



County of Middlesex

Environmental Study Report

Blacks Bridge Class Environmental Assessment

June 2022 – 20-3135





Notice of Completion

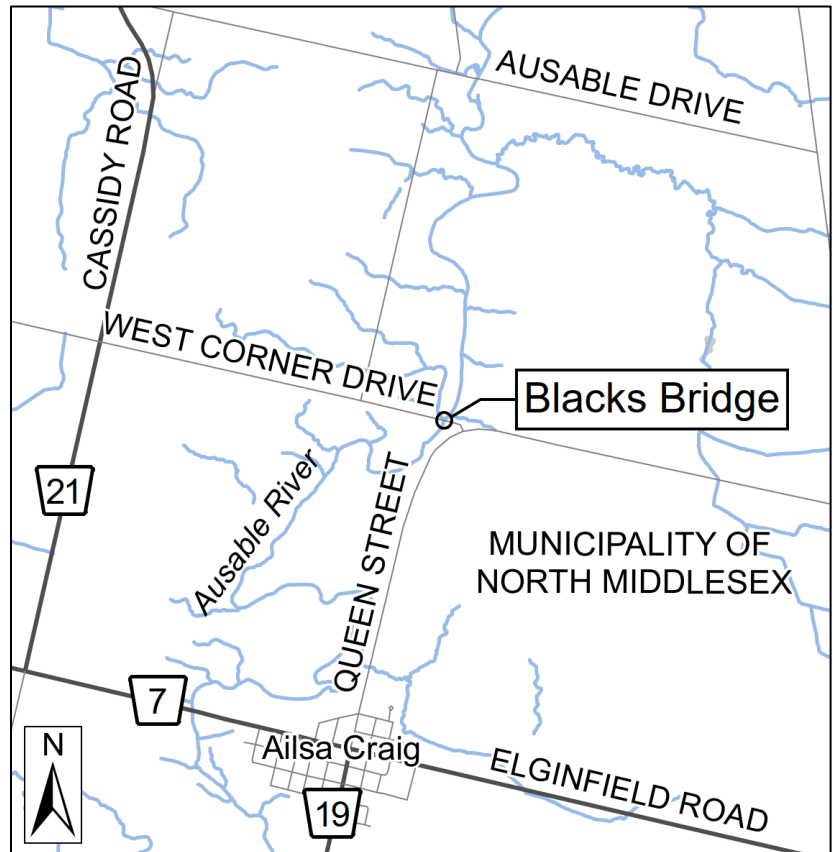


Class Environmental Assessment Study for Blacks Bridge

The County of Middlesex retained Dillon Consulting Limited to complete a Municipal Class Environmental Assessment (EA) study to determine the preferred long-term solution for the future use of Blacks Bridge. The existing bridge carries West Corner Drive over the Ausable River in the Municipality of North Middlesex, as shown on the map below. The bridge has been closed since September 2019 due to structural deficiencies.

The study is recommending Blacks Bridge be replaced with a new 44 metre (m) single span bridge on the same alignment as the existing bridge.

The study was completed in accordance with the planning and design process for Schedule 'C' projects under the Municipal Class EA (2000, as amended). An Environmental Study Report (ESR) is being made available for public review for a period of 30 calendar days in accordance with the requirements of the Municipal Class EA. The ESR documents the environmental assessment process completed, including the evaluation of alternatives, anticipated environmental impacts, mitigation measures, consultation completed throughout the study, and commitments for future work.



The ESR is available for review from **June 23, 2022, to July 25, 2022**, at the locations listed below during regular business hours, and online at:

www.middlesex.ca/departments/roads/environmental-assessments/blacks-bridge-survey.

North Middlesex Municipal Office

229 Parkhill Main Street
Parkhill, Ontario
N0M 2K0

Ailsa Craig Library

147 Ailsa Craig Main Street
Ailsa Craig, Ontario
N0M 1A0

If you have questions or comments regarding information provided in the ESR, please contact either of the following project team members no later than **July 25, 2022**.

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Dillon Consulting Limited
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Kitchener, Ontario, N2H 5G5
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If you have accessibility requirements, please contact one of the project team members listed above. Comments and information collected during the study will be used in accordance with the *Municipal Freedom of Information and Protection of Privacy Act* and *Access to Information Act*. With the exception of personal information, all comments will become part of the public record.

Section 16 Order (Aboriginal and Treaty Rights)

A request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e., requiring an individual/comprehensive EA), or that conditions be imposed (e.g., requiring further studies) only on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered.

Requests should include the requester contact information and full name. Requests should specify what kind of order is being requested (i.e., request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This information will allow the MECP to efficiently begin reviewing the request.

The request should be sent in writing or by email to the following contacts, and copied to the project team members listed above, no later than **July 25, 2022**.

**Minister of the Environment,
Conservation and Parks**

Ministry of Environment, Conservation and
Parks
777 Bay Street, 5th Floor
Toronto, Ontario
M7A 2J3
Email: Minister.MECP@ontario.ca

**Director, Environmental Assessment
Branch**

Ministry of Environment, Conservation and
Parks
135 St. Clair Ave. W, 1st Floor
Toronto, Ontario, M4V 1P5
Email: EABDirector@ontario.ca

Further information on requests for orders under Section 16 of the *EA Act* is available on the MECP website at:

<https://www.ontario.ca/page/class-environmental-assessments-section-16-order>

All personal information included in your request – such as name, address, telephone number, and property location – is collected under the authority of Section 30 of the *EA Act* and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the *Freedom of Information and Protection of Privacy Act* does not apply (Section 37). Personal information you submit will become part of a public record available to the general public unless you request that your personal information remain confidential.

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Acronyms, Abbreviations and Initialisms

ABCA	Ausable Bayfield Conservation Authority
CHER	Cultural Heritage Evaluation Report
cm	centimetre
CNWA	Canadian Navigable Waters Act
County	Country of Middlesex
DFO	Fisheries and Oceans Canada
Dillon	Dillon Consulting Limited
EA	Environmental Assessment
EASR	Environmental Activity and Sector Registry
ECA	Environmental Compliance Approval
e.g.	exempli gratia (for example)
ELC	Ecological Land Classification
ESR	Environmental Study Report
ext.	extension
FAC	Fisher Archaeological Consulting
ha	hectare
HEC-RAS	Hydrologic Engineering Center River Analysis System
HIA	Heritage Impact Assessment
HTLTC	Huron Tract Land Trust Conservancy
i.e.	id est (that is)
km	kilometre
m	metre
MECP	Ministry of the Environment, Conservation and Parks
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries

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NoA	Notice of Activity
OP	Official Plan
P.Eng.	Professional Engineer
PIC	Public Information Centre
RSS	retained soil system
SAR	Species at Risk
SARA	Species at Risk Act
SCC	Species of Conservation Concern
SWH	Significant Wildlife Habitat
TAC	Transportation Association of Canada
Tel	telephone number
TMHC	Timmins Martelle Heritage Consultants Inc.

Executive Summary

The County of Middlesex (County) retained Dillon Consulting Limited (Dillon) to complete a Class Environmental Assessment (EA) study for Blacks Bridge in the Municipality of North Middlesex, Ontario. The study was initiated in 2019 to determine the preferred long-term solution for the bridge, which is currently closed due to structural deficiencies. A Cultural Heritage Evaluation Report completed during the study determined that Blacks Bridge has cultural heritage value, and as a result the study was completed as a Schedule C project under the Municipal Class EA (2000, as amended).

Alternative solutions including bridge rehabilitation, replacement, or removal were considered. The objective was to find a solution that balances the needs and values of the local community with engineering considerations, cost, and protection of the environment. Through a comparative evaluation, replacement with a new bridge was identified as the preferred solution, largely due to the importance of creating an improved crossing that can be used by a range of vehicles. The study progress, evaluation, and preferred solution were presented at a virtual Public Information Centre (PIC) in May 2021 for public review and input. In general, comments received as part of the Public Information Centre supported bridge replacement. Concerns were raised regarding cultural heritage impacts and maintaining access to adjacent lands, which were responded to by the project team.

Following selection of the preferred solution, design options for the replacement bridge were developed, including a range of span lengths and three different substructure configurations. A comparative evaluation of the design options identified a 44 metre (m) single span bridge with vertical closed abutments and retaining walls as the preferred design option. Key advantages of this design include reduced impacts to the natural environment, reduced construction complexity and cost, and better incorporation of attributes of the existing bridge when compared to the other options. The evaluation and preferred design option were summarized in a project update newsletter that was distributed in March 2022 for public review and input. Comments received in response to the newsletter and follow-up consultation with impacted landowners were supportive of the proposed replacement approach.

The preliminary design of the replacement bridge provides for 3.25 m wide lanes in each direction, 1.0 m wide shoulders, and an overall paved deck width of 8.5 m, which accommodates agricultural vehicles and anticipated future traffic volumes. A 1.6 m profile grade (road height) raise on West Corner Drive is required at the west abutment to accommodate the new structure, which results in the need to acquire property surrounding the bridge. The property requirements for the project to expand the West Corner Drive right-of-way requires approximately 0.30 ha of additional property, including impacts to three private property owners in the vicinity of the bridge.

The preliminary bridge design is expected to increase the water surface elevation upstream of the bridge by approximately 0.25 m for the Regional Event (i.e., Hurricane Hazel). The higher upstream water surface elevation for the Regional Event results in a slight increase in the flood area for one property northwest of the bridge. The project team discussed the design, hydraulic impacts, and property requirements with the property owners, who did not express concerns with the proposed approach.

The preliminary bridge design includes attributes of the existing bridge, such as the single span configuration, full-height vertical abutments, and its use as a vehicular crossing. To mitigate the impact of removing a bridge with cultural heritage value, documentation of Blacks Bridge will be completed prior to removal, and a commemorative plaque or interpretive sign will be installed following construction of the replacement bridge.

No in-water work is anticipated to be required for the bridge replacement; however, work within the banks of the Ausable River has potential to require approval under the *Fisheries Act*. When design details are known, submission of a Request for Review to Fisheries and Oceans Canada is recommended to determine whether approvals/permits are required for the undertaking.

Timing windows and other requirements are recommended within this report to avoid/mitigate impacts to Species at Risk that have potential to occur within the area surrounding Blacks Bridge. Additional future studies, consultation, and anticipated permits/approvals are also identified within the report.

The bridge replacement is planned to begin in fall 2022 and be completed in 2023, subject to funding and approvals. The preliminary estimated construction cost is

\$2.6 million. The timing and details of construction will be refined during the future detailed design stage.

1.0

Introduction

Dillon Consulting Limited (Dillon) was retained by the County of Middlesex (County) to complete a Municipal Class Environmental Assessment (EA) study for Blacks Bridge in the Municipality of North Middlesex, Ontario. The study was completed as a Schedule C project under the Municipal Class EA (2000, as amended) and involved:

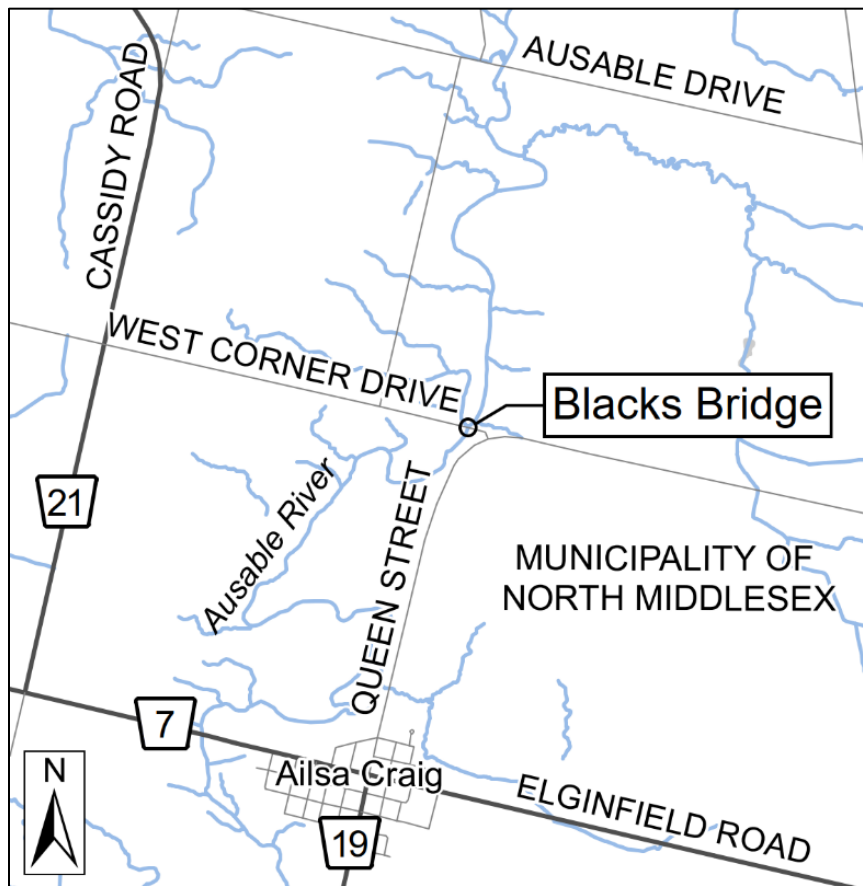
- Documenting the existing environmental conditions;
- Evaluating feasible alternative solutions to select a preferred solution for the crossing;
- Developing alternative design options for the preferred solution;
- Selecting the preferred design option and advancing it to a preliminary design level;
- Consulting with the public, stakeholders, Indigenous communities, and agencies throughout the study; and
- Preparing this Environmental Study Report (ESR).

The purpose of this ESR is to document the study process, potential project impacts, mitigation measures, and commitments for future work. This ESR has been made available for agency, Indigenous community, and public review and feedback.

1.1

Project Location

Blacks Bridge carries West Corner Drive across the Ausable River, approximately 2 kilometres (km) north of County Road 7 (Elginfield Road) in Ailsa Craig, as shown in **Figure 1**.

Figure 1: Project Location

1.2 Class Environmental Assessment Process

The Municipal Class EA (2000, as amended) outlines a streamlined EA process for municipal projects with relatively predictable environmental effects. Under the Class EA, projects are classified into one of four “Schedules” based on the type of work proposed and, for some projects, the anticipated construction costs. The classification of the project determines the planning and design process that is required under the Class EA.

The full planning and design process under the Class EA is illustrated in **Figure 2**, and includes the following five phases:

- Phase 1 – Identify the problem/opportunity to be addressed;
- Phase 2 – Evaluate alternative solutions to address the problem/opportunity;
- Phase 3 – Develop and evaluate alternative design options for the preferred solution;

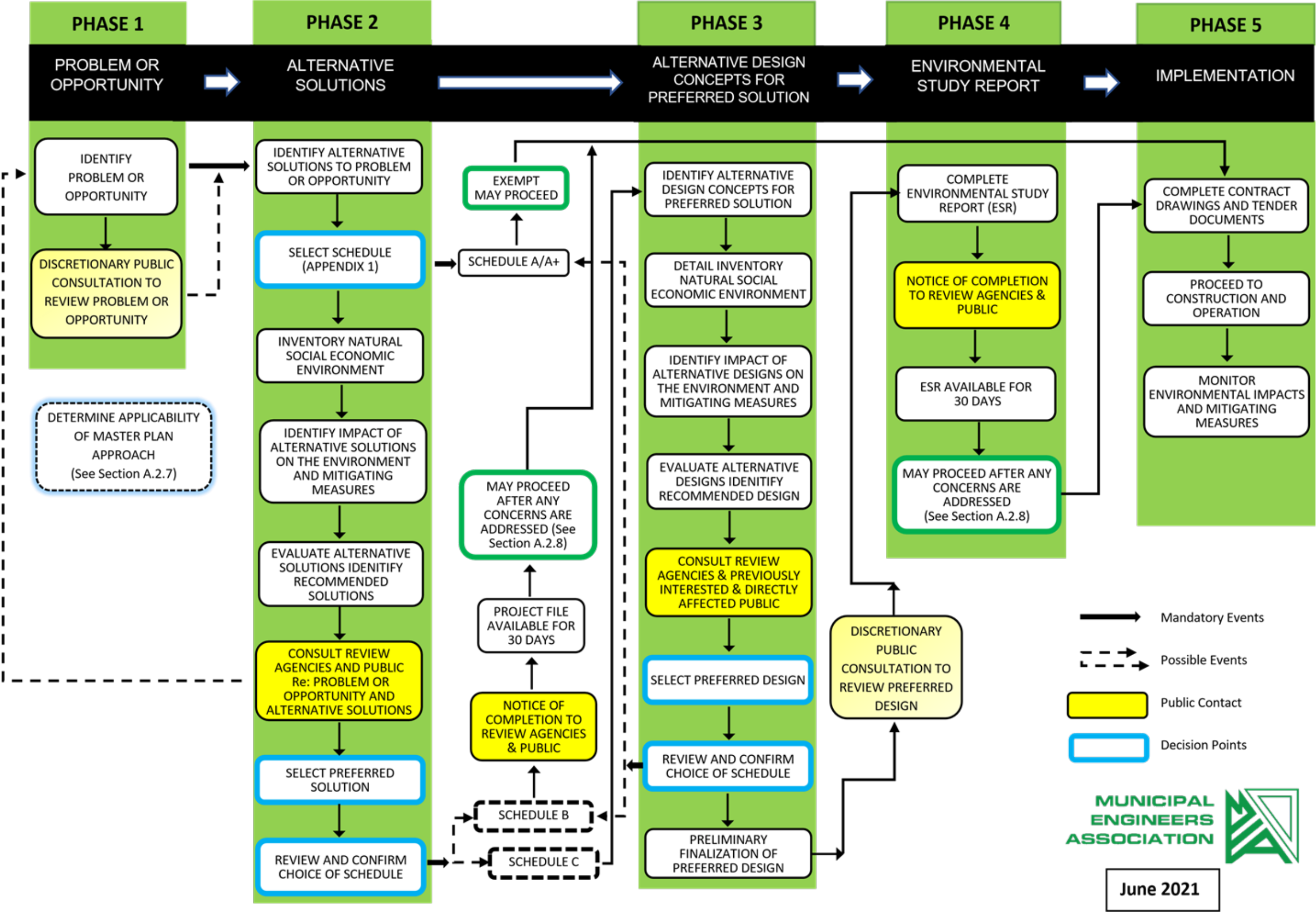
- Phase 4 – Document the study in an ESR; and
- Phase 5 – Implement the project (detailed design, construction, and environmental monitoring).

Schedule A projects are generally minor operational and upgrade activities with minimal environmental effects, and are pre-approved (i.e., they can proceed to implementation without following the planning and design process set out in the Class EA). Schedule A+ projects are limited in scale, have minimal adverse environmental impacts, and require no documentation; however, the public is to be advised of the project prior to implementation.

Schedule B projects generally have a greater potential for environmental impacts, and are required to proceed through the first two phases of the Class EA planning and design process prior to implementation. Proponents must identify and assess alternative solutions to the problem, inventory impacts, and select a preferred solution. They must also contact relevant agencies and affected members of the public. Following completion of Phase 2 and publishing of the project file for public review, the project may proceed to detailed design and construction (Phase 5) as long as there are no outstanding concerns.

Schedule C projects require more detailed study, public consultation, and documentation, as they generally have greater potential for impacts. Projects categorized as Schedule C must proceed through all 5 phases of the planning and design process, including an additional opportunity for public review of the evaluation of design options (Phase 3), and publication of an ESR for public review.

Figure 2: Municipal Class EA Planning and Design Process



Source: Municipal Class EA (2000, as amended)

1.2.1 Project-Specific Study Process

This study was initiated as a Schedule B project; however, it was later changed to Schedule C due to the heritage potential of the bridge as identified in a Cultural Heritage Evaluation Report (**Appendix D**) completed by ASI as part of the study. As a Schedule C project, this study proceeded through Phases 1 through 4 of the planning and design process depicted in **Figure 2**. The study process is summarized in this section; additional details are provided throughout this report.

In accordance with the process for Schedule C projects, the following activities were completed as part of the study:

- A Notice of Study Commencement was issued on August 20, 2020;
- A problem and opportunity statement was developed for the study;
- Alternative solutions were developed and evaluated to identify the preferred solution;
- A Virtual PIC was held on May 19, 2021, to provide an overview of the study, present the evaluation undertaken to identify the preferred solution, and gather feedback;
- Design options for the preferred solution were developed and evaluated to identify the preferred design option;
- A project update newsletter was issued on March 10, 2022, to present information and gather feedback on the evaluation and identification of the preferred design option; and
- Preliminary design and impact assessment were completed.

The preparation and filing of this ESR completes the planning and preliminary design stage of the project. This ESR is being made available for public, Indigenous community, and agency review for 30 calendar days. Following completion of this study, the project will proceed to detailed design and construction.

1.2.2 Section 16 Order (Aboriginal and Treaty Rights)

A request can be made to the Ministry of the Environment, Conservation and Parks (MECP) for a Section 16 Order under the *EA Act*. A Section 16 Order requires a project to complete a higher level of study (i.e., an individual/comprehensive EA), or imposes conditions (e.g., requiring further studies). A Section 16 Order can only be sought on the

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grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered.

Further information on Section 16 Order requests is provided in the Notice of Completion, a copy of which is included following the cover page of this report.

2.0

Project Need and Justification

2.1

Structure Inspection and Evaluation

On September 5, 2019, Dillon carried out a visual inspection of the bridge at the request of the County due to concerns about its condition. Following Dillon's preliminary recommendations, the County closed the bridge to vehicular traffic and pedestrians. Further details on the inspections and findings are provided in **Section 4.1**.

Figure 3: Photo of Blacks Bridge, Facing West



2.2

Problem and Opportunity Statement

The problem and opportunity statement for this Class EA study is as follows:

“Blacks Bridge is currently closed to vehicular and pedestrian traffic due to structural deficiencies, resulting in access impacts and increased travel distances to cross the Ausable River. An opportunity exists to evaluate long-term solutions for the water crossing including opportunities to repair the existing bridge, replace it with a new bridge, or remove it from service entirely without replacement. The long-term solution and design should balance the needs and values of the local

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community with engineering considerations, cost, and protection of the natural and cultural environment.”

3.0

Consultation

This section summarizes consultation with agencies, Indigenous communities, and the public that was completed throughout the study. Input was considered by the project team and incorporated into the decision-making process. Copies of consultation materials are included in **Appendix A**.

3.1

Project Contact List

The project contact list includes a total of 624 contacts, from the following groups:

- The local Councillor;
- Provincial Ministries;
- Municipal staff;
- Ontario Provincial Police;
- Local emergency services (fire and emergency medical services);
- Ausable Bayfield Conservation Authority;
- Indigenous communities;
- Local school boards;
- Student transportation services;
- Other local agencies and interest groups; and
- Local property owners.

The contact list was updated throughout the EA based on feedback received, with parties who submitted comments or requested to be kept informed of the project added.

3.2

Notice of Study Commencement

A Notice of Study Commencement was developed to introduce the project and provide information about the study process to members of the public, Indigenous communities, and other stakeholders. The Notice also included a link to a public survey that was advertised and made available on the County website, as described in **Section 3.2.2**.

The Notice of Study Commencement was circulated on August 20, 2020, as follows:

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- Dillon emailed the Notice to project contact list;
- The County mailed the Notice to residents in the area surrounding the bridge; and
- The Notice was published in the London Free Press.

Four general comments were received via email and telephone regarding the Notice of Study Commencement. The comments included requests to be added to the contact list, requests for additional time to provide input, confirmation of no comments, and information on assessing natural features. Responses were provided by the project team as required.

3.2.1 Community Petition

On September 24, 2020, the project team received a petition signed by 308 members of the surrounding community. The petition called for the County to either repair or replace the bridge. Issues related to economic strain, transportation needs, emergency response times, winter maintenance, ease of access, and community events were listed to highlight the importance of the crossing.

3.2.2 Public Survey

The public survey was open from August 20, 2020, to September 10, 2020, at www.middlesex.ca/blacks-bridge-survey, and a hard copy was made available upon request. The purpose of the survey was to understand how Blacks Bridge and Ausable River have historically been used, and what ideas exist in the community for its long-term need and functionality. The survey included questions that inquired about the type of people who used the bridge, reasons they used it, how they use Ausable River in the area, and how they have been impacted by the bridge closure.

A total of 263 survey responses were received online or by mail. In general, respondents were local residents, landowners, or business owners/operators who use Blacks Bridge and/or Ausable River and prefer for the bridge to be replaced with a new two-lane vehicular bridge. Respondents identified the primary use of the bridge as vehicular transportation for general day-to-day purposes, with cycling/walking/recreational use slightly less common. Commuting and agricultural use were also identified by some respondents, with a number of respondents providing comments about the importance

of the bridge for agricultural use. Recreational uses of Ausable River including canoeing, kayaking, and fishing were identified by a number of respondents.

The following observations from the Notice of Study Commencement and public survey were carried into subsequent evaluation and impact assessment:

- The crossing was identified as important for transportation related to agricultural operations in the area. Respondents noted Blacks Bridge was used to travel between farms on both sides of the Ausable River, to transport crops to Alisa Craig, Nairn, and Denfield, to access commercial/agricultural related operations in Ailsa Craig, and to access equipment storage located on Queen Street south of the bridge;
- Public opinion indicates Blacks Bridge is important for connectivity and vehicular and active transportation in the area, and is used for transportation into Ailsa Craig and surrounding towns;
- Residents indicated the area surrounding the Ausable River experiences flooding and Blacks Bridge acts as an alternative route when Ausable Drive and Drummond Road are flooded;
- Blacks Bridge is seen as an important location for recreation (walking and cycling) and for accessing nature, wildlife, and activities such as fishing, canoeing, and kayaking on the Ausable River;
- Some survey respondents perceive Blacks Bridge as having historical and cultural value; and
- There are concerns regarding travel times for emergency vehicles if Blacks Bridge is closed.

3.3 Virtual Public Information Centre

A Virtual Public Information Centre (PIC) was held over Zoom on May 19, 2021. The purpose of the PIC was to provide an overview of the study and existing conditions, present the alternative solutions considered, identify the preferred solution, and collect input. The preferred solution was identified to be replacement of the bridge with a new bridge. Details on the evaluation of alternative solutions, and the preferred solution to replace Blacks Bridge are provided in **Section 5.0**.

The Notice of Virtual PIC was distributed as follows:

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- May 6, 2021 – Dillon mailed the Notice to non-email contacts on the project contact list;
- May 7, 2021 – Dillon emailed the Notice to email contacts on the project contact list;
- May 7, 2021 – The Notice was published in the London Free Press; and
- May 7, 2021 – The County updated its website with the Notice and a link to register for the virtual PIC.

The PIC was attended by 25 individuals. The event included a presentation delivered by Dillon, followed by a question and answer session. A total of 11 questions were posed to the project team during the PIC, and three comments were received after the event. Comments received during and after the PIC, and project team responses, are summarized in **Table 1** and **Table 2**.

Table 1: Comments and Responses during the Virtual PIC

Contact	Date Received	Comments	Project Team Response
Member of the Public	May 19, 2021	Inquired about whether the Cultural Heritage Evaluation Report and traffic reports will be posted to the project website.	<ul style="list-style-type: none"> • Noted technical studies will be included as part of the ESR for public review • Offered to respond to specific questions in advance.
Member of the Public	May 19, 2021	Asked whether the traffic study was conducted prior to or during the COVID-19 pandemic.	<ul style="list-style-type: none"> • Traffic conditions were reviewed before the bridge was closed, which was prior to the pandemic.
Member of the Public	May 19, 2021	Asked whether replacement is preferred by the local community or throughout the county.	<ul style="list-style-type: none"> • Provided details on engagement completed, noting comments were received from residents in close proximity as well as

Contact	Date Received	Comments	Project Team Response
			<p>residents from other parts of Middlesex County</p> <ul style="list-style-type: none"> Noted the preferred solution was identified based on the technical evaluation and feedback received through the public survey.
Member of the Public	May 19, 2021	Asked whether the existing bridge can be relocated.	<ul style="list-style-type: none"> Noted that the Heritage Impact Assessment will help to determine what should be done with the bridge.
Member of the Public	May 19, 2021	Asked whether anything can be done to facilitate current pedestrian use of the bridge.	<ul style="list-style-type: none"> Provided details on the safety concerns associated with the current bridge Acknowledged the challenges associated with the bridge closure, but explained safety is the main concern and cannot allow for any use.
Member of the Public	May 19, 2021	Asked for a date of completion, and why the replacement was delayed.	<ul style="list-style-type: none"> Explained that required studies (heritage, Species at Risk, etc.) impacted the project timing but that the money is earmarked in the County budget for the replacement to be built Noted Schedule C EA projects are a long process.

Contact	Date Received	Comments	Project Team Response
Member of the Public	May 19, 2021	Asked if the replacement bridge would be in the same location.	<ul style="list-style-type: none"> Advised that using the existing bridge footprint is generally the preferred option, but will require more research in the next phase of the study.
Member of the Public	May 19, 2021	Asked what can be done to stop people from currently using the bridge, and to increase safety before the bridge is replaced.	<ul style="list-style-type: none"> Reiterated that people should not be using the bridge because it is unsafe County will take additional measures to block access to the bridge.
Member of the Public	May 19, 2021	Asked if the removal of the wingwalls can cause safety issues, as people are still using the bridge.	<ul style="list-style-type: none"> Stability of the wingwalls is not a major concern, but the concrete supports are significantly deteriorated below the truss and could suddenly fail without warning. Reiterated that pedestrians and vehicles should not be entering the bridge.
Member of the Public	May 19, 2021	Inquired if the wingwalls could be replaced with concrete barriers, instead of the snow fence currently being used.	<ul style="list-style-type: none"> The County will be investigating and taking additional protective measures to address safety concerns.

Table 2: Comments and Responses Following the Virtual PIC

Contact	Date Received	Comments	Project Team Response
Member of the Public	May 13, 2021	Expressed support for replacement with a new bridge.	<ul style="list-style-type: none"> These comments have been noted by the project team.
Kate Monk, Huron Tract Land Trust Conservancy/Ausable Bayfield Conservation Authority	June 1, 2021	Affirmed that the bridge provides an important connection between two halves of a property owned by Huron Tract Land Trust Conservancy/Ausable Bayfield Conservation Foundation and that this connection needs to be considered in the construction process to allow for continued access to the property.	<ul style="list-style-type: none"> These comments have been noted by the project team and will be considered as we proceed with the next phase of the study There may be temporary access disruptions during construction within the work area; however, the design team will work with the County to explore potential options to avoid or mitigate impacts.
Member of the Public	June 4, 2021	Stated that Blacks Bridge should be rehabilitated as a pedestrian bridge due to its heritage value and that if rehabilitation was not the selected alternative, a similar design and bridge preservation or commemoration should be sought.	<ul style="list-style-type: none"> These comments have been noted by the project team Our analysis and public consultation to date indicates that usability of the bridge for agricultural and other vehicles is important to the surrounding community In the next phases of this study, bridge design and

Contact	Date Received	Comments	Project Team Response
			evaluation, as well as a Heritage Impact Assessment, will be completed and mitigation measures will be developed based on the results.

3.4 Project Update Newsletter

Following the evaluation of design options for the replacement bridge, a newsletter was circulated to provide an update about the project and to seek input on the evaluation of alternative design options. Further details regarding anticipated impacts of the preferred design option were provided to impacted property owners, as described in **Section 3.4.1**.

The newsletter outlined the design options and the comparative evaluation which identified Option 2A, a 44 m single span bridge with vertical closed abutments and retaining walls, as the preferred design option. Further details on the evaluation are provided in **Section 6.0**. A conceptual design of the preferred design option and a summary of next steps for the project were included in the newsletter.

The newsletter was distributed on March 10, 2022, as follows:

- Dillon emailed and mailed the newsletter to project contact list;
- The County posted the newsletter to its website; and
- The Municipality of North Middlesex posted the newsletter to its website and Facebook page.

To date, one comment has been received in response to the newsletter. Comments received and project team responses are summarized in **Table 3**.

Table 3: Newsletter Comments and Responses

Contact	Date Received	Comments	Project Team Response
Member of the Public	May 19, 2021	Expressed support for the bridge replacement and asked whether the new bridge will accommodate large farm equipment.	<ul style="list-style-type: none"> • The proposed design should accommodate agricultural vehicles. Since traffic volumes on West Corner Drive are low, agricultural equipment should be able to use the entire bridge with any opposing traffic waiting for them to cross. • The proposed design does not include vertical clearance restrictions. • The County will monitor the traffic situation and can erect signage or other measures to keep travel safe for all bridge users.

3.4.1**Landowner Consultation**

The bridge replacement is expected to impact lands owned by the Municipality of North Middlesex, the Huron Tract Land Trust Conservancy (HTLTC), and two private property owners. In addition to land acquisition requirements, one of the private property owners is also impacted by slightly greater flood area due to the higher upstream water surface elevation for the Regional Event (**Section 8.3**). The project update newsletter was sent to each of the impacted landowners along with a cover letter and drawings detailing the anticipated property impacts. An invitation to reach out to the project team for a virtual meeting was included in each of the cover letters.

The project team met virtually with the Municipality of North Middlesex on March 16, 2022. Dillon provided an overview of the project, anticipated property impacts on the

Municipality lands surrounding the bridge, and ongoing consultation with other stakeholders. The Municipality agreed with the proposed approach and did not express concerns about the property impacts.

The project team met virtually with the HTLTC on March 24, 2022. Dillon provided an overview of the project and anticipated property impacts on HTLTC lands surrounding the bridge. The HTLTC expressed support for the project, and noted they wish to establish a small parking lot on their lands on the west side of the Ausable River. The project team suggested it would consider the possibility of creating a lay-down area for construction materials on the west side, which could be repurposed into a HTLTC parking lot in the future.

The project team had a telephone conversation with the impacted private property owner with land to the north side of Blacks Bridge (both to the east and west of the Ausable River) on May 13, 2022. Dillon provided an overview of the project and anticipated private property impacts on lands surrounding the bridge. The property owner expressed support for the project, and advised he had no concerns with the proposed approach or impacts to his property as the required lands are not farmed.

The project team met virtually with the impacted private property owners with land northwest of Blacks Bridge on May 30, 2022. Dillon provided an overview of the project, anticipated private property impacts on lands adjacent to West Corner Drive, and hydraulic impacts pertaining to the Regional Event. The property owners expressed support for the project, and advised they had no concerns with the proposed approach or impacts to their property.

3.5

Consultation with Indigenous Communities

Representatives from the following Indigenous communities were included in the contact list and received all Notices issued throughout the study as well as the project update newsletter:

- Chippewas of the Thames First Nation;
- Chippewas of Kettle & Stony Point First Nation;
- Oneida Nation of the Thames;
- Caldwell First Nation;

- Delaware Nation (Moravian of the Thames);
- Chippewas of Aamjiwnaang;
- Métis Nation of Ontario;
- Munsee-Delaware Nation;
- Walpole Island First Nation; and
- Southern First Nation Secretariat.

Dillon placed telephone calls with each Indigenous community listed above following circulation of each of the Notices and the project update newsletter. During the course of the study, Dillon spoke with representatives of each of the communities except Chippewas of the Thames First Nation, with which voicemail messages were left. Correspondence from Indigenous communities included requests to add individuals to the contact list or change contact information, and confirmation that the community had no comments regarding the project. No comments or concerns were received from Indigenous communities regarding the project. Records of all communications with Indigenous communities are provided in **Appendix A**.

3.5.1 Archaeological Assessment

As part of ongoing archaeological assessment work for the project, Fisher Archaeological Consulting (FAC) contacted the following Indigenous communities to inquire about what level of involvement they wish to have:

- Chippewas of the Thames First Nation
- Caldwell First Nation
- Munsee-Delaware Nation.

To date, Chippewas of the Thames First Nation and Caldwell First Nation have expressed interest in providing field monitors for the Stage 2 Archaeological Assessment which is planned for spring/summer 2022. No response was received from Munsee-Delaware Nation.

4.0

Existing Conditions

This section summarizes the existing conditions of Blacks Bridge and the surrounding area as they relate to the study. Existing conditions were considered in the evaluation documented in **Section 5.0** and **Section 6.0**, and the impact assessment in **Section 8.0**.

4.1

Structural

Blacks Bridge is a single span through truss (Pratt) bridge with a span of approximately 35 m, constructed in 1912.

Following concerns identified by the County, Dillon carried out a visual inspection of the bridge on September 5, 2019, to review deterioration at the east abutment and to provide a high-level review of the general condition of the structure. The review identified structural issues that, if left unrepaired, could potentially result in a localized failure of the ends of the bridge deck at both abutments. Following Dillon's preliminary recommendations, the County closed the bridge to vehicular traffic and pedestrians.

Figure 4: Photo of Corroded Beam on Blacks Bridge



Figure 5: Photo of Corroded Joint on Blacks Bridge



Dillon conducted a subsequent visual inspection on October 16, 2020. Key findings of the structural inspections included light to very severe deterioration, corrosion, and rust jacking as well as a bent diagonal member on the north truss.

Details on the scope of rehabilitation that would be required to address the above deficiencies are provided in **Section 5.1.1**.

4.2 Hydrology

Dillon modelled the existing hydrological conditions of the Ausable River at Blacks Bridge using the Hydrologic Engineering Center River Analysis System (HEC-RAS). Existing conditions were modelled based on topographic survey data and information received from the Ausable Bayfield Conservation Authority (ABCA).

The hydrological conditions were modelled for a range of storm events including the Regional Event, which is used to define floodplain extents in the area where Blacks Bridge is located. In this location, the Regional Event is Hurricane Hazel, a historic storm that resulted in 2.3 times the water flow volume of the 1-in-100-year storm event.

Based on the existing bridge opening and the height of West Corner Drive, the Regional Event flood level overtops the roadway on West Corner Drive to the west of the bridge by 1.60 m at the low point. The current design standards indicate the maximum permitted depth of flow over the roadway as relief flow at water crossings is 0.3 m.

Flooding of surrounding roadways (Ausable Drive and Drummond Road) was also identified by local residents (**Section 3.2.2**).

4.3 Natural Environment

This section summarizes existing natural environment conditions surrounding Blacks Bridge. More detailed information is provided in the Natural Environment Summary Memo (Dillon, March 2022; **Appendix B**).

A Study Area of 120 m surrounding the bridge was used for the natural environment review (**Figure 6**). Existing conditions were identified based on a review of background information and a September 28, 2021, field visit. The field visit consisted of Ecological

Land Classification (ELC), a single-season vegetation inventory, and an aquatic habitat assessment.

The Study Area surrounding Blacks Bridge and the Ausable River consists of forests/woodlands, marsh, swamp, meadow, and agricultural fields (**Figure 7**). Ecological constraints and opportunities within the Study Area are illustrated in **Figure 8**. Key constraints are summarized in the following sections and anticipated impacts, including opportunities for positive impacts, are discussed in **Section 8.1**.

4.3.1 Terrestrial Ecosystems

The woodlands within the Study Area are designated as Significant Woodlands within both the Middlesex County Official Plan (OP; Schedule C) and the Municipality of North Middlesex OP (Schedule C) due to their proximity to a watercourse. The Municipality of North Middlesex OP also identifies Hazard Lands within the Study Area on both sides of the Ausable River.

Figure 6: Natural Environment Study Area



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



MIDDLESEX COUNTY
BLACKS BRIDGE NATURAL
ENVIRONMENT SUMMARY

NATURAL ENVIRONMENT STUDY AREA
FIGURE 6

- Study Area
- Blacks Bridge
- Waterbody
- Watercourse



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: ZJB
MAP CHECKED BY: KM
MAP PROJECTION: NAD 1983 UTM Zone 17N

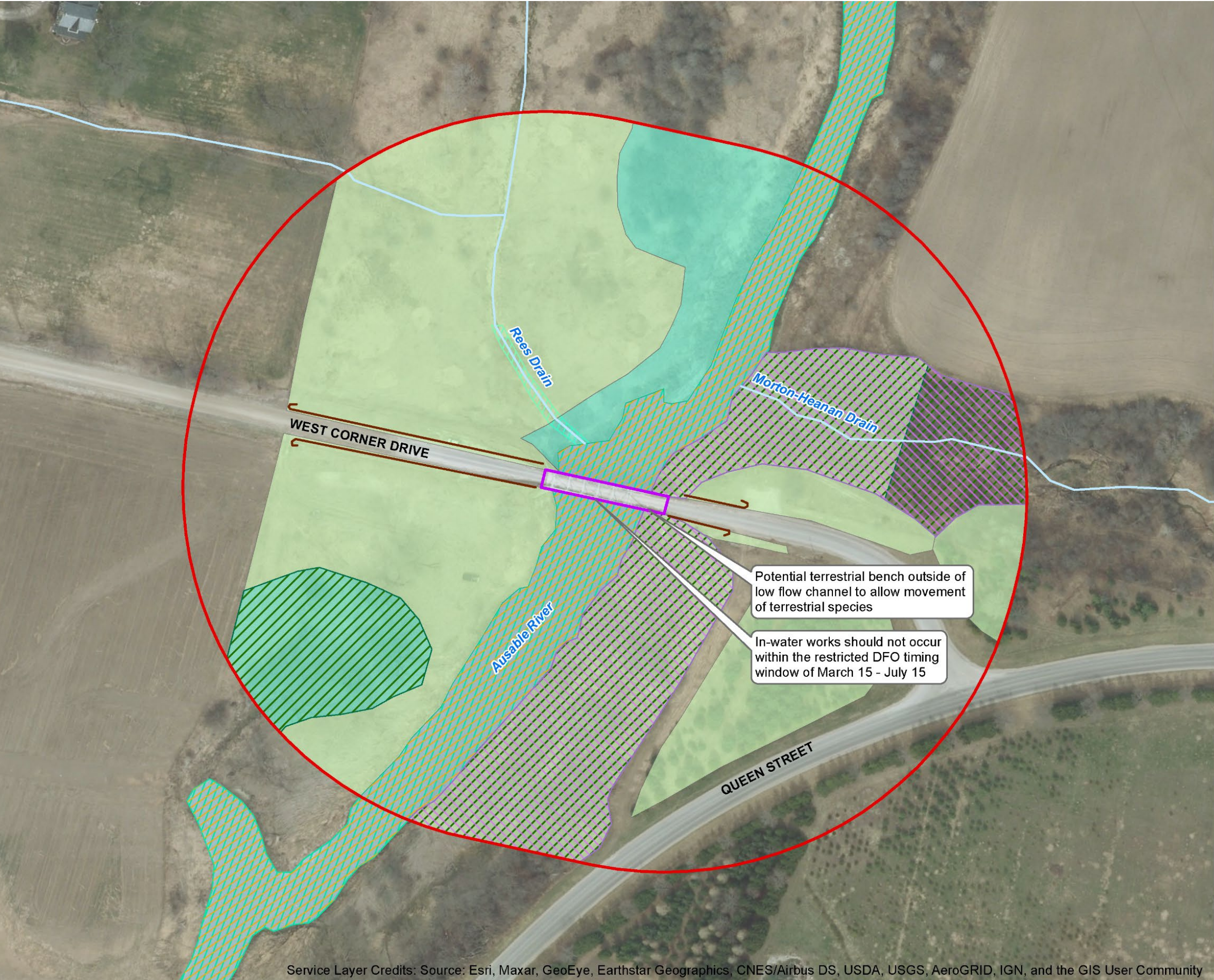


PROJECT: 20-3135
STATUS: DRAFT
DATE: 2021-11-04

Figure 7: Vegetation Communities



Figure 8: Ecological Constraints and Opportunities



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



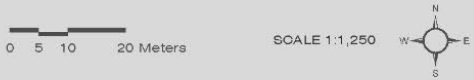
MIDDLESEX COUNTY
BLACKS BRIDGE NATURAL
ENVIRONMENT SUMMARY

**ECOLOGICAL CONSTRAINTS
AND OPPORTUNITIES**
FIGURE 8

- Study Area
- Blacks Bridge
- Potential Wildlife Fencing
- Potential Restoration Area
- Unevaluated Wetlands
- Significant Woodlands
- DFO Species at Risk Critical Habitat
- DFO Aquatic SAR and SCC
- Waterbody
- Watercourse

**Candidate Significant Wildlife
Habitat**

- Turtle Wintering Areas and SCC Turtle Habitat
- Eastern Wood-Pewee



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: ZJB
MAP CHECKED BY: KM
MAP PROJECTION: NAD 1983 UTM Zone 17N



PROJECT: 20-3135
STATUS: DRAFT
DATE: 2021-11-04

The following potential Species at Risk (SAR) habitat was identified within the Study Area through background review, and investigated during the field visit:

- Barn Swallow (Threatened) have the potential to nest under the existing bridge. No Barn Swallow nests were observed; however, a Cliff Swallow nest was observed on the bridge;
- Butternut (Endangered) are often found within open deciduous forests or along forest edges. No Butternut trees were observed; and
- SAR bats have the potential to occur within the wooded areas of the Study Area. However, the forests within the Study Area contain trees that are small in size with no obvious cavity/snag trees observed during the survey. As such, the Study Area is not considered suitable roosting habitat for bats, including SAR bats.

Based on the habitat observed during the site reconnaissance survey, the following were identified as candidate Significant Wildlife Habitat (SWH):

- Turtle Wintering Areas – the open water of the Ausable River;
- Special Concern and Rare Wildlife Species:
 - Eastern Wood-pewee (Special Concern) – suitable habitat within the FOD7-4 and FOD7 communities;
 - Northern Map Turtle (Special Concern) – suitable habitat within the Ausable River;
 - Snapping Turtle (Special Concern) – suitable habitat within the Ausable River; and
 - Eastern Milksnake (S3) – suitable habitat within the farmland and meadows.

4.3.2 Fish and Fish Habitat

The Ausable River at Blacks Bridge is a permanent river that flows south-west, emptying into Lake Huron. Within the Study Area, Ausable River is identified by Fisheries and Oceans Canada (DFO) as potential habitat for aquatic SAR and Species of Conservation Concern (SCC). Although no SAR occurrences were observed during the site reconnaissance survey, potentially suitable habitat for the following aquatic SAR was observed:

- Black Redhorse (Critical Habitat, *Species at Risk Act* [SARA]);

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- Eastern Sand Darter;
- Kidneyshell (Critical Habitat, SARA);
- Snuffbox (Critical Habitat, SARA);
- Northern Riffleshell (Critical Habitat, SARA);
- Wavy-rayed Lampmussel.

Additionally, based on background review, the following SCC fish have the potential to occur in the Ausable River within the Study Area:

- Rainbow (Special Concern);
- River Redhorse (Special Concern);
- Northern Sunfish (Special Concern); and
- Grass Pickerel (Special Concern).

4.4 Socio-Economic Environment

4.4.1 Land Use

This section summarizes a review of the existing and designated/planned land uses surrounding Blacks Bridge. OP Schedules referred to in this section are included in **Appendix C**.

Blacks Bridge carries West Corner Drive east-west over the Ausable River in the Municipality of North Middlesex. A rural residential area is located approximately 200 m south of the bridge on Queen Street. Ailsa Craig, the nearest urban settlement, is located approximately 2 km south of the bridge. Ailsa Craig is made up of a small commercial main street along County Road 7, with surrounding residential areas that are primarily suburban with single detached dwellings.

Lands surrounding Blacks Bridge are primarily agricultural, and are designated for agricultural use in both the County of Middlesex OP (1997; Schedule A) and the Municipality of North Middlesex OP (2004; Schedule A). The intent of these designations is to protect and strengthen agricultural operations in the area.

Lands south of Blacks Bridge on both sides of the Ausable River are designated “Urban Reserve Area” in the Municipality of North Middlesex OP (Schedule A). This designation is intended to serve as a buffer between Urban Settlement Areas and agricultural areas,

and also protect for future expansion of Urban Settlement Areas beyond the 20-year horizon of the OP. Prior to its closing, Blacks Bridge served as a connection between these potential future urban areas across the Ausable River.

As noted in **Section 4.3.1**, lands adjacent to Blacks Bridge, and to the south, are also designated natural heritage/natural resource features. Specifically, lands directly east and southwest of the bridge are designated “Significant Woodlands” in the Middlesex County OP (Schedule C) and “Woodlands” in the Municipality of North Middlesex OP (Schedule C). Both plans call for protection of these areas.

Lands further south are designated “Aggregate Resource Area” in the Middlesex County OP (Schedule C) and “Mineral and Aggregate Resources” in the Municipality of North Middlesex OP (Schedule C). These designations indicate potential for future aggregate development in the area.

West Corner Drive is designated a “Local Road” in Schedule B of the Municipality of North Middlesex OP. Local Roads generally carry lower volumes of local traffic and provide access to abutting properties.

According to information from the Municipality of North Middlesex, there is 1 active residential development application in the surrounding area, at 92 Queen Street (approximately 1.7 km south of Blacks Bridge in Ailsa Craig). A Draft Plan of Subdivision including 8 single-detached dwellings and a block reserved for future medium density residential development was approved on November 12, 2019.

Blacks Bridge is located within an area regulated by the Ausable Bayfield Conservation Authority (ABCA).

Ontario Regulation 147/06 states that a permit from ABCA is required for development in the area.

Information on the ABCA website indicates “filling, construction, or altering of watercourses” may require a permit from ABCA.

4.4.2 Source Water Protection

The Ausable Bayfield Source Protection Plan (2015) was reviewed to identify applicable source protection policies at the project location. Blacks Bridge is not located within a wellhead protection area, Intake Protection Zone, or Highly Vulnerable Aquifer.

4.4.3 Navigability

The Ausable River is not included on the list of Scheduled Waters under the *Canadian Navigable Waters Act* (CNWA). However, through public consultation, it was identified that the Ausable River is used for recreational canoeing and kayaking in the vicinity of Blacks Bridge. As a result, the Ausable River in this area has been identified as a navigable waterway for the purposes of the CNWA.

Figure 9: Photo of Blacks Bridge from Ausable River



4.5 Cultural Resources

4.5.1 Heritage

A Cultural Heritage Evaluation Report (CHER) was completed in September 2020 by Timmins Martelle Heritage Consultants Inc. (TMHC). The CHER concluded that Blacks Bridge has cultural heritage value. Specifically, the bridge was found to meet the *Ontario Regulation 9/06* criteria for identification as a heritage property on the basis of its design/physical value and historical/associative value.

The CHER was subsequently combined with a Heritage Impact Assessment (HIA), the results of which are summarized in **Section 8.9**. The combined CHER/HIA (TMHC, March 2022) is included in **Appendix D**.

4.5.2 Archaeology

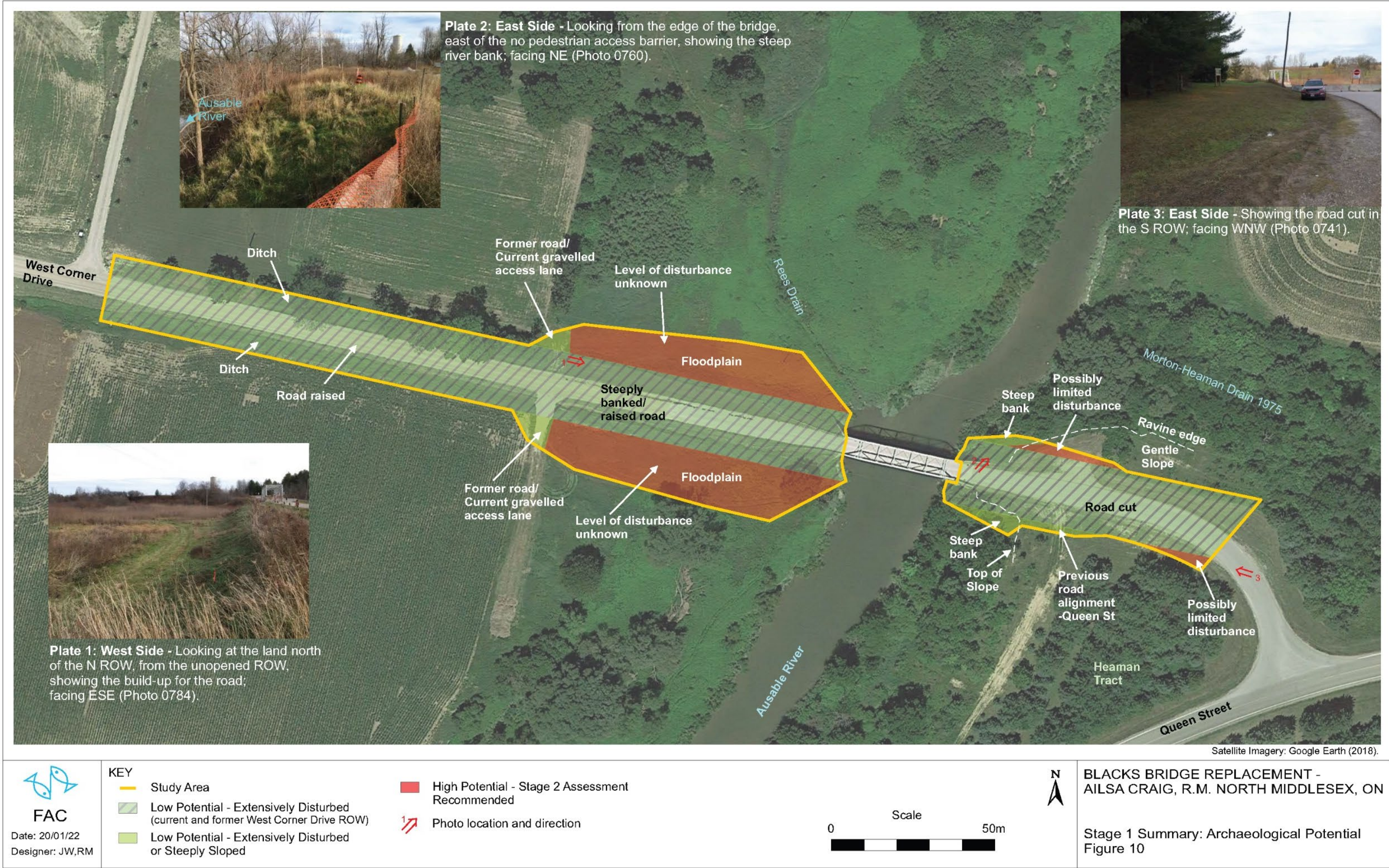
A Stage 1 Archaeological Assessment was completed by FAC in January 2022. The Study Area and the results of the assessment are depicted in **Figure 10** and summarized below.

Due to the site location on the banks of the Ausable River and the presence of nearby archaeological sites, the Study Area generally has a high potential for Indigenous and Euro-Canadian archaeological resources. No registered archaeological sites were identified within proximity to the Study Area; however, a previous archaeological study approximately 150 metres to the east recovered a projectile point.

Portions of the Study Area have previously been extensively disturbed due to construction, primarily related to the bridge and changing roadway alignments over time. These areas do not retain archaeological potential.

Areas where no disturbance has been documented or the level of disturbance could not be confirmed visually during the Property Inspection retain high archaeological potential. These areas include most of the floodplain on the west side of the river, as there is potential for buried deposits below any surface disturbance.

Figure 10: Stage 1 Archeological Assessment Results



5.0 Assessment of Alternative Solutions

This section documents the alternative solutions that were identified and evaluated as part of Phase 2 of the Class EA process.

5.1 Alternative Solutions

Alternative solutions represent planning options for addressing the identified problems and opportunities. The following alternative solutions were identified for this study:

- Do nothing;
- Alternative 1A: Rehabilitate the Bridge for Vehicular Use;
- Alternative 1B: Rehabilitate the Bridge for Active Transportation;
- Alternative 2: Replace the Bridge; and
- Alternative 3: Remove the Bridge.

The “Do Nothing” alternative was screened out because it does not address the need to identify an appropriate long-term solution. Blacks Bridge cannot safely support pedestrian or vehicular traffic in its current condition due to the structural deficiencies noted in **Section 4.1**.

5.1.1 Alternative 1A: Rehabilitate the Bridge for Vehicular Use

Alternative 1A would involve rehabilitating Blacks Bridge to reinstate single-lane vehicular use of the bridge. For the purpose of the evaluation, it was assumed the rehabilitated bridge would accommodate 2-way vehicular traffic with a single alternating lane, as was the case prior to its closure. The rehabilitated bridge would have a vertical clearance restriction and a maximum 7-tonne load restriction, similar to the case prior to its closure.

The following rehabilitation activities would be required for this alternative:

- Clean and recoat structural steel;
- Replace bearings;
- Reconstruct top portion of abutments and wingwalls;
- Replace severely corroded rivets with new structural steel bolts at deteriorated truss joints;

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- Complete structural steel repairs to truss members with severe local pitting corrosion;
- Replace expansion joints at each end;
- Replace existing barrier system with new metal traffic barrier or pedestrian/bicycle combination barrier;
- Place scour protection at bridge abutment foundations;
- Place erosion protection at bridge embankments;
- Temporary works including cofferdams, work platforms, and environmental enclosures; and
- Temporary jacking system and temporary support.

5.1.2 Alternative 1B: Rehabilitate the Bridge for Active Transportation

Alternative 1B would rehabilitate Blacks Bridge for active transportation (pedestrian, cyclist, etc.) use only, with no vehicular use permitted. Similar rehabilitation activities as noted in **Section 5.1.1** would be required to rehabilitate the bridge for active transportation. This alternative would allow for recreational and other active transportation uses of the bridge, but would not provide for vehicular use. While both recreational and vehicular uses of the bridge were identified as important considerations in the public survey (**Section 3.2.2**), the importance of vehicular use was more widely noted.

5.1.3 Alternative 2: Replace the Bridge

Alternative 2 would replace the existing bridge with a new single lane or two-lane bridge in the same location. For the purpose of the evaluation of alternative solutions, it was assumed the existing abutments would be partially or fully removed and new abutments would be constructed behind the existing abutment locations, increasing the size of the opening under the bridge.

An increase in the height of the roadway was expected to be required to accommodate the structure depth of the replacement structure. As part of the road profile adjustments, an opportunity to raise the grade of the approach roadway on the west approach was identified to address the road overtopping issues noted during consultation and identified through preliminary hydraulic evaluation. It was noted

design options for the replacement bridge could include single span or multi-span alternatives.

5.1.4 Alternative 3: Remove the Bridge

Alternative 3 would involve removing Blacks Bridge completely without replacement. It was assumed the existing abutments would be partially or fully removed as part of this alternative. An opportunity to revegetate areas around the existing bridge, including portions of West Corner Drive that would no longer be required without the crossing, was identified. If this alternative were selected, property acquisition could be required to create cul-de-sacs at what would become the ends of West Corner Drive on each side of the Ausable River.



5.2 Evaluation of Alternative Solutions

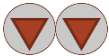
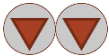






The alternatives were evaluated based on criteria and associated metrics that consider the natural and socio-economic environment, engineering considerations, and capital cost. For the purposes of this evaluation, the previous state of Blacks Bridge (prior to its closure in September 2019: single-lane with 7-tonne load posting and restricted clearance), was considered to be the existing condition.










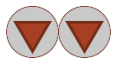


Information received from the public in response to the Notice of Study Commencement and public survey (**Section 3.2**) was incorporated into the evaluation of alternative solutions and identification of the preferred solution.




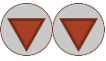



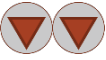

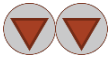


The comparative evaluation of alternative solutions is summarized in **Table 4** and the preferred alternative for each category is discussed in **Table 5**. The evaluation assesses the performance of each alternative in comparison to other alternatives for each criterion. Symbols are used to indicate the level of preference for each alternative, from “least preferred” to “most preferred.” Further assessment is included for the most and least preferred alternative overall under each of the four categories (natural environment, socio-economic environment, engineering, and cost). The preferred solution is identified in **Section 5.2.1**, based on an analysis of the evaluation results and in consideration of the significance of the categories and the priorities of the County.









Table 4: Comparative Evaluation of Alternative Solutions



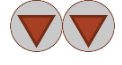





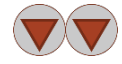



Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Natural Environment: Fish and Fish Habitat	Relative area required for in-water work	<ul style="list-style-type: none">Anticipated to have the largest temporary footprint impacts for in-water work due to construction of cofferdams, temporary support for truss, and abutment rehabilitation work <div> Least preferred</div>	<ul style="list-style-type: none">Anticipated to have the largest temporary footprint impacts for in-water work due to construction of cofferdams, temporary support for truss, and abutment rehabilitation work <div> Least preferred</div>	<ul style="list-style-type: none">In-water work can be avoided through use of containment platforms and partial removal of existing abutmentsNew bridge abutments would be built behind the existing abutments, providing a greater offset from the existing river banks <div> Most preferred</div>	<ul style="list-style-type: none">In-water work can be avoided through use of containment platforms and partial removal of existing abutments <div> Most preferred</div>
Natural Environment: Terrestrial Ecosystems	Relative footprint impacts requiring vegetation removals	<ul style="list-style-type: none">Moderate amount of vegetation removals required to facilitate construction, including vegetation removals to access abutments and sides of existing structureVegetation removals required to accommodate erosion protection work needed for abutment rehabilitation <div> Less preferred</div>	<ul style="list-style-type: none">Moderate amount of vegetation removals required to facilitate construction, including vegetation removals to access abutments and sides of existing structureVegetation removals required to accommodate erosion protection work needed for abutment rehabilitation <div> Less preferred</div>	<ul style="list-style-type: none">Compared to other alternatives, Alternative 2 requires the largest amount of vegetation removals (temporary and permanent) to accommodate grade raise and embankment widening for new structure <div> Least preferred</div>	<ul style="list-style-type: none">Alternative 3 involves a relatively small temporary disturbance to existing vegetation communities, but presents an opportunity to revegetate the stream bank at the existing bridge abutment/wingwall areas and portions of West Corner Drive as a result of the structure removalMinor vegetation removals are anticipated for cul-de-sacs (can likely avoid trees) <div> Most preferred</div>









Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Natural Environment: Species at Risk	Impacts to potential Species at Risk (SAR) habitat	<ul style="list-style-type: none"> Highest potential to impact aquatic SAR habitat due to larger area of in-water work compared to other alternatives Temporary disturbance to potential SAR habitat (bridge)  Least preferred	<ul style="list-style-type: none"> Highest potential to impact aquatic SAR habitat due to larger area of in-water work compared to other alternatives Temporary disturbance to potential SAR habitat (bridge)  Least preferred	<ul style="list-style-type: none"> New structure would be built with a larger span, avoiding need for in-water work for construction activities In-water work can be avoided through use of containment platforms and partial removal of existing abutments Removal of potential SAR habitat (bridge)  More preferred	<ul style="list-style-type: none"> In-water work can be avoided through use of containment platforms and partial removal of existing abutments Removal of potential SAR habitat (bridge)  More preferred
Natural Environment: Groundwater and Surface Water	Relative requirements for dewatering activities; potential impacts to Ausable River water quality	<ul style="list-style-type: none"> Rehabilitation of existing abutments would require cofferdam construction and dewatering of surface water to complete construction Minimal impacts to water quality/quantity anticipated  Most preferred	<ul style="list-style-type: none"> Rehabilitation of existing abutments would require cofferdam construction and dewatering of surface water to complete construction Minimal impacts to water quality/quantity anticipated  Most preferred	<ul style="list-style-type: none"> Removal of existing abutments may require cofferdam construction, dewatering of surface water, and potential groundwater dewatering activities to complete construction Minimal impacts to water quality/quantity anticipated  Less preferred	<ul style="list-style-type: none"> Removal of existing abutments may require cofferdam construction and dewatering of surface water to complete construction Duration of activity anticipated to be less compared to other alternatives  More preferred









Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Natural Environment: Source Water Protection	Potential impacts to drinking water sources	<ul style="list-style-type: none"> No impacts anticipated – Blacks Bridge is not located within a wellhead protection area, Intake Protection Zone, or Highly Vulnerable Aquifer  Most preferred	<ul style="list-style-type: none"> No impacts anticipated – Blacks Bridge is not located within a wellhead protection area, Intake Protection Zone, or Highly Vulnerable Aquifer  Most preferred	<ul style="list-style-type: none"> No impacts anticipated – Blacks Bridge is not located within a wellhead protection area, Intake Protection Zone, or Highly Vulnerable Aquifer  Most preferred	<ul style="list-style-type: none"> No impacts anticipated – Blacks Bridge is not located within a wellhead protection area, Intake Protection Zone, or Highly Vulnerable Aquifer  Most preferred
Natural Environment: Natural Hazard Lands	Impacts to lands regulated by Ausable Bayfield Conservation Authority (ABCA)	<ul style="list-style-type: none"> Smallest area of impact to natural hazard lands (staging/access areas; no permanent change to ABCA regulated lands)  More preferred	<ul style="list-style-type: none"> Smallest area of impact to natural hazard lands (staging/access areas; no permanent change to ABCA regulated lands)  More preferred	<ul style="list-style-type: none"> Largest area of impact to natural hazard lands due to grading and new structure construction Potential to improve hydraulic opening  Less preferred	<ul style="list-style-type: none"> Opportunity for positive impact through removal of the structure and naturalization of the riparian area  Most preferred
Socio-Economic Environment: Agricultural Operations	Change in travel distance to key destinations for agricultural operations (Hensall Co-op, equipment storage on Queen Street, and Ailsa Craig Farm Equipment Repair)	<ul style="list-style-type: none"> No change from existing conditions – rehabilitated bridge would not support large agricultural equipment due to horizontal and vertical clearances to existing truss members and maximum 7-tonne load limit for single unit vehicles  Least preferred	<ul style="list-style-type: none"> No change from existing conditions – rehabilitated bridge would not support agricultural equipment  Least preferred	<ul style="list-style-type: none"> Reduces travel distance by up to 7.3 km (maximum impact: from agricultural property directly west of existing bridge to equipment storage on Queen Street – 650 m with bridge; 7.9 km without)  Most preferred	<ul style="list-style-type: none"> No change from existing conditions  Least preferred

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Socio-Economic Environment: Land Use/Official Plan	Impacts to existing and future land uses; consistency with Official Plan policies	<ul style="list-style-type: none"> No change to existing conditions – bridge supports existing residential land uses and potential future urban areas to the south  More preferred	<ul style="list-style-type: none"> Similar to existing conditions – bridge supports active transportation for existing residential land uses and potential future urban areas to the south)  More preferred	<ul style="list-style-type: none"> Greatest improvement to connectivity – bridge supports existing agricultural and residential land uses, and potential future urban areas to south  Most preferred	<ul style="list-style-type: none"> Removal of bridge impacts existing residential land uses and potential future urban areas to the south  Least preferred
Socio-Economic Environment: Local Road Connectivity	Impact to local road network and connectivity of surrounding rural residential community	<ul style="list-style-type: none"> No change from existing conditions – bridge accommodates vehicular and bicycle traffic  Most preferred	<ul style="list-style-type: none"> Reduction in connectivity across Ausable River requires detour of up to 7.7 km for vehicular traffic  Less preferred	<ul style="list-style-type: none"> No change from existing conditions – bridge accommodates vehicular and bicycle traffic  Most preferred	<ul style="list-style-type: none"> Reduction in connectivity across the Ausable River requires detour of up to 7.7 km for vehicular and bicycle traffic  Least preferred
Socio-Economic Environment: Emergency Services	Impact to travel distance from nearest fire, police, and paramedic stations	<ul style="list-style-type: none"> No change from existing conditions – emergency vehicle access limited to 7 tonnes for single-unit vehicles, resulting in up to 3.5 km detour for fire trucks; provides for police and paramedic vehicles  Less preferred	<ul style="list-style-type: none"> Increases travel distance by up to 1 km for police and paramedic vehicles; maintains detour of up to 3.5 km for fire trucks  Least preferred	<ul style="list-style-type: none"> Reduces travel distance by up to 3.5 km for fire trucks; provides for police and paramedic vehicle access  Most preferred	<ul style="list-style-type: none"> Increases travel distance by up to 1 km for police and paramedic vehicles; maintains detour of up to 3.5 km for fire trucks  Least preferred

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Socio-Economic Environment: Recreational Use of Ausable River	Anticipated impacts to navigation (during and after construction)	<ul style="list-style-type: none">• Temporary impacts during construction activities involving overhead work• No permanent change from existing conditions; existing bridge not anticipated to interfere with navigation <div> More preferred</div>	<ul style="list-style-type: none">• Temporary impacts during construction activities involving overhead work• No permanent change from existing conditions; existing bridge not anticipated to interfere with navigation <div> More preferred</div>	<ul style="list-style-type: none">• Temporary impacts during construction activities involving overhead work• No permanent change from existing conditions; neither existing bridge nor replacement bridge are anticipated to interfere with navigation <div> More preferred</div>	<ul style="list-style-type: none">• Temporary impacts during construction activities involving overhead work• No permanent change from existing conditions; existing bridge is not anticipated to interfere with navigation <div> More preferred</div>
Socio-Economic Environment: Cultural Heritage Resources	Impacts to heritage value of bridge (form and function)	<ul style="list-style-type: none">• Retains the bridge’s form and design as a riveted, seven-panel through-truss bridge• Retains function of bridge as a vehicle crossing <div> Most preferred</div>	<ul style="list-style-type: none">• Retains the bridge’s form and design as a riveted, seven-panel through-truss bridge• Loss of function of bridge as a vehicle crossing <div> More preferred</div>	<ul style="list-style-type: none">• Permanent removal of cultural heritage resource• Impacts can be mitigated through sympathetic design, interpretive signage, or other commemoration of heritage bridge <div> Less preferred</div>	<ul style="list-style-type: none">• Permanent removal of cultural heritage resource• Impacts can be mitigated through interpretive signage or other commemoration of heritage bridge <div> Less preferred</div>

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Socio-Economic Environment: Archaeological Resources	Potential for impacts to archaeological resources	<ul style="list-style-type: none"> Least impact to lands with archaeological potential anticipated – impacted areas are limited to previously disturbed areas; potential for temporary work areas to impact undisturbed areas  Most preferred	<ul style="list-style-type: none"> Least impact to lands with archaeological potential anticipated – impacted areas are limited to previously disturbed areas; potential for temporary work areas to impact undisturbed areas  Most preferred	<ul style="list-style-type: none"> Greatest potential for impacts to previously undisturbed areas – larger area of impact anticipated due to approach road grade raise and potential road widening  Least preferred	<ul style="list-style-type: none"> More potential for impacts than Alternatives 1A and 1B anticipated – impacted areas for bridge work are limited to previously disturbed areas; potential for cul-de-sacs and temporary work areas to impact undisturbed areas  More preferred
Engineering: Roadway	Road safety (risk of vehicle-vehicle, or vehicle-cyclist collisions, based on anticipated conflict points)	<ul style="list-style-type: none"> Potential for cyclist use of bridge in mixed cyclist/vehicular traffic condition Risk of driver error at transition from two-lane roadway to one-lane bridge can be mitigated with traffic signals  Less preferred	<ul style="list-style-type: none"> Risk of driver error can be mitigated with barrier installation to prevent vehicle entrance onto bridge Potential cyclist conflicts can be mitigated by pavement markings/signage  Most preferred	<ul style="list-style-type: none"> Replacement bridge can be constructed with two lanes, resulting in lower risk than Alternative 1A due to consistent two-lane roadway  Most preferred	<ul style="list-style-type: none"> No conflicts  Most preferred
Engineering: Structural	Bridge safety (risk of bridge failure or impacts to bridge)	<ul style="list-style-type: none"> Highest risk Load and clearance restrictions will remain Risk of non-compliance to load and clearance posting, overloading, vehicle strikes, damage and/or failure  Least preferred	<ul style="list-style-type: none"> Lower risk than Alternative 1A No load restriction for pedestrian or cycling use Restrictions may apply to recreational vehicles and/or maintenance vehicles  More preferred	<ul style="list-style-type: none"> No load restriction No vertical clearance restriction  Most preferred	<ul style="list-style-type: none"> Structure and risk would be removed  Most preferred

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
	Requirements for future maintenance and rehabilitation	<ul style="list-style-type: none">Frequent maintenance/repairs (every 5-10 years +/-) of steel truss to address ongoing deteriorationMajor rehabilitation (deck and expansion joint replacement) anticipated at 20-30 years <div> Least preferred</div>	<ul style="list-style-type: none">Frequent maintenance/repairs (every 5-10 years +/-) of steel truss to address ongoing deteriorationMajor rehabilitation (deck and expansion joint replacement) anticipated at 20-30 years <div> Least preferred</div>	<ul style="list-style-type: none">Limited requirement for future paintingMinor rehabilitation anticipated around 25-30 yearsMajor bridge rehabilitation anticipated around 40-50 years <div> More preferred</div>	<ul style="list-style-type: none">No requirement for maintenance <div> Most preferred</div>
	Anticipated service life (requirement for future removal/replacement/major rehabilitation)	<ul style="list-style-type: none">30 years <div> Least preferred</div>	<ul style="list-style-type: none">30 years <div> Least preferred</div>	<ul style="list-style-type: none">75 years <div> More preferred</div>	<ul style="list-style-type: none">No requirement for future removal/replacement/rehabilitation <div> Most preferred</div>

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
	Construction complexity	<ul style="list-style-type: none">• Highest complexity• Extensive cofferdams and complex temporary support falsework and jacking system required to support truss for abutment rehabilitation• Recoating of built-up steel sections with difficult to access areas• Full enclosure of truss for cleaning and coating adds to complexity• Extensive substructure rehabilitation with potential unknown risks <div> Least preferred</div>	<ul style="list-style-type: none">• Highest complexity• Extensive cofferdams and complex temporary support falsework and jacking system required to support truss for abutment rehabilitation• Recoating of built-up steel sections with difficult to access areas• Full enclosure of truss for cleaning and coating adds to complexity• Extensive substructure rehabilitation with potential unknown risks <div> Least preferred</div>	<ul style="list-style-type: none">• Moderate complexity anticipated• Conventional construction methods for existing structure removal• Conventional substructure and superstructure replacement• Profile grade raise and road widening requires additional embankment fill, approach work and utility relocation• Construction complexity may be greater if in-water work is to be avoided <div> More preferred</div>	<ul style="list-style-type: none">• Lowest complexity• Conventional construction methods for existing structure removal• Conventional slope stabilization for new embankment profile <div> Most preferred</div>
	Engineering: Geotechnical	<ul style="list-style-type: none">• Existing abutment stability risks to be addressed with rehabilitation design and scour/erosion protection plan <div> Least preferred</div>	<ul style="list-style-type: none">• Existing abutment stability risks to be addressed with rehabilitation design and scour/erosion protection plan <div> Least preferred</div>	<ul style="list-style-type: none">• New structure would not include stability risks <div> Most preferred</div>	<ul style="list-style-type: none">• No stability risk <div> Most preferred</div>











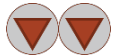

Criteria	Metric	Alternative 1A: Rehabilitate the Bridge for Vehicular Use	Alternative 1B: Rehabilitate the Bridge for Active Transportation	Alternative 2: Replace the Bridge	Alternative 3: Remove the Bridge
Engineering: Watercourse Hydraulics	Hydraulic performance of bridge and adjacent roadway	<ul style="list-style-type: none"> • Clearance from 25-year water level provided • Road overtopped for the Regional Event approximately 60-150 m west of bridge  Less preferred	<ul style="list-style-type: none"> • Clearance from 25-year water level provided • Road overtopped for the Regional Event approximately 60-150 m west of bridge  Less preferred	<ul style="list-style-type: none"> • Clearance from 25-year water level will be provided • Adjacent road overtopping for the Regional Event may be mitigated by increasing the bridge opening and improving the road profile  More preferred	<ul style="list-style-type: none"> • Opportunity to reduce impact of adjacent road overtopping by removing portion of approach roadway that would no longer be needed  Most preferred
	Impact to upstream flood potential	<ul style="list-style-type: none"> • No change from existing conditions • Limited flooding identified by HEC-RAS Model • Existing flooding identified by local residents, impacting ability to use surrounding road network  <ul style="list-style-type: none"> • Less preferred 	<ul style="list-style-type: none"> • No change from existing conditions • Limited flooding identified by HEC-RAS Model • Existing flooding identified by local residents, impacting ability to use surrounding road network  Less preferred	<ul style="list-style-type: none"> • Potential to reduce extent of flooded area upstream due to increase in overall bridge span/opening  More preferred	<ul style="list-style-type: none"> • Potential to reduce extent of flooded area upstream due to removal of existing earth embankment in the floodplain west of the bridge  Most preferred
Cost: Capital Cost	Approximate anticipated cost of rehabilitation/replacement/removal	<ul style="list-style-type: none"> • Higher anticipated cost than Alternative 3  Less preferred	<ul style="list-style-type: none"> • Higher anticipated cost than Alternative 3  Less preferred	<ul style="list-style-type: none"> • Highest anticipated cost  Least preferred	<ul style="list-style-type: none"> • Lowest anticipated cost  Most preferred

Table 5: Preferred Alternative Summary

Category	Preferred Alternative
Natural Environment	<ul style="list-style-type: none">Alternative 3 is preferred with respect to anticipated impacts to the natural environment, primarily because removal of the bridge presents opportunities for naturalizationAlternatives 1A, 1B, and 2 are similarly less preferred with respect to natural environment impactsIt is anticipated natural environment impacts for all alternatives can generally be avoided or mitigated
Socio-Economic Environment	<ul style="list-style-type: none">Alternative 2 is preferred in terms of socio-economic impacts due to the replacement bridge’s usability and associated benefits to agricultural operations, connectivity for existing and planned future land uses surrounding the bridge, and emergency service response timesAlternative 3 is least preferred, primarily because it does not accommodate connectivity between existing and planned future land uses on the east and west sides of the Ausable River in the areaConnectivity was identified as a key community need/value, and was considered to be a critical factor in this evaluation
Engineering	<ul style="list-style-type: none">Alternative 3 is preferred from an engineering perspective across all criteriaAlternative 1A is least preferred (slightly less preferred than Alternative 1B), largely due to safety risks, structural and geotechnical deficiencies of the existing bridge, and construction complexity for the rehabilitation
Cost	<ul style="list-style-type: none">Alternative 3 is preferred as it is expected to have the lowest capital costAlternative 2 is expected to have the highest capital costIt is noted costs were estimated at a high level and do not include lifecycle costs; however, no change to the ranking of alternatives is anticipated as a result of more detailed cost estimates

5.2.1 Preferred Solution

Although removal of Blacks Bridge (Alternative 3) has benefits in terms of its lesser impact to the natural environment, engineering, and capital cost, replacement (Alternative 2) has been identified as the preferred solution. Similar to removal, the “do nothing” alternative would generally be the least impactful; however, it would not address the safety concerns due to the deteriorating structural condition. Neither the removal nor the “do nothing” alternative provides the access and emergency response capability that is valued by the local community.

Bridge replacement is ideal in terms of providing access for agricultural vehicles as well as emergency services and other vehicles, which was identified as a key community need/value. The high volume of public comments in opposition to removal of the bridge (**Section 3.2**) highlights the importance of the crossing to the local community.

Bridge removal was identified as preferred from a natural environment perspective; however, impacts on the natural environment for any of the four alternatives can generally be avoided or mitigated and are considered to be minor.

With respect to engineering considerations, bridge removal eliminates structural safety risks and requirements for future maintenance/rehabilitation/replacement. However, the importance of the crossing for the community offsets these engineering benefits. While bridge replacement is more costly, the County is supportive of the bridge replacement option due to its benefits to local agricultural operations and the surrounding community.

Rehabilitation of the bridge (Alternatives 1A and 1B) has been identified as least preferred. Although the anticipated cost of bridge replacement is higher, the cost of bridge rehabilitation is also relatively high. In comparison to replacement, rehabilitation results in lower remaining service life, limited function (load posted for vehicles plus vertical clearance restriction, or active transportation only) and greater long-term maintenance needs. Rehabilitation options include greater impacts to the natural environment during construction and do not address hydraulic performance issues including road overtopping. Although rehabilitation has low potential to impact cultural resources, these benefits are outweighed by the socio-economic (community access) and engineering issues identified above and in **Table 4**.

6.0

Evaluation of Design Options

Following selection of bridge replacement as the preferred solution, design options were developed for the replacement bridge. This section describes the design options and the evaluation completed to select the preferred design option.

6.1

Design Options

Four design options were developed and evaluated to determine the preferred structure type, span configuration, and road geometry. For all options, the new bridge accommodates two lanes of traffic on West Corner Drive over the Ausable River and is constructed on the same alignment as the existing bridge. Design options included a range of span configurations, abutment configurations, and structure depths in conjunction with road profile improvements on West Corner Drive. The design options are discussed in the following sections, and the evaluation is summarized in **Table 6**. Preliminary drawings of the design options are included in **Appendix E**.

6.1.1

Option 1: 52 m Single Span

Option 1 is a 52 m single span bridge with 2:1 sloped embankments (open abutments). A 1.9 m profile grade (road height) raise is required on West Corner Drive at the west abutment to accommodate the new structure. This option provides the greatest profile grade raise and approach embankment reconstruction requirements on West Corner Drive due to the greatest structure depth. Option 1 also includes a longer span and greater deck area compared to other feasible single span options. Due to the longer span, girder erection requires higher crane capacity or multiple cranes compared to other shorter span single span options to accommodate the greater pick-up load and radius.

6.1.2

Option 2: 41 m Single Span

Option 2 is a 41 m single span bridge with vertical closed abutments, including retained soil system (RSS) walls at each abutment. A 1.5 m profile grade (road height) raise on West Corner Drive is required at the west abutment to accommodate the new structure. This option was determined to have insufficient hydraulic capacity based on the hydraulic evaluation completed by the design team and was therefore dismissed.

6.1.3

Option 2A: 44 m Single Span

Option 2A is a 44 m single span bridge with vertical closed abutments, including RSS walls at each abutment. A 1.6 m profile grade (road height) raise on West Corner Drive is required at the west abutment to accommodate the new structure. This option includes a shorter span and smaller deck area compared to other feasible single span options and provides an opportunity for wildlife passage underneath the bridge. Girder erection using a single crane from one side of the Ausable River is feasible using commonly available crane equipment.

6.1.4

Option 3: 51 m 3-Span

Option 3 is a 51 m long 3-span bridge with 2:1 sloped embankments (open abutments). A 0.9 m profile grade (road height) raise on West Corner Drive is required at the west abutment to accommodate the new structure. This option provides the least profile grade raise and approach embankment reconstruction on West Corner Drive due to the shallowest structure depth. However, the construction of temporary cofferdams and excavations in the watercourse is required to place new pier foundations, contributing to greater potential for environmental/SAR impacts, construction duration, and construction cost.

6.2

Evaluation of Design Options



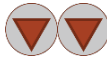



The design options were evaluated based on seven key criteria that differ across the design options. Since all of the design options involve replacing the bridge and result in minor footprint impacts, differences in the potential for archaeological, terrestrial, and socio-economic impacts are anticipated to be minimal. Consequently, the following criteria were used for the evaluation:



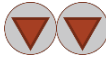



- Heritage considerations; namely, resemblance to the existing bridge;
- Hydraulic conditions anticipated within the Ausable River;
- Potential for environmental impacts associated with in-water work;
- Construction complexity;
- Construction duration;
- Profile (road height) raise and associated property impacts; and
- Construction cost.




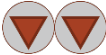





Similar to the evaluation of alternative solutions (**Section 5.2**), a comparative evaluation was completed to identify how each option compares to the others under each of the criteria.

The evaluation is summarized in **Table 6**, and the results are discussed in **Section 6.2.1**. As noted in **Section 6.1.2**, Option 2 was identified as not acceptable and dismissed. Option 2 is included in **Table 6** for information purposes only but the level of preference is not included for the various criteria as it is not applicable.

Table 6: Comparative Evaluation of Design Options

Criteria	Option 1: 52 m Single Span	Option 2: 41 m Single Span	Option 2A: 44 m Single Span	Option 3: 51 m 3-Span
Heritage Considerations	<ul style="list-style-type: none"> Single span similar to existing bridge 2:1 open abutment configuration includes no resemblance to existing embankment configuration  <p>Less preferred</p>	<ul style="list-style-type: none"> Single span similar to existing bridge Vertical closed abutment wall includes some resemblance to existing abutment wall and wingwall configuration 	<ul style="list-style-type: none"> Single span similar to existing bridge Vertical closed abutment wall includes some resemblance to existing abutment wall and wingwall configuration  <p>More preferred</p>	<ul style="list-style-type: none"> 3-span does not resemble existing bridge 2:1 open abutment configuration includes no resemblance to existing embankment configuration  <p>Least preferred</p>
Watercourse Hydraulics	<ul style="list-style-type: none"> Acceptable hydraulic performance  <p>Most preferred</p>	<ul style="list-style-type: none"> Unacceptable hydraulic performance <p>Not acceptable</p>	<ul style="list-style-type: none"> Acceptable hydraulic performance  <p>More preferred</p>	<ul style="list-style-type: none"> Acceptable hydraulic performance  <p>Most preferred</p>

Criteria	Option 1: 52 m Single Span	Option 2: 41 m Single Span	Option 2A: 44 m Single Span	Option 3: 51 m 3-Span
Environmental Impacts	<ul style="list-style-type: none"> No in-water work  <p>More preferred</p>	<ul style="list-style-type: none"> No in-water work 	<ul style="list-style-type: none"> No in-water work  <p>More preferred</p>	<ul style="list-style-type: none"> In-water work requiring mitigation  <p>Least preferred</p>
Construction Complexity	<ul style="list-style-type: none"> More complex No in-water work Higher crane capacity or multiple cranes required due to weight of girders  <p>Less preferred</p>	<ul style="list-style-type: none"> Less complex No in-water work Feasible girder erection with conventional single crane 	<ul style="list-style-type: none"> Less complex No in-water work Feasible girder erection with conventional single crane  <p>More preferred</p>	<ul style="list-style-type: none"> Most complex Construction of piers in watercourse Significant temporary cofferdam systems required.  <p>Least preferred</p>

Criteria	Option 1: 52 m Single Span	Option 2: 41 m Single Span	Option 2A: 44 m Single Span	Option 3: 51 m 3-Span
Construction Duration	<ul style="list-style-type: none"> Similar to Option 2 and Option 2A  More preferred	<ul style="list-style-type: none"> Similar to Option 1 and Option 2A 	<ul style="list-style-type: none"> Similar to Option 1 and Option 2  More preferred	<ul style="list-style-type: none"> Longest duration  Less preferred
Profile Raise (Raising Road) & Property Impact	<ul style="list-style-type: none"> Greatest profile grade raise Greatest property required  Least preferred	<ul style="list-style-type: none"> Greater profile grade raise and property required than Option 3 but less than Option 1 	<ul style="list-style-type: none"> Greater profile grade raise and property required than Option 3 but less than Option 1  Less preferred	<ul style="list-style-type: none"> Least profile grade raise Least property required  More preferred
Construction Cost	<ul style="list-style-type: none"> Higher estimated cost  Less preferred	<ul style="list-style-type: none"> Lower estimated cost 	<ul style="list-style-type: none"> Lower estimated cost  More preferred	<ul style="list-style-type: none"> Highest estimated cost  Least preferred
Summary	Less preferred	Not carried forward	Preferred	Least preferred

6.2.1 Preferred Design Option

Through the comparative evaluation summarized in **Table 6**, Option 2A, a 44 m single span bridge with vertical closed abutments and retaining walls, was identified as the preferred design option. This option crosses the Ausable River with a single span and includes vertical abutment and retaining wall elements similar to the existing bridge configuration. Option 2A avoids in-water work, while providing acceptable hydraulic performance and reducing the complexity, duration, and cost of construction. Avoiding in-water work mitigates the potential for impacts to fish and fish habitat, including aquatic SAR habitat identified in Ausable River (**Section 4.3.2**).

Comments received to date through the newsletter and consultation meetings with ABCA and impacted landowners support the preferred design option. The design provides access across the Ausable River for all types of traffic, including agricultural and emergency services vehicles, which was identified as a key community need/value (**Section 3.2**).

7.0

Preliminary Design

Preliminary design was completed to advance the preferred design option and allow for potential impacts to be assessed. This section outlines the proposed replacement bridge structure and approach roadway reconstruction. Preliminary design drawings are included in **Appendix F**.

Following completion of this Class EA study, detailed design will be completed to refine the preliminary design and confirm details including construction cost, duration, and anticipated impacts.

7.1

Proposed Replacement Structure

As noted in **Section 6.2.1**, the preferred design option is a 44 m single span bridge. The preliminary design provides for 3.25 m wide lanes, 1.0 m wide shoulders, and an overall paved deck width of 8.5 m, which accommodates agricultural vehicles and estimated future traffic volumes. As noted in **Section 6.1.3**, a 1.6 m profile grade raise on West Corner Drive is required at the west abutment to accommodate the new structure. The bridge abutments will have a closed configuration with RSS walls. Catch basins will be provided at the west approach to the bridge (i.e., at the low end of the bridge grade) to collect and outlet runoff onto the river banks.

The preliminary design of the replacement structure includes wildlife passage under the bridge on both sides of the Ausable River. The purpose of these wildlife passages is to allow movement of terrestrial species underneath the bridge instead of over the road.

7.2

West Corner Drive Reconstruction

The preliminary design of the West Corner Drive approaches to the bridge is based on the 2017 Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads. The existing road classification of rural-local-undivided is maintained. The preliminary design includes steel beam guide rail adjacent to West Corner Drive on the approach to the bridge. The approach guide rail length is designed to protect vehicles from entering the Ausable River and steep slopes.

7.3 Staging and Duration

The existing bridge is currently closed to all traffic and will remain closed throughout the duration of construction. The new bridge will be constructed on the same alignment as the existing bridge in a single stage. As noted in **Section 3.4.1**, a laydown area for construction materials may be established on the southwest side of the bridge. The requirement for of this laydown area, as well as its feasibility and layout, will be determined during detailed design.

In general, construction is proposed to occur over two construction seasons as follows:

Fall 2022:

- Remove existing steel truss superstructure and vegetation removals after the breeding bird period (i.e., after August 31); and
- Remove existing abutments to the proposed removal limits.

2023:

- Construct abutments and RSS retaining walls;
- Erect steel girders;
- Construct bridge deck and barriers;
- Complete grading on West Corner Drive;
- Construct approach slabs, waterproof bridge deck, and pave bridge deck approaches; and
- Install guide rail.

7.4 Construction Cost

Based on the preliminary design, the estimated construction cost is \$2.6 million. This cost estimate will be refined during detailed design.

8.0 Environmental Impacts and Commitments

This section outlines anticipated environmental impacts of the preliminary design, mitigation measures, commitments for future consultation and studies, and which permits and approvals are expected to be required.

8.1 Natural Environment

As noted in **Section 6.2.1**, no in-water work is anticipated to be required for the bridge replacement. However, work within the banks of the Ausable River has potential to trigger requirements under the *Fisheries Act*. When design details are known, submission of a Request for Review to DFO is recommended to determine whether approvals/permits are required for the undertaking.

Based on the results of the natural environment reviews completed and documented in **Appendix B**, the following potential impacts have been identified:

- Removal of the existing bridge may disturb or require removal of bird nests situated on the support beams or underside of the bridge;
- Impacts and/or removal of trees and vegetation associated with construction activities;
- Interactions with and disturbance of wildlife including birds, mammals, and reptiles;
- Increased erosion and sedimentation of lands within and adjacent to the construction area; and
- Potential for the movement of invasive species by humans and machinery.

Preliminary mitigation measures to avoid or minimize adverse effects to the natural environment are identified below. Additional mitigation measures may be identified through the agency approvals and permitting process.

- Install, maintain, and repair erosion and sediment control measures to prevent entry of sediment to the Ausable River;
- Minimize vegetation clearing to the extent possible;
- Machinery is to arrive and depart clean to prevent spread of invasive species to and from other sites;

- Bridge works and vegetation removal should occur outside the breeding bird season (April 1 to August 31). Should clearing be required during the breeding bird season, nest searches conducted by a qualified person must be completed within 48 hours in advance of clearing activities;
- Clearing trees should occur outside of the bat roosting timing window (May 1 – September 30). Should tree removal be required during the roosting window, a search of each tree to be removed must be completed by a qualified person prior to removal;
- If bridge works occur during the turtle active season (May 1 to September 30), exclusion fencing (i.e., silt fencing) should be installed along the construction area boundary and to contain areas with exposed soil, including stockpile areas;
- Avoid or minimize work below the seasonal high-water mark and in the active channel of the Ausable River;
- Store equipment and materials on the existing road allowance to avoid impacts to natural heritage features. If additional staging areas are required, the southwest quadrant may be considered; however, existing overhead hydro may pose a constraint. Erosion and sediment control of excavated areas and temporary soil stockpiles on site shall be considered;
- If wildlife is encountered, work shall be temporarily suspended until the animal is out of harm's way; and
- Restore and re-vegetate disturbed areas. Details on invasive species recommended to be removed and replaced with native species are provided in **Section 8.1.1.**

Targeted Barn Swallow surveys within the active season (May to August) are recommended before work on the bridge takes place. If Barn Swallow nesting is observed on the bridge, the project is eligible for exemption registration under Section 23.18 (Threats to health and safety, non-imminent) of *Ontario Regulation 242/08* through the submission of a Notice of Activity (NoA) form.

In addition, a tree survey and inventory within the proposed municipal right-of-way is recommended. The tree survey is to include documentation of trees with a diameter at breast height of 10 centimeters or greater.

If wildlife is persistently found in the construction zone, and allowing them to exit the work area is found to delay construction activity, a Scientific Wildlife Collectors Permit under the *Fish and Wildlife Conservation Act*, 1997 could be sought in advance by a qualified professional to complete wildlife salvages and transport wildlife to an alternative habitat location. In addition to the Scientific Wildlife Collectors, the qualified professional may need to register under Section 23.17 (Species protection, recovery activities) of *Ontario Regulation 242/08* to be able to handle or relocate SAR.

8.1.1 Positive Natural Environment Impacts

Opportunities for the bridge replacement to create positive impacts on the natural environment have also been identified. Wildlife passage on dry land under the existing bridge is not possible due to the location of full height abutments at the river's edge. As noted in **Section 7.1**, the preliminary design includes wildlife passages (terrestrial benches) on both sides of the Ausable River to allow movement of terrestrial species underneath the bridge instead of over the road.

In addition, removal of invasive species currently present within the Study Area should be incorporated into the construction contract. Invasive species identified within the Study Area include Autumn Olive (*Elaeagnus umbellata*), European Buckthorn (*Rhamnus cathartica*) and Tartarian Honeysuckle (*Lonicera tatarica*). In general, there is also an opportunity to restore and enhance habitats within the Study Area once the bridge works are complete.

8.2 Water Quality

Construction works have potential to impact the Ausable River water quality through erosion and sedimentation as well as the risk of spills during construction. The following mitigation measures are recommended to address these potential impacts:

- Erosion and sediment control measures should be developed during detailed design to prevent entry of sediment to the Ausable River; and
- Operational constraints regarding equipment refueling, maintenance, and washing, as well as spill prevention and response, should be included in the construction contract.

8.3 Hydrology

Modelling of the Ausable River indicates the preliminary design increases the water surface elevation upstream of the bridge by approximately 0.25 m for the Regional Event. As noted in **Section 4.2**, at the Blacks Bridge site, the Regional Event is defined as Hurricane Hazel which is more severe than the 100-year event.

The higher upstream water surface elevation for the Regional Event results in a slightly greater flood area for one property northwest of the bridge. As noted in **Section 3.4.1**, the project team met virtually with the property owners to discuss the Regional Event impacts as well as property requirements. The property owners expressed support for the project, and advised they had no concerns with the proposed approach or impacts to their property.

The preliminary design meets all the other hydraulic criteria, and eliminates the overtopping of West Corner Drive at the spill point to the west of the bridge.

8.3.1 Climate Change

Climate change resilience is an important factor to consider for the design of water crossings. Climate change impacts have the potential to produce more frequent and more severe rainfall events, resulting in increased water flows in the river and conveyance requirements for the water crossing over the lifespan of the structure.

The hydraulic evaluation completed as part of the design options assessment indicates the proposed condition accommodates the anticipated increase in water flows due to climate change over the lifespan of the new bridge. The preliminary design further improves hydraulic performance by accommodating both climate change impacts and the Regional Event.

8.4 Property Impacts

The preliminary design raises the height of West Corner Drive, which will require permanent property acquisition north and south of West Corner Drive on both the east and west approaches to the bridge. The combined property requirements for the project impact 3 private property owners in the vicinity of the bridge, with a total of 0.30 ha required. In addition, a temporary construction easement would be required for

the potential staging area southwest of the bridge. The preliminary property requirements are shown in **Figure 11**.

In addition to permanent property acquisition, a temporary construction easement would be required for the construction laydown area, if it is determined to be feasible during detailed design (**Section 7.3**).

As documented in **Section 3.4.1**, the project team has discussed the property requirements with all impacted property owners and no concerns have been raised. Continued consultation with impacted property owners will be required during detailed design to complete the land transactions.

8.5 Navigation

As noted in **Section 4.4.3**, the Ausable River not included on the list of Scheduled Waters, but is considered a navigable waterway for the purposes of the CNWA.

Based on the preliminary design, a navigational envelope of at least 3.0 m horizontal by 1.5 m vertical can be maintained throughout construction. This is considered sufficient to accommodate canoes and kayaks. Upstream and downstream signage for boaters, and flashing beacons, should be provided during construction. The preliminary design does not result in a permanent change to the navigational clearance at the crossing location.

Regulatory approval is not anticipated to be required under the CNWA based on the characteristics of Blacks Bridge and the proposed replacement. However, a Notification of Work on a Non-Scheduled Waterway is required, which includes depositing information about the project to Transport Canada's online public registry and advertising a 30-day public review of that information. The notification should be completed during detailed design when more information about the bridge design, construction methods, and the timing and duration of construction is available.

8.6 Noise and Vibration

Noise levels resulting from use of the replacement bridge are anticipated to be similar to the previous conditions (prior to bridge closure). Construction noise and vibration impacts are temporary in nature but will be noticeable at times. The municipal by-law

hours of construction operation should be adhered to or an exemption requested by the contractor. If public complaints are received, they should be addressed as required.

8.7 Utilities

Relocation of a Bell utility line on the south side of West Corner Drive is required to accommodate the bridge and embankment reconstruction and will be completed prior to construction of new abutments. Consultation with affected utility companies will be required during detailed design when utility impacts are known.

No impacts to the overhead Hydro One poles and hydro wires to the north of West Corner Drive are expected.

The storm sewer system at the east bridge approach may be reconstructed to accommodate the proposed bridge and profile grade raise construction. If during detailed design it is determined that reconstruction of the storm sewer system is required, an Environmental Compliance Approval (ECA) will be required prior to construction.

8.8 Excess Soil Management

Due to the grade raise required to accommodate the preliminary design, construction of the replacement bridge is expected to generate minimal excess soils. Opportunities to place excess soil on the approach embankment side slopes to avoid transporting excess soil off site will be explored during detailed design. Management of excess soil shall be addressed during detailed design in compliance with *Ontario Regulation 406/19*.

8.9 Cultural Heritage

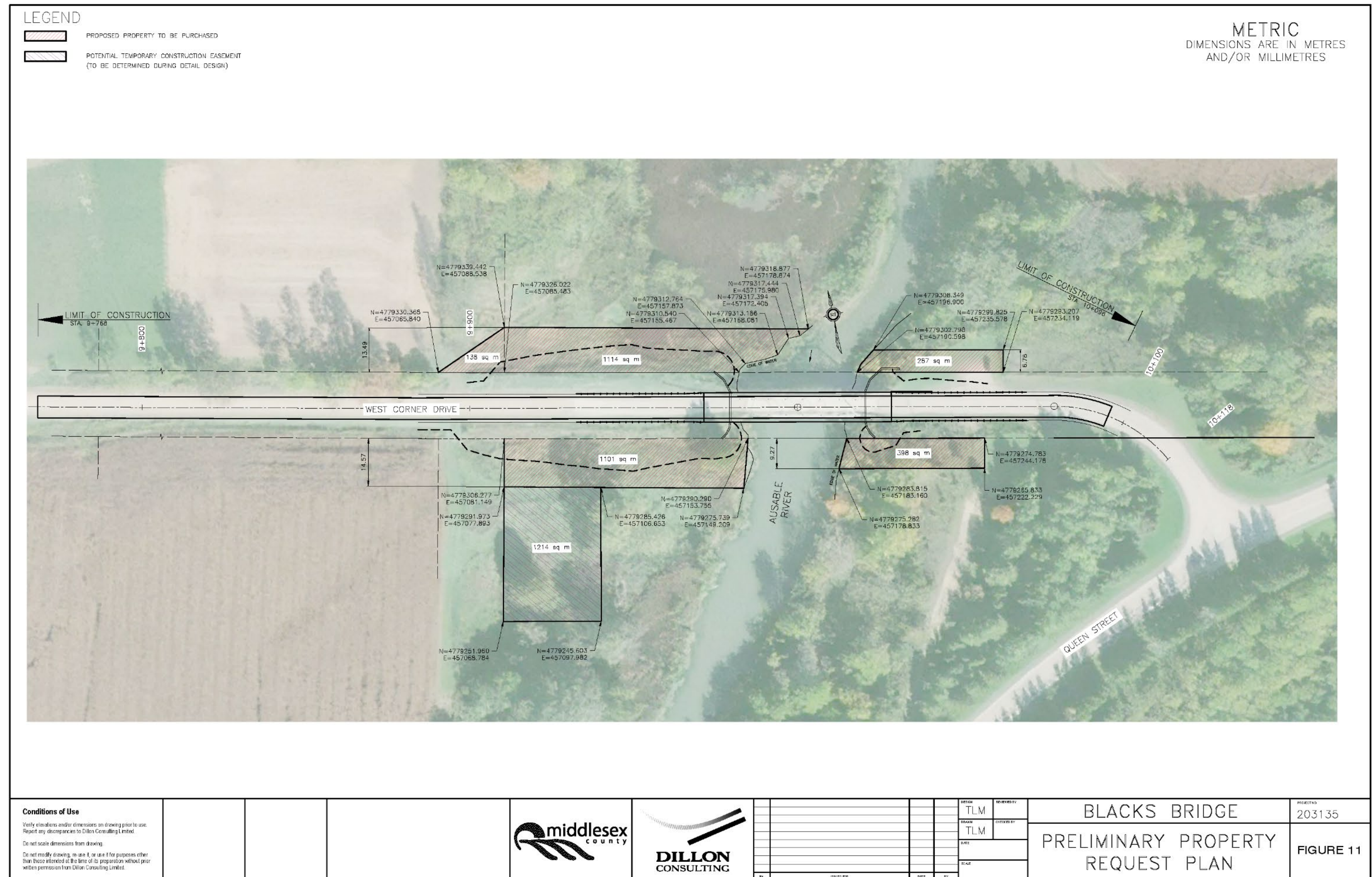
This project involves removal of Blacks Bridge, which has been identified as having cultural heritage value (**Section 4.5.1**). A HIA assessing the preferred design option was completed by TMHC and combined with the CHER completed earlier in the study. The CHER/HIA (TMHC, March 2022) is included in **Appendix D**.

The preliminary design has some resemblance to the existing bridge as a single span bridge with vertical abutments. The proposed design also retains the original function as a vehicular crossing.

The following mitigation measures are recommended to address the removal of Blacks Bridge:

- The final design for the replacement bridge should consider and, where possible and appropriate, incorporate the scale, massing, materials, and finishes of the original bridge in its original location;
- Sufficient documentation of the bridge should be undertaken prior to demolition, including additional photography, accompanied by a photographic key plan, and engineering drawings. All documentation shall be submitted to the North Middlesex Historical Society, copying the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) on the accompanying cover letter.
- In consultation with local stakeholders and Indigenous communities, the County will install a commemorative plaque or interpretive sign at the site of the replacement bridge within one year of completion. Interpretive content should reference the current bridge's through-truss design, history of bridges at this location, the Sarnia Bridge Company, and historic photographs. If feasible, salvaged components of the original bridge could be incorporated into the commemoration.

Figure 11: Property Request Plan



8.10 Archeological Resources

The preliminary design is expected to impact lands that were identified as having archaeological potential in the Stage 1 archaeological assessment completed as part of this study (**Figure 10**). A Stage 2 archaeological assessment is planned to be undertaken spring/summer 2022, in coordination with Indigenous field monitors. Additionally, a Stage 1-2 archaeological assessment will be completed for the additional lands that are being considered for a construction laydown area (**Section 7.3**). The results of these studies will be documented in a combined Stage 1-2 archaeological assessment report.

MHSTCI acceptance of required archaeological assessment report(s) into the Ontario Public Register of Archaeological Reports is required prior to ground disturbance within undisturbed areas with archaeological potential.

9.0

Commitments to Future Work

This section summarizes work that is recommended to be completed as the project advances through the detailed design stage prior to construction.

9.1

Future Consultation

The following future consultation activities are recommended to be completed as the project proceeds through detailed design:

- Continue to consult with impacted property owners regarding required property acquisition;
- Consult with affected utility companies during detailed design when utility impacts are known;
- Consult with local stakeholders and Indigenous communities regarding the commemorative plaque or interpretive sign to be included at the site of the replacement bridge;
- Complete a public Notification of Work on a Non-Scheduled Waterway in accordance with Transport Canada requirements under the CNWA; and
- Consult with DFO regarding potential requirements for approval under the *Fisheries Act*.

9.2

Recommended Additional Studies

The following additional studies are recommended to be completed prior to construction:

- Stage 1 Archaeological Assessment of additional lands that are being considered for a construction laydown area;
- Stage 2 Archaeological Assessment prior to ground disturbance within areas identified as having archaeological potential in the Stage 1 assessments completed as part of this study;
- Tree survey and inventory within the proposed municipal right-of-way, including documentation of trees with a diameter at breast height of 10 centimeters or greater; and

- Targeted Barn Swallow surveys within the active season (May to August) are recommended before work on the bridge takes place.

9.3

Anticipated Permits, Approvals, and Exemptions

It is anticipated that the following permits, approvals, and exemptions will need to be obtained prior to construction start:

- A permit from the ABCA under *Ontario Regulation 97/04* is anticipated to be required for the bridge replacement;
- If impacts to SAR are identified during the detailed design stage, confirm the requirements to address these impacts under the *Endangered Species Act*;
- Obtain approvals (if required) under the *Fisheries Act* as identified by DFO through future consultation;
- Confirm the need for an Environmental Activity and Sector Registry (EASR);
- If during detailed design it is determined that reconstruction of the storm sewer system at the east bridge approach is required, an ECA will be required prior to construction; and
- MHSTCI acceptance of required archaeological assessment report(s) into the Ontario Public Register of Archaeological Reports prior to ground disturbance within undisturbed areas with archaeological potential.

References

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