- 2025-02-05 – email from Montrose to all agencies including the Notice of Public Information Centre #1 (NOPIC #1) and outlining the event's role in the broader project consultation program.

- 2025-03-12 – MECP email correspondence following up on their 2024-11-04 acknowledgement letter and requesting an update. Montrose responded via email with updates on 2025-03-17.
- 2025-03-14 – MNR email correspondence acknowledging receipt of NOPIC and providing contact information to the study team should questions related to MNR interests arise.
- 2025-04-11 – MNR email correspondence in response to 2025-02-05 NOPIC advising of eventual approval requirements under the LRIA, providing links to numerous related guidance documents, and the potential requirement for approval under the Fish and Wildlife Conservation Act (1997) related to construction activities and the potential for physical impacts on fish or wildlife (e.g., relocation requirements).
- 2025-04-22 – Notice of publication of Baseline Environmental Inventory Report (BEIR) to project mailing list, including all regulatory agencies.
- 2025-04-23 – DFO email correspondence replying to Notice of BEIR publication advising of review responsibilities and no interest in administrative processes, only projects (works, undertakings, or activities) being conducted in or near waterbodies that support fish, and project proposal for impacts to Species at Risk.
- 2025-09-18 – email and letter confirming receipt and entry of the Stage 1 Archaeological Report (TMHC 2025-09-02) into the Ontario Public Register of Archaeological Reports.
- 2025-11-06 – Submission of Heritage Impact Assessment (TMHC 2025-10-29) as a stand-alone document for MCM review in advance of EA PP completion and circulation. Included in submission was Teeterville Dam and Truss Bridge Heritage Evaluation (Stantec 2019-03-11).
- 2025-12-03 – Presentation of project update to LPRCA Board for endorsement of preferred alternative and approval to proceed to publication of EA report for 30-day review.
- 2025-12-09 - Presentation of project to Norfolk County Council for information.
- 2026-01-12 – MCM correspondence confirming receipt and review of the Heritage Impact Assessment and conclusion that the HIA “is consistent with requirements, guidance, and standards under the Planning Act and Municipal Class Environmental Assessment process and best practice guidance prepared by MCM with respect to cultural heritage.” The correspondence offered a single editorial comment requiring resolution, limited to a revision within Section 6 of the HIA to reflect that the project was completed under the Class Environmental Assessment for Flood and Erosion Control Projects, and not the Municipal Class EA as described in the earlier draft. This minor revision was implemented and the final HIA reissued, as included within Appendix F.

The above represents a comprehensive list of agency consultation completed to-date and no regulatory objects to the report or project remain outstanding at the time of publication.

6.7 Notice of Completion

A Notice of Completion (NOC) was prepared to advise the public of the filing of the study, to outline EA processes and timelines related to the 30-day review / commenting period and Section 16 Orders, and to provide contact information for Montrose and LPRCA staff. This notice was emailed to all who expressed an interest in the study on February 27, 2026, mailed in hard copy to all residents directly adjacent to the Study Area (approx. 32 properties) or others who might be directly affected by the project, published in the Simcoe Reformer and Norfolk & Tillsonburg News.

In addition to the general public, and as documented in the following sections, the NOC was also distributed to the entire stakeholder list including governmental agencies, NGOs, and Indigenous communities.

7 Selection of Preferred Alternative

As outlined in the preceding sections, the various alternatives have been evaluated across a range of environmental categories and associated criteria and have been vetted through consultation with numerous stakeholders and a range of consultation approaches, ultimately leading to the selection of a preferred alternative that can, upon completion of the CO Class EA notification, review, comment, and Section 16 Order processes, proceed to implementation.

The preferred alternative, determined through the evaluation process is Alternative 2 – Repair Dam, as described in Section 4.2 and illustrated on Figure 17. Per the scoring summarized on Table 17, the Repair Dam alternative is not an overwhelming favourite, especially as compared to the Replace Dam alternative, but is assessed as preferred from constructability, approvability, capital cost, and cultural heritage perspectives. While the full extent of repairs will need to be further reviewed to ensure compliance with current federal and provincial dam safety guidelines it is expected that it would follow the general approach outlined in previous design work (Stantec 2020) and primarily include:

- Repair concrete on wingwalls, piers and abutments.
- Undertake stability improvements to the dam’s concrete structure involving the addition of concrete mass within the existing spillway area and grouting of the void below the base slab of the spillway and underlying subgrade.
- Replacement of the dam access and control infrastructure that was removed in 2022 owing to safety concerns, for use in future stoplog operations. As part of this element, it is expected that public pedestrian access (i.e., steel bridge) of a similar aesthetic to that historically in place, would be included to reflect considerations of cultural heritage and historic public use of the area.

A potential addition to the Stantec design for repairs would include the introduction of a new low-flow sluice / valve control as part of the dam's flow control capabilities.

This low flow control could be positioned through the existing concrete wall at an elevation near the existing spillway invert with the aim of improved operational flexibility, supporting potential future operations such as dam drawdown for larger repairs, easier stoplog removal / replacement, and/or periodic, controlled sediment flushing activities from the area immediately upstream of the structure to support maintenance of the fire water supply source (i.e., retain a deeper, sediment-free pool around the system's intake). While the core dam repair elements identified above would not necessarily require sediment removal upstream of the dam structure, implementation of a low-level outlet as described here would be expected to benefit from some localized sediment removal.

Should the CO Class EA processes be completed satisfactorily and the Repair Dam alternative be approved to proceed to implementation, such is expected to necessitate very little disturbance to the reservoir and accumulated sediments, as works will be confined to the area immediately surrounding the concrete dam structure. Detailed design, permitting, and any further required studies could take place as early as 2026-2027 with construction in 2027-2028 pending additional approvals, funding, and applicable review provisions.

8 Detailed Environmental Analysis of the Preferred Alternative

With the selection of the preferred approach confirmed through a thorough evaluation of the alternatives and supported through consultation, it was then subjected to a more detailed study of potential environmental impacts. The detailed environmental analysis screening table template (Table 2 from Conservation Ontario 2024), reproduced as Table 20, was completed for this purpose.

Nearly one-third of the screening criteria (21/65, or 32%) were assessed as not applicable to the project. For the rest, most were assessed as neutral (28/65, or 43%) or slightly positive (16/65, or 25%); no negative impacts were identified. Those assessed as having a neutral impact were defined as such either because they exist in the area but are not expected to be impacted with the implementation of the preferred alternative (i.e., "non-impacted neutral"), or because there are both negative and positive impacts that have been assessed as offsetting or cancelling each other out (i.e., "balanced neutral").

Beyond simply providing additional detail in the assessment of potential impacts related to the implementation of the preferred alternative, the intent of the detailed analysis is to document how potential negative impacts will be mitigated through avoidance, reduction, or compensation approaches. Discussions within Sections 8.1 to 8.5 have been completed to clarify aspects or considerations in the "balanced neutral" or positively ranked impacts; "non-impacted neutral" criteria are not discussed.

Table 19 Detailed Environmental Analysis of Preferred Alternative

Screening Criteria	Rating of Potential Effect							
	-H	-M	-L	NIL	+L	+M	+H	N/A
Physical								
Unique Landforms				X				
Existing Mineral/Aggregate Resources Extraction Industries								X
Earth Science - Areas of Natural and Scientific Interest (ANSI)								X
Specialty Crop Areas								X
Agricultural Lands or Production				X				
Niagara Escarpment								X
Oak Ridges Moraine								X
Environmentally Sensitive/Significant Areas (physical)					X			
Air Quality								X
Agricultural Tile or Surface Drains				X				
Noise Levels and Vibration								X
High/Stormwater Flow Regime				X				
Low/Base Water Flow Regime					X			
Existing Surface Drainage and Groundwater Seepage				X				
Groundwater Recharge/Discharge Zones					X			
Falls within a vulnerable area as defined by the Clean Water Act								X
Littoral Drift								X
Other Coastal Processes								X
Water Quality				X				
Soil/Fill Quality								X
Contaminated Soils/Sediments/Seeps								X
Existing Transportation Routes				X				
Constructed Crossings (e.g., bridges, culverts)						X		
Geomorphology				X				
Biological								
Wildlife Habitat					X			
Habitat Linkages or Corridors				X				
Significant Vegetation Communities				X				
Environmentally Sensitive/Significant Areas (biological)					X			
Fish Habitat					X			
Species of Concern (e.g., species at risk, vulnerable/threatened/ endangered species, conservation priorities - flora or fauna)				X				
Exotic/Alien and Invasive Species				X				
Wildlife/Bird Migration Patterns				X				
Wildlife Population				X				
Wetlands					X			
Microclimate				X				
Life Science ANSIs								X
Unique Habitats								X

Note: Screening of Potential Effects as negative (-), neutral (NIL), or positive (+) and rating them as relatively high (H), medium (M), low (L), or not applicable (N/A)

Table 20 Detailed Environmental Analysis of Preferred Alternative (cont'd)

Screening Criteria	Rating of Potential Effect							
	-H	-M	-L	NIL	+L	+M	+H	N/A
Cultural								
Traditional Land Uses				X				
Indigenous Community or Reserve				X				
Outstanding Land Claim as identified by the Indigenous Community								X
Transboundary Water Management Issues								X
Riparian Uses					X			
Recreational or Tourist Uses of a Water Body and/or Adjacent Lands					X			
Recreational or Tourist Uses of Existing Shoreline Access				X				
Aesthetic or Scenic Landscapes or Views				X				
Archaeological Resources				X				
Built Heritage Resources					X			
Cultural Heritage Landscapes				X				
Historic Canals								X
Federal Property								X
Heritage River System								X
Other								
Socioeconomic								
Surrounding Neighbourhood or Community				X				
Surrounding Land Uses or Growth Pressure				X				
Existing Infrastructure, Support Services, Facilities					X			
Pedestrian Traffic Routes					X			
Property Values or Ownership				X				
Existing Tourism Operations				X				
Property/Farm Accessibility					X			
Other								
Engineering/Technical								
Rate of Erosion in Ecosystem				X				
Sediment Deposition Zones in Ecosystem				X				
Flood Risk in Ecosystem					X			
Slope Stability				X				
Existing Structures					X			
Hazardous Lands								X
Hazardous Sites								X
Other								

Note: Screening of Potential Effects as negative (-), neutral (NIL), or positive (+) and rating them as relatively high (H), medium (M), low (L), or not applicable (N/A)

8.1 Impacts / Considerations Related to Physical Screening Criteria

Environmentally Sensitive/Significant Areas (physical)

- The addition of structural stability to the dam will permit the reinstatement of historic seasonal operations that includes the installation of two additional stoplogs following spring freshet adding approximately 0.40 m to the summer/fall reservoir operating levels, and their removal for the winter/spring periods. Though not truly representative of a natural hydrologic cycle, this impact would provide more seasonal variability in environmental characteristics within the reservoir and around the terrestrial wetland perimeter, with shallow areas varying between wet and dry conditions throughout the year, conditions considered to represent a net positive impact as compared to the existing, stable levels maintained year-round.

Low/Base Water Flow Regime

- The implementation of the repair dam alternative will have a positive impact on water levels as described previously, permitting seasonal adjustment in reservoir storage depth. The active PTTW within the reservoir identified as an irrigation water supply source for adjacent fields should benefit from extra operational flexibility and reduced maintenance requirements, as will the County's emergency fire water supply source intake near the dam. Further, the ability to store more water through summer periods builds in some climate change resiliency in possibly providing an emergency irrigation water supply source in the event of extended drought periods.

Groundwater Recharge / Discharge Zones

- Additional reservoir depths through summer/fall periods should assist in providing additional recharge around the feature's perimeter potentially benefiting water volumes available to local shallow, sand point well supplies or for downstream coldwater discharges back to the Big Creek system. Conceptual hydrogeologic assessments completed as part of this project have concluded that the connection to nearby private wells is likely limited so impacts, if any, would be small but positive in any event.

8.2 Impacts / Considerations Related to Biological Screening Criteria

Wildlife Habitat & Environmentally Sensitive / Significant Areas (biological)

- The seasonal variability in reservoir operating levels afforded through implementing the repair dam alternative is expected to benefit wildlife that utilize the standing water habitat such as fish, turtles, and waterfowl (permanent and migratory) and generally maintain or improve form and function of the PSW.

Fish Habitat

- The seasonal variability in reservoir operating levels afforded through implementing the repair dam alternative will directly increase fish habitat as compared to existing in the form of an additional 0.4 m depth across the entire surface area of the reservoir and add to perimeter areas. The seasonally increased water column depth provides additional habitat that may benefit top predator species such as Largemouth Bass, for which there was reportedly a thriving fishery in the reservoir historically. An increase in water levels will also increase littoral zone habitat around the reservoir's perimeter, creating habitat for Largemouth Bass that prefer to be close to dense aquatic vegetation and submerged aquatic plants, or other cover such as sunken woody debris. Increased littoral zone habitat is also beneficial as nursery habitat for a variety of species as these shallow zones are generally warmer, calmer waters with higher productivity of algae and zooplankton, which are food sources for young-of-the-year (YOY) fish, including young bass. These zones also attract smaller-bodied forage fish that serve as a food source for adult fish.

Wetlands

- The change in summer/fall reservoir operating levels, while not truly representative of a natural hydrologic cycle, would provide seasonal variability within the reservoir and its terrestrial wetland perimeter, with shallow areas varying between wet and dry conditions throughout the year. These conditions are considered to represent a net positive impact, as compared to the existing, stable levels maintained year-round.

8.3 Impacts / Considerations Related to Cultural Screening Criteria

Traditional Land Uses / Indigenous Community or Reserve

- Consultation undertaken with local Indigenous communities throughout the Class EA process has not identified any specific concerns or any perceived negative or positive effects. Lacking such confirmation, this screening criteria has been assessed as having a neutral rating for potential effect. Should further consultation / engagement completed through the Class EA process and/or the project implementation yield new information (e.g., Stage 2 archaeology be deemed necessary), or previously unknown potential negative effects be identified, the approach will involve additional consultation / engagement and a collaborative approach to mitigation.

Riparian Uses & Recreational or Tourist Uses of a Water Body and / or Adjacent Lands

- The additional depth afforded by the reinstatement of seasonal stoplog operations should improve water access for users such as the privately held, active PTTW (for irrigation supply) on the west side of the reservoir and improve water access for recreational users such as canoers / kayakers, wildlife viewing, still water anglers, the community's annual carp derby, etc.

Archaeological Resources

- Should the preferred alternative impact any areas of archaeological potential, as identified in the Stage 1 archaeological assessment, complete the Stage 2 archaeological assessment (and if recommended Stage 3 and 4) as early as possible during detailed design and prior to any ground disturbing activities.
- Should previously undocumented (i.e., unknown, or deeply buried) archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the Ontario Heritage Act.
- The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the MCM should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.
- The preliminary implementation design includes minor in-water disturbances in/around the dam and spillway which will likely require the completion of a Marine Archaeological Checklist and associated discussions with MCM, and further archaeological assessment may be required.

Built Heritage Resources / Cultural Heritage Landscapes

- The Teeterville Dam and Truss Bridge Heritage Evaluation report (Stantec 2019) and Heritage Impact Assessment report (TMHC 2025) (Appendix F) document the requirement for, and results of, the assessment of built heritage and cultural heritage features within the Study Area and the potential for impact associated with the implementation of the preferred alternative. The conclusion as it relates to the concrete dam structure is that the anticipated design of the repair dam alternative will retain the location and general configuration of the spillway and earthen berm and therefore preserve the physical and historical linkages between the dam, the reservoir and Big Creek.
- Adding stability to the structure will also permit the reintroduction of dam operational infrastructure (e.g., an operator access platform and stoplog lifting equipment) atop the concrete structure, the detailed design of which could incorporate elements that speak to the heritage of the steel truss bridge that was removed in 2022 for safety reasons.

8.4 Impacts / Considerations Related to Socioeconomic Screening Criteria

Existing Infrastructure, Support Services, Facilities

- The additional depth afforded by the reinstatement of seasonal stoplog operations should provide additional flexibility in operational depth and potentially reduce maintenance requirements associated with the County's dry hydrant / emergency fire water supply intake.

Pedestrian Traffic Routes

- The reinstatement of access to the top of the dam for LPRCA staff and operational activities (i.e., stoplog removals / placements) provides an opportunity to replace public, pedestrian access to, and across, the dam area as well, should such be determined to be of interest. If considerations for access over and above that required for dam operations were desirable, the inclusion of such would serve to improve public pedestrian access to the area in a similar manner to that which existed historically.

However, it is industry-recommended practice and a common approach for dam owners to specifically implement measures to limit public interaction on/around water control structures given concerns over public safety and associated liability. Pedestrian access beyond that required for operational staff is not inherently required as part of the repair dam alternative's implementation. The assessment of desirability in this regard can/will be deferred to detailed design.

Property / Farm Accessibility

- As already discussed under riparian uses, the additional depth afforded by the reinstatement of seasonal stoplog operations should improve water access for users such as the privately held, active PTTW (for irrigation supply) on the west side of the reservoir.

8.5 Impacts / Considerations Related to Engineering/Technical Screening Criteria

Flood Risk in Ecosystem

- Improving the stability of the structure through the repair dam alternative inherently reduces flood risk through downstream reaches, as the risk of related failure and uncontrolled discharge is reduced.

Existing Structures

- The structural integrity of the dam will be improved through the implementation of the repair dam alternative, reducing but not eliminating the risk of dam failure.

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