5th Line Bridge (Bridge No. 09) Schedule 'C' Municipal Class Environmental Assessment

Environmental Study Report

Prepared For:

Township of Essa

July 2024

CREATING QUALITY SOLUTIONS TOGETHER

5TH LINE BRIDGE (BRIDGE NO. 09) SCHEDULE 'C' MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL STUDY REPORT

PROJECT NO. 217031

Prepared For:

TOWNSHIP OF ESSA

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Table of Contents

List of Figures

List of Tables

Appendices

1 Background

1.1 Introduction

The Township of Essa has retained the services of Ainley & Associates Ltd. (the Ainley Group) to undertake a Municipal Class Environmental Assessment (Class EA) to address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. This project has been initiated to evaluate options that would accommodate two lanes of traffic and improve the horizontal and vertical alignment of the approaches, over an approximate distance of 700m. As part of this project, improvements and stabilization will be made to the embankments in the project area.

Bridge No. 9 and the 5th Line provide a key transportation link between the communities of Angus, Baxter, and Alliston. This route is also frequently used to access Canadian Forces Base Borden and the Honda of Canada Manufacturing Plant. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25. Figure 1, overleaf, outlines the project study area.

The existing structure is estimated to have been constructed circa 1950, making it older than 70 years at the present time. The bridge currently operates as a single-lane structure, with sightlines on the north and southbound approaches being below standard requirements for the posted speed limit. Ongoing erosion and sediment deposition is creating a restriction in the Nottawasaga River at the Bridge No. 9 location resulting in ice and debris jams causing flooding and further scour of the south embankment to the point of instability.

In 2019, and again in 2021, an inspection of Bridge No. 9 was completed following the Ontario Structure Inspection Manual (OSIM). The investigations identified the need for immediate maintenance items and a recommendation to replace the structure within 6-10 years.

Figure 1: Project Study Area

1.2 Municipal Class Environmental Assessment Process

The Municipal Class Environmental Assessment document (last amended in February 2024) as published by the Municipal Engineers Association outlines a planning process for municipalities to follow so as to complete infrastructure projects in an environmentally responsible manner and

in accordance with the *Environmental Assessment Act* (EAA). Based on the scope of the proposed improvements, a Schedule 'C' level of planning was determined to be required.

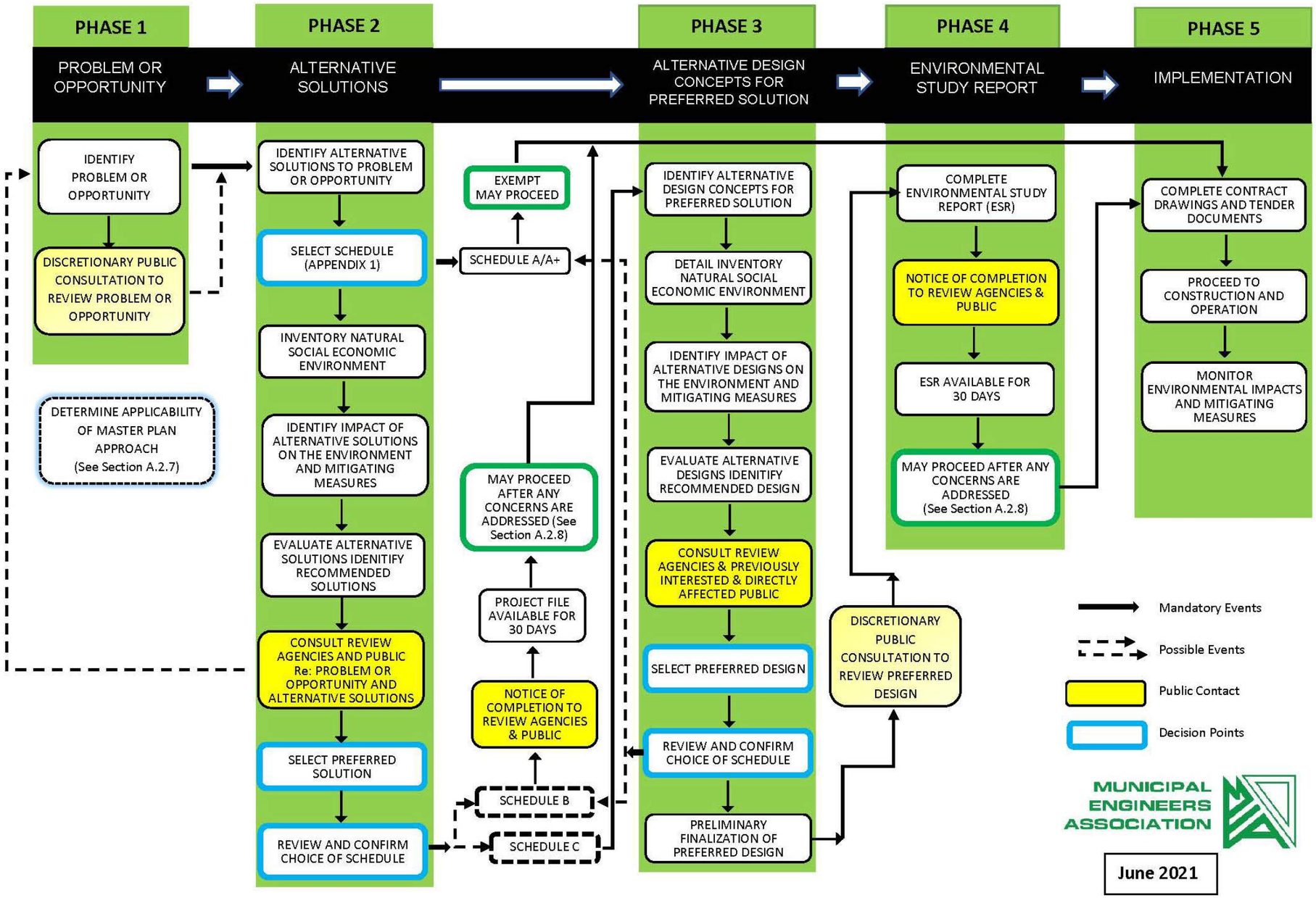
A Schedule 'C' project requires completion of Phases 1 to 4 of the Class EA process as illustrated in Figure 2, overleaf, which is generally comprised of the tasked identified in the following table.

Table 1: Schedule C Municipal Class EA Phases

Phase	Task
Phases 1 & 2	▪ Identify the problem/opportunity; ▪ Inventory the existing environment (physical/built, natural, social and economic); ▪ Develop alternative solutions to address the problem/opportunity; ▪ Evaluate proposed alternative solutions; ▪ Consult with the public, review agencies, relevant stakeholders; and ▪ Select the Preferred Solution giving consideration to the evaluation and any feedback received through consultation.
Phases 3 & 4	▪ Establish alternative design concepts to implement the Preferred Solution as selected at the close of Phase 2; ▪ Evaluate the impacts of the proposed alternative designs on the existing environment; ▪ Consult with the public, review agencies, relevant stakeholders; ▪ Select the Preferred Design in consideration of comments received; ▪ Develop a suitable mitigation strategy to minimize potential environmental impacts; ▪ Prepare an Environmental Study Report (ESR) to document the Class EA process; ▪ Issue a Notice of Completion followed by a 30-day review period; and ▪ Address any final comments and conclude the Class EA process.
Phase 5	▪ Complete the detailed design, prepare the contract drawings and tender documents, and proceed to construction. ▪ Monitor for environmental provisions and commitments.

Consultation is a key component of the Class EA process as it allows members of the public, Indigenous communities, and relevant review agencies opportunity to provide relevant information and feedback for consideration.

Figure 2: MCEA Planning and Design Process



1.3 Objective of this Report

The objective of this report is to document the Schedule 'C' Class EA planning process. This report identifies the deficiencies affecting the subject study area; the Problem/Opportunity Statement to be addressed; the alternative solutions considered; and the evaluation of these alternatives to demonstrate the decision-making process leading to the selection of the preferred solution and subsequently the design solution. This report also describes the existing project environment, the potential for environmental impact, and the mitigation strategy proposed. Consultation completed during this process is also included.

1.4 Project Study Team

The project team involved in the completion of this Schedule 'C' Class EA includes the following:

Proponent:	Township of Essa
Prime Consultant:	Ainley Group
Sub-Consultants:	Archeoworks Inc.
	ASI
	Water's Edge Environmental Solutions Team Ltd.
	EXP Services Inc.
	RiverStone Environmental Solutions Inc.

2 Planning Policy and this Class EA

There are various land use planning policies, principles, and other guiding documents that provided input and context to this MCEA process. This section provides a brief description of these and demonstrates the consistency of this study in relation to provincial, regional, and municipal planning goals and objectives.

2.1 Provincial Framework

2.1.1 Provincial Policy Statement (2020)

The *Provincial Policy Statement (2020)* provides policy direction relating to land use planning and development in Ontario. Section 3 of the *Planning Act* stipulates that all decisions affecting planning matters are to be consistent with the *Provincial Policy Statement (PPS)*. Policies applicable to this study include the following:

- Section 1.1.1 g "Healthy, liveable and safe communities are sustained by ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs"
- Section 1.6.1 "Infrastructure and public service facilities shall be provided in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs"
- Section 1.6.8.1 "Planning authorities shall plan for and protect corridors and rights-of-way for infrastructure, including transportation, transit and electricity generation facilities and transmission systems to meet current and projected needs"
- Section 2.1.1 "Natural features and areas shall be protected for the long term."

- Section 2.6.5 “Planning authorities shall engage with Indigenous communities and consider their interests when identifying, protecting and managing cultural heritage and archaeological resources”
- Section 3.1.3 “Planning authorities shall prepare for the impacts of a changing climate that may increase the risk associated with natural hazards”

As part of this Municipal Class EA process, consideration is being given to the potential to impact the physical, natural, social, cultural and economic environment prior to selection of the preferred solution and preferred design. Various studies have been completed to obtain a better understanding of the existing conditions of the study area so that impacts can be properly assessed and appropriate mitigation developed.

2.1.2 Places to Grow Act (2005) & A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020)

The *Places to Grow Act, 2005* enables the development of regional growth plans that guide government investments and land use planning policies. *A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020)* builds on the PPS and plans for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life. This Plan applies to the area designated by Ontario Regulation 416/05 as the Greater Golden Horseshoe growth plan area, within which the Township of Essa is located.

The Growth Plan guides decisions on transportation, infrastructure planning, land use planning, urban form, housing, natural heritage and resource protection in the interest of promoting economic prosperity.

Policies within the Growth Plan applicable to this study include the following:

Section 3.2.2 (2) *“The transportation system within the GGH will be planned and managed to:*
a) provide connectivity among transportation modes for moving people and for moving goods;
e) accommodate agricultural vehicles and equipment, as appropriate; and
f) provide for the safety of system users.”

Municipal Class EA planning for improvements to the 5th Line Bridge is consistent with the policy direction of the Growth Plan as it will improve the condition and safety of the transportation network for users.

2.1.3 Proposed Provincial Planning Statement (2023)

In 2023, the Province issued a proposal to consolidate the PPS and the Growth Plan into one provincewide land use policy document to support provincial housing targets and objectives. It is anticipated that, if adopted, the new policy statement would still contain much of the aforementioned policies applicable to this Municipal Class EA process.

2.1.4 Source Water Protection

The purpose of the *Clean Water Act* (2006) is to protect drinking water at the source and to safeguard human health and the environment. It aims to protect existing and future drinking water sources. It ensures that municipal drinking water supplies are protected through prevention by the development of a watershed-based source protection plan. The source protection plans identify vulnerable areas within each municipality and provide policies to

address existing and future risks to municipal drinking water sources within these vulnerable areas. This project is subject to the South Georgian Bay Lake Simcoe's Region Source Protection Plan (SGBLS – SPP) and is within the Nottawasaga Valley Source Protection Area. As a result, source water protection is being considered as part of this study.

2.1.5 Climate Change

The MECP document entitled "Considering Climate Change in the Environmental Assessment Process" (2017) provides guidance relating to the Ministry's expectations for considering climate change during the environmental assessment process. The Guide is now a part of the Environmental Assessment Program's Guides and Codes of Practice. The environmental assessment of proposed undertakings is to consider how a project might impact climate change and how climate change may impact a project. Climate Change is being considered during the course of this study and is discussed further in Section 8 and 11 of this document.

2.1.6 Nottawasaga Valley Conservation Authority Guidance Documents

Conservation authorities are governed by the *Conservation Authorities Act*, which is administered by the Ministry of the Environment, Conservation, and Parks.

The NVCA Planning and Regulation Guidelines (NVCA, August 2009) is a guidance document that outlines the role of a conservation authority under the *Conservation Authorities Act* and the *Planning Act*. These guidelines provide direction relating to standards and requirements associated with NVCA approvals.

Portions of the project study area are within an area regulated by the Nottawasaga Valley Conservation Authority (NVCA) and, as such, consultation with and a permit from this agency will be required.

2.2 Municipal Framework

2.2.1 Township of Essa Official Plan (2001) – Update in Progress

At the municipal level, provincial policy is implemented through the Township of Essa's Official Plan document. The Official Plan is intended to ensure that any changes in the physical structure of the Township will be in harmony with the social, economic, and financial needs of the Township while taking into consideration the proper management of natural resources and environmental concerns.

The Township is currently undertaking an update to their Official Plan; however, at present, the update has been put on hold while the Township engages with Provincial and Upper-Tier stakeholders regarding recent and ongoing legislative changes.

3 Phase 1 – Problem/Opportunity Statement

The purpose of Phase 1 of the Class EA process is to develop a problem/opportunity statement that clearly identifies the issue, challenge, or opportunity that is being reviewed and addressed. The problem/opportunity statement that has been developed for the Township of Essa 5th Line Bridge is as follows:

> *"The purpose of the undertaking is to examine options to address deficiencies associated with Bridge No. 9, located on the 5th Line over the Nottawasaga River between 20th Sideroad and 25th Sideroad. The objective is to provide a solution that will accommodate two lanes of vehicular traffic, improve the horizontal and vertical alignment to meet*

minimum geometric standards, and address ongoing issues related to erosion, sediment deposition as well as ice/debris jams in the river."

4 Existing Conditions

This section describes the characteristics of the study area to provide a baseline and context for the development and evaluation of alternative solutions and their potential impacts.

4.1 Physical Environment

4.1.1 Existing Road and Bridge Structure

The 5th Line is a two-lane rural collector road with an Average Annual Daily Traffic (AADT) volume of 1,150 (2017). It provides a key transportation link between the communities of Angus, Baxter, and Alliston.

The existing Bridge No. 9 structure was constructed in or around 1950. It is a two-span continuous concrete parabolic T-beam structure with a concrete deck and a concrete wearing surface. The deck is supported on three lines of concrete T-beams cast integral with the deck. The concrete T-beams are supported on concrete abutments and piers constructed normal to the road alignment.

Figure 3, below, is a photo of Bridge No. 9 showing the west elevation view, as taken in 2019.

Figure 3: Bridge No. 9 West Elevation View (2019)

Figure 4 and 5, overleaf, are photos of the Nottawasaga River upstream and downstream of the existing bridge structure, taken in 2022.

This shows the level of scour, erosion, sediment and debris buildup that has occurred.

Figure 4: Nottawasaga River Upstream (East) of Bridge No. 9 (2022)

Figure 5: Nottawasaga River Downstream (West) of Bridge No. 9 (2022)

4.1.2 Existing Road and Bridge Deficiencies

Bridge No. 9 is 52 m long with only a 6.1 m wide driving platform. It currently operates as a single-lane structure rendering it functionally deficient for the volume of traffic it serves. In order to comply with the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, the Ministry of Transportation Ontario (MTO) Geometric Design Supplement, and the Canadian Highway Bridge Design Code, the bridge platform would have to be increased to an absolute minimum width of 9.0 m and a preferred width of 11.0 m.

Compounding the issue at this particular location is the fact that the northbound and southbound roadway approaches are quite steep and on a horizontal curve, so the sightlines do not meet the minimum geometric requirements for the posted speed limit, which has already been lowered in an attempt to improve the situation. Figure 6, overleaf, shows the curvature of the approaches to Bridge No. 9.

There is also ongoing erosion of the riverbanks and deposition of sediment at the central pier, which is contributing to ice and log jams that cause flooding and require ongoing maintenance.

In recent biennial inspections completed in accordance with the Ontario Structure Inspection Manual (OSIM), it has been identified that, due to age, the bridge condition is deteriorating and the structure should be replaced in the 6- to 10-year timeframe. Copies of the OSIM reports are included in Appendix A.

4.1.3 Land Use

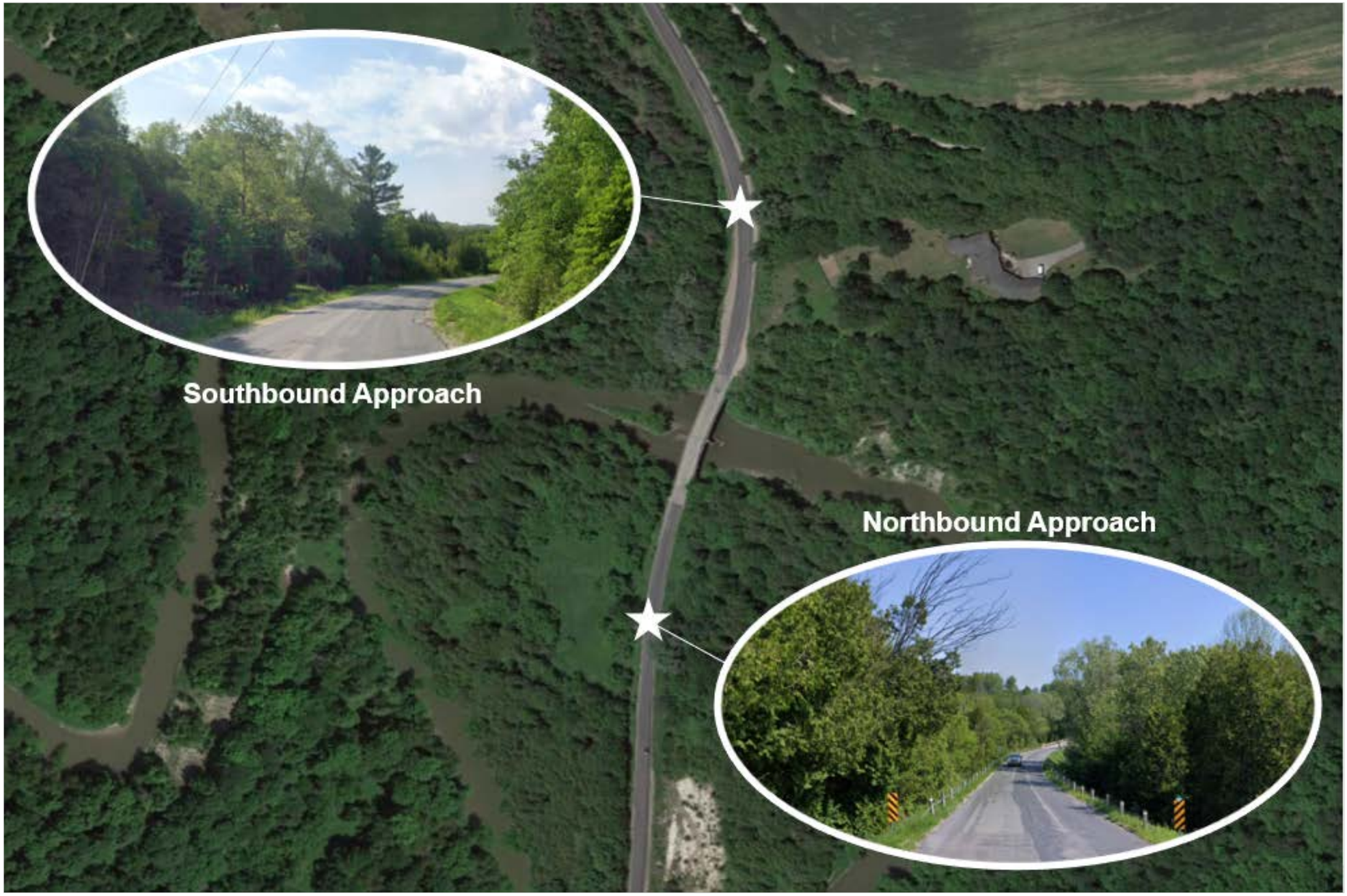
The current road right-of-way (ROW) is used for transportation purposes. Under the Township of Essa's Official Plan, the land use for much of the study area outside of the ROW limit is categorized as "Environmental – Significant Areas," except for a small segment in the north end, which is categorized as "Agricultural".

Portions of the Nottawasaga River are considered to be a navigable waterway and are used for recreational purposes such as kayaking, canoeing, and angling.

4.1.4 Existing Utilities

There is existing buried telecommunications plant to the south and north of the bridge as well as existing aerial telecommunications that cross over the river adjacent to the existing bridge. Additionally, there is aerial Hydro to the north of the bridge. There is no existing sanitary, storm, or watermain infrastructure within the project limits.

Figure 6: 5th Line Approaches to Bridge No. 9



4.2 Natural Environment

This section provides an inventory of the study area's existing natural environment, including significant resources, vegetation, Species-at-Risk (SAR), aquatic (fish/fish habitat), and ground and surface water. To assist in the completion of this inventory, RiverStone Environmental completed an Environmental Impact Study. In addition, a fluvial geomorphic assessment was complete by Water's Edge to characterize various physical river parameters for the segment of the Nottawasaga River present within the study area. A copy of each report is included in Appendix B and Appendix C, respectively.

4.2.1 Significant Natural Heritage Features

A portion of an area of natural and scientific interest (ANSI) known as the "Nottawasaga River North", as designated by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNRF), encompasses a large portion of the study area. The ANSI is identified for its representation of valley bottomland features on outwash deposits, moderate representation of semi-mature conifer bottomland forest and successional mixed forest.

Based on the functions, attributes, and ecological features associated with the valley system, a substantial portion of lands within the study area should be regarded as significant valley lands. Additionally, based on the total size of the associated area of contiguous woodland, as well as various ecological characteristics, woodlands within the study area should be considered significant woodlands.

Formal designation of the feature and its boundaries would be subject to review and concurrence by the municipality. Schedule A of the Township OP identifies all or the majority of lands within the study area as "Environmental – Significant Areas". Likewise, the study area is contained with the County of Simcoe's "Greenlands" designation, which is inclusive of several significant/key natural heritages features.

4.2.2 Vegetation Communities

Existing vegetation communities within the study area were first assessed via a desktop exercise and then refined during site investigations where feasible. All natural vegetation communities were mapped according to Ecological Land Classification (ELC) community tables. The following ELC vegetation communities were identified throughout the study area:

- FOC4: Fresh – Moist Cedar Coniferous Forest Ecosite
- FOM: Dry Scots Pine – Aspen Mixed Forest
- CUM1(a): Moist Mineral Cultural Meador Ecosite
- CUM(b): Dry – Fresh Mineral Cultural Meadow Ecosite
- CUT1: Fresh Mineral Cultural Thicket Ecosite
- SBS1: Shrub Sand Barren Ecosite

4.2.3 Species at Risk (SAR)

To assess the potential presence of individual species and/or habitat for endangered and threatened species within the study area, review of the species designated in Ontario was conducted. The species contained in the list below were identified as having the highest likelihood of being present within the study area.

- **Butternut *(Juglans cinerea)*** – a single Butternut sapling was documented within the road allowance of 5th Line, to the south of the bridge.
- **Lake Sturgeon *(Acipenser fulvescens)*** – it is assumed that the study area is likely to provide general (primarily migratory) habitat, but is unlikely to support significant habitat functions.
- **Bobolink *(Dolichonyx oryzivorous)*** – features identified within the study area with potential to function as habitat for Bobolink are specific to the hayfield in the northwestern portion of the study area. A single male Bobolink was observed flying over a portion of the hayfield during a field investigation. There was however a lack of activity documented during breeding bird surveys.
- **Eastern Meadowlark *(Sturnella magna)*** – features identified within the study area with potential to function as habitat for Eastern Meadowlark are specific to the hayfield in the northwestern portion of the study area.
- **Barn Swallow *(Hirundo rustica)*** – features identified within the study area with potential to function as habitat for Barn Swallow are specific to the bridge. The underside of bridge structures are known to be preferred nesting sites for individuals or colonies.
- **Bank Swallow *(Riparia riparia)*** – features identified within the study area with potential to function as habitat for Bank Swallow are specific to banks along the river corridor. Eroding banks offer physical structure which have potential to support Bank Swallow colonies.
- **Endangered Bat Species** – forests within the road right-of-way are not representative of significant roosting habitat for bats, including endangered species; however, it is recognized that this is based on a qualitative assessment only. Additionally, and regardless of the quality of potential roosting habitat within the study area, there is always the potential for individuals of endangered bat species to occur within any forested setting.

In addition, the following special concern and/or rare wildlife species were confirmed and/or identified as having a high likelihood of occurring within the study area.

- **Midland Painted Turtle *(Chrysemys picta)*** and **Snapping Turtle *(Chelydra serpentina)*** – There is potential that the river channel and shoreline areas support general and/or significant habitat for one or more species.
- **Monarch *(Danaus plexippus)*** – Both common milkweed and Swamp Milkweed were noted as occurring within the study area in small numbers, indicating that Monarch may utilize the study area to fulfill various life processes.
- **Northern Brook Lamprey *(Ichthyomyzon fossor)*** and Silver Lamprey ***(Ichthyomyzon unicuspis)*** – The Natural Heritage Information Centre database contains a record of element occurrence for Northern Brook Lamprey and Silver Lamprey within the data square which encompasses the study area.

4.2.4 Fish Habitat

The reach of the Nottawasaga River within and adjacent to the study area is considered direct fish habitat. Substrates in proximity to the bridge are dominated by sand and silt, with at least one discrete patch of gravel noted near the south bank on the west side of the bridge. In-stream cover is limited throughout most of the study area except for the growing accumulation of woody debris on the sediment “island” at the center pier of the bridge structure that may provide cover for fish.

4.2.5 River Hydraulics

A bathymetric survey to map the depth and shape of the riverbed at the bridge location was completed. This survey was then incorporated into an existing conditions hydraulic model provided by the NVCA to be used as the basis for evaluating the hydraulic conveyance capacity of the various alternatives to be considered.

4.2.6 Fluvial Geomorphology

The majority of the study area is part of one large meander, which the 5th Line bridge is situated in the middle of. The river is highly sinuous, as is typical for the Nottawasaga River in this area. It winds across the landscape in a deep valley which it is easily confined to. The Nottawasaga River is a confined system with valley walls regularly higher than 15 m above the river. The valley has very little floodplain as the valley walls typically slope straight into the river channel.

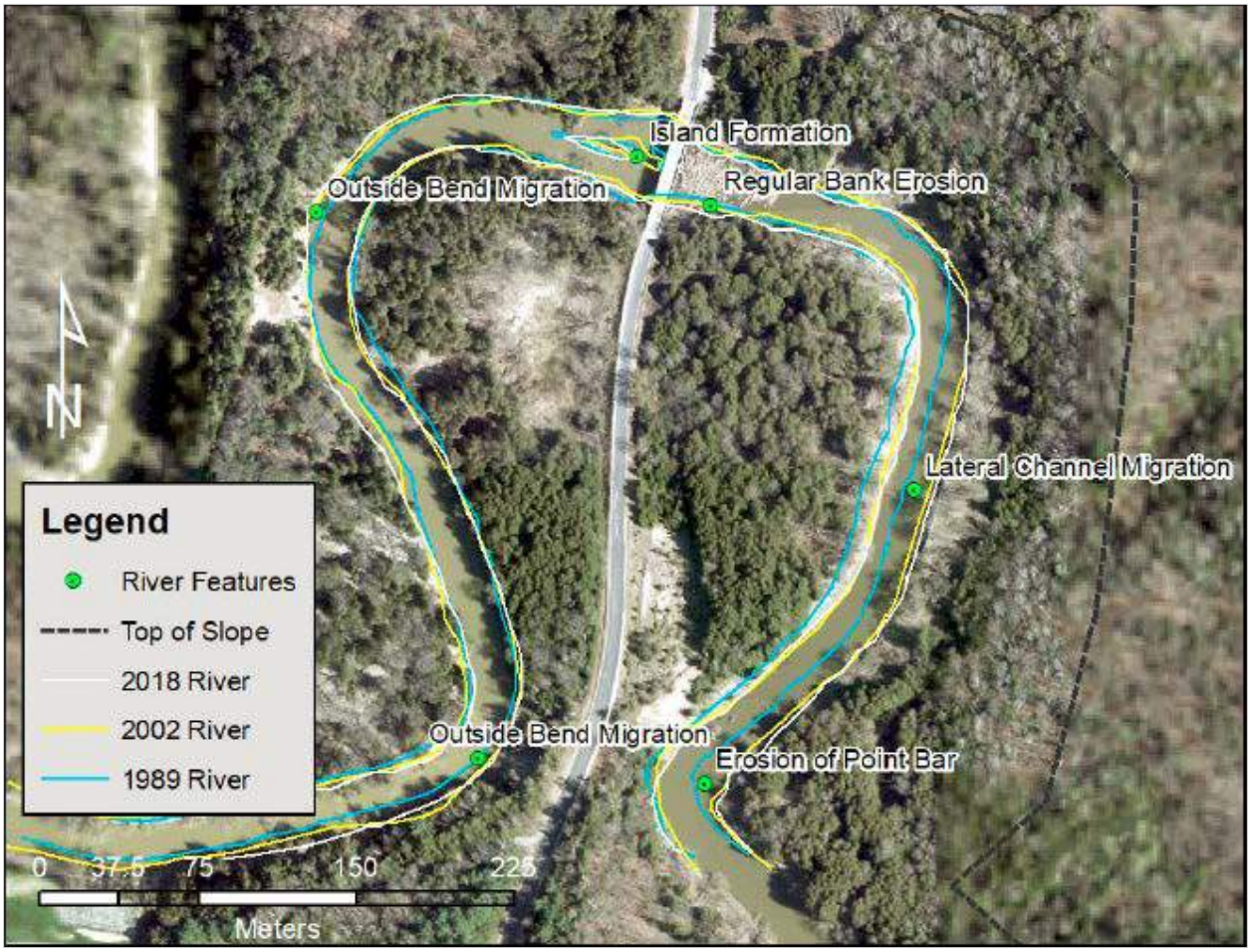
The average bankfull width, which is the width at which water is entirely contained within the channel banks was measured to be 24.7 m in riffles and slightly wider in pools at 29.6 m.

Various techniques were used to better understand general river conditions (stability, habitat, erosion/degradation, riparian, etc.). Watercourse stability was assessed using a Rapid Geomorphic Assessment (RGA), which was developed to characterize components of channel adjustment and assign a stability score based on field observations.

The study reach was found to be *transitional*, meaning that channel morphology is within a range of variance for rivers of similar hydrographic characteristics, but the evidence of instability is frequent. The occurrence of large woody debris, leaning trees, and fracture lines along the top of the banks indicated that the channel is widening. Heavy siltation in the pools and accretion on the point bars provided evidence of aggradation.

Figure 7, overleaf, shows key areas of historical geomorphology changes that have been observed from air photos. The first is the island formation at the downstream side of the bridge pier. The pier slows the velocity of the water on the downstream side of the pier creating an area of deposition. This deposition has continued to accumulate over time creating a sizeable formation in the river, as the island extends for more than 55 m downstream from the bridge pier. Because of this loss of channel area, the banks of the river on either side of the island have eroded outwards. The location of these riverbanks changes regularly, however the alignment of the river through this section is stable, likely in part due to the bridge abutments protecting the bank. Log jams due to the bridge pier also occur regularly and could play a part in the bank erosion through this section.

Figure 7: Historical Geomorphology Changes



Measurements to determine erosion over the last 29 years were taken at three locations that were easily distinguished to be eroding, typically on the outside bend of a meander. The total erosion over the 29-year period ranged from 6.1 m to 14.0 m, resulting in an average 100-year erosion rate of 31.8 m.

4.2.7 Surface Water and Groundwater

One small but presumably permanent drainage feature, occurs within the northeast portion of the study area, conveying roadside runoff and groundwater discharge down the valley slopes and into the Nottawasaga River. The feature has little to no channel and an average depth of <5 cm. Ecological functions of this feature are assumed to be minimal, with no direct fish habitat identified.

A small wet area characterized by scattered seeps and the small drainage feature discussed above were present in the northeast portion of the study area. Seeps and other forms of groundwater discharge are largely dependent on site-specific soil and topographic conditions, as well as the broader dynamics of groundwater tables within the local landscape.

The Study Area falls within the South Georgian Bay Lake Simcoe Region (SGBLS) Source Protection Plan area. Using the Ministry of the Environment, Conservation and Parks (MECP)

Source Protection Information Atlas, a search was completed to identify any vulnerable areas present within the Study Area.

The Atlas indicates that the Study Area is within a Highly Vulnerable Aquifer Area as well as a Significant Groundwater Recharge Area with a vulnerability score of 6.

4.2.8 Geotechnical

A preliminary geotechnical investigation consisting of two boreholes was completed at the location of the existing bridge. The investigation revealed that the existing soils consist of soft silty clay layers that may not be suitable for the use of spread footings due to concerns with potential settlement. A foundation on piles is a more feasible alternative, but accommodation of down drag on the piles would need to be considered as part of the detailed design.

A copy of the geotechnical investigation report is included in Appendix D.

4.3 Cultural Environment

4.3.1 Archaeological Resources

To establish the archaeological context and further establish the archaeological potential of the study area, *Archeoworks Inc*. conducted a comprehensive Stage 1 Archaeological Assessment. The results of this background research are summarized below, a full copy of the Stage 1 Archaeological Assessment report can be found in Appendix E.

Review of historical aerial imagery, combined with a desktop review of current conditions, indicate that the majority of the Study Area can be considered to have been disturbed as a result of the original construction of the roadway and bridge and would; therefore, not retain any archaeological potential. Further, the permanently wet portions of the study area (i.e. the river) and the steeply sloped areas adjacent to it are considered to have no or low archaeological potential.

Only small portions of the study area are considered to retain archaeological potential. Specifically, these include the narrow, grassed margins following both sides of 5th Line and immediately fronting 8082 5th Line (west side of road) and 8119 5th Line (east side of road).

4.3.2 Cultural Heritage Resources

A Cultural Heritage Evaluation of Bridge No. 9 was conducted by Archeological Services Inc. (ASI) to assess impacts of the proposed undertaking in consideration of its determined cultural heritage value. The results of this background research are summarized below, a full copy of the Cultural Heritage Evaluation report can be found in Appendix F.

Based on the results of archival research, an analysis of the bridge design and construction in Ontario, field investigations, and heritage evaluation, it was determined that Bridge No. 9 did not retain cultural heritage value following application of *Regulation 9/06* of the *Ontario Heritage Act*.

5 Phase 2 – Proposed Alternative Solutions

As previously mentioned, Phase 2 of the MCEA process includes the development of alternative solutions to address the needs, problems, and opportunities identified for the Study Area. These alternative solutions are high-level options and include a “Do Nothing” option to provide a basis for comparison. The alternative solutions developed to address the problem/opportunity statement are presented in the subsections that follow.

5.1 Option 1 – "Do Nothing"

The "Do-Nothing" option considers no improvements and/or modifications. This alternative does not address the problem/opportunity statement and is provided as a benchmark to gauge the potential impacts of the other options being considered.

5.2 Option 2 - Rehabilitate Existing Bridge

This option involves rehabilitating the existing bridge structure in its current location. Some limited additional deck width could be achieved; however, due to the substructure design, it will not be possible to obtain two-lanes that meet current minimum design standards. As part of the rehabilitation, the existing barrier system and approach guiderail would be replaced to meet the requirements of the Roadside Design Manual (RDM). In addition, slope flattening and tree clearing within the road right-of way approaching the bridge (approximately 30m) in each direction would be completed to the extent possible in order to improve the sightlines; however, the geometric design standard would not be achieved.

5.3 Option 3 - Replace Bridge Structure in Current Location to Accommodate Two Lanes of Traffic

This option involves replacing the bridge structure in its existing location. The new bridge would be of sufficient width to support two lanes of traffic and would meet all requirements of Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Canadian Highway Bridge Design Code (CHBDC) and RDM. The replacement would provide an opportunity to adjust the road profile and bridge elevation to improve the overall vertical alignment. Erosion protection measures along the banks would also be reviewed along with removal of sediment deposition from the river to restore channel flow. In addition, slope flattening and vegetation removal would be considered to improve sightlines.

5.4 Option 4 - Replace Bridge on a New Road Alignment to the West

The existing bridge structure would be demolished and a new bridge constructed west of the existing location, remaining within the ROW. The new bridge would be of sufficient width to support two lanes of traffic and would meet all requirements of Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Canadian Highway Bridge Design Code (CHBDC) and RDM. As part of this option the road alignment on the 5th Line approaching the bridge from both directions (north and south) would be adjusted to 'straighten' the curves in the road. Erosion protection measures along the banks would also be reviewed along with removal of sediment deposition from the river to restore channel flow.

6 Phase 2 Evaluation

Under the Class EA process, evaluation involves the identification and consideration of the effects of each alternative on all aspects of the environment. The completion of the evaluation considered a number of factors, which were separated into the following evaluation criteria:

- Physical Environment: Degree to which the solution addresses structural and functional deficiencies; Impacts to existing utilities
- Natural Environment: Impacts to significant Natural Heritage Features, Terrestrial Vegetation/Wildlife (Including SAR), Fish Habitat (Including SAR), River System and Bank Stability, Surface Water, and Groundwater

- Social and Cultural Environment: Impacts to Archaeological, Built Heritage and Cultural Resources and Landscapes; Noise; Property Impacts; and Recreational Use
- Economic Environment: Construction Costs; Operation and Maintenance Costs

6.1 Evaluation Matrix

A summary of the evaluation results is presented in the format of an Evaluation Matrix. The Evaluation Matrix provides a means of comparing the effects that each alternative will generate on the area environment. Visual markers were used to represent the potential for impact on each of the evaluation criteria. Green represents a positive or preferred option, as it relates to the criteria being evaluated. Red is indicative of a negative or least preferred option as it has a higher potential to impact the environment. A blank space indicates that the impact is considered neutral.

The Evaluation Matrix was completed using information gathered by specific field studies and background research. Through this evaluation, a Preliminary Preferred Solution was identified and presented to the public as part of the Public Information Centre (PIC). Further details regarding public consultation can be found in Section 9.

The purpose of the Evaluation Matrix is to provide a visual summary. Further details on the evaluation of each criteria is provided in the sections that follow.

Least Preferred	Negative Neutral	Neutral	Positive Neutral	Most Preferred
LP	**NN**	**N**	**PN**	**MP**

Table 2: Phase 2 Evaluation Matrix of Alternative Solutions

Evaluation Criteria	Opt 1	Opt 2	Opt 3	Opt 4	Description of Impacts
Physical Environment					
Addresses Structural Deficiencies	LP	MP	MP	MP	The existing structure has numerous structural deficiencies and Option 1 would do nothing to address this. Options 2, 3, and 4 could address all structural deficiencies.
Addresses Functional Deficiencies	LP	NN	MP	MP	The existing structure is functionally deficient due to its limited width, vertical/horizontal alignment, and limited sightlines on each approach. Option 1 would do nothing to address this. Option 2 would provide minimal improvement. Options 3 and 4 would provide opportunity to address these functional deficiencies.
Impacts to Existing Utilities	MP	NN	NN	LP	There is existing aerial hydro and telecommunications along the corridor. Option 1 would have no impact on these utilities. Options 2 and 3 are not anticipated to impact the utilities. Option 4 may require relocation of the hydro/telecommunications. (Note: At the time of PIC #1, it was anticipated that a sanitary forcemain was being constructed along 5th Line and was being attached to the existing bridge; however, this was never constructed and is no longer planned.)
Natural Environment					
Scientific Natural Heritage Features	N	NN	NN	LP	Options 2 and 3 would not be expected to adversely impact features and functions associated with the ANSI, as the valley landform would not require alteration. Temporary impacts may include construction disturbance to various wildlife habitat functions associated with the ANSI. Option 4 would require substantial grading of valley slopes and removal of forested cover within the ANSI, resulting in both permanent and long-term impacts at a site level.
Terrestrial Vegetation/Wildlife (Including SAR)	N	N	N	LP	Option 2 and 3 would not be expected to require substantial removals of trees within the ROW. Option 4 results in more substantial removal of forest cover. There is potential to impact SAR.
Fish Habitat (Including SAR)	PN	NN	NN	NN	Options 2-4 have the potential to adversely impact fish habitat by creating obstruction within the channel, removing important cover, or releasing sediment and or/pollutants into the river. From an aquatic habitat perspective, the current log jam is beneficial fish habitat.
River System and Bank Stability	LP	NN	MP	MP	The existing bridge pier is causing the formation of the island, major logjams, and erosion along the upstream and downstream banks. Option 2 would not remove the central pier; however, some bank protection measures could be explored. Option 3 and 4 design structure would eliminate the central pier and could include bank protection adjacent to the existing abutments to prevent scouring in the future.
Surface Water	N	NN	NN	LP	Options 2 and 3 may result in temporary construction disturbance to a small drainage feature conveying runoff. Option 4 would likely require re-alignment of this feature within the ROW. Removal of tree cover would result in decreased shading, and potentially increase water temperature prior to the feature entering the main river channel.
Ground Water	N	N	N	N	Multiple small seeps were identified within the northeastern portion of the study area. Option 2 and 3 would not be expected to alter any factors influencing the presence of seeps within the study area. Option 4 proposes the road re-alignment toward the west, away from the identified seepage zone. Provided that no grading is proposed east of the existing 5th Line alignment, no impacts to the seepage zone are expected under Options 2-4.
Cultural And Social Environment					
Noise	N	NN	NN	NN	Options 2, 3 and 4 would have temporary noise disturbances due to construction activity. There are 6 residential dwellings within the study area.
Archaeological	N	PN	PN	NN	Parts of the study area have low or no longer retain archaeological potential due to steeply sloping terrain, permanently wet conditions or previous disturbance, portions in the north end will still require Stage 2 Investigation.
Cultural and Built Heritage	N	N	N	N	Bridge No. 9 was not determined to retain cultural heritage value following application of Regulation 9/06 of the Ontario Heritage Act.
Property Impacts	N	NN	NN	LP	Option 2 and 3 may potentially result in minor property impacts due to vegetation clearing along the roadside. Option 4 would have property impacts associated with the new road alignment and property entrances.
Recreational Use	LP	LP	MP	MP	With Option 1 and 2 the formation of log jams will continue to occur, causing obstructions for recreational uses. The configuration of the new structures proposed under Option 3 and 4 would reduce the formation of log jams and provide open waterway for recreational uses.
Economic Environment					
Construction Costs	N	NN	NN	LP	There is no construction cost associated with Option1. Construction costs under Option 2 and 3 could be considered comparable, whereas construction costs associated with Option 4 are estimated to be considerably higher.
Operating/Maintenance Costs	LP	NN	PN	PN	Maintenance of current structure will increase as the structure is over 70 years old. Option 1 has the highest cost due to the need for regular log jam removal and potential structure maintenance. Option 2 will similarly have ongoing maintenance for log jam removal. Options 3 and 4 should require less maintenance due to their revised configuration and new construction.

6.2 Physical Environment

The objective of this study is to find a solution to address the structural and functional deficiencies of the bridge as well as ongoing erosion and sediment deposition.

The originally posted speed limit was 60km/hr, but with deficient sightlines across the existing narrow bridge, the recommended speed limit was set at 30km/hr. For the purposes of assessing the options, the design speed was set as 80 km/hr (i.e. desired posted speed limit of 60 km/hr plus 20 km/hr).

Based on the design speed and the Average Annual Daily Traffic (AADT), to meet the minimum TAC and roadside safety requirements, a lane width of 3.50 m, a shoulder width of 2.0 m, and a bridge side clearance of 2.0 m is required, for a total road platform and bridge width of 11.0 m.

Widening of the bridge to accommodate this required platform and making modifications to the road profile to meet the requirements of TAC, MTO, and the CHBDC can only be accomplished with a full bridge replacement, meaning either Option 3 or 4. A bridge rehabilitation, as per Option 2, can only provide nominal improvement and would not meet these requirements.

There is existing aerial hydro and telecommunications along the corridor. The intent is to provide minimal impact to the existing infrastructure and utilities as the relocation requires additional time and expenses to complete.

6.3 Natural Environment

6.3.1 Scientific Natural Heritage Features

Options 2 and 3 would not be expected to adversely impact features and functions associated with the ANSI, as the valley landform would not require alteration. Temporary impacts may include construction disturbance to various wildlife habitat functions associated with the ANSI. Option 4 would require substantial grading of valley slopes and removal of forested cover within the ANSI, resulting in both permanent and long-term impacts at a site level.

6.3.2 Terrestrial Vegetation and Wildlife (Including SAR)

Option 2 and 3 would not be expected to require substantial removals of trees within the ROW. Option 4 results in more substantial removal of forest cover. There is potential to impact SAR.

6.3.3 Fish and Fish Habitat (Including SAR)

Options 2, 3 & 4 have the potential to adversely impact fish habitat by creating obstruction within the channel, removing important cover, or releasing sediment and or/pollutants into the river. From an aquatic habitat perspective, the current log jam is beneficial fish habitat. However, this log jam is only seasonal, temporary and causes more damage to the embankments than the benefits they provide for the fish habitat. Options 3 and 4 would be able to address the sediment “island” formation and can provide natural wood debris along the embankments as part of the environmental restoration Works associated with the bridge replacement options.

6.3.4 River System and Bank Stability

Often, options for ‘do nothing’ have the least impact from a fluvial perspective as it is usually best to avoid disruptions to a stream corridor. However, in this case the existing bridge pier is causing the formation of the island, major logjams, and erosion along the upstream and downstream banks. The bridge pier has also forced the widening of the river in the area of the

bridge. Bridge piers affect the river in a number of ways including reducing channel velocities, limiting sediment transport, and increasing erosion potential at the pier and bridge abutments. The Nottawasaga River at this location is a relatively narrow and deep river and the bridge pier is a major obstruction to this natural shape. Bridge piers work best in large rivers with shallow and wide sections where the river flow can spread across the channel and floodplain, dissipating energy. Should the existing bridge be retained these issues would continue to occur, potentially causing serious scour to the abutments or upstream flooding due to logjams.

Option 2 includes the rehabilitation of the existing bridge in the current location, and from a fluvial geomorphological perspective this would have the same effect as the 'do nothing' alternative. However, this alternative could include bank protection adjacent to the existing abutments to prevent scouring in the future. If no changes to the bridge setup are proposed, then the same issues as the first option apply.

Option 3 of replacing the bridge in the current location would generally have the same effect as the first two alternatives if the location and design of the bridge do not change. Specifically, issues regarding the bridge pier, if located in the center of the channel would still apply. However, differences for this alternative could potentially include increased span and therefore a greater setback from the river for the abutments. Any increased setback from the river is positive as it removes the bridge abutments from any future migration and allows the river to naturally meander without obstruction. Alternatively, this option could also include increased bank protection adjacent to the abutments if they were to remain in the current location with no increased setback.

Option 4 includes the replacement and relocation of the bridge 55 m to the west. This option provides the possibility for the construction of a full span bridge over the river. The ideal situation for river crossings is a large span bridge with abutments outside of the erosion hazard limits and no piers. The Nottawasaga River is a large river within a large valley which makes spanning such a distance costly, however avoiding bank erosion repairs and logjams could potentially offset future repair costs. The alignment of the bridge over the river is also important when considering the alternatives. The existing bridge is perpendicular to the river alignment, meaning it crosses at 90 degrees. This is the ideal situation as it limits the area of impact to the river valley and also generally provides the widest buffer from the river to the bridge abutments. This may not be applicable if the proposed bridge spans well outside of the erosion hazard limits. If the bridge is within the erosion hazard limits, then it is preferred to align it perfectly perpendicular to the river alignment.

6.3.5 Surface Water

Options 2 and 3 may result in temporary construction disturbance to a small drainage feature conveying runoff. Option 4 would likely require re-alignment of this feature within the ROW. Removal of tree cover would result in decreased shading, and potentially increase water temperature prior to the feature entering the main river channel.

6.3.6 Groundwater

Multiple small seeps were identified within the northeastern portion of the study area. Option 2 and 3 would not be expected to alter any factors influencing the presence of seeps within the study area. Option 4 proposes the road re-alignment toward the west, away from the identified seepage zone. Provided that no grading is proposed east of the existing 5th Line alignment, no impacts to the seepage zone are expected under Options 2, 3 & 4.

6.4 Cultural and Social Environment

6.4.1 Archeological Resources

As previously noted, the Stage 1 Archaeological Assessment determined that only small portions in the north end of the Study Area would require Stage 2 Archaeological Assessment. Given that Option 2 involves only rehabilitation of the bridge, it is unlikely that the small areas would be disturbed and a Stage 2 would be required. For Options 3 & 4, the completion of the Stage 2 assessment would be required.

6.4.2 Cultural Heritage Resources

As no cultural heritage resources were identified, there are no impacts from any o the proposed options.

6.4.3 Property Impacts

Option 2 and 3 may potentially result in minor property impacts due to vegetation clearing along the roadside. Option 3 has the potential for minor property impacts when following current design standards. Option 4 would have the most property impacts associated with the new road alignment and property entrances.

6.4.4 Recreational Land Use

With Option 1 and 2, the erosion and deposition of sediment as well as the formation of log jams will continue to occur, causing obstructions for recreational uses. Option 3 and 4 would provide an opportunity to modify the configuration of the structure to reduce address this issue and provide an open waterway for recreational uses.

6.5 Economic Environment

There is no construction cost associated with Option 1. Construction costs under Options 2 and 3 could be considered comparable, whereas construction costs associated with Option 4 is estimated to be considerably higher.

Further, maintenance of the current structure will increase as the structure is over 70 years old. Therefore, Option 1 has the highest cost due to the need for regular log jam removals and potential structure maintenance. Option 2 will similarly have ongoing maintenance requirements for log jam removals. Option 3 and 4 should require less maintenance due to the revised configuration and new construction.

6.6 Selection of the Preferred Solution

Based on the results of the analysis and evaluation, it was concluded that Option 1 and 2 do not provide an opportunity to address the main structural and functional concerns with the bridge structure and would result in further maintenance costs over the remaining lifespan of the structure. Option 4 is a viable option; however, the environmental and property impacts far outweigh the benefits of the proposed revised bridge location and road re-alignment.

Therefore, based on the evaluation of alternative options, Option 3 - Replace Bridge Structure in Current Location to Accommodate Two Lanes of Traffic was identified as the preferred solution.

7 Phase 3 – Proposed Alternative Design Concepts for Preferred Solution

As part of the Phase 3 of the MCEA process, several design concepts were developed to suit the Preferred Solution selected in Phase 2.

For this purposes, replacement of the bridge structure was first assessed for vertical road alignment design options and then, once a preferred vertical road alignment design option was selected, structure configuration design options were considered.

7.1 Vertical Road Alignment Design Options

Based on the design speed, calculated lane width, and a maximum recommended rural road superelevation of 6%, the minimum radius for the horizontal alignment was calculated.

Through multiple iterations, it was determined that the only feasible horizontal alignment that will maintain the proposed bridge in a similar location to existing while still meeting all requirements of TAC, MTO, and the CHBDC would be:

- Tangent to the existing road at the tie-in locations;
- A 280 m radius curve to the south of the bridge;
- Straight over the bridge; and
- A 380m radius curve to the north of the bridge.

Further, based on the design speed and the sight stopping distance, the minimum vertical curvature “k-factors” were calculated to be 26 for a crest curve and 30 for a sag curve.

Multiple vertical curves were then assessed and it was narrowed down to three feasible options.

- Option 1 – Lowest vertical alignment
  This option involves raising the elevation of the road at the bridge location by approximately 2.2 m.
- Option 2 – Highest vertical alignment
  This option involves raising the elevation of the road at the bridge location by approximately 4.7 m.
- Option 3 – Mid-height vertical alignment
  This option involves raising the elevation of the road at the bridge location by approximately 3.4 m.

These options are represented on the Drawing included in Appendix G.

7.2 Structure Configuration Design Options

Three options for the configuration of the structure were considered, including:

- Option A – Single span bridge structure
- Option B – Two span bridge structure
- Option C – Three span bridge structure

These options are represented on the Drawings included in Appendix H.

8 Phase 3 Evaluation

Similar to Phase 2 of the MCEA process, the design options were subjected to evaluation of their potential impacts on all aspects of the environment. The completion of the evaluation considered a number of factors, which were again separated into evaluation criteria, as follows:

- **Physical Environment:** Design Requirements and Constructability, Safety, and Impacts to Existing Utilities.
- **Natural Environment:** Terrestrial Vegetation/Wildlife (Including SAR), Fish Habitat (Including SAR), River System and Bank Stability, Surface Water, and Groundwater
- **Social and Cultural Environment:** Archaeological, Built and Cultural Heritage, Noise, Property Impacts, and Recreational Use, Travel Delays/Detours
- **Economic Environment:** Property Acquisition Costs, Construction Costs, and Operation and Maintenance Costs

8.1 Evaluation Matrix

A summary of the evaluation results is presented in the format of an Evaluation Matrix.

Each matrix provides a means of comparing the effects that the design concept may have on the area environment in question. As before, visual markers were used to represent the potential for impact on each of the evaluation criteria.

Least Preferred	Negative Neutral	Neutral	Positive Neutral	Most Preferred
LP	**NN**	**N**	**PN**	**MP**

Through these evaluations, a Preliminary Preferred Design Concept was identified and presented to the public as part of a Public Information Centre (PIC). Further details regarding public consultation can be found in Section 9.

Table 3: Phase 3 Evaluation Matrix of Alternative Design Concepts – Vertical Road Alignment

Evaluation Criteria	Opt 1	Opt 2	Opt 3	Description of Impacts
Physical Environment				
Horizontal & Vertical Alignment Design Criteria	MP	MP	MP	Horizontal alignment is consistent for all options. All three options satisfy design and safety requirements.
Impacts to Existing Utilities and Infrastructure	NN	NN	NN	Initially, it was anticipated that there would be a sanitary forcemain on the existing bridge to contend with; however, this was not constructed. Further, it was initially anticipated that the reconstruction of the bridge may be completed with no or minimal impacts to other utilities, however, after proceeding with preliminary design, it was determined that utilities will need to be relocated. As such, all three of the current options will require relocation of both Bell and Hydro. The relocation of the utilities may provide an opportunity to implement upgrades to these systems, which may also benefit the general public in the area.
Design & Constructability	NN	LP	NN	All three options make modifications and improvements to the existing road grade and sight lines, resulting in a raise of the elevation from the existing bridge. All three options require slope flattening at the south side of the existing river due to the ongoing scour around the existing bridge caused by the growing “island” of sediment behind the existing center pier. The main differences are that: ▪ Option 1 would require slightly more road work (710 m) than Options 2 & 3 (625 m). It would require the least amount of imported fill as it has the lowest raise in grade at the location of the bridge and the least limits of disturbance. ▪ Option 2 would require the most amount of imported fill material and raises the elevation of the bridge a considerable amount (approximately 2.5 m more than Option 1), requiring taller pier construction and the potential for more down drag, which may impact the bridge foundation design. It has the greatest limits of disturbance and it also moves the low point in the road further from the bridge requiring more curb and gutter for stormwater control. ▪ Option 3 follows the existing road profile as closely as possible south of the bridge and ties into the existing sooner than the other options to the north of the bridge. As a result, it would require the least amount of excavation. However, it does raise the elevation of the bridge (approximately 1.2 m more than Option 1). It moves the low point in the road closer to the bridge requiring less curb and gutter construction for stormwater control.
Natural Environment				
Areas of Natural and Scientific Interest	NN	LP	NN	The study area is within a significant woodland/valley land area, although the area has no specialized habitat features. All options will require tree clearing and grubbing north and south of the bridge, which will impact the feature. Minimizing the impact as well as mitigating the impact through restoration and naturalization will be needed. Option 1 provides the least impact in that it has the least area of disturbance whereas Option 2 has the largest area of disturbance and the most impact on tree clearing.
Terrestrial Vegetation/Wildlife (Including SAR)	NN	LP	NN	Similar to the ANSI, all options will require tree clearing and grubbing north and south of the bridge; however, trees and shrubs will be planted as part of the restoration works. Option 1 provides the least environmental impact in that it has the least disturbance and the least amount of imported fill. Option 2 has the largest limit of disturbance and the most impact on tree clearing. A single butternut tree was found to the south of the bridge. All options may impact this tree and further analysis and mitigation will be required during detailed design.
Fish Habitat (Including SAR)	N	N	N	The three options have similar impacts on fish and fish habitat. All options will require in-water work to remove the existing “island” of sediment that has formed south of the existing pier, which will cause a temporary, short-term impact. However, removal of the sediment also provides an opportunity for reconstruction of the channel bed and to provide improved habitat that will be to the ultimate benefit of fish and the watercourse in general. Removal of trees will reduce shading temporarily until restoration and naturalization is achieved. Appropriate approval agencies will be consulted while preparing the environmental protection and restoration works for the project.
River System and Bank Stability	NN	LP	NN	All options will require slope stabilization near the proposed abutments as well as armouring to minimize future erosion and scour. However, the more the road elevation is increased, the more slope stabilization and limits of disturbance will be required. Therefore, Option 1 has the least amount of impact with Option 2 having the most impact.
Surface Water	N	N	N	All of the options will be directing surface water from the road. All options will result in temporary construction disturbance to a small drainage feature conveying runoff. However, surface water will be controlled during construction operations and proper sediment control measures will be in place to ensure no foreign materials or contamination will enter the watercourse.
Ground Water	N	N	N	Multiple small seeps were identified within the northeastern portion of the study area. No grading is proposed east of the existing 5th Line alignment (north of the existing bridge) and therefore no impacts to the seepage zone are expected under any of the options.
Climate Change	N	N	N	All three options provide an alignment that allows for the smooth flow of traffic without the need for stopping to allow other users to pass (i.e. in the current single-lane configuration); thereby, nominally reducing emissions. All options will require tree clearing and grubbing north and south of the bridge; however, trees and shrubs will be planted as part of the restoration works. Although Option 1 requires a slightly longer length of road construction, it offers a better cut/fill balance with the least amount of imported fill for construction.

Evaluation Criteria	Opt 1	Opt 2	Opt 3	Description of Impacts
Cultural And Social Environment				
Noise	NN	NN	NN	All options will have similar temporary noise impacts from construction operations.
Archaeological	N	N	N	Based on the previous findings, parts of the study area have low or no longer retain archaeological potential due to steeply sloping terrain, permanently wet conditions or previous disturbance. Only small portions in the north end will require Stage 2 Archaeological Assessment. Each of the alignment options do not interfere with the previously indicated areas that would require a stage 2 archaeological assessment; therefore, there are no archaeological concerns.
Cultural and Built Heritage	N	N	N	There are no previously identified cultural and built heritage resources located within the vicinity of the work.
Property Impacts	NN	LP	NN	Each option will require property acquisition and may impact existing driveways. Option 1 will require the least amount of property acquisition and Option 2 requires the most property acquisition, with Option 3 being in the middle.
Recreational Use	PN	PN	PN	Each option will allow for a bridge to be constructed to meet the minimum navigational opening requirements for the Nottawasaga River. Removal of the existing “island” of sediment will improve the recreational use of the Nottawasaga River at this location. There may be temporary impacts to navigation during construction.
Construction Timing/Travel Delays/Detours	N	LP	NN	All three alignment options will require lengthy construction period and some road closures/detours. The lower the road elevation, the less time and materials required to complete the bridge construction; therefore, decreasing the overall time required to close the road and provide a detour, making Option 1 more attractive. Option 1 also has the least requirement for importing material as the cut and fill to the south of the bridge is nearly balanced and would only require moving material from one spot to another on site.
Economic Environment				
Construction Costs	N	LP	NN	Each of the options will require considerable construction costs, with Option 1 being the least costly, Option 3 being the next, and Option 2 being the most expensive.
Operating/Maintenance Costs	N	LP	NN	Operation and maintenance costs will be reduced with all options. Option 1, having the lowest road elevation, may be less prone to side slope maintenance. Further, Option 1 has the least surface area, so the potential future maintenance and replacement costs may be lower.
Property Acquisition Costs	N	LP	NN	Option 2 requires the most amount of property, making it the most expensive. Option 1 requires the least amount of property and Option 3 is in the middle.

Based on the evaluation completed, Option 1 was selected as the Preferred Design Option for the Vertical Road Alignment as it:

- Meets the TAC, MTO, and CHDBC requirements;
- Has the smallest limits of disturbance, thereby offering the least impacts on the natural environment and also minimizing impacts to property and the property acquisition requirements; and
- Has the lowest road construction and property costs.

This Preferred Design Option for the vertical road alignment was then combined with the three design options for the structure configuration and evaluated as presented in Table 4, overleaf.

Table 4: Phase 3 Evaluation Matrix of Alternative Design Concepts – Structure Configuration

Evaluation Criteria	Opt A	Opt B	Opt C	Description of Impacts
Physical Environment				
Design & Constructability	LP	NN	NN	Option A: with the longest single span, will require the largest girders and largest equipment for installation. The total number of piles under the abutments and retaining wall is the highest of all options. All options will require cofferdams and each have their own unique complexities with comparable levels of difficulty.
Hydraulic Analysis	MP	MP	MP	All three options are able to convey the 50-year design storm while providing the required freeboard.
Natural Environment				
Fish Habitat (Including SAR)	N	LP	N	Option B will have the pier built in the middle of the river, which will result in disturbance in the riverbed. This option also leads to the possibility of a sediment island and ice/log jams forming in the future as it is the same configuration as the existing structure. Option A & C will have the abutments and piers built on the riverbank, outside the bankful width rather than in the water, which will minimize impacts.
River System and Bank Stability	PN	NN	MP	Option A & C, having the central pier eliminated and the new bridge abutments and piers set outside the bankful width as well as added scour and erosion protection measures along with removal of sediment deposition from the river to restore channel flow will increase the stability of the river system and riverbank. Option C, with additional spans on each end will provide larger flow area for the flood season. Additional mitigation features can also be added to the piers to assist with breakup of ice and logs. Option B, the same configuration as the existing bridge with the pier in the river, slows the velocity of the water on the downstream side of the pier creating an area of deposition. This deposition will continue to accumulate over time, leading to sediment island and log jams.
Climate Change	NN	NN	PN	Options B & C will provide a larger flow area for major flooding events and will better allow for passing of more intense storms as a result of climate change. Option B, having the same configuration as existing poses a challenge for future sediment deposition and ice/log jams. Additional mitigation features can be added to the piers to assist with breakup of ice and logs. However, with Option C, having the piers set back from the normal water level is preferred.
Cultural And Social Environment				
Noise	LP	NN	NN	Noise impacts will be temporary during construction. It is anticipated that the major source of construction noise will be from pile driving. Option A has the highest number of piles and will require the longest pile driving time. Option B has the least number of piles, with Option C in the middle.
Recreational Use	MP	NN	MP	With Option B, there would be a pier in the middle of the channel and the potential for formation of sediment islands and log jams over time, causing obstructions and reduced water depths for recreational uses. Option A and C would provide an open waterway for recreational use.
Economic Environment				
Construction Costs	LP	NN	NN	Construction costs under Option B are considered to be the lowest, with Option C being approx. $0.6M more. Whereas construction costs associated with Option A are estimated to be considerably higher (+/-$1.5 to 2M more).
Operating/Maintenance Costs	PN	NN	PN	All options will reduce the operations and maintenance costs to the Township as the bridge will be new. Option C is anticipated to have the least operations and maintenance costs due to the integral abutment configuration. Over time, Option B is anticipated to have ongoing operations and maintenance cost for sediment and ice/log jam removal.

Based on the evaluation completed, Option C was selected as the Preferred Design Option for the Structure Configuration as it:

- Eliminates the central pier and reduces the potential for future issues with sediment deposition as well as ice/log jams;
- Provides a more open waterway for recreational use;
- Provides a larger flow area for major flooding events such as the regional event as well as future climate change impacts;
- Provides for smaller girders, making installation easier; and
- Has a lower construction cost compared to Option A.

9 Consultation

9.1 Notice of Study Commencement

A Notice of Study Commencement was placed in the Alliston Herald newspaper for the August 8 and 15, 2019 editions. A mail out to area residents adjacent to the project study area, relevant review agencies as well as Indigenous communities and agencies was issued on August 8, 2019 providing notification of the commencement of the project. A summary of the comments received is provided below and also in Table 5: Comment Summary, included at the end of this section.

- A communication was received from the Ministry of the Environment, Conservation and Parks acknowledging receipt of the Notice of Commencement and providing information on the Ministry's areas of interest with respect the to the Class EA process.
- Chippewas of Rama First Nation informed the project team that they were interested in the project and had some concerns regarding the potential impact on the aquatic habitat of the Nottawasaga River. They requested a copy of any reports upon their completion particularly impact assessments.
- An inquiry from Huron Wendat Nation was received as to if there would be any archaeological assessment(s) completed for the project.

A complete copy of the mailing list along with copies of all comments received and associated responses provided as a result of the Notice of Study Commencement are included in Appendix I.

9.2 Notice of Public Information Centre No. 1

A Notice of Public Information Centre (PIC) No. 1 was placed in the Alliston Herald newspaper for the November 18 and 25, 2021 editions and a copy of the notice was also posted on the Township of Essa's website. A mail out to area residents adjacent to the project study area, relevant review agencies as well as Indigenous communities and agencies was issued on November 18, 2021 providing notification of the scheduled virtual PIC No. 1.

Public Information Centre No. 1 was hosted virtually on November 29, 2021. The PIC presentation included two comment periods: one mid-way through the presentation material and the second at the end of the presentation.

The live virtual PIC was attended by 5 members of the public. The project information presented was well received with all comments and questions addressed or resolved during the PIC. Some of the inquires received from the public included concerns for impacts to private property. The project team shared that if the design results in any required disturbance, regrading or construction beyond the existing road allowance, the Township will approach the affected property owner to acquire the necessary property or to obtain a construction/grading easement.

A comment period was also provided following the PIC presentation. Comments were received until December 13, 2021. A total of four comments were received during this period from agency, Indigenous communities, and members of the public. A summary of the comments received is provided below and also in Table 5: Comment Summary, included at the end of this section.

- The Ministry of Tourism, Culture and Sport acknowledged receipt of the Notice of PIC No. 1 and review of presentation material. The MTCS requested a copy of the Stage 1 Archaeological Assessment and Cultural Evaluation report. These reports were provided via email to the MTCS on December 22, 2021.
- Huron Wendat Nation inquired if any archaeological studies or field work would be a part of the project. A copy of the Stage 1 Archaeological Assessment report was sent to Huron Wendat on December 22, 2021 via email. It was also acknowledged that no field work was planned at that time, but the project team would continue to consult with Huron Wendat Nation as the Class EA continued.
- The public comments received were inquires for consideration to spawning salmon and trout within the river, and concern over the potential for illegal dumping during construction. The project team shared that continued consultation will be completed with the Department of Fisheries and Oceans (DFO) and the Ministry of Natural Resources and Forestry (MNRF) to ensure that the bridge construction will be completed in accordance with all timing window requirements for in water work. There are no plans to deal with potential garbage dumping at the dead ends of the road closure. However, the contractor will be tasked with cleaning up any garbage that may accumulate during the completion of the contract.

A complete copy of the mailing list along with copies of all comments received and associated responses provided as a result of the Notice of PIC No. 1 are included in Appendix I.

9.3 Notice of Public Information Centre No. 2

A Notice of Public Information Centre No. 2 was placed on the Township's website and social media outlets on December 1, 2023. A mail out to area residents adjacent to the project study area, relevant review agencies as well as Indigenous communities and agencies was also issued on December 5, 2023 providing notification of the status of the project and the virtual scheduled PIC scheduled for December 13, 2023.

Public Information Centre No. 2 was hosted virtually on December 13, 2023. Advanced registration for the live event was required and a total of 20 members of the public along with Township staff and Council members signed up.

A question period was held at the end of the presentation and the project team responded to the following general inquiries regarding the posted speed limit, need for utility relocations, property impacts, detours/road closures, as well as construction timing.

A comment period was also provided following the PIC presentation. Comments were received until December 31, 2023. Comments were received from a total of six (6) respondents. A summary of the comments received is provided below and also in Table 5: Comment Summary, included at the end of this section.

- The Ministry of Citizenship and Multiculturalism acknowledged receipt and review of the Cultural Heritage Evaluation Report (CHER) and noted no concerns.
- Chippewas of Rama First Nation expressed a concern with drainage from the bridge deck directing road salt into the river.
- The public comments received were inquiries regarding number of lanes being considered, impacts to property, minimizing construction inconvenience for commuters, and the need for the road realignment. Responses were provided to clarify and also note that additional

details regarding the required property acquisition and other items will be refined during detailed design.

A complete copy of the mailing list along with copies of all comments received and associated responses provided as a result of the Notice of PIC No. 2 are included in Appendix I.

9.4 Notice of Completion

A Notice of Completion was issued on July 8, 2024 and comments are currently being accepted during the 30-day public review period.

Table 5: Comment Summary

AGENCY COMMENTS			
Following Notice of Commencement (Issued July 2019):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Chunmei Liu Regional Environmental Planner Central Region MECP chunmei.liu@ontario.ca	Comment received via email August 8, 2019: "The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the Township of Essa has indicated that the study is following the approved environmental planning process for a Schedule C project under the Municipal Class Environmental Assessment (Class EA). The attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please identify the areas of interest which are applicable to the project and ensure they are addressed. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule" The letter continued to describe the Crown's duty to consult and provided information on Indigenous communities the proponent is required to consult with as they may be potentially affected by the proposed project. A copy of the full letter and attachments can be found in Appendix I.	No response required.
2.	Kimberly Livingstone Heritage Planner (A) Ministry of Tourism, Culture and Sport kimberly.livingstone@ontario.ca	Comment received via email August 13, 2019: "All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. If the screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file." The letter provided details on components of cultural heritage that must be considered as part of the Class EA. A copy of the full letter can be found in Appendix 'x'.	No response required.
Following Notice of Public Information Centre #1 (Issued November 2021):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Karla Barboza MCIP, RPP, CAHP| (A) Team Lead, Heritage Ministry of Heritage, Sport, Tourism and Culture Industries Karla.Barboza@ontario.ca	Comment received via email on December 2, 2021: "Thanks for sending the Notice of Public Information Centre to the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI). I reviewed the PIC materials and have some observations and comments: - Slide 11 states that the area has archaeological potential but it notes that post-1950 developments have artificially altered much of the are surrounding the road alignment. Please include documentation in the EA report to support the	Response provided via email by Ainley on December 22, 2021: "Thank you for your review and feedback. A Stage 1 Archeological Assessment has been completed for the project area in addition to the cultural heritage assessment for the Bridge No. 9. I have attached a copy of both reports for your review and file. Our project contact list has been updated as directed. Thank you."

		conclusion that all areas, to be impacted by ground disturbing activities, been subjected to recent extensive and intensive disturbances and to depths greater than the depths of the proposed activities – see Part D of the Municipal Heritage Bridges – Cultural, Heritage and Archaeological Resources Assessment Checklist (Revised April 11, 2014) and associated guidance. - Slide 11 also states that a cultural heritage assessment was completed for Bridge No. 9. Could you please send an electronic copy of the report for our review?"	
Following Notice of Public Information Centre #2 (Issued December 2023):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Liam Smythe Ministry of Citizenship and Multiculturalism Liam.Smythe2@ontario.ca	Letter received via email on January 11, 2024 confirming that MCM have reviewed the CHER and find that it has been prepared in accordance with best practices and requirements.	No response required.
Following Notice of Completion (Issued July 2024):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
INDIGENOUS COMMUNITY COMMENTS			
Following Notice of Commencement (Issued July 2019):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Maxime Picard Huron Wendat Nation maxime.picard@cnhw.qc.ca	Comment received via email July 30, 2019: This is to acknowledge reception of the attached letter on the Township of Essa - 5th Line Bridge Improvements Project. Could you please clarify if any archaeological assessment is anticipated as part of the EA ? Comment received via email July 31, 2019: Thanks for following-up Bob. Please provide us with the reports once completed.	Response provided via email by Township on July 30, 2019: "Yes, there will be an archaeological assessment completed for this project. A Stage 1 and 2 Archaeological Assessment will be completed for this project."
2.	Greg Garratt Georgian Bay Métis Council gbmccontact@gmail.com	Comment received via email on August 1, 2019: "Thank you. I have included our consultation in this email for future communications."	No response required.
3.	Sharday James Community Consultation Worker, Communications Chippewas of Rama First Nation shardayj@ramafirstnation.ca	Comment received via email on August 6, 2019: "I am sending this email in regards to a notice we received from you dated July 30th about the study commencement for improvements to the 5th Line Bridge in Essa Township. Thank you for contacting us. We are interested in this project and have some concerns regarding the potential impact on the aquatic habitat of the	Response provided via email by Township on August 6, 2019: "Thank you for your email. I have copied Ainley and they will be able to give you a report when the study is complete."

		Nottawasaga River. Could you please send us any reports upon their completion particularly impact assessments."	
Following Notice of Public Information Centre #1 (Issued November 2021):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Dominic Ste-Marie Huron Wenday Nation dominic.ste-marie@wendake.ca	Comment received via email on November 18, 2021: "Thank you for your email. Could you please let us know if any archaeological studies or fieldwork will be necessary as part of this project?"	Response provided via email by Ainley on December 22, 2021: "Thank you for your interest in the project. A Stage 1 Archaeological Assessment has been completed and the report is attached for your information. There is no field work planned at this time, we will continue to provide you with updated project information as we continue through the Class EA."
Following Notice of Public Information Centre #2 (Issued December 2023):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Ben Benson Chippewas of Rama First Nation consultation@ramafirstnation.ca	Comment received on December 14, 2023. Concerned about drainage/bridge deck drains directing road salt into the river.	Response provided via email on December 15, 2023 that these concerns would be kept in mind during the detailed design and that often the deck drains can be eliminated and road surface runoff is directed into either a ditch or a grassy area in an effort to filter out much of the salt and sediment before it reaches the river.
Following Notice of Completion (Issued July 2024):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.			
PUBLIC COMMENTS			
Following Notice of Commencement (Issued July 2019):			
No comments received.			
Following Notice of Public Information Centre #1 (Issued November 2021):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.	Redacted	Comment received via email on November 29, 2021: "We could hear nothing of the meeting and accordingly, my husband, (redacted), would like to meet with you Wednesday, December 1st anytime after 11:00 a.m." Please contact him at (redacted)" Comment received via email on November 30, 2021: "Thanks for the info."	Response provided via email by Ainley on November 30, 2021: "I am responding on behalf of Mr. Mikael from the Township, who received your email regarding the Public Information Centre held yesterday evening. We are sorry that the audio of the presentation was not working for you. I have attached a copy of the presentation for you to review in hopes that the information is helpful and answers some of your questions. I have also included below a link to You Tube where you can watch a recording of the PIC presentation: 5th Line Bridge Rehabilitation - YouTube

			Please connect with our team if you have any follow up questions and we would be happy to discuss them with you." Response provided via email and phone call by Ainley on November 30, 2021: "It was a pleasure speaking to you this morning. Further to Jody's email below and our telephone discussion, it is my understand that your concerns at this time are primarily related to any potential impacts that the project may have to your property. Unfortunately, as I noted, we are not yet in a position to determine if there will be any impacts to you or your property as we are still evaluating the potential options to address the issues with the bridge. However, once the preferred solution and preliminary design are complete, we would be happy to meet with you to discuss any potential impacts to you and any concerns that you may have at that time."
2.	Redacted	Comment received via email on December 10, 2021: "I have a number of questions concerning the proposed 5th line bridge project and I was hoping you could provide me with a little more information. I'm the landowner on the southeast side of the bridge so this project directly impact myself and my property. These questions assume we are moving ahead with option #3 – the replacement of the existing bridge using the current roadway. 1. If the construction of this bridge and any enhancements to the road leading to the bridge goes beyond the road allowance, will the township be compensating the landowners for the loss or damage to their land? If so, how is this determined? 2. Will there be a new road allowance resulting in landowners losing a portion of their property and if so, how is this new road allowance determined? Again, how is the landowner compensated? 3. I have a fence that runs along a portion of my property, if this fence is removed or taken down to assist with the construction of the bridge or turnaround, will the construction crew be repairing or reinstalling my fence? 4. If the construction results in the cutting of trees to allow for this project, is there a plan to restore or re-plant trees in and around the disturbed areas? 5. In the Zoom call on Nov 29th, I posed a question about snowplows and garbage trucks going beyond the road closures that would occur at the 20th & 25th sideroads. There was mention that a turnaround would be constructed for these vehicles along with school buses so that residents would not be impacted by the road closures. Has there been any thought of exactly where these turnarounds would be constructed? If so, can that be placed on the project map for further reference? 6. If there is a decision to change from the plan of moving forward with option #3, will the public be notified? Will there be another Zoom call and/or question period? 7. Currently there is some room to park cars on the north side of the bridge for people using the river for recreational purposes such as canoeing. Will this space remain under the new reconstruction plans? Having said that, this area is a known dumping ground given vehicles can easily pull over and dump their garbage	Response provided via email by Ainley on December 13, 2021: An email was sent that answered each of the respondent's questions and provided further information. A copy of the full email can be found in Appendix I.

		8. Given the road will be closed at the 20th & 25th sideroads and dead end roads are used by dumpers frequently, is there a plan to deal with potential excess garbage that may be dumped? 9. Is there any more information on the proposed sewer/water lines that are to be run from Angus to the new subdivision in Baxter? If so, can it be included in the bridge project plans so that all know how it's going to be incorporated with the new bridge construction? 10. In terms of the timing of the construction project, has there been any consideration given to the spawning runs of salmon and trout that occur in this river? 11. I know there are a number of stages before this project receives the necessary funding and approvals to move forward but is there a rough target date (year) that you are hoping to start this project? Option #3 does seem to be the best choice. I'm very opposed to option #4 which would have a much larger impact on the environment and landowners" Comment received via email on December 15, 2021: "Thanks Brian for your reply. I believe you've answered all my questions for now. I'll come back if I have any further questions. Have a great day and all the best over this holiday season."	

Following Notice of Public Information Centre #2 (Issued December 2023):

No.	Respondent Information	Comments Received	Response Provided (if necessary)
1.	Redacted	Phone call received – unable to attend PIC. Interested in how many lanes are being proposed and impacts to adjacent properties.	Questions were responded to verbally. A memo was prepared to summarize the discussion and is included in Appendix I.
2.	Redacted	Comment received via email on December 13, 2023 Requested clarification on which option would be quickest to complete in order to minimize inconvenience to commuters.	Response provided on December 14, 2023 All will require lengthy construction periods, making them generally comparable with some minor differences between options.
3.	Redacted	Comments received via email on December 20, 2023 1. First, I'd like to understand why a straightening of the road is needed since the posted speed limit has been dropped to 60km? The sight lines are not an issue travelling at that speed and I believe a less invasive road straightening can be accomplished. Also it didn't seem to be an issue when the posted speed limit was 80km. 2. The unnecessary straightening of the road is going to wipe out a stand of willow trees that is an important winter food source to porcupines. These are beautiful willow trees that I often see porcupines occupying especially during the winter. Can we just not leave the road as is? Would this not cut down on the overall cost if the road was left as is?	Responses provided on December 21, 2023 and May 15, 2024, both of which have been included in Appendix I.

		3. I have a fence that borders my property that I paid to have installed. If this fence is removed or damaged, will it be replaced by the contractor? 4. What is the process to determine the price for property acquisition? 5. How much land, in acres, is being considered for the southeast portion of this project? I would like this to me minimized as much as possible. 6. I currently receive and participate in the Conservation Land Tax Incentive Program (CLTIP) and could lose this benefit depending on how much land is taken. I definitely need to know this number. Will I be compensated for losing this benefit which equates to approx. $2k/yr? I have participated in this program since owning the property for over 20 yrs and would like to continue to do so. I would expect to be compensated for a minimum of 20 years. 7. Will I receive a new property survey at your cost to outline the new boundaries? Overall, I'm really not happy with the proposed straightening of the road and believe the project could save on costs by looking at a less invasive proposal. If the lower portion of the road was considered for straightening say approx. 200-250' from the start of the bridge on the south side, the majority of the land and trees on the south east side would remain intact along with my fence. I would like to see further discussion and solutions on the potential road straightening. Comments received on December 22, 2023 Thank you for your reply. I still disagree with the road straightening and do not see it as necessary. I do not see why the bridge can't be replaced in the exact same spot as it currently sits which would be cost beneficial. If it wasn't for this bridge replacement, the township would never consider the straightening of the road. I hope the Township and Ainley can find a compromise between this construction and landowners, like myself, that are directly impacted. I would like to have further dialogue with the Township and Ainley on other potential options or solutions to limit the property loss on my side. I would also need to know the exact acreage that will be impacted. The property to the west, 7900, has 100 acres whereas I have much less in 11.66 acres and as mentioned, I could lose my CLTIP tax credit. It would be great to see a scale drawing with the exact measurements of the project and the land impacted. The slide in the presentation is not all that clear and doesn't have any measurements.	
4.	Redacted	Comments received via email on January 10, 2024 They are a supplier of modular steel bridges and are interested in providing more information on their products as the design progresses.	Response provided on May 23,2024 advising that this may be considered during detailed design.

Following Notice of Completion (Issued July 2024):			
No.	**Respondent Information**	**Comments Received**	**Response Provided (if necessary)**
1.			

10 Description of the Preferred Design

This section describes the key features and design criteria for the selected Preferred Design.

The preferred design includes an approximately 82 m long, three-span bridge with 3.5 m driving lanes, 2.0 m side clearance and corresponding 2.0 m paved shoulder on the road approaches.

The bridge barrier should be a minimum Test Level 4 (TL-4) with a height of 1.05 m and steel beam guiderail incorporated on the approaches.

For a posted speed of 60 km/h and corresponding design speed of 80 km/h, a 280 m radius curve to the south of the bridge and a 380 m radius curve to the north of the bridge can be combined with vertical curves with a k-value of 26 for a crest curve and 30 for a sag curve.

The preferred design will also include the removal of the debris and sedimentation in the watercourse to provide an unobstructed 32 m channel width along with armouring for scour and erosion protection.

Property acquisition on all four quadrants and the relocation of hydro and telecommunications infrastructure will be required.

The preliminary construction cost estimate for the preferred design is estimated to be $8.6M plus HST. This estimate does not include costs for design, property acquisition, or utility relocation. This estimate will be refined further during detailed design.

11 Potential Impacts, Mitigation Measures and Commitments to Future Work

The various potential impacts along with the recommended mitigation strategy and/or commitments to complete future work during the detailed design stage are summarized in Table 6. It is noted that both short-term (i.e. temporary) potential impacts related to construction as well as long-term impacts have been considered.

Table 6: Mitigation Measures and Future Commitments

Environment	Potential Impact or Concern	Mitigation or Future Commitment
General	Engagement and Consultation	▪ Continued coordination and engagement will be completed with the following during detailed design and construction: ▪ Adjacent property owners regarding project schedule, property acquisition/grading easements, restoration. ▪ Indigenous communities, particularly in conjunction with the completion of any further archaeological assessments and field work. ▪ Utility service providers regarding relocation requirements. ▪ County of Simcoe, emergency services, school boards, with regards to construction timing and schedules as well as traffic management.
	Permits and Approvals	▪ Consultation and securing of permits and approvals will be completed with the following agencies, as required, during detailed design and construction: ▪ Transport Canada (Navigation), DFO, MNRF, MECP, NVCA, Township of Essa (Road Occupancy)
	Monitoring	▪ Monitoring during construction and post-construction will be completed to ensure the project is constructed in accordance with the approved design and associated permits/approvals and that the environmental mitigation and effects are as anticipated.
Physical	Final Alignments and Grading	▪ The horizontal and vertical alignments can be fine tuned, as necessary, during detailed design. ▪ The extent of grading and limits of disturbance (and associated property acquisition) should be minimized during detailed design as much as possible.
	Hydraulics	▪ The final design must convey the 50-year storm event as a minimum. ▪ The hydraulic analysis will be updated to reflect the final design and for the purposes of obtaining permitting/approvals.
	Construction Staging and Traffic Management	▪ Construction staging and traffic management plans will be prepared during design and construction to ensure efficient operations and the safety of road users.
	Geotechnical Investigation and Management of Excess Soils	▪ A geotechnical investigation will be completed to assess existing soil conditions and support the foundation design for the replacement structure. ▪ 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 will be completed in accordance with O. Reg. 406/19 and the MECP's document entitled "Rules for Soil Management and Excess Soil Quality Standards". All required investigations, analysis, planning, and reporting to meet the regulations will be completed.
	Utilities	▪ Coordination with Hydro and telecommunications will be completed during detailed design to ensure relocation of existing utilities to a location suitable for the proposed bridge replacement work.
Natural	Vegetation and Terrestrial Wildlife	▪ Limits of disturbance will be minimized to the extent possible, which will also minimize tree cutting. Tree preservation fencing may be incorporated into the design to ensure limits are adhered to. ▪ Tree cutting will be completed outside of the migratory birds and bat roosting windows. ▪ Netting of the existing bridge will be reviewed the ensure that nests are not developed on the bridge prior to demolition. ▪ Restoration/naturalization plans will be prepared and included as part of the design and construction of the project. ▪ Additional investigation will be completed to confirm that no significant bat roosting habitat is present. If found, mitigation such as bat roosting boxes may be incorporated into the design.
	Fish and Fish Habitat	▪ In-water works will only be completed during the permissible timing windows. ▪ Restoration plans will be prepared and implemented to improve fish habitat in consultation with DFO.
	Species at Risk	▪ Potential impacts to the single butternut tree will be reviewed as detailed design progresses. Additional investigations including a genetic assessment and/or a Butternut Health Assessment may be required. Pending the outcome, further mitigation, compensation, and authorizations may be required.

Environment	Potential Impact or Concern	Mitigation or Future Commitment
	Groundwater, Surface Water, and Source Water Protection	▪ Environmental protection plans will be prepared during design and construction to minimize risk from activities such as spills, bridge demolition, etc. ▪ Activities, including the maintenance of construction machinery, will be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the natural environment. ▪ To minimize the potential for erosion and off-site transport of sediment into surface water features and the natural environment, the ESC design will be completed to meet NVCA guidelines and standards. At a minimum, ESC fencing will be installed along the limits of the construction area prior to the commencement of construction.

Cultural and Social	Air Quality	▪ Impacts of construction activities on air quality are expected to be temporary in nature and will be mitigated through best practices including the following:
		  ▪ Use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fuelled trucks to reduce emissions from construction equipment.
		  ▪ Regular cleaning of construction sites and access roads to remove construction-caused debris and dust.
		  ▪ Dust suppression on unpaved haul roads and other traffic areas susceptible to dust, subject to the area being free of sensitive plant, water or other ecosystems that may be affected by dust suppression chemicals.
		  ▪ Covered loads when hauling fine-grained materials.
		  ▪ Prompt cleaning where tracking of soil, mud or dust has occurred.
		  ▪ Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto roads.
		  ▪ Covered stockpiles of soil, sand and aggregate as necessary.
		▪ Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces.

	Climate Change	▪ Ensure hydraulic design is completed with consideration for increase in storm intensity, duration, and frequency related to climate change, as per Township standards. ▪ Ensure removal of the sediment island to prevent future ice and log jams. ▪ Incorporate vegetation into the restoration works to the extent possible to assist with stabilization, carbon sequestration, and provision of shade.
	Archaeological Resources	▪ The Stage 2 archaeological assessment will be completed by test pit and pedestrian survey in the locations identified in the Stage 1 report. ▪ Should it be determined during detailed design that the proposed work extends beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands. ▪ Should previously undocumented archaeological resources be discovered, the proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the Ontario Heritage Act.
	Noise and Vibration	▪ Construction will be limited to the time periods allowed by the Township's Noise bylaw. If construction activities are required outside of these hours, the Contractor will seek exemptions directly from the municipality in advance. ▪ All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. ▪ Preconstruction condition surveys as well as vibration monitoring will be included in the detailed design and construction plans, where necessary.
	Illegal Dumping and Site Conditions	▪ The contractor will be responsible for ensuring a secure project site to prevent illegal dumping as well as clean up of any garbage and debris.
Economic	Costs	▪ Continued effort will be required during detailed design and construction to minimize the economic impact of the project while ensuring all requirements are met.

Appendix A

OSIM Reports (2019 & 2021) for Bridge No. 9

BCI 62.8

BRIDGE NO. 9

Description

This structure, on Line 5 over the Nottawasaga River, consists of a two-span concrete parabolic T-beam superstructure with a total deck length of 51.8 metres. The superstructure is supported by concrete abutments and pier. The structure provides a 6.1 metre wide driving platform between barriers curbs.

Additional Investigations Required

- None

LICENSED PROFESSIONAL ENGINEER
J.C. BALDWIN
100199953
2019-06-07
PROVINCE OF ONTARIO

Maintenance Needs (1-2 years)

- Tighten loose guide cables (Urgent): $2,000
- Remove downstream blockage: $25,000

Recommended Work

- Replace missing portion of barrier system (Urgent): $35,000
- Replace deteriorated guide rail system per requirements of the Roadside Design Manual and current OPSD requirements, to protect traffic from bridge and river hazards (1-5 years): $45,000

- Remove and Replace Structure (6-10 years): $5,575,000

Municipal Structure Inspection Form

INVENTORY DATA

Structure Name	Bridge No. 9				
Main Hwy/Road #	Line 5	On ☒ Under ☐	Crossing Type:	Navig. Water ☒ Non-Navig. Water ☐ Rail ☐ Road ☐ Ped. ☐ Other ☐	
Road Name	Line 5				
Structure Location	Line 5, south of side road 25, 1.95 km north of 20th side road; over the Nottawasaga river				
Latitude	44º 17' 25" N (4904748 N)	Longitude	79º 50' 40" W (592196 E)	UTM Zone 17	
Owner(s)	Township of Essa	Heritage Designation:	Not Cons. ☐ Cons./not App. ☐ List/not Desig. ☐ Desig./not List ☐ Desig. & List ☐		
MTO Region *	20 Central	Road Class:	Freeway ☐ Arterial ☐ Collector ☐ Local ☐		
MTO District *	21 Central Region	Posted Speed	60 km/hr	No. of Lanes	1
Old County *	30 Simcoe	AADT	800	% Trucks	2
Geographic Twp. *	785 Essa	Special Routes:	Transit ☐ Truck ☐ School ☒ Bicycle ☐		
Structure Type *	Concrete T-Beam	Detour Length Around Bridge		(km)	
Total Deck Length	51.8 (m)	Fill on Structure	0	(m)	
Overall Str. Width	7.8 (m)	Skew Angle	0	(degrees)	
Total Deck Area	316 (m^2)	Direction of Structure	N-S		
Roadway Width	6.1 (m)	No. of Spans	2		
Span Lengths	25.9, 25.9			(m)	

HISTORICAL DATA

Year Built	1950	Year of Last Major Rehab.		
Last OSIM Inspection	N/A	Last Evaluation		
Last Enhanced OSIM Inspection		Current Load Limit		(tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #		
Last Underwater Inspection		By-Law Expiry Date		
Last Condition Survey	2007	Min. Vertical Clearance		(m)

Rehab. History: (Date – Description)

Municipal Structure Inspection Form

FIELD INSPECTION INFORMATION			
Date of Inspection:	June 6, 2019	Type of Inspection:	☒ OSIM ☐ Enhanced OSIM
Inspector:	James Baldwin, P.Eng. - Ainley Group		
Others in Party:	Maru Abantao - Ainley Group		
Access Equipment Used:			
Weather:	Sunny, Clear		
Temperature:	+18ºC		

ADDITIONAL INVESTIGATIONS REQUIRED		Priority			Estimated Cost
		None	Normal	Urgent	
Material Condition Survey		X			N/A
	Detailed Deck Condition Survey:	X			N/A
	Non-destructive Delam. Survey of Asphalt-Covered Deck:	X			N/A
	Concrete Substructure Condition Survey:	X			N/A
	Detailed Coating Condition Survey:	X			N/A
	Detailed Timber Investigation	X			N/A
	Post-Tensioned Strand Investigation	X			N/A
Underwater Investigation:		X			N/A
Fatigue Investigation:		X			N/A
Seismic Investigation:		X			N/A
Structure Evaluation:		X			N/A
Monitoring (deformations, settlements, movements, crack widths)		X			N/A
Load Posting – Estimated Load	N/A			Total Cost	N/A
Investigation Notes:					

OVERALL STRUCTURE NOTES	
Overall Comments:	
Date of Next Inspection:	2021

Suspected Performance Deficiencies

01	Load carrying capacity	**07**	Jammed expansion joint	**13**	Flooding/channel blockage
02	Excessive deformations (deflections & rotations)	**08**	Pedestrian/vehicular hazard	**14**	Undermining of foundation
03	Continuing settlement	**09**	Rough riding surface	**15**	Unstable embankments
04	Continuing movements	**10**	Surface ponding	**16**	Other
05	Seized bearings	**11**	Deck drainage		
06	Bearing not uniformly loaded/unstable	**12**	Slippery surfaces		

Maintenance Needs

01	Lift and Swing Bridge Maintenance	**07**	Repair to Structural Steel	**13**	Erosion Control at Bridges
02	Bridge Cleaning	**08**	Repair of Bridge Concrete	**14**	Concrete Sealing
03	Bridge Handrail Maintenance	**09**	Repair of Bridge Timber	**15**	Grout and Seal
04	Painting Steel Bridge Structures	**10**	Bailey bridges - Maintenance	**16**	Bridge Deck Drainage
05	Bridge Deck Joint Repair	**11**	Animal/Pest Control	**17**	Scaling (Loose Concrete or ACR Steel)
06	Bridge Bearing Maintenance	**12**	Bridge Surface Repair	**18**	Other

IMG_1357
Road over Structure Looking South

IMG_1413
Road over Structure Looking North

IMG_1726
East Elevation View

IMG_1839
West Elevation View

Element Group:*	Deck	Length:	51.8 m
Element Name: *	Deck Top	Width:	6.1 m
Location:		Height:	
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	316 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		160	108	48	09

Comments:
Large area of deterioration – potholes patched with asphalt
Small to medium spalls, large spalls near approaches. Large spall north & south spans
Localized narrow transverse & longitudinal cracking
Light to medium scaling, abrasions
Ponding of water at northeast, above pier
Deck chain dragged – delaminated areas between construction joints

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1512
Typical Deck Top

IMG_1507
Deck Top at North End

IMG_1527
Deck Top at South End

Element Group:*	Deck	Length:	51.8 m
Element Name: *	Soffit	Width:	
Location:	East Fascia	Height:	0.5 m
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	25.9 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2		19.4	6.5		N/A

Comments:
Narrow Pattern cracking, with rust staining and light efflorescence
Curb construction joint appears to be a longitudinal crack (full length)

Recommended Work:				Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1748
East Facia from North End

IMG_1718
East Facia from South End (1 of 2)

IMG_1481
East Facia from South End (2 of 2)

Element Group:*	Deck	Length:	51.8 m
Element Name: *	Soffit	Width:	
Location:	West Fascia	Height:	0.5 m
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	25.9 m²
Environment:	Severe	Limited Inspection ☒	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²		19.0	6.9		N/A

Comments:
Light to medium pattern cracking, with rust staining and light efflorescence
Curb construction joint appears to be a longitudinal crack (full length)
Surface deposits

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1427
West Facia from South End

IMG_1390
West Facia from North End (1 of 2)

IMG_1839
West Facia from North End (2 of 2)

Element Group:*	Deck	Length:	25.9
Element Name: *	Soffit	Width:	6.3
Location:	Underside of Deck (North/South)	Height:	
Material: *	Concrete, cast-in-place	Count:	2
Element Type: *		Total Quantity:	326.3 m²
Environment:	Benign	Limited Inspection ☒	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2		261	65.3		N/A

Comments:
Narrow to medium cracking with efflorescence at north and south ends, some areas appear to be wet
Light scaling & surface deposit
Localized areas of delamination

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1789
North Span Soffit (Looking South)

IMG_1820
North End Soffit

IMG_1693
South Span Soffit (Looking North)

IMG_1700
Typical Soffit Deficiencies (1 of 2)

IMG_1797
Typical Soffit Deficiencies (2 of 2)

Element Group:*	Deck	Length:	75 mm
Element Name: *	Drainage System	Width:	75 mm
Location:	East & West Sides of Deck	Height:	Deck Thickness
Material: *	Concrete, cast-in-place	Count:	8 East / 8 West
Element Type: *		Total Quantity:	16
Environment:	Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	
	Each			16		N/A

Comments:
Minor spalling at deck surface
Surface deposits

Recommended Work:				Maintenance Needs:		N/A
☐ Rehab	☐ Replace					
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1442
Typical Deck Drain from Top of Deck

IMG_1702
Typical Deck Drain from Underside of Deck

IMG_1701
Typical Deck Drain Surface Deposit

Element Group:*	Joints	Length:	6.1 m
Element Name: *	Seals/sealants	Width:	0.05 m
Location:	North	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Approach – no seal, filled with debris, deterioration, patched
At Deck – no seal, filled with debris, deterioration, patched & cracking

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1361
North Approach & Deck Joints

IMG_1508
North Joint at Deck (1 of 2)

IMG_1509
North Joint at Deck (2 of 2)

Element Group:*	Joints	Length:	6.1 m
Element Name: *	Seals/sealants	Width:	0.05 m
Location:	Center	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:	Severe	Limited Inspection ☐	

Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	Each			1		N/A

Comments:
No seal, filled with debris, deterioration, patched & cracking

Recommended Work:	☐ Rehab	☐ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1533
Center Span Deck Joint

Element Group:*	Joints	Length:	6.1 m
Element Name: *	Seals/sealants	Width:	0.05 m
Location:	South	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:	Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Approach – no seal, filled with debris, deterioration, patched
At Deck – no seal, filled with debris, deterioration, patched & cracking

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1431
South Approach and Deck Joints

IMG_1434
South Deck Joint (1 of 2)

IMG_1437
South Deck Joint (2 of 2)

Element Group:*	Barriers	Length:	66.8 m
Element Name: *	Railing Systems	Width:	0.2 m
Location:	East	Height:	0.4 m
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *	Concrete Rail with N/S End Panel	Total Quantity:	66.8 m
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m		30.1	26.7	10.0	01,16

Comments:
Rust staining, narrow pattern cracking, medium spalling, medium to severe scaling
Medium spall at north end of panel

Recommended Work:				Maintenance Needs:		
☐ Rehab	☒ Replace					N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1360
East Railing Inside Face

IMG_1481
East Railing Outside Face

IMG_1458
East Railing North End Panel

Element Group:*	Barriers	Length:	66.8 m
Element Name: *	Railing Systems	Width:	0.2 m
Location:	West	Height:	0.4 m
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *	Concrete Rail with N/S End Panel	Total Quantity:	66.8
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m		23.3	26.2	17.3	01,08,16

Comments:
4.08 m length of railing missing concrete railing, with loose and exposed rebar – Section replaced with coped W-Section (206 mm Wide x 205 mm Height) clamped to existing concrete posts
Remainder railing - narrow pattern cracking with rust staining, medium spalling at edges and abrasions
Railing recessed at northwest end panel, missing plaque – medium to severe scaling and spalling

Recommended Work:	☐ Rehab	☒ Replace	Maintenance Needs:	N/A
☒ Urgent	☐ 1-5 years	☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year	☐ 2 year
Replace missing railing system				

Element Photo:

IMG_1379
West Railing Inside Face

IMG_1390
West Railing Outside Face

IMG_1378
West Railing North End Panel

IMG_1418
West Railing South End Panel

IMG_1401
West Railing Missing Section

Element Group:*	Barriers	Length:	600 mm
Element Name: *	Posts	Width:	260 mm
Location:	East	Height:	920 mm
Material: *	Concrete, cast-in-place	Count:	20
Element Type: *	Concrete Post	Total Quantity:	20
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			19	1	01,16

Comments:
Medium spalling at corners
Narrow cracking with rust staining
9th post from north, medium spalling with exposed rebar

Recommended Work:	☐ Rehab	☒ Replace	Maintenance Needs:	N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years ☐ None	☐ Urgent ☐ 1 year	☐ 2 year
Replace structure				

Element Photo:

IMG_1462
Typical East Concrete Post Inside Face

IMG_1723
Typical East Concrete Post Outside Face

IMG_1495
Post with Exposed Rebar

Element Group:*	Barriers	Length:	600 mm
Element Name: *	Posts	Width:	260 mm
Location:	West	Height:	920 mm
Material: *	Concrete, cast-in-place	Count:	19
Element Type: *	Concrete Post	Total Quantity:	19
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			18	1	01,09

Comments:
Narrow pattern cracking with rust staining
Light to medium spalling at corners
7th post from south missing – concrete rail missing and exposed rebar

Recommended Work:				Maintenance Needs:		
☒ Urgent	☐ 1-5 years	☐ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace missing posts						N/A

Element Photo:

IMG_1446
Typical West Post Inside Face

IMG_1656
Typical West Post Outside Face

IMG_1403
Missing Concrete Post

Element Group:*	Sidewalk/curbs	Length:	51.8 m
Element Name: *	Curbs	Width:	850 mm
Location:	East	Height:	300 mm
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	44 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²		30	12	2	N/A

Comments:
Small to medium spalling, light scaling, narrow to wide cracking with rust staining at top face, abrasions from snowplows, narrow to wide longitudinal cracking at curb face
Severe spalling / disintegration at southeast corner close to fascia
Medium to severe scaling at southeast corner/approach

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1459
Typical East Curb (1 of 3)

IMG_1630
Typical East Curb (2 of 3)

IMG_1575
Typical East Curb (3 of 3)

Element Group:*	Sidewalk/curbs	Length:	51.8 m
Element Name: *	Curbs	Width:	850 mm
Location:	West	Height:	300 mm
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	44 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²		30	10	4	N/A

Comments:
Small to medium spalling, medium scaling, narrow cracking with rust staining, abrasions from snowplows, narrow longitudinal cracking at curb face
Severe spalling / disintegration at southeast corner close to fascia
Medium to severe scaling at northwest corner/approach and at missing railing location

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1447
Typical West Curb (1 of 2)

IMG_1394
Typical West Curb (2 of 2)

IMG_1628
West Curb at Missing Railing

Element Group:*	Approaches	Length:	128 m
Element Name: *	Barriers	Width:	
Location:	Southeast/Southwest	Height:	
Material: *	Wood & Guy Cable	Count:	2
Element Type: *	3 Cable Guide Rail	Total Quantity:	256 m
Environment:	Benign	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m				256	08

Comments:
Loose cables noted
Weathering of posts
Some posts experiencing medium rot/decay
Exposed guy concrete anchor at Southeast end of deck
System not connected to structure

Recommended Work:				Maintenance Needs:		18
☐ Urgent	☒ 1-5 years	☐ 6-10 years	☐ None	☒ Urgent	☐ 1 year	☐ 2 year
Replace system with guide rail				Tighten loose cables		

Element Photo:

IMG_1586
Typical Southwest Cable Guide Rail

IMG_1607
Typical Southeast Cable Guide Rail

IMG_4709
Exposed Guy Cable Anchorage

Element Group:*	Approaches	Length:	7.3 m
Element Name: *	Wearing Surface	Width:	6.25 m
Location:	North	Height:	
Material: *	Asphalt	Count:	1
Element Type: *		Total Quantity:	45.6 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		29.6	16.0		09

Comments:
Wide traverse cracking, medium longitudinal cracking
Medium abrasions
Light settlement at joints

Recommended Work:				Maintenance Needs:		N/A
☐ Urgent	☒ 1-5 years	☐ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Remove and replace asphalt						

Element Photo:

IMG_1361
North Approach

Element Group:*	Approaches	Length:	7.3 m
Element Name: *	Wearing Surface	Width:	6.25 m
Location:	South	Height:	
Material: *	Asphalt	Count:	1
Element Type: *		Total Quantity:	45.6 m²
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		27.4	18.2		09

Comments:
Rutting, settlement at joints
Pattern / alligator cracking, wide traverse & longitudinal cracking
Medium areas patched with asphalt

Recommended Work:				Maintenance Needs:		N/A
☐ Urgent	☒ 1-5 years	☐ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Remove and replace asphalt						

Element Photo:

IMG_1525
South Approach

Municipal Structure Inspection Form

Element Group:*	Approaches	Length:	
Element Name: *	Road Alignment	Width:	
Location:	North	Height:	
Material: *	Asphalt	Count:	1
Element Type: *		Total Quantity:	1
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each				1	08,16

Comments:
North road alignment on approach to bridge provides reduced visibility of the narrow bridge.

Recommended Work:	☒ Rehab	☐ Replace	Maintenance Needs:	N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year	☐ 2 year
Recommend alignment adjustment be reviewed during other major works				

Element Photo:

IMG_1551
Road North of Bridge (1 of 3)

IMG_1555
Road North of Bridge (2 of 3)

IMG_1559
Road North of Bridge (3 of 3)

Municipal Structure Inspection Form

Element Group:*	Approaches	Length:	
Element Name: *	Road Alignment	Width:	
Location:	South	Height:	
Material: *	Asphalt	Count:	1
Element Type: *		Total Quantity:	1
Environment:	Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		01,16

Comments:
South road alignment on approach to bridge provides reduced visibility of the narrow bridge.

Recommended Work:	☒ Rehab	☐ Replace	Maintenance Needs:	N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year	☐ 2 year
Recommend alignment adjustment be reviewed during other major works				

Element Photo:

IMG_1597
Road South of Bridge (1 of 3)

IMG_1603
Road South of Bridge (2 of 3)

IMG_1606
Road South of Bridge (3 of 3)

Element Group:*	Beams	Length:	25.0 m
Element Name: *	Girders	Width:	0.5 m
Location:	North/South Underside of Deck	Height:	0.5 m @ center/2.0 m @ pier/abutment
Material: *	Concrete, cast-in-place	Count:	6
Element Type: *	Arched T-Beam	Total Quantity:	525 m²
Environment:	Benign	Limited Inspection	☒
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2		396	105	24	N/A

Comments:
Parabolic T-Beam x 3 each span
Localized wide cracking on outside face, narrow pattern cracking with rust staining, honeycombing, medium spalling with exposed rebar at underside, delamination, light to medium scaling
Deposit staining from deck drains
Rebar chair rusting, remnant formwork

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1670
South Girders (1 of 2)

IMG_1666
South Girders (2 of 2)

IMG_1674
Typical Exposed Rebar and Deterioration of Girders

IMG_1789
North Girders (1 of 2)

IMG_1816
North Girders (2 of 2)

Municipal Structure Inspection Form

Element Group:*	Beams	Length:	3.15 m
Element Name: *	Diaphragms	Width:	0.2 m (approximated)
Location:	North/South Spans	Height:	0.5 m
Material: *	Concrete, cast-in-place	Count:	4
Element Type: *		Total Quantity:	15.1 m²
Environment:	Benign	Limited Inspection	☒
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		11.3	3.8		N/A

Comments:
Light to medium scaling, narrow to medium cracking

Recommended Work:	☐ Rehab	☐ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1690
South Diaphragm

IMG_1786
Typical North Diaphragm

IMG_1692
Cracks in Diaphragm

Municipal Structure Inspection Form

Element Group:*	Abutments	Length:	
Element Name: *	Abutment Wall	Width:	7.65 m
Location:	North	Height:	5.0 m to 6.2 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	45.9 m²
Environment:	Benign	Limited Inspection ☒	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²		40.4	5.5		N/A

Comments:
Inspection based on accessible portions of abutment
Light scaling, narrow cracking, rust staining, efflorescence
Small localized spalling
(2) 76Ø sub drain holes
Graffiti and surface deposits

Recommended Work:	☐ Rehab	☐ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1817
North Abutment Wall

Municipal Structure Inspection Form

Element Group:*	Abutments	Length:	
Element Name: *	Abutment Wall	Width:	7.65 m
Location:	South	Height:	4.0 m to 5.0 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	34.4 m²
Environment:	Benign	Limited Inspection ☒	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Condition Data:	Units	
	m²		30.3	4.1		N/A

Comments:
Inspection based on accessible portions of abutment
Light scaling, narrow cracking, honeycombing
Small localized spalling
Embankment washed out at face
Sub drain holes not visible
Graffiti and surface deposits

Recommended Work:	☐ Rehab	☐ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1710
South Abutment Wall

Municipal Structure Inspection Form

Element Group:*	Abutments	Length:	7.3 m
Element Name: *	Wingwall	Width:	
Location:	Northeast	Height:	5.0 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	36.5 m²
Environment:	Benign	Limited Inspection ☒	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		31.0	5.5		N/A

Comments:
Inspection based on accessible portions
Medium spalling with exposed rebar
Narrow pattern cracking with rust staining and moisture
Vegetation and tree growth near face
Appears stable

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1743
Northeast Wingwall (1 of 2)

IMG_1776
Northeast Wingwall (2 of 2)

IMG_1424
Typical Wingwall Exposed Rebar

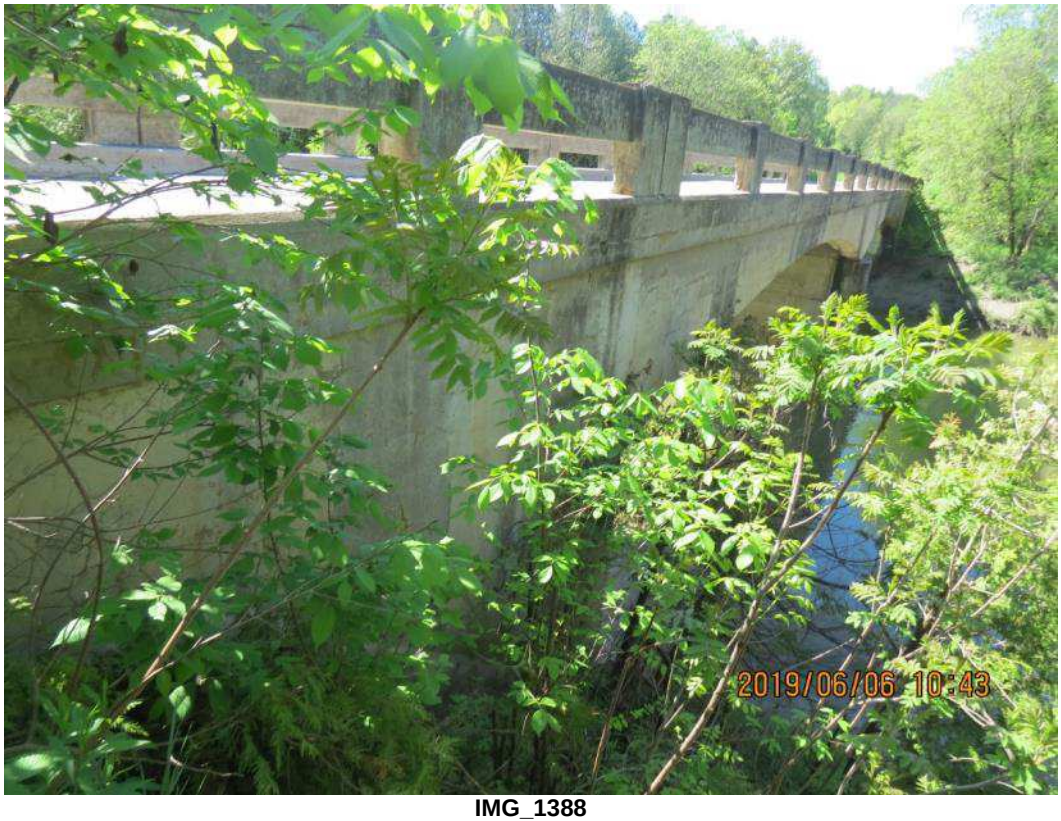
Element Group:*	Abutments	Length:	7.3 m
Element Name: *	Wingwall	Width:	
Location:	Northwest	Height:	6.2 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	45.3 m²
Environment:	Benign	Limited Inspection ☒	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		36.3	9.0		N/A

Comments:
Inspection based on accessible portions
Medium spalling with exposed rebar
Narrow pattern cracking with rust staining and moisture
Minor washout of embankment along face of wingwall
Vegetation and tree growth near face

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:



IMG_1388
Northwest Wingwall (1 of 2)

IMG_1854
Northwest Wingwall (2 of 2)

IMG_1851
Northwest Wingwall Minor Washout

Municipal Structure Inspection Form

Element Group:*	Abutments	Length:	7.3 m
Element Name: *	Wingwall	Width:	
Location:	Southeast	Height:	5.0 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	36.5 m²
Environment:	Benign	Limited Inspection	☒
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		31.0	5.5		N/A

Comments:
Inspection based on accessible portions
Medium spalling with exposed rebar
Narrow pattern cracking with rust staining and moisture

Recommended Work:	☐ Rehab	☒ Replace	Maintenance Needs:	N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years ☐ None	☐ Urgent ☐ 1 year	☐ 2 year
Replace structure				

Element Photo:

IMG_1485
Southeast Wingwall

Municipal Structure Inspection Form

Element Group:*	Abutments	Length:	7.3 m
Element Name: *	Wingwall	Width:	
Location:	Southwest	Height:	5.0 m (exposed)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	36.5 m²
Environment:	Benign	Limited Inspection	☒
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		30.0	6.5		N/A

Comments:
Inspection based on accessible portions
Medium spalling with exposed rebar
Narrow pattern cracking with rust staining and moisture

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1423
Southwest Wingwall

Element Group:*	Piers	Length:	1.0 m (approx.)
Element Name: *	Shaft & Diaphragm	Width:	9.0 m (approx.)
Location:	Centre	Height:	7.0 m (approx.)
Material: *	Concrete, cast-in-place	Count:	1
Element Type: *		Total Quantity:	140 m²
Environment:	Moderate	Limited Inspection	☒
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m²		120	20		N/A

Comments:
Limited inspection due to river depth
Rusting cutwater, east side
Narrow pattern cracking with rust staining
Large spall at southwest, top left corner at south face
Vertical construction joint in diaphragm – efflorescence

Recommended Work:	☐ Rehab	☒ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☒ 6-10 years	☐ None	☐ Urgent	☐ 1 year	☐ 2 year
Replace structure						

Element Photo:

IMG_1659
Center Pier West Side (1 of 2)

IMG_1862
Center Pier West Side (2 of 2)

IMG_1764
Center Pier East Side (1 of 2)

IMG_1861
Center Pier East Side (2 of 2)

IMG_1686
Center Pier South Face

IMG_1782
Center Pier North Face

IMG_1687
Typical Pier Cracking and Efflorescence

Municipal Structure Inspection Form

Element Group:*	Embankments & Streams	Length:	
Element Name: *	Streams and Waterways	Width:	
Location:		Height:	
Material: *		Count:	
Element Type: *		Total Quantity:	All
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	All			X		13

Comments:
East-West flow of water
Debris buildup (blockage) on west side of structure

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					18
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☒ 1 year	☐ 2 year
				Remove debris buildup		

Element Photo:

IMG_1576
River Looking Upstream

IMG_1570
River Looking Downstream

IMG_1572
Downstream Debris Buildup

Municipal Structure Inspection Form

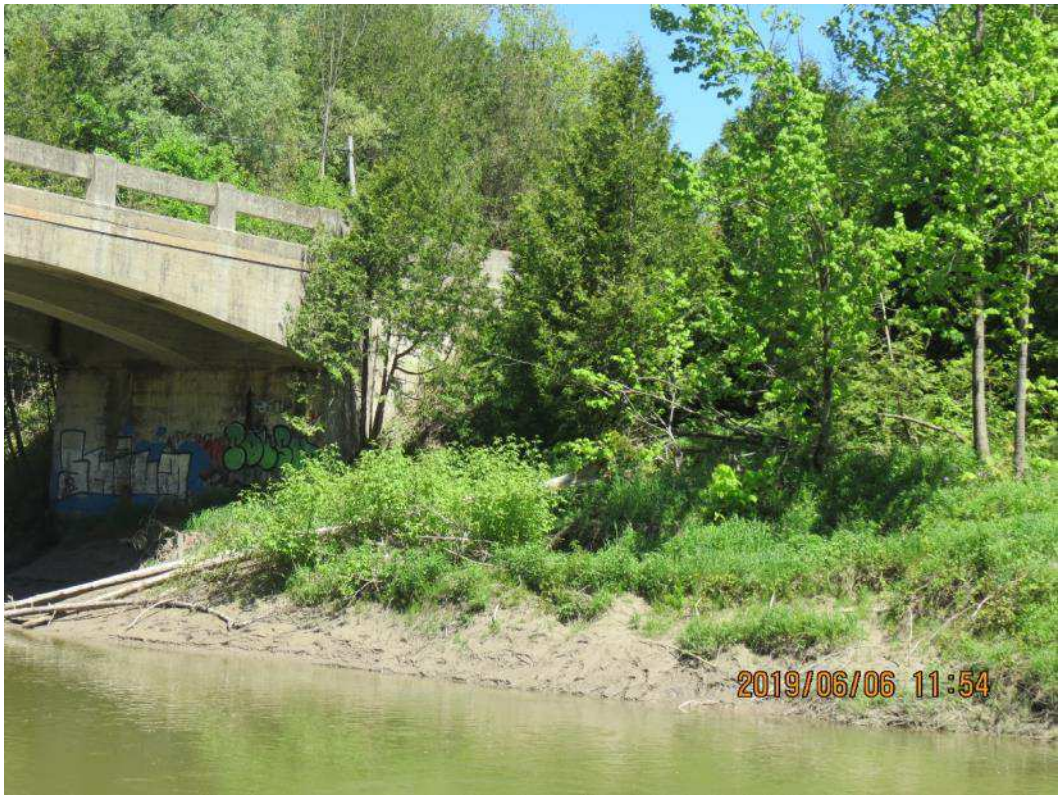
Element Group:*	Embankments & Streams	Length:	
Element Name: *	Embankments	Width:	
Location:	Northeast	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Steep, vegetation, trees
Appears stable

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:



IMG_1729
Northeast Embankment (1 of 2)

IMG_1777
Northeast Embankment (2 of 2)

Municipal Structure Inspection Form

Element Group:*	Embankments & Streams	Length:	
Element Name: *	Embankments	Width:	
Location:	Northwest	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Steep, vegetation
Appears stable

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1426
Northwest Embankment (1 of 2)

IMG_1856
Northwest Embankment (2 of 2)

Municipal Structure Inspection Form

Element Group:*	Embankments & Streams	Length:	
Element Name: *	Embankments	Width:	
Location:	Southeast	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Steep, washout beyond abutment face
rip-rap, vegetation
Appears stable

Recommended Work:	☐ Rehab	☐ Replace		Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1768
Southeast Embankment (1 of 2)

IMG_1725
Southeast Embankment (2 of 2)

Municipal Structure Inspection Form

Element Group:*	Embankments & Streams	Length:	
Element Name: *	Embankments	Width:	
Location:	Southwest	Height:	
Material: *		Count:	1
Element Type: *		Total Quantity:	1
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each			1		N/A

Comments:
Steep, washout beyond abutment face
rip-rap, vegetation
Appears stable

Recommended Work:				Maintenance Needs:		N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1803
Southwest Embankment

Municipal Structure Inspection Form

Element Group:*	Accessories	Length:	
Element Name: *	Signs	Width:	
Location:		Height:	
Material: *		Count:	8
Element Type: *	Object Marker/Narrow Bridge	Total Quantity:	8
Environment:		Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	Each		7	1		N/A

Comments:
(4) object marker signs NE/ NW/ SE/ SW corners of bridge - NW corner sign leaning slightly
(2) narrow bridge signs with (2) recommended speed signs on approaches

Recommended Work:				Maintenance Needs:		
☐ Rehab	☐ Replace					N/A
☐ Urgent	☐ 1-5 years	☐ 6-10 years	☒ None	☐ Urgent	☐ 1 year	☐ 2 year

Element Photo:

IMG_1358
North Bridge Object Markers

IMG_1413
South Bridge Object Markers

IMG_1550
Typical North & South Narrow Bridge with Recommended Speed Signs

REPAIR AND REHABILITATION REQUIRED		Priority				Estimated Structural Cost
Element[1]	Repair and Rehabilitation Required[2]	6 to 10 years	1 to 5 years	Within 1 year	Urgent	
Structure	Demolition	X				$250,000
Structure	Replacement	X				$3,250,000
	OR					
Structure	Replace Missing Barrier				X	$35,000
Other						N/A
Estimated Rehabilitated or Replacement Structure Dimensions[3]				Total Structural Cost		$3,535,000
Total Deck Length (m)	N/A	Overall Str. Width (m)	N/A			

1 - Indicate specific costs for structure replacement OR for rehabilitation under the given headings.
2 - Give a very brief description of the rehabilitation work required.
3 - Estimated structure dimensions after completion of the proposed work – if it is expected to change.

ASSOCIATED WORK[4]	Comments	Estimated Associated Work Cost
Approaches[5]		$2,000,000
Detours		N/A
Traffic Control		$50,000
Utilities		$25,000
Other	Guide Rail	$45,000
	Total Associated Work Cost	$2,120,000

Total Construction Cost	**$5,655,000**

4 - Includes other construction costs associated with the structure. Engineering fees for reports, environmental studies, designs, project management and contingencies are not included as associated work.
5 - Approach cost is for work (fill, pavement, guide rail, etc.) immediately adjacent to the structure to adjust for minor changes in horizontal or vertical alignment and for barrier end treatments at the structure.

JUSTIFICATION

Municipal Structure Inspection Form **STRUCTURE ID** **BR 09**

Inventory Data

Structure Name	5th Line Bridge				
Main Hwy/Road #		On ☑ Under ☐		Crossing Type	Non-navig water
Road Name	5th Line				
Structure Location	1.8km North of 20th Sideroad (over Nottawasaga River)				
Latitude	44.29001		Longitude	-79.84453	
Owner(s)	Township of Essa				
Heritage Designation	Not "Cons"				
Road Class:	Local				
MTO Region	Central				
MTO District	Simcoe		Posted Speed		No of Lanes 1
Old County	Simcoe		AADT		% Trucks
Geographic Twp	Essa		Special Routes:	Transit ☐ Truck ☐ School ☐ Bicycle ☐	
Structure Type	T-Beam		Detour Length Around Bridge		(km)
Total Deck Length	52 (m)		Fill on Structure		(m)
Overall Str Width	7.6 (m)		Skew Angle		(Degrees)
Total Deck Area	395.2 (sq. m)		Direction of Structure	North/South	
Roadway Width	6 (m)		No of Spans	2	
Span Lengths	25.9, 26.1 (m)				

Historical Data

Year Built:	1950	Last Biennial Inspection:	2018
Current Load Limit:	(tonnes)	Last BridgeMaster Inspection:	
Load Limit By-Law #:		Last Evaluation:	
By-Law Expiry Date:		Last Underwater Inspection:	
Min Vertical Clearance:	(m)	Last Condition Survey:	2007

Rehab History: (Date/description)

Field Inspection Information

Date of Inspection: 2021-05-27 Temperature: 12° C

Inspected By: D.M. Wills Associates Ltd.
Inspector: Kyle Riddell, P.Eng
Others in Party: Zoe Baird
Equipment Used: Camera, Tape Hip Waders, and Hand Tools
Weather: Sunny

Additional Investigations Required

	Priority	Estimated Cost
Detailed Deck Condition Survey:	None	0
DART Survey	None	0
Detailed Coating Condition Survey:	None	0
Underwater Investigation:	None	0
Fatigue Investigation:	None	0
Seismic Investigation:	None	0
Structure Evaluation:	None	0
Load Posting:Estimated Load		Total Cost 0

Next Date Inspection: 2023-05-25

BCI 61.09

Special Notes:

Suspected Performance Deficiencies

00	None	06	Bearing not uniformly loaded/unstable	12	Slippery surfaces
01	Load carrying capacity	07	Jammed expansion joint	13	Flooding/channel blockage
02	Excessive deformations (deflections rotations)	08	Pedestrian/vehicular hazard	14	Undermining of foundation
03	Continuing settlement	09	Rough riding surface	15	Unstable embankments
04	Continuing movements	10	Surface ponding	16	Other
05	Seized bearings	11	Deck drainage		

Maintenance Needs

01	Lift and Swing Bridge Maintenance	07	Repair to Structural Steel	13	Erosion Control at Bridges
02	Bridge Cleaning	08	Repair of Bridge Concrete	14	Concrete Sealing
03	Bridge Handrail Maintenance	09	Repair of Bridge Timber	15	Rout and Seal
04	Painting Steel Bridge Structures	10	Bailey Bridges - Maintenance	16	Bridge deck Drainage
05	Bridge Deck Joint Repair	11	Animal/Pest Control	17	Other
06	Bridge Bearing Maintenance	12	Bridge Surface Repair		

Element Data

Element Group:	Abutments	Length:	
Element Name:	Abutment walls	Width:	7.5
Location:		Height:	5.1
Material:	Cast-in-place concrete	Count:	2
Element Type:		Total Quantity:	76.5
Environment:	Benign	Limited Inspection	☐
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m		66.4	10.1	

Perform. Deficiencies

Comments

Wet staining and narrow map cracking throughout. Localized rust stains at north abutment drain holes. Medium crack with efflorescence in between T-beams on both abutments. Moderate honeycombing throughout.

Estimated Construction Cost: $790,400.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Abutments	Length:	8.2
Element Name:	Wingwalls	Width:	
Location:		Height:	3
Material:	Cast-in-place concrete	Count:	4
Element Type:		Total Quantity:	98.4
Environment:	Benign	Limited Inspection	☐
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m		89.7	8.5	0.2

Perform. Deficiencies

Comments

Narrow to medium stained map cracking throughout. Localized delamination with exposed corroded rebar.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Beams/MLE's	Length:	
Element Name:	Diaphragms	Width:	
Location:	Mid-span	Height:	
Material:	Cast-in-place concrete	Count:	4
Element Type:		Total Quantity:	4
Environment:	Benign	Limited Inspection	☑
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Each		4		

Perform. Deficiencies

Comments

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Beams/MLE's				Length:		
Element Name:	Diaphragms				Width:		
Location:	Pier				Height:		
Material:	Cast-in-place concrete				Count:	2	
Element Type:					Total Quantity:	2	
Environment:	Benign				Limited Inspection	☑	
Protection System:							

Condition Data:

Units	Exc	Good	Fair	Poor
Each		2		

Maint. Needs:

Perform. Deficiencies:

Comments:
Medium crack at centre between each beam with efflorescence on both sides. Wet staining and narrow map cracking throughout.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work:
Replace bridge.

Element Group:	Beams/MLE's				Length:	26	
Element Name:	Girders				Width:	0.4	
Location:					Height:	1.4	
Material:	Cast-in-place concrete				Count:	6	
Element Type:					Total Quantity:	499.2	
Environment:	Benign				Limited Inspection	☐	
Protection System:							

Condition Data:

Units	Exc	Good	Fair	Poor
Sq. m		170.6	319	9.6

Maint. Needs:

Perform. Deficiencies:

Comments:
On interior beams: localized honeycombing on side of beam, localized rust stains throughout. On exterior beams: Delaminations with exposed rebar throughout, concentrated at ends. Wet staining at drain outlets. Localized severe spalling + honeycombing.

Estimated Construction Cost: $600,000.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work:
Replace bridge.

Element Group:	Barriers				Length:	68.5	
Element Name:	Barrier/Parapet Walls				Width:	0.25	
Location:					Height:	0.9	
Material:	Cast-in-place concrete				Count:	2	
Element Type:	Concrete Post and Railing				Total Quantity:	137	
Environment:	Severe				Limited Inspection	☐	
Protection System:							

Condition Data:

Units	Exc	Good	Fair	Poor
m			127.8	9.2

Maint. Needs:

Perform. Deficiencies:

Comments:
Narrow map cracking throughout railings. Spalls throughout intermediate and end posts, generally at top and bottom corners. 1 post missing. Spalls on railing near end posts. 1 missing railing section at midpsan, west, replaced with a steel beam.

Estimated Construction Cost: $260,000.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work:
Replace with code compliant barrier with bridge replacement.

Element Group:	Sidewalks/curbs	Length:	68.5
Element Name:	Curbs	Width:	0.7
Location:		Height:	0.3
Material:	Cast-in-place concrete	Count:	2
Element Type:		Total Quantity:	137
Environment:	Severe	Limited Inspection	☐
Protection System:			

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m			134.2	2.8

Maint. Needs

Perform. Deficiencies

Comments

Narrow to medium map cracking on top face. Abrasion damage, scour along interior face. Localized medium cracks and spalls throughout. Long wide crack on interior face at north midspan.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Approaches	Length:	6
Element Name:	Wearing surface	Width:	6
Location:		Height:	
Material:	Asphalt	Count:	2
Element Type:		Total Quantity:	72
Environment:	Severe	Limited Inspection	☐
Protection System:			

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m			50	22

Maint. Needs

Perform. Deficiencies

Comments

Approach lower than concrete deck top, patch ramp constructed. Alligator cracking, potholes, and patches throughout.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Repave approaches with bridge replacement.

Element Group:	Decks	Length:	52
Element Name:	Deck top	Width:	6
Location:		Height:	
Material:	Cast-in-place concrete	Count:	1
Element Type:		Total Quantity:	312
Environment:	Severe	Limited Inspection	☐
Protection System:			

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m		175.9	100	36.1

Maint. Needs

Perform. Deficiencies

Comments

Scouring and spalling, asphalt patching of concrete throughout.

Estimated Construction Cost: $980,800.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Decks	Length:	52
Element Name:	Soffit - Thin Slab	Width:	6.4
Location:		Height:	
Material:	Cast-in-place concrete	Count:	1
Element Type:		Total Quantity:	332.8
Environment:	Benign	Limited Inspection	☑
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Sq. m		233	99.8	

Perform. Deficiencies

Comments

Delaminations at drainhole locations.Spalling with exposed rebar, and localized light honeycombing at several locations. Wet staining and localized transverse cracks with efflorescence throughout.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Replace bridge.

Element Group:	Decks	Length:	
Element Name:	Drainage	Width:	
Location:		Height:	
Material:		Count:	16
Element Type:		Total Quantity:	16
Environment:	Severe	Limited Inspection	☐
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Each				16

Perform. Deficiencies

Comments

Drains are 0.1m X 0.1m holes through concrete deck. Leaking onto beams and causing damage.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Install deck drains and extend below soffit with bridge replacement.

Element Group:	Embankments & Streams	Length:	
Element Name:	Embankments	Width:	
Location:		Height:	
Material:		Count:	4
Element Type:		Total Quantity:	4
Environment:	Benign	Limited Inspection	☐
Protection System:			

Maint. Needs

Condition Data:	Units	Exc	Good	Fair	Poor
	Each			1	3

Perform. Deficiencies

Comments

Severe erosion at southwest, southeast, and northwest quadrants.

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Recommended Work

Repair erosion as part of structure replacement work.

Element Group:	Embankments & Streams	Length:	
Element Name:	Streams and Waterways	Width:	
Location:		Height:	
Material:		Count:	1
Element Type:		Total Quantity:	1
Environment:	Benign	Limited Inspection	☐
Protection System:			

Condition Data:

Units	Exc	Good	Fair	Poor
Each				1

Comments

Fallen vegetation surrounding pier at north and south.

Recommended Work

Remove debris from watercourse as part of structure replacement work.

Maint. Needs

Perform. Deficiencies

Flooding/channel blockage

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Element Group:	Piers	Length:	1.5
Element Name:	Shafts/columns/Pile Bents	Width:	7.6
Location:		Height:	3.2
Material:		Count:	1
Element Type:		Total Quantity:	58.2
Environment:	Benign	Limited Inspection	☑
Protection System:			

Condition Data:

Units	Exc	Good	Fair	Poor
Sq. m		52	6	0.2

Comments

Narrow map cracking and wet stianing throughout. Concrete spalling under east girder at north.

Recommended Work

Replace bridge.

Maint. Needs

Perform. Deficiencies

Estimated Construction Cost: $0.00

Priority: None / **6-10 yrs** / 1-5 yrs / Within 1 yr / Urgent

Repair and Rehabilitation Required

Element Group	Element Name	Comments Repair/Rehabilitation	Priority (Years)	Estimated Cost
Decks	Deck top	Replace bridge.	6-10 yrs	$980,800.00
Barriers	Barrier/Parapet Walls	Replace with code compliant barrier with bridge replacement.	6-10 yrs	$260,000.00
Beams/MLE's	Girders	Replace bridge.	6-10 yrs	$600,000.00
Abutments	Abutment walls	Replace bridge.	6-10 yrs	$790,400.00
			Total	**$2,631,200.00**

Associated Work

	Comments	Estimated Cost
Approaches		$0.00
Detours		$0.00
Traffic Control	Traffic Management	$75,000.00
Utilities		$0.00
Right of Way	Existing Bridge Removal	$395,200.00
Environmental Study		$0.00
Other	Engineering and Contract Administration	$400,000.00
Contingencies	15% (Construction)	$465,000.00
	Total Estimated Const. Cost	**$3,966,400.00**

Justification

5th Line Bridge (BR09)

Roadway looking South.

East elevation.

5th Line Bridge (BR09)

Patches and map cracking on approach wearing surface (typ.)

Asphalt patches on deck wearing surface (typ.)

5th Line Bridge (BR09)

Potholes on deck wearing surface (typ.)

Map cracking on barrier end posts (typ.)

5th Line Bridge (BR09)

Scaling on North-West barrier end post.

Spalls at bottom corners of intermediate barrier post (typ.)

5th Line Bridge (BR09)

Spall at top corner of intermediate barrier post (typ.)

Spall with exposed rebar on East intermediate barrier post.

5th Line Bridge (BR09)

Missing section at midspan of West railing replaced by I-Beam.

Spall on top face of East curb.

5th Line Bridge (BR09)

Map cracking top face of curb (typ.)

Scouring along bottom of curb.

5th Line Bridge (BR09)

Medium crack and abrasion damage along interior face of North curb.

Transverse crack with efflorescence on soffit (typ.)

5th Line Bridge (BR09)

Localized honeycombing interior soffit.

Localized rust stain (typ. of North abutment)

5th Line Bridge (BR09)

Delamination and spall with exposed rebar South-East wing wall.

Medium crack with efflorescence at centre of end diaphragm (typ.). Spalling at east girder.

5th Line Bridge (BR09)

Delamination and spall with exposed rebar at bottom of exterior T-beam (typ.)

T-beams, soffits, and diaphragms looking South.

5th Line Bridge (BR09)

Medium crack with efflorescence at centre of pier diaphragm (typ.)

East stream (fallen trees in watercourse)

Appendix B
Environmental Impact Study

NATURAL HERITAGE EVALUATION/ ENVIRONMENTAL IMPACT STUDY

Bridge No.9 Environmental Assessment

5th Line, Township of Essa

October 2021

RIVERSTONE
ENVIRONMENTAL SOLUTIONS INC.

RIVERSTONE
ENVIRONMENTAL SOLUTIONS INC.

October 29, 2021
RS# 2019-091

Ainley & Associates
c/o Jody Marks
Barrie, ON
via email: marks@ainleygroup.com

SUBJECT: Natural Heritage Evaluation/Environmental Impact Study as part of a Class EA for Bridge No. 9, 5th Line, Township of Essa

Dear Jody,

RiverStone Environmental Solutions Inc. is pleased to provide you with the attached report.

Please contact us if there are any questions regarding the report, or if further information is required.

Best regards,

RiverStone Environmental Solutions Inc.

Bev Wicks PhD
Senior Ecologist / Principal

ENVIRONMENTAL ASSESSMENT NON-TECHNICAL SUMMARY

Type of Study Natural Heritage Evaluation/Environmental Impact Study		**Date** October 29, 2021
Project Manager Bev Wicks	**Civic Address** 5th Line Township of Essa	**Development Proposed** Environmental Assessment
	Planning Authorities Township of Essa, County of Simcoe	**Proponent** Township of Essa

Report Summary

The purpose of this study is to assess natural heritage features and functions associated with an existing bridge crossing over the Nottawasaga River in the Township of Essa. The study has been conducted to inform a municipal Class EA which is being undertaken to review various options for rehabilitation or replacement of the crossing. The crossing is situated in an area identified by the province as an 'area of natural and scientific interest', with various other potential and confirmed natural heritage features and functions present. The study aims to characterize these features and functions, and provide an assessment of potential impacts associated with the various alternatives being contemplated through the EA process. Based on both desktop and on-site investigations, RiverStone has determined that:

- The lands within and adjacent to the bridge right of way contain various potential and confirmed significant natural heritage features, including an area of natural and scientific interest, potential and confirmed habitat for endangered and threatened species, candidate significant wildlife habitat, fish habitat, drainage features, and candidate significant valleylands.
- At least one EA alternative would involve removal of portions of one or more identified features; however, potential impacts to the landform and associated ecological functions would are expected to be limited in scope. Short-term construction impacts may also occur without appropriate mitigation measures.
- Specific impacts to natural heritage features associated with each EA alternative are provided in **Section 4**, with accompanying mitigation measures provided where appropriate.

Table of Contents

List of In-text Tables

List of Figures

List of Appendices

1 BACKGROUND

RiverStone Environmental Solutions Inc. (RiverStone), working in conjunction with Ainley & Associates (Ainley), was retained by the Township of Essa (Township) to prepare a Natural Heritage Evaluation/Environmental Impact Study (EIS) to form one component of a municipal Class Environmental Assessment (EA) within the Township. It is our understanding that the EA is being undertaken to review various options for improvements to an existing bridge crossing over the Nottawasaga River. The crossing is situated on a municipal roadway described as 5th Line, approximately 2.5 km south of the Angus settlement area (**Figure 1**).

The crossing, formally described as Bridge No. 9, spans a broad section of the Nottawasaga River and associated valley system, intersecting the middle of a sharp oxbow feature. The valley system is designated by the province as an area of natural and scientific interest (ANSI) due to the presence of unique ecological and landform characteristics. The river itself is known to provide habitat for various migratory fish, while forests in the surrounding valleylands have the potential to support various important habitat features and functions. An existing conditions assessment undertaken by RiverStone in 2019 identified several natural heritage features of interest. This study represents a more in-depth assessment of those features and functions that were initially identified by RiverStone in 2019.

Both rehabilitation and replacement of the bridge crossing represent alternatives being contemplated through the EA process. Such alternatives have the potential to adversely impact one or more natural heritage features through various pathways, including impacts related to active construction, as well as long-term changes to the Nottawasaga River valley landform and associated areas of natural cover. RiverStone's study has been undertaken to assess such impacts and provide a discussion to support selection of the preferred solution for improvements to Bridge No.9. This report provides the findings of our study, including relevant results of detailed on-site investigations, with guidance and recommendations provided to aid in identifying mitigation options and additional requirements for the various alternatives.

2 APPROACH AND METHODS

The approach and methods used to carry out this EIS are detailed in this section. Broadly speaking, this includes:

1. Identifying a study area in which to focus assessment efforts.
2. Gathering and reviewing background biophysical information for the study area, including existing natural feature mapping and records for species of conservation interest which are relevant to the study area.
3. Conducting site investigations and targeted survey methods (where appropriate) to field-verify the presence or absence of relevant features, *e.g.*, wetland communities, habitat for endangered or threatened species.
4. Determining the potential for negative impacts to identified features associated with implementation of various development alternatives.
5. Identifying methods by which potential negative impacts can be mitigated via avoidance, minimization, and/or compensation measures, to inform the selection of the preferred alternative.

2.1 Identification of Study Area

For the purposes of this report, RiverStone identified a study area centered on the existing bridge structure. The study area includes the 5th Line right of way (ROW) extending north and south of the bridge to the maximum extent of potential works associated with any one of the identified development alternatives. Beyond this, our study area includes consideration for an adjacent land width measured at 120 m, consistent with direction in the Natural Heritage Reference Manual (NHRM) under the Provincial Policy Statement (PPS). The extent of the study area assessed is identified in all figures contained at the end of this report.

2.2 Background Information Sources Reviewed

Background biophysical information related to the study area was collected and reviewed from a variety of sources. This includes:

- **Township of Essa Official Plan** (July 2001), **Township of Essa Zoning By-law 2003-50** (no date specified).
- **County of Simcoe Official Plan** (Approved December 29, 2016) for natural feature mapping.
- **Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Areas and Natural Heritage Information Centre (NHIC)** database regarding information on occurrences of SAR and provincially tracked species (squares: 17NK9204); accessed Oct 2021, at: http://www.gisapplication.lrc.gov.on.ca/mamnh/Index.html?site=MNR_NHLUPS_NaturalHeritage&viewer=NaturalHeritage&locale=en-US).
- **Ontario Breeding Bird Atlas (OBBA) database and the Atlas of the Breeding Birds of Ontario, 2001–2005** (Cadman et al. 2007) regarding birds that were documented to be breeding in the vicinity of the study area during the 2001–2005 period (square: 17NK90; accessed at: http://www.birdsontario.org/atlas/squareinfo.jsp).
- **Ontario Reptile and Amphibian Atlas** database regarding records of reptiles and amphibians that have been observed within the vicinity of the study area (square: 17NK92; accessed Oct 2021 at: http://www.ontarioinsects.org/herpatlas/herp_online.html).
- **Distribution of Fish Species at Risk** generated by Fisheries and Oceans Canada (accessed at: http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html).
- **Atlas of the Mammals of Ontario** (Dobbyn 1994) regarding mammal records within and adjacent to the study area.
- **Great Lakes Conservation Blueprint for Terrestrial Biodiversity, Volume 2** (Henson and Brodribb (2005) regarding terrestrial biodiversity within Ecodistrict 6E-6 (Barrie).
- **Great Lakes Conservation Blueprint for Aquatic Biodiversity, Volume 2** (Phair et al. (2005) regarding aquatic biodiversity within tertiary watershed 2EC (Nottawasaga).
- **Physiography of Southern Ontario** (Chapman and Putnam 2007) for information pertaining to the physiography and soils of the study area and adjacent lands.

2.3 Site Investigations

The background review of biophysical information as outlined in **Section 2.2** informed the scoping of field data collection activities undertaken in both 2019 and 2021. On-site investigations were focused on a variety of general and targeted data collection efforts, including:

- Vegetation inventory and delineation of ecological land classification (ELC) units;
- Assessment of wildlife habitat features and functions;
- Qualitative assessment of fish habitat and general aquatic habitat structure within the study area;
- Targeted amphibian breeding survey to collect preliminary data and inform potential further survey requirement;
- Targeted breeding bird surveys undertaken to identify potential species at risk and inform a desktop assessment of significant wildlife habitat;
- Assessment/inventory of features which may represent habitat for endangered and/or threatened species, including qualitative assessment of woodlands representing potential endangered bat habitat; and,
- Assessment of key hydrologic features (*e.g.*, wetlands, drainage features) to inform delineation of feature limits within the ROW, and approximation of feature limits in adjacent private lands.

Table 1. Site investigations and primary tasks.

Date	Primary Task(s)	Staff
July 26, 2019	General constraints assessment; fish habitat assessment	C. Mann, J. Gauthier
April 29, 2021	Breeding amphibian point count survey	L. Uskov
June 17, 2021	Breeding bird point count survey #1; ELC; wetland and drainage feature assessment; vegetation inventory; general wildlife habitat assessment	M. Francis
June 28, 2021	Breeding bird point count survey #2; general SAR habitat assessment; general wildlife habitat assessment	M. Francis
Aug 25, 2021	Vegetation inventory; fish habitat assessment; general SAR habitat assessment; general wildlife habitat assessment	M. Francis, T. Robinson

Evidence for the presence of a species (or use of an area by a species) was determined from visual and/or auditory documentation (*e.g.*, song, call) and/or observation of nests, tracks, burrows, browse, and scats (where applicable). If/where present, natural features of conservation interest (*e.g.*, SAR habitat, etc.) were digitized and delineated in the field with a high accuracy GPS. Features of interest were photographed, and all information collected was catalogued for future reference. Representative photographs detailing on-site conditions are provided in **Appendix 1**.

2.3.1 Habitat-based Wildlife Assessment

RiverStone's primary approach to site assessment is habitat-based. We first focus on evaluating the potential for significant features and species within an area of interest, prior to undertaking any targeted assessments or surveys. An area is considered potential habitat if it satisfies several criteria, usually specific to a species, but occasionally characteristic of a broader group (*e.g.*, several species of turtles use sandy shorelines for nesting, several species of bats use cavity trees as day roosts and maternity sites, etc.). Physical attributes of a site that can be used to assess habitat function include structural characteristics (*e.g.*, age and composition of forest canopy, water depth), ecological

community (*e.g.*, meadow marsh, rock barren, coldwater stream), and structural connectivity to other habitat features required by a species of interest or indicator species. Species-specific habitat preferences and/or affinities are determined from status reports produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Cadman et al. (2007), published and unpublished documents, and direct experience.

2.3.2 Targeted Wildlife Assessment

Where appropriate, RiverStone explores further species-specific assessments in accordance with applicable standard methods and protocols. Targeted survey efforts may be undertaken due to one or more triggers, such as a specific request from an approval authority, an existing record for a species of interest, or a limitation to a habitat-based assessment (*e.g.*, limited property access). For this study, targeted survey methodologies were employed for the following groups of wildlife.

2.3.2.1 Breeding Birds

Breeding bird surveys were conducted in 2021 in accordance with the Ontario Breeding Bird Atlas (OBBA) protocol (Bird Studies Canada et al. 2001). Surveys were conducted within the appropriate season (May 24–July 10), time of day (between dawn and 5 hours after dawn), and weather conditions (no rain, wind speed ≤3 on the Beaufort Wind Scale). A total of three point-count stations were surveyed in 2021 (**Figure 2**) with each survey event occurring for a minimum duration of 10 minutes at each station. The purpose of this exercise was two-fold: to identify the presence of potential threatened bird species, and/or to identify species which may indicate the presence of SWH associated with one or more vegetation communities.

2.3.2.2 Breeding Amphibians

RiverStone initiated targeted surveys for breeding amphibians within the study area in the spring of 2021, following the standards of the Marsh Monitoring Program. Following a lack of results during the initial spring survey, and a lack of evidence for standing water features which may support breeding amphibians, it was concluded that breeding amphibian habitat was not present in proximity to the bridge and ROW, and no additional surveys were undertaken. The purpose of this exercise was to identify if features were present within the study area which may function as habitat for breeding amphibians (*e.g.*, suitable wetlands, woodland vernal pools).

2.3.2.3 Fish and Aquatic Habitat

Fish and aquatic habitat conditions within the Nottawasaga River were assessed approximately 50 m upstream and 50 m downstream of the bridge in accordance with the Ontario Stream Assessment Protocol (OSAP) (Stanfield 2010). More specifically, a modified version of the OSAP Section 4, Module 1 (Rapid Assessment Methodology for Channel Structure) was employed; modifications to this OSAP module reflect the level of detail required given site conditions and the nature of the proposed works. OSAP is the most comprehensive and widely applied habitat assessment protocol for wadeable watercourses and was developed by MNRF. OSAP provides standard assessment techniques to characterize watercourses and their attendant fish and aquatic habitat at discrete locations. Useful site-specific information that was collected includes channel structure, instream cover, substrate type, stability, type and density of riparian vegetation, and location of groundwater upwellings.

2.3.3 Topography, Surficial Geology, & Drainage

The geophysical setting of this property was determined using topographic mapping, soils mapping, geological mapping, aerial photography, and descriptions gathered through on-site investigations. Drainage features were identified through the review of background mapping resources and/or delineated in the field

2.3.4 Vegetation Communities

All natural vegetation communities on the subject property were mapped according to Ecological Land Classification (ELC) community tables (Lee et al., 1998). ELC defines ecological units or communities based on bedrock, climate (temperature, precipitation), physiography (soils, slope, aspect), and corresponding vegetation. Use of the system permits biologists and other land managers to use a common language to describe vegetation communities, which in turn facilitates the identification of communities likely to support certain natural heritage features or functions. The ELC system is an organizational framework that can be applied at different scales. The ecological units most useful for site-specific evaluations are ecosites and vegetation types (also known as ecoelements). Vegetation communities were delineated via aerial photo interpretation and subsequently confirmed and refined in the field. The boundaries of any identified wetland boundaries were delineated in accordance with the "50% wetland vegetation rule" as directed by the Ontario Wetland Evaluation System (OWES), where feasible.

2.4 Key Natural Heritage Features & Key Hydrologic Features

Provincial and local planning policies employ varying terms for natural heritage features and designations that have recognized 'statuses' within the relevant planning jurisdiction, including Significant Natural Heritage Features (Provincial Policy Statement), Key Natural Heritage Features/Key Hydrologic Features (Growth Plan for the Greater Golden Horseshoe), regulated natural heritage features (Conservation Authority regulations), etc. This EIS employs the terminology of the provincial Growth Plan for the Greater Golden Horseshoe (hereafter, 'Growth Plan'), as the subject property is located within the planning area for the Growth Plan. RiverStone's study included a review of all potential KNHF/KHF, which may be present within the study area. KNHF/KHF, as defined by the Growth Plan, include the following:

- Permanent & intermittent streams
- Inland lakes and their littoral zones
- Seepage areas and springs
- Wetlands (including provincially significant wetlands)
- Habitat of endangered and threatened species
- Fish habitat
- Areas of natural and scientific interest (life science)
- Significant valleylands
- Significant woodlands
- Significant wildlife habitat
- Sand barrens, savannahs, tallgrass prairies, and/or alvars.

Where necessary, KNHFs such as significant woodlands, significant valleylands, and significant wildlife habitat (SWH) were identified using existing background mapping and/or assessed in accordance with provincial guidance documents, *e.g.*, Natural Heritage Reference Manual (NHRM). The potential presence/absence of relevant species of conservation interest, such as endangered and threatened species, was assessed by experts in the field using a habitat-based approach and/or targeted survey methodologies. In general, discrete KNHF/KHF boundaries (where present) were delineated with a survey-grade GPS receiver capable of 2 m accuracy, and all relevant features were photographed and catalogued for inclusion in this report.

2.5 Impact Assessment and Mitigation Measures

To carry out a rigorous and defensible ecological assessment of potential impacts associated with the proposed development, RiverStone employs the following approach.

1. *Predict* impacts to features and species of conservation interest on the subject property and adjacent lands based on the proposed development plan (from construction to post-completion), including both direct (*e.g.,* vegetation clearance) and indirect (*e.g.*, light pollution, encroachment post-development) impacts.
2. *Evaluate the significance* of predicted impacts to features and species of conservation interest based on their spatial extent, magnitude, timing, frequency, and duration.
3. *Assess the probability or likelihood* that the predicted impacts will occur at the level of significance expected (*e.g.,* high, medium, low probability).

In instances where the potential for negative impacts to features or species of conservation interest exist, ecologically meaningful mitigation measures are offered to avoid, minimize, and/or compensate for such impacts. RiverStone's impact assessment and recommended mitigation measures are provided in **Section 5.**

2.6 Applicable Environmental Policies

This study has been undertaken to support preparation of a municipal class EA, a process which is subject to a unique approvals process as per Ontario's Environmental Assessment Act (consolidated to 2021). Notwithstanding, there are several environmental policies (*e.g.*, statutes, regulations, plans, guidance documents, etc.) that are considered relevant within the jurisdiction, and which have been considered in the preparation of this study, including:

- Township of Essa Official Plan (July 2001)
- County of Simcoe Official Plan (Approved December 29, 2016)
- Nottawasaga Valley Conservation Authority Regulation 172/06, pursuant to the Conservation Authorities Act, R.S.O. 1990, c. C.27
- Provincial Policy Statement, 2020, pursuant to the *Planning Act*, R.S.O. 1990, c. P.13, including:
    - Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (OMNR 2010c)
    - Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNR 2015)
- Growth Plan for The Greater Golden Horseshoe, 2019, pursuant to Places to Grow Act, S.O. 2005

- Provincial *Endangered Species Act* (ESA), S.O. 2007, c. 6
- Federal *Migratory Birds Convention Act*, S.C. 1994, c. 22, including:
- Federal *Fisheries Act*, R.S.C. 1985, c. F-14, amended on 2019-08-28

3 BIOPHYSICAL FEATURES

The following provides a description of the various existing conditions of the study area, including biological and physical characteristics identified through RiverStone's background review and on-site investigations. **Section 3.1 – 3.4** discuss the general findings of field surveys, while **Section 3.5** provides a subsequent summary of those identified features which represent *significant* features, as derived through the collective site summary and background assessment.

3.1 General Site Conditions

The study area (**Figure 1**) is centred on a bridge structure that conveys flows from the Nottawasaga River under 5th Line. The existing structure, Bridge No. 9, is composed of a twin span bridge with centre pier and three poured-in-place arching beams. Photos detailing existing conditions during the onsite assessment are provided in **Appendix 1**.

The bridge is located in a rural area surrounded by a mix of natural features and private agricultural and residential properties. Lands immediately surrounding the study area consist primarily of second-growth forest, some of which appears quite mature, while other areas exhibit a history of clearance/management. In this location, the river passes through a steep-walled valley within a sharp oxbow feature. Areas of substantial erosion are present along the steep river banks, and a sizeable log jam has developed upstream and downstream of bridge. Outside of the direct river valley corridor, the broader landscape contains large swaths of woodland and mixed agricultural lands.

3.2 Fish and Wildlife Habitat

The cumulative results of RiverStone's background review, as well as habitat-based biological assessments indicate that the study area provides potential and confirmed habitat for a variety of wildlife. RiverStone documented evidence on site for a variety of generic wildlife species, including White-tailed Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor lotor*), Grey Squirrel (*Sciurus carolinensis*), and Eastern Chipmunk (*Tamias striatus*).

As noted in **Section 2**, RiverStone also undertook targeted survey efforts for multiple groups of wildlife within accessible portions of the study area. Breeding bird surveys documented a variety of species within or adjacent to the study area, most of which are generalists and many of these described as exhibiting possible or probable breeding behaviour. Additional bird species were documented incidentally throughout the course of on-site investigations. Summarized data from the two point count surveys is contained in **Appendix 2**.

No direct observations or calls of any reptiles or amphibians were recorded during on-site investigations, including during RiverStone's single targeted amphibian calling survey on April 29 (2021). Suitable habitat features are present for certain species guilds (*i.e.*, turtles), as discussed further in this report. Fish habitat was assumed to be present from the onset of this study, based on available background information sources and consultation with local authorities. RiverStone's on-site investigations of fish habitat structure and function further refined our understanding of the habitat features which may be present within the study area.

Ultimately, all relevant observations of fish and wildlife species and/or habitat features, including individuals of species at risk and/or species which indicate candidate SWH functions, are discussed in **Section 4** of this report within the context of KNHF.

3.3 Topography, Physiography, & Drainage

The subject property is situated in the provincial Ecodistrict 6E-6, within the Lake Simcoe Lowlands physiographic region (Chapman and Putnam 1984). The Simcoe Lowlands encompass over 2,800 km^2 of low-lying land draining into Georgian Bay (Nottawasaga Bay) and Lake Simcoe. The Nottawasaga River traverses the Simcoe Lowlands on its northward path to Nottawasaga Bay, cutting a prominent valley feature through deep layers of sandy substrates. The topography of the study area is generally quite steep, with the valley walls directly adjacent to the river being the steepest. One or more small drainage features within the study area drain run-off and groundwater seepage down these slopes toward the main river channel.

The Ontario Soil Survey classifies uplands and valley slopes within the study area as a mix of sands and loams, including various phases and representations of the Tioga series. Tioga soils are described as deep and well draining, typically forming on higher positions in flood plains. The lowest points of the river corridor are classified as 'bottom land' soils, a generic description assigned to soils that occur on variable textured alluvial deposits in the beds of streams and rivers.

3.4 Vegetation Communities

Existing vegetation communities within the study area were first assessed via desktop exercise. Preliminary community polygons were mapped using background information sources, including historical and current aerial photographs. The mapped vegetated communities were then ground-truthed and refined during site investigations where feasible. It is noted that, within the study area, staff were limited to directly accessing only the lands within the ROW, while adjacent privately-owned lands were evaluated from the boundary of the ROW. Vegetation community mapping in accordance with Lee et al. (1998) is provided in **Figure 2**. A list of vascular plants observed during vegetation community surveys is provided in **Appendix 3**. Where wetland communities or conditions were encountered, RiverStone delineated the boundaries of these features within the subject property per the OWES "50% wetland vegetation" rule. All interpretation and classification of vegetation communities was conducted by experts certified in ELC and OWES.

3.4.1 FOC4: Fresh – Moist Cedar Coniferous Forest Ecosite

This variable ecosite encompasses the majority of the study area, occurring along valley slopes and terraces throughout. Eastern White Cedar (*Thuja occidentalis*) is the primary canopy species, and various cedar-dominant vegetation community types are represented and may be distinguished through further investigation. Soil moisture regimes range from dry to moist, with isolated wet areas also present in association with small seepage zones and/or impounded drainage features along the valley slopes. Associate cover species include a broad and variable mix of Manitoba Maple (*Acer negundo*), American Basswood (*Tilia americana*), Green Ash (*Fraxinus pennsylvanica*), apple species (*Malus sp.*), Black Willow (*Salix nigra*), Balsam Poplar (*Populus balsamifera*), American Elm (*Ulmus americana*), Eastern White Pine (*Pinus strobus*), Scots Pine (*Pinus sylvestris*), and Trembling Aspen (*Populus tremuloides*). Canopy composition and age is generally indicative of second-growth woodlands with ongoing succession being influenced by a history of disturbance, presumably attributed to forest management, active erosion, and likely some historic agricultural activities.

Shrub and herbaceous cover appear sparse throughout the core areas of this ecosite, attributed to the typically dense cedar canopy. Where present, the following species may be found in widely-variable mixes: Common Buckthorn (*Rhamnus cathartica*), Marginal Wood Fern (*Dryopteris marginals*), Ostrich Fern (*Matteuccia struthiopteris*), Bulblet Fern (*Cystopteris bulbifera*), Early Meadow Rue (*Thalictrum dioicum*), Herb Robert (*Geranium robertianum*), nettle species (*Urtica* sp.), Common Blackberry (*Rubus allegheniensis*), Fireweed (*Chamerion angustifolium ssp. circumvagum*) and Colts Foot (*Tussilago farfara*). Along community edges, associated with roadside ditches and narrow river banks, the following additional species were noted as common: Reed Canary-grass (*Phalaris arundinacea*), (*Impatiens capensis*), European Raspberry (*Rubus idaeus*), Staghorn Sumac (*Rhus hirta*), Gray Dogwood (*Conus racemose*), aster species (*Symphyotrichum ssp.*), Canada Goldenrod (*Solidago canadensis*), Spotted Joe-pye-weed (*Eutrochium* maculatum), and Broadleaf Cattail (*Typha latifolia*).

3.4.2 FOM: Dry Scots Pine – Aspen Mixed Forest

This dry forest unit is described at a high-level as a successional mix of Scots Pine and Trembling Aspen, with associates of White Spruce (*Picea glauca*), White Birch (*Betula papyrifera*) and others. This forest is associated with a high point within the ROW, on a steep, gravelly embankment, containing a drought-tolerant mix of vegetation. The canopy is semi-open in several locations, with a sparse mix of dry meadow species throughout, including Common Juniper (*Juniperus communis*), Canada Goldenrod, Wild Basil (*Clinopodium vulgare*), Mullein (*Verbascum thapsus*), Ebony Sedge (*Carex eburnea*), Virginia Anemone (*Anemone virginiana*), etc.

3.4.3 CUM1(a): Moist Mineral Cultural Meadow Ecosite

This ecosite was described as a moist cultural meadow, with some elements indicative of wetland conditions within its core (*e.g.*, meadow marsh). The community was assessed from its edge only, due to property access limitations; however, staff concluded that the primary condition within this community was more representative of a moist meadow assemblage vs. a meadow marsh. Tree and shrub cover is generally absent within the community; however, a dense layer of mixed-age Manitoba Maple is present around the perimeter. A mix of disturbance-prone herbaceous vegetation was present throughout, including Garlic Mustard (*Alliaria petiolata*), Reed Canary-grass, Canada Anemone (*Anemone canadensis*), Nettle species, Smooth Brome (*Bromus inermis*), Thicket Creeper (*Parthenocissu*s sp.), Canada Thistle (*Cirsium arvense*), and Dame's Rocket (*Hesperis matronalis*). Standing water was not visually evident during RiverStone's spring and summer assessments.

3.4.4 CUM1(b): Dry – Fresh Mineral Cultural Meadow Ecosite

Dry to fresh cultural meadow occupies areas of the road shoulder along the 5th Line, and miscellaneous locations within the ROW. These areas are represented by disturbed, successional cover influenced by on-going road maintenance and other activities. Species present within this community include, Wild Carrot (*Daucus carota*), White Sweet Clover (*Melilotus albus*), Poison Ivy (*Toxicodendron radicans ssp. negundo*), Northern Bracken Fern, Browneyed Susan (*Rudbeckia triloda*), Ox-eye Daisy (*Leucanthemum vulgare*), Riverbank Grape, Common St. John's Wort (*Hypericum prolificum*), Meadow Buttercup (*Ranunculus acris*), Purple Crown Vetch (*Securigera varia*), Cow Vetch (*Vicia cracca*), Red Clover (*Trifolium pretense*), Chicory (*Cichorium intybus*), Common Yarrow (*Achillea millefolium*), Bird's-foot Trefoil (*Lotus corniculatus*), Common Timothy (*Phleum pretense*), and Reed Canary Grass.

Additionally, located ~10 m west of the bridge in the centre of the river, a sand pile has formed. This community is highly dynamic due to the proximity of the bridge pier and seasonally changing water levels. At the time of our site visit, this area was dominated by cultural species that include Reed Canary Grass, Canada Goldenrod, Canada Bluejoint (*Calamagrostis canadensis*), Common Evening Primrose (*Oenothera biennis*), Purple Crown Vetch, Manitoba Maple, Common Milkweed (*Asclepias syriaca*), Dames Rocket, and Philadelphia Fleabane (*Erigeron philadelphicus var, philadelphicus*). This community was grouped into the general cultural meadow classification.

3.4.5 CUT1: Fresh Mineral Cultural Thicket Ecosite

This small cultural ecosite is located on a steep hillside that is partially within the ROW. A low and semi-open mix of Scots Pine, White Cedar, and White Spruce covers between 25-50% of the area. The remainder is composed of common cultural meadow flora, including mixed Equisetum spp., Heart-leaved Aster (*Symphyotrichum cordifolium*), Bracken Fern, Oxeye Daisy (*Leucanthemum vulgare*), Black-eyed Susan, Sphinx's Ladies Tresses (*Spiranthes incurva*), and others. While no discrete seepage area was noted, some indicators of shallow groundwater were observed in sparse quantities at the base of the slope associated with this community, including Eriophorum sp., Green Bulrush (*Scirpus atrovirens*), and Yellow Lady's Slipper (*Cypripedium parviflorum*). It is assumed that this community was subject to recent clearance/disturbance, and it appears to be succeeding back toward forest conditions.

3.4.6 SBS1: Shrub Sand Barren Ecosite

This ecosite occurs within the southeastern portion of the study area, adjacent to the ROW at the top of a steep valley slope. Exposed, hardened sandy soils are present on eroded mounds, with sparse, scrubby growth of White Cedar and Scots Pine throughout. Groundcover is generally sparse, with Bird's Foot Trefoil (*Lotus corniculata*), Grey Goldenrod (*Solidago nemoralis*), and mixed pasture grasses being common. Although this feature may be naturally occurring, its vegetation composition suggests an origin of anthropogenic disturbance. The small size of the feature likely precludes any significant habitat functions; however, sand barren communities represent KNHFs as per definitions contained in the Growth Plan.

3.4.7 ANTH(a): Anthropogenic – Hayfield

A typical hayfield community is present directly northwest of the ROW on 5th Line. The feature represents an active agricultural operation.

3.4.8 ANTH(b): Anthropogenic – Residential

One or more rural residential properties are present in the vicinity of the study, which may include physical dwellings and other structures, as well as maintained/manicured amenity spaces.

4 KEY NATURAL HERITAGE FEATURES & KEY HYDROLOGIC FEATURES

Based on the biophysical information collected during background information gathering, and the summarized existing conditions of the study area as described above, **Table 2** below identifies all KNHF/KHF that are present (or potentially present) within the study area. RiverStone's rationale for identifying such features is provided in the sections that follow. Relevant mapping is shown in **Figure 2**.

Table 2. Summary of the Assessment of Key Natural Heritage Features and Key Hydrologic Features within the Study Area.

Key Natural Heritage/Hydrologic Feature	Estimated Status of Natural Feature of Conservation Interest within the Subject property
Permanent & Intermittent Streams	*Present*. See **Section 4.1.**
Inland Lakes and Littoral Zones	*Absent*. No further assessment.
Seepage Areas and Springs	*Present*. See **Section 4.2.**
Wetlands (Including PSWs)	*Potentially present*. See **Section 4.3.**
Habitat of Endangered and Threatened Species	*Present*. See **Section 4.4**
Fish Habitat	*Present*. See **Section 4.5**
Areas of Natural and Scientific Interest	*Present*. See **Section 4.6**
Significant Valleylands	*Potentially present.* **See Section 4.7**
Significant Woodlands	*Potentially present.* **See Section 4.8**
Significant Wildlife Habitat	*Potentially present.* **See Section 4.9**
Sand Barrens, Savannahs, Tallgrass Prairies, and/or Alvars	*Present*. See **Section 4.10**

Shaded rows denote KNHF/KHF that are present or have the potential to be present within the study area.

4.1 Permanent and Intermittent Streams

The Nottawasaga River represents a large, permanent watercourse within the study area. Biophysical features of this prominent watercourse are discussed further below in the context of fish habitat and other KNHF associated with the river and valley system. With respect to streams (*i.e.*, smaller watercourses), one additional small but presumably permanent drainage feature occurs within the study area, conveying roadside runoff and groundwater discharge down the valley slopes and into the Nottawasaga River. The feature appears to originate in the north-east portion of the study area from within a small ravine on privately-owned lands (see **Figure 2**). It is then conveyed under the road via culvert, receiving any storm runoff, before draining south through another ravine on the west side of 5th Line. The small stream follows the low point between the road embankment and a steep valley slope which rises westward parallel to the road. The feature has little to no channel and an average depth of <5 cm. After several obstructions and a steep drop off at the bank of the main river, drainage from the small stream enters the river approximately 20-30 m west of the bridge structure. Further discussion, including an assessment of potential impacts to this feature resulting from implementation of the proposed development plan, is provided in **Section 5.2.1.**

4.2 Seepage Areas and Springs

One or more seepage areas are present within the study area. Staff documented one prominent seepage zone in the north-east portion of the study area, represented by diffuse seeps occurring along a terrace in the valley, adjacent 5th Line (**Figure 2**). While no areas of prominent groundwater emergence were noted, wet areas with accumulated iron precipitate were observed. A small drainage feature (discussed above) appears to receive any groundwater released in this area, before conveying flows into a culvert under 5th Line. It is possible and likely that additional seepage zones are present throughout the study area; however, due to access limitations outside of the 5th Line ROW, no additional locations were

confirmed. Further discussion, including an assessment of potential impacts to identified seepage features resulting from implementation of the proposed development plan, is provided in **Section 5.2.2.**

4.3 Wetlands

Wetland vegetation communities were not identified through RiverStone's ELC exercise. As noted, a moist cultural meadow community was described adjacent to the ROW west of 5th Line, south of the bridge structure. Staff noted through a review from the edge of the ROW that the community contained minor elements of facultative wetland vegetation, but not in sufficient quantities to warrant classification as a form of meadow marsh. Other areas within and adjacent to the ROW also contain elements of wetland vegetation, generally associated with wetter pockets of roadside ditches, narrow bands of riparian vegetation along the river corridor, or discrete wet pockets associated with a noted seepage zone. These would all be considered inclusions within broader identified communities, and not classified as a unique or identifiable vegetation community. While wetland communities may be contained within the broader study area, RiverStone's on-site investigations within the ROW did not result in identification of any wetland communities. No further assessment is provided with respect to wetlands.

4.4 Habitat of Endangered and Threatened Species

To assess the potential presence of individuals and/or habitat for endangered and threatened species within the study area, RiverStone staff conducted a review of the list of species designated as endangered and threatened in Ontario, as per Schedules 2 and 3 of Ontario Regulation 230/08. The potential presence of many species on this list can be ruled out based on a limited geographical range within the province. Other species are further ruled out based on the lack of specific habitat conditions which are required to carry out key life processes. The species contained within the list below were identified as having the highest likelihood of being present within the study area. Where the likely or confirmed presence of an individual species and/or its habitat was supported by our field assessment and background review, these species are discussed further in the impact assessment in **Section 5**.

4.4.1 Butternut (*Juglans cinerea*)

A single Butternut sapling was documented within the ROW west of 5th Line, south of the bridge structure (**Figure 2**). The tree was located at the bottom of the road embankment, along the edge of a dense white cedar forest, with no other individuals observed in the vicinity. Further discussion, including an assessment of potential impacts to the observed tree and associated habitat resulting from implementation of the proposed development plan, is provided in **Section 5.2.3.1.**

4.4.2 Lake Sturgeon (*Acipenser fulvescens*)

RiverStone consulted with staff at the Nottawasaga Valley Conservation Authority (NVCA; Fred Dobbs, Manager, Stewardship Services) to collect information regarding fish habitat functions within the study area. NVCA staff confirmed the use of this section of the river by Lake Sturgeon primarily as a migratory passage between spawning areas located both upstream and downstream from the study area. The NVCA also indicated that there are records of juvenile Lake Sturgeon making use of areas that contain a mix of pea gravel and sand (directly downstream from the bridge); however, the extent to which they use this region of the river has not been thoroughly characterized. RiverStone undertook a general visual assessment of conditions within the study area and noted that areas of coarse substrate (*e.g.*, gravel) were highly limited; however, visibility conditions within the river are typically poor due to high turbidity. Based on our discussions with NVCA and on-site investigations, it is assumed that

the study area is likely to provide general (primarily migratory) habitat for Lake Sturgeon but is unlikely to support significant habitat functions. Further discussion, including an assessment of potential impacts to Lake Sturgeon and associated habitat resulting from implementation of the proposed development plan, is provided in **Section 5.2.3.2.**

4.4.3 Bobolink (*Dolichonyx oryzivorous*)

RiverStone's background assessment and initial on-site investigations identified features within the study area with potential to function as habitat for Bobolink. Specifically, the hayfield feature in northwestern portion of the study area provides suitable habitat structure for this species. Staff surveyed the hayfield, and also undertook several surveys of the site as a whole (including breeding bird surveys). Staff did not document Bobolink during targeted breeding bird surveys; however, a single individual was observed flying over the hayfield on June 28th by staff while exiting the study area. It was noted at this time that the hayfield had undergone a recent partial cutting. Timing of first hay removal can impact the functionality of hayfield habitats, by potentially removing cover before young have fledged nests. Due to a lack of activity documented during breeding bird surveys, and the condition of the hayfield during mid breeding season, it is estimated that Bobolink are either not utilizing or not successfully utilizing the hayfield for breeding/nesting. However, the presence of an individual male clearly indicates that the species is present in the local area and may attempt to use this site in the future. Depending on the nature of the chosen development alternative, pre-construction surveys may be warranted to determine if this species is utilizing the hayfield community in the future. No further assessment undertaken.

4.4.4 Eastern Meadowlark (*Sturnella magna*)

RiverStone's background assessment and initial on-site investigations identified features within the study area with potential to function as habitat for Eastern Meadowlark. Specifically, the hayfield feature in northwestern portion of the study area provides suitable habitat structure for this species. Staff surveyed the hayfield, and also undertook several surveys of the site (including breeding bird surveys), during which no individual Eastern Meadowlark were noted. Depending on the nature of the chosen development alternative, pre-construction surveys may be warranted to determine if this species is utilizing the hayfield community in the future; however, at this time, there is no indication that the species is present. No further assessment undertaken.

4.4.5 Barn Swallow (*Hirundo rustica*)

RiverStone's background assessment and initial on-site investigations identified features within the study area with potential to function as habitat for Barn Swallow. Specifically, the underside of bridge structures are known to be preferred nesting sites for individuals or colonies of Barn Swallow. Staff surveyed the underside of the existing bridge (see **Appendix 1** for reference photos) and undertook several surveys of the site (including breeding bird surveys), during which no individual Barn Swallow or associated habitat features were noted. There is potential that this species may occupy suitable areas within the ROW in the future (*i.e.*, the bridge), and pre-construction surveys may be warranted in this regard; however, at this time, there is no indication that the species is present. No further assessment undertaken.

4.4.6 Bank Swallow (*Riparia riparia*)

RiverStone's background assessment and initial on-site investigations identified features within the study area with the potential to function as habitat for Bank Swallow. Specifically, eroding banks

along the river corridor offer physical structures which have the potential to support Bank Swallow colonies. Staff surveyed exposed river banks, and also undertook several surveys of the site (including breeding bird surveys), during which no individual Bank Swallow or associated habitat features were noted. There is potential that this species may occupy suitable areas within the ROW in the future, and pre-construction surveys may be warranted in this regard; however, at this time, there is no indication that the species is present. No further assessment undertaken.

4.4.7 Endangered Bat Species (*Myotis lucifugus, Myotis septentrionalis, Perimyotis subflavus*)

These species, assessed as a species guild (multiple related species with similar habitat characteristics), include multiple bat species listed as endangered in Ontario, with habitat requirements that are generally ubiquitous within areas of mature tree cover. Bats are highly mobile species; however, individuals and groups of the noted bat species are also recognized as having some degree of fidelity to suitable local sites for daily and seasonal 'roosting' activities, including for rearing pups. While some species (*i.e.*, *Myotis lucifugus*) exhibit a preference for roosting in anthropogenic structures, natural roosting sites are also important. Natural roosting sites are generally associated with mature forests containing a sufficient density of large trees in various stages of decay, otherwise known as 'snags'. Snags provide features such as cavities and/or substantial loose bark, which bats rely upon for shelter and thermoregulation throughout the active season.

Protocols exist for quantifying the density of snags within forested vegetation communities, to determine if snags occur in densities considered to be significant. Likewise, acoustic monitoring equipment is available to aid in recording and identifying the diversity and density of bats using a particular area throughout the active season. In RiverStone's experience, qualitative assessment by a qualified individual represents a reasonable preliminary tool for assessing the functionality of forests as potentially-significant roosting habitat. RiverStone staff noted that forest communities within the ROW and the broader study area are composed of mixed second growth in variable age classes. Large sections of the ROW contain dense stands of healthy, immature White Cedar (averaging <15 cm DBH), which would generally not provide suitable conditions for roosting bats. Some portions of the ROW do contain more mature stands of White Cedar and other species; however, in general, trees were similarly noted as being in a healthy condition throughout the ROW, without the substantial presence of snag trees.

In consideration of on-site observations, staff are of the opinion that forests within the ROW are not representative of significant roosting habitat for bats, including endangered species; however, it is recognized that this is based on a qualitative assessment only. Additionally, and regardless of the quality of potential roosting habitat within the study area, there is always the potential for individuals of endangered bat species to occur within any forested setting. Further discussion, including an assessment of potential impacts to these species resulting from implementation of the proposed development plan, is provided in **Section 5.2.3.3.**

4.5 Fish Habitat

The section of the Nottawasaga River within the study area is within the Middle Nottawasaga River Watershed. This section of river is situated in a deep valley with steep walls and a series of steep embankments. Directly west of Bridge #9, a large sandbar has formed likely due to sediments falling out of suspension on the downstream side of the centre bridge abutment. Substrates in proximity to the bridge are dominated by sand and silt, with at least one discrete patch of gravel noted near the south bank on the west side of the bridge. In-stream cover is limited throughout most of the study area except

for a large accumulation of woody debris downstream of the crossing which may provide cover for fish.

The main river has limited gravel and is therefore largely limited to a migration passage for several fish species, including Rainbow Trout (*Oncorhynchus mykiss*), Chinook Salmon *(Oncorhynchus tshawytscha*), and White suckers *(Catostomus commersonii)*. Mature Lake Sturgeon use this stretch of river to migrate between spawning grounds located above and below the study area. This section of river also has resident fish populations including Northern Pike (*Esox lucius*) and low densities of Smallmouth Bass (*Micropterus dolomieu*). The NVCA reports some evidence of a population of Muskellunge (*E. masquinongy*), although this is not well documented. There is some evidence that discrete patches of pea gravel and coarse sand within the study area may provide limited habitat for juvenile fishes including Rainbow Trout, Chinook Salmon and Lake Sturgeon *(NVCA personal communication),* although it is not known to what extent they rely on this region.

As noted, a second drainage feature was documented within the study area. With a poorly defined channel, minimal water depth, and several obstructions, the feature is not considered direct fish habitat; however, it can be considered indirect or contributing fish habitat. Further discussion, including an assessment of potential impacts to fish habitat features and functions resulting from implementation of the proposed development plan, is provided in **Section 5.2.4.**

4.6 Areas of Natural and Scientific Interest

It is the responsibility of the MNRF to designate and administer mapping for areas of natural and scientific interest (ANSIs). Based on available background mapping, it is our understanding that a portion of a life science ANSI known as 'Nottawasaga River North' encompasses a large portion of the study area. The ANSI is identified for its representation of valley bottomland features on outwash deposits, moderate representation of semi-mature conifer bottomland forests and successional mixed forests. Important features and functions include a diversity of vegetation cover and wildlife habitat, as well as forested corridors along the Nottawasaga River and groundwater seepage features present along slopes throughout the valley. Based on RiverStone's assessment, the study area is generally representative of the various features and functions for which the ANSI has been identified. Further discussion, including an assessment of potential impacts to the functions and values of the ANSI resulting from implementation of the proposed development plan, is provided in **Section 5.2.5.**

4.7 Significant Valleylands

Significant valleylands represent valleys or other landform depressions with recognized significant attributes, such as supporting natural vegetation cover with associated ecological linkages and corridors. Designation of significant valleylands is ultimately the responsibility of the relevant planning authority; however, site-specific designation of these feature can be undertaken using standardized provincial criteria provided by the province and/or the planning authority. In this case, there does not appear to be an existing designation in the OPs of either the Township or County of Simcoe that specifically identifies valleylands associated with the study area as significant. Notwithstanding, Schedule A of the Township OP identifies all or the majority of lands within the study area as 'Environmental – Significant Areas'. Likewise, the study area is contained with the County of Simcoe's 'Greenlands' designation, which is inclusive of several significant/key natural heritages features, including significant woodlands. Finally, the province designates a life science ANSI associated with the study area (as discussed above), which is identified in part due to valley landform and associated ecological functions.

In addition to the above, RiverStone has reviewed recommended provincial criteria for assessing valleyland significance, as contained in the provincial NHRM for interpreting natural heritage policies of the PPS. It is our opinion that based on the functions, attributes, and ecological features associated with the valley system, a substantial portion of lands within the study area should be regarded as significant valleylands. Formal designation of the feature and its boundaries would be subject to review and concurrence by the planning authority. Further discussion, including an assessment of potential impacts to the functions of significant valleylands resulting from implementation of the proposed development plan, is provided in **Section 5.2.6**.

4.8 Significant Woodlands

Significant woodlands represent areas of forested cover with recognized significant attributes, such as large contiguous blocks of woodland or woodlands with unique composition or characteristics. Designation of significant woodland is ultimately the responsibility of the relevant planning authority; however, site-specific designation of these feature can be undertaken using standardized provincial criteria provided by the province and/or the planning authority. In this case, there does not appear to be an existing designation in the OPs of either the Township or County of Simcoe that specifically identifies woodlands associated with the study area as significant. Notwithstanding, Schedule A of the Township OP identifies all or the majority of lands within the study area as 'Environmental – Significant Areas'. Likewise, the study area is contained with the County of Simcoe's 'Greenlands' designation, which is inclusive of several significant/key natural heritages features, including significant woodlands.

In addition to the above, RiverStone has reviewed recommended provincial criteria for assessing woodland significance, as contained in the provincial NHRM for interpreting natural heritage policies of the PPS. It is our opinion that based on the total size of the associated area of contiguous woodland, as well as various ecological characteristics, woodlands within the study area should be considered significant woodlands. Formal designation of the feature and its boundaries would be subject to review and concurrence by the planning authority. Further discussion, including an assessment of potential impacts to the functions of significant woodlands resulting from implementation of the proposed development plan, is provided in **Section 5.2.7.**

4.9 Significant Wildlife Habitat

SWH represents a range of habitat features that are recognized as providing specialized or otherwise important functions for various forms of wildlife. Designation of confirmed SWH is ultimately the responsibility of the relevant planning authority, and it is our understanding that no specific SWH designations have been applied to study area. Notwithstanding, it is recognized that SWH features and functions are generally impractical to identify and designate on a broad scale, and can require review on a site-specific basis. Therefore, RiverStone has reviewed applicable technical guidance on the identification of specific SWH features and functions as contained in the SWH Criteria Schedules for Ecoregion 6E (MNRF 2015). A preliminary assessment of the criteria schedules is contained within **Appendix 4**, and SWH features which have been confirmed or have the potential to occur within the study area were identified as follows:

4.9.1 Waterfowl Stopover and Staging Areas (Aquatic)

Open water sections of the Nottawasaga River have the potential to support seasonal stopover and staging areas for waterfowl. An assessment of potential impacts to this function resulting from implementation of the proposed development plan is provided in **Section 5.2.8.1.**

4.9.2 Shorebird Migratory Stopover Areas

Shoreline sections of the Nottawasaga River have the potential to support seasonal stopover areas for migratory shorebirds. It is noted that this function, if present, would be expected to be limited due to the steep nature of valley slopes within the ROW and inherent limited availability of shoreline areas. An assessment of potential impacts to this function resulting from implementation of the proposed development plan is provided in **Section 5.2.8.2.**

4.9.3 Bat Maternity Colonies

Forested vegetation communities within the study area have the potential to support bat maternity colonies. It is noted that this function, is present, would be expected to be limited due to the predominance of immature forest cover within the ROW. An assessment of potential impacts to this function resulting from implementation of the proposed development plan is provided in **Section 5.2.8.3.**

4.9.4 Turtle Nesting Areas

Shoreline sections of the Nottawasaga River have the potential to support nesting areas for one or more turtle species. It is noted that this function, if present, would be expected to be limited due to the steep nature of valley slopes within the ROW and inherent limited availability of shoreline areas. An assessment of potential impacts to this function resulting from implementation of the proposed development plan is provided in **Section 5.2.8.4**.

4.9.5 Seeps and Springs

One or more diffuse seepage areas are present within the study area. This feature is discussed as a stand-alone KNHF in **Section 4.2**, with further discussion and impact assessment provided in **Section 5.2.2.**

4.9.6 Special Concern and Rare Wildlife Species

Based on RiverStone's background information review and the results of on-site investigations, the following special concern and/or rare wildlife species were confirmed and/or identified as having a high likelihood of occurring within the study area:

4.9.6.1 Eastern Wood-pewee (Contopus virens)

During the course of on-site investigations on June 17th (2021), a single Eastern Wood-pewee was heard calling from forested areas within the surrounding valley corridor, estimated to be a distance of 100m or greater to the west of the study area. This was documented as an incidental observation, as Eastern Wood-pewee was not documented during targeted breeding bird point count surveys or during subsequent site visits. This species is most closely aligned with mature deciduous and mixed forests, with open understory and adjacency to forest gaps being important structural characteristics (COSEWIC 2012). Forest structure within the study area was described as containing predominantly coniferous canopy coverage, with minor elements of mixed coverage. Structurally, the majority of the forest communities contained within the study area have dense canopies and sub-canopies. These characteristics, as well as the lack of breeding evidence, suggest that forest cover within the study area does not support significant habitat for Eastern Wood-pewee. No further assessment undertaken.

4.9.6.2 Wood Thrush (Hylocichla mustelina)

During on-site investigations on June 17th (2021), a single Wood Thrush was heard calling from forested areas within the surrounding valley corridor, estimated to be a distance of 50-100 m to the east of the study area. This was documented as an incidental observation, as Wood Thrush was not documented during targeted breeding bird point count surveys or during subsequent site visits. Similar to Eastern Wood-pewee, Wood Thrush is most closely aligned with mature deciduous forests (COSEWIC 2012). Forest structure within the study area was described as containing predominantly coniferous canopy coverage, with minor elements of mixed coverage. These characteristics, as well as the lack of breeding evidence, suggest that forest cover within the study area does not support significant habitat for Wood Thrush. No further assessment undertaken.

4.9.6.3 Midland Painted Turtle (Chrysemys picta)

The NHIC database contains a record of element occurrence for Midland Painted Turtle within the data square which encompasses the study area (square #17NK9204). During on-site investigations, staff undertook visual surveys of the river, with a focus on potential turtle basking features and shoreline areas. While no individuals of any turtle species were observed, there is potential that the river channel and shoreline areas support general and/or significant habitat for one or more species, including Midland Painted Turtle. An assessment of potential impacts to candidate habitat for this species resulting from implementation of the proposed development plan is provided in **Section 5.2.8.6**.

4.9.6.4 Snapping Turtle (Chelydra serpentina)

As discussed above in regard to Midland Painted Turtle, there is potential that the river channel and shoreline areas support general and/or significant habitat for Snapping Turtle. An assessment of potential impacts to candidate habitat for this species resulting from implementation of the proposed development plan is provided in **Section 5.2.8.6**.

4.9.6.5 Monarch (Danaus plexippus)

Monarch are ubiquitous within any open and successional habitats (*e.g*., meadows, roadsides, woodland edges) where its host plant, Milkweed (*Asclepias* spp.), occurs. Both Common Milkweed (*A. syriaca*) and Swamp Milkweed (*A. incarnata*) were noted as occurring within the study area in small numbers, indicating that Monarch may utilize the study area to fulfill various life processes. An assessment of potential impacts to candidate habitat for this species resulting from implementation of the proposed development plan is provided in **Section 5.2.8.6**.

4.9.6.6 Grasshopper Sparrow (Ammodramus savannarum)

Grasshopper Sparrow was documented during a single targeted breeding bird point count survey (June 28, 2021). An individual was observed in the hayfield community within and adjacent to the northwestern portion of the study area. Staff noted that the outer portions of the hayfield had been recently cut as part of active agricultural operations. The individual Grasshopper Sparrow continued to use the central portion of the field, including potential tending of an active nest. Despite this observation, active agricultural operations are not considered to constitute SWH. No further assessment undertaken.

4.9.6.7 Northern Brook Lamprey (Ichthyomyzon fossor)

The NHIC database contains a record of element occurrence for Northern Brook Lamprey within the data square which encompasses the study area (square #17NK9204). An assessment of potential impacts to candidate habitat for this species resulting from implementation of the proposed development plan is provided in **Section 5.2.8.6**.

4.9.6.8 Silver Lamprey (Ichthyomyzon unicuspis)

The NHIC database contains a record of element occurrence for Silver Lamprey within the data square which encompasses the study area (square #17NK9204). An assessment of potential impacts to candidate habitat for this species resulting from implementation of the proposed development plan is provided in **Section 5.2.8.6**.

4.10 Sand Barrens, Savannahs, Tallgrass Prairies, and/or Alvars

As described in **Section 3.4.6**, a small sand barren vegetation community was identified within the study area. As depicted in **Figures 2 and 3**, this ecosite occurs within the southeastern portion of the study area, adjacent to the ROW at the top of a steep valley slope. Due to the small size of this community, it did not meet the threshold to be considered a form of SWH, as discussed in **Appendix 4**. The small and generally degraded nature of vegetation composition within this community indicate that there are likely no significant or unique ecological functions ascribed to this feature. Notwithstanding, sand barren communities are recognized as being inherent rare, and are defined as per Growth Plan definitions as a KNHF. An assessment of potential impacts to this feature associated with implementation of development alternatives is provided in **Section 5.2.9**.

5 IMPACT ASSESSMENT AND RECOMMENDATIONS

5.1 Proposed Development Plan

It is our understanding that this EA is being undertaken by the Township to review various options for improvements to an existing bridge crossing over the Nottawasaga River. The existing crossing is narrow and situated in a manner that represents certain safety concerns, presumably related to restricted sight lines and steep grades. In addition to the standard EA alternative to implement no improvements (*i.e.*, 'do nothing'), the alternatives being considered at this time include:

1) Rehabilitation/improvements of the bridge within the existing alignment;
2) Replacement of the structure within the existing alignment; and,
3) Replacement of the structure and realignment of the roadway within the existing ROW.

In all scenarios, works would be contained within the existing ROW; however, Alternative 3 listed above represents a substantial change to the alignment of the road within the ROW. RiverStone has illustrated this conceptual re-alignment in **Figure 3**, based on information provided by Ainley. Alternatives 1 and 2 listed above are not illustrated in RiverStone's report figures, as it is assumed that the post-construction footprint would be comparable to the existing built footprint. Detailed design considerations for any of the potential solutions would not be made available until the preferred solution is identified.

5.2 Impact Assessment

The following section represents a preliminary impact assessment to aid in the selection of a preferred EA alternative, referenced as Alternatives 1, 2, and 3 as listed in above **Section 5.1.** The assessment takes into consideration all the KNHF/KHF discussed in **Section 4** that were determined to be applicable to the study area and outlines the potential impacts to these features. A summarized assessment of impacts and preliminary mitigation measures is provided in table format in **Appendix 5**.

5.2.1 Permanent and Intermittent Streams

The small stream identified within the study area originates to the east of the study area, crosses the existing alignment of 5th Line, and traverses the ROW directly west of the road embankment (**Figure 2**). Ecological functions of this feature are assumed to be minimal, with no direct fish habitat identified. The feature conveys stormwater runoff and cold groundwater contributions directly to the Nottawasaga River, which presumably aids in thermoregulation of fish habitat within the main river channel.

Alternative 1 and 2 may result in temporary construction disturbance to this feature, including sedimentation and contamination. Depending on the scale of road works that may be associated with bridge improvements/replacement, temporary re-direction of this drainage may be necessary to facilitate work on roadside ditches and culverts. These impacts would be expected to be temporary, with standard measures available to mitigate any adverse impacts. The temporary decrease in surface water quality due to increased sediment in surface water runoff during construction would need to be mitigated through implementation of an erosion and sediment control plan in accordance with applicable best management practises.

Alternative 3 would likely require re-alignment of this feature within the ROW. Given the lack of direct ecological functions associated with this drainage feature, re-alignment would not be expected to result in any significant adverse impacts. Removal of tree cover associated with this feature would result in decreased shading, and potentially increase water temperature prior to the feature entering the main river channel. Given the small scale of the feature in relation to the main river, thermal impacts to the river would likely be negligible. As with Alternatives 1 and 2, construction mitigation measures would be required, and post-construction naturalization of the channel would be recommended.

5.2.2 Seeps and Springs

Multiple small seeps were identified within the northeastern portion of the study area, within and adjacent to the ROW east of the roadway (**Figure 2**). A small wet area characterized by scattered seeps and the small drainage feature discussed above is identified on **Figure 3** as a seepage zone. Seeps and other forms of groundwater discharge are largely dependent on site-specific soil and topographic conditions, as well as the broader dynamics of groundwater tables within the local landscape. Alternatives 1 and 2 would not be expected to alter any factors influencing the presence of seeps within the study area. Alternative 3 contemplates a re-alignment of the road toward the west of the ROW, and away from the identified seepage zone east of the existing alignment. Provided that no grading is proposed east of the existing 5th Line alignment, no impacts to the identified seepage zone would be expected as a result of any of the EA alternatives.

5.2.3 Habitat of Endangered and Threatened Species

5.2.3.1 Butternut

The single Butternut occurs in the southwestern portion of the study area (**Figure 2**), located directly west of the existing road alignment. Potential adverse impacts to this feature would include direct removal of the tree, direct encroachment into the rooting zone, and/or disturbance/alteration within suitable habitat surrounding the tree. Any road re-construction and/or re-alignment associated with bridge works has the potential to cause such adverse impacts. If tree removal is determined to be required, a more detailed assessment of impacts and mitigation planning would need to be completed following selection of the preferred alternative and preparation of detailed design drawings. Additional steps may include a required genetic assessment to determine if the identified tree is a genetically-pure 'native' specimen, and/or a Butternut Health Assessment to determine the health category of the tree. Pending the outcome of these preliminary assessments, further requirements can range from removal of the tree without a requirement to mitigate, to potential compensation plantings or ESA authorizations. At this time, it is not evident that the single documented tree would require removal to accommodate any of the potential design alternatives. Re-alignments associated with Alternative 3 may require removal of the tree; however, additional design details would be required to confirm the footprint of construction.

5.2.3.2 Lake Sturgeon

The stretch of the Nottawasaga River associated with the study area represents migratory habitat for Lake Sturgeon. While structural characteristics of the river channel within the study area are not conducive to active spawning habitat, unobstructed passage is imperative to ensure that individual Lake Sturgeon can move upstream and downstream of the study area to fulfill life processes. All EA alternatives have the potential to adversely impact Lake Sturgeon by creating an obstruction within the channel, removing important cover (*e.g.*, overhanging trees, submerged logs), or releasing sediment and/or pollutants into the river. A more detailed assessment of impacts and mitigation planning (including potential consultation with MECP regarding ESA compliance) would need to be completed following selection of the preferred alternative and preparation of detailed design drawings.

5.2.3.3 Endangered Bat Species

Individuals of endangered bat species cannot legally be killed, harmed, or harassed as per Section 9 of Ontario's Endangered Species Act (ESA). To ensure that individuals of endangered bat species are not killed, harmed, or harassed through the development process (should they be present), RiverStone recommends that any tree removals required to accommodate any of the design alternatives take place outside of the season in which these species may be active, *i.e.*, April - Oct.

Beyond the protection of individuals, areas of identified habitat are also protected from destruction as per Section 10 of the ESA. Avoidance of destruction or adverse impact to areas of potential habitat is generally a more complex process than mitigating impacts to individuals of a protected species, and this is especially true for bats. Based on a qualitative assessment provided in **Section 4.4.7**, forest cover within the study area is not expected to function as significant habitat for bats, including for endangered species. Notwithstanding, no detailed quantitative assessment of bat habitat function has been undertaken to date.

Alternatives 1 and 2 would not be expected to require substantial removals of trees within the ROW. Pending confirmation through review of detailed design drawings, there is no expectation that

additional assessment of bat habitat would be required to support Alternatives 1 and 2. Conversely, Alternative 3 would result in more substantial removal of forested cover. If selected, Alternative 3 may require a more detailed assessment of habitat function to confirm that no significant roosting habitat for endangered bats is present. Mitigation measures such as installation of bat nesting boxes may be sufficient to offset minor loss of habitat. A subsequent assessment of impacts and mitigation planning (including consultation with MECP and potential ESA authorization) may need to be completed based on detailed design drawings.

5.2.4 Fish Habitat

As discussed in **Section 5.2.3.2** in relation to Lake Sturgeon, the Nottawasaga River represents direct habitat for a diverse range of fish species. All EA alternatives have the potential to adversely impact fish habitat by creating an obstruction within the channel, removing important cover (*e.g.*, overhanging trees, submerged logs), or releasing sediment and/or pollutants into the river. Specifically, it is suspected that one or more alternatives may result in removal of the large log jam that occurs underneath and directly upstream of the bridge (see **Figure 2**). In general, it is recommended that this feature be retained to the extent possible or offset with comparable cover following implementation of the selected alternative.

Other potential temporary disturbance to aquatic species due to a decrease in surface water quality during construction would need to be mitigated by undertaking construction outside of the relevant fish spawning timing window and implementing appropriate construction Best Management Practices. A more detailed assessment of impacts and mitigation planning (including potential ESA authorization) would need to be completed following selection of the preferred alternative and preparation of detailed design drawings. Depending on the nature of the selected alternative, authorization under the Fisheries Act will presumably be required to confirm acceptance of mitigation planning by the applicable authority (Department of Fisheries and Oceans Canada).

5.2.5 Area of Natural and Scientific Interest

The ANSI designation associated with the study area represents a composite of various other significant natural heritage features and functions. The ANSI is recognized due to the unique attributes of the Nottawasaga River valley, including its forested slopes, natural linkage functions, unique wildlife habitats, and prominent groundwater emergence zones. The designation is applied to a stretch of nearly 20 km of the contiguous river valley corridor, and the portion of ANSI within the study area is clearly representative of those characteristics for which the designation was applied.

Potential impacts to the ANSI would be represented by the range of potential impacts to its collective features and functions. In general, Alternatives 1 and 2 would not be expected to adversely impact features and functions associated with the ANSI, as the valley landform would not require alteration, and areas of forest cover would not require any substantial removal. Temporary impacts may include construction disturbance to various wildlife habitat functions associated with the ANSI; however, RiverStone expects that such disturbance would be minor and temporary in nature, and mitigation options are available in this regard.

Conversely, Alternative 3 would presumably require substantial grading of valley slopes and removal of forested cover within the ANSI, resulting in both permanent and long-term impacts at a site level. Given the scale of the ANSI, it is not evident that these site-level impacts would affect the overall integrity of the feature. For example, on-site investigations concluded that no specialized habitat features are present within the areas of the ROW that would be altered to accommodate Alternative 3

(*e.g.*, interior breeding bird habitat, significant bat roosting habitat). Additionally, general impacts associated with removal of forest cover may be mitigated in the long-term through post-construction restoration of the existing alignment footprint, which would presumably be retired following re-alignment. As such, the post-construction functionality of valley linkage corridors would be expected to remain consistent with existing conditions, albeit following a period of restoration and naturalization.

It is our understanding that, outside of local and provincial planning policies, ANSI are not afforded the forms of regulated protections that are applicable to other significant features, such as wetlands or habitat for endangered and threatened species. Therefore, there is no expectation that any development or alteration within the ANSI designation would require additional regulatory authorizations or approvals.

5.2.6 Significant Valleylands

Potential impacts to candidate significant valleylands are reflected in the discussion above pertaining to the ANSI feature. As with the ANSI designation, valleylands are a composite of physical and ecological attributes, and assessing impacts to the function and integrity of valleylands can be complex. As stated above, Alternatives 1 and 2 would retain the existing valley landform and vegetation cover, while Alternative 3 would require potentially substantial grading of slopes to accommodate re-alignment. This would result in physical alteration to the landform and associated removal of forest cover, which may represent a long-term impact to wildlife habitat functions within the valley corridor. As noted above, impacts associated with removal of forest cover may be mitigated in the long-term through post-construction restoration of the existing alignment footprint, which would presumably be retired following re-alignment. If Alternative 3 is selected, a more detailed assessment of impacts and mitigation planning would be required based on detailed design drawings.

It is also noted that certain physical features associated with valley systems (*e.g.*, flood plains, meander belts, steep slopes) are regulated by the NVCA under Ontario Regulation 172/06. Based on a review of background information, NVCA's regulation area extends across most of the study area (**Appendix 6**). A permit from the NVCA would presumably be required for any of the alternatives being reviewed, and additional technical studies may be required to support NVCA's permit application process.

5.2.7 Significant Woodlands

Potential impacts to candidate significant woodlands are reflected in the discussions above pertaining to the ANSI feature and candidate significant valleylands. As stated above, Alternatives 1 and 2 would retain the existing vegetation cover within the ROW, while Alternative 3 would require substantial removal of forest cover, which may affect wildlife habitat functions within the valley corridor. It is noted that the continuity of forest cover within the valley is already fragmented due to the presence of the existing roadway; however, re-alignment of the roadway would at least temporarily increase the width of the woodland gap. As noted above, impacts associated with removal of forest cover for Alternative 3 may be mitigated in the long-term through post-construction restoration of the existing alignment footprint. Through re-vegetation efforts, the gap in contiguous woodland cover could be minimized in the long-term to be comparable to the existing conditions.

For all potential design alternatives, a more detailed assessment of impacts and mitigation planning would be required based on detailed design drawings. Recommended short-term mitigation measures in all scenarios would include preparation of a tree inventory and preservation plan, edge management plan, and tree protection fencing to accurately assess the extent of damage and limit the footprint of

disturbance. Aside from potential ESA processes related to habitat for endangered and threatened species, there is no expectation that removal of trees from the candidate significant woodland would require additional regulatory authorizations or approvals. Notwithstanding, and as noted above, authorizations from the NVCA may be required for any further alterations associated with the valley feature (*e.g.*, removal of stumps, grubbing, grading).

5.2.8 Significant Wildlife Habitat

5.2.8.1 Waterfowl Stopover and Staging Area (Aquatic)

Open water sections of the river within the study area may support this seasonal habitat function. It is expected that if this function occurs within the study area, it would be limited in nature and potentially inconsistent on any given year. In general, and given the nature of potential works, there is no expectation that open water areas of the river would be impacted in such a way as to prevent continued stopover activities from occurring. No specific mitigation measures are recommended.

5.2.8.2 Shorebird Migratory Stopover Area

Shoreline sections of the river within the study area may support this seasonal habitat function. As with waterfowl stopover habitat, it is expected that if this function occurs within the study area, it would be highly limited in nature and potentially inconsistent on any given year. In general, and given the nature of potential works, there is no expectation that shoreline areas of the river would be impacted in such a way as to prevent continued stopover activities from occurring. No specific mitigation measures are recommended.

5.2.8.3 Bat Maternity Colonies

Areas of forest cover within the study area represent potential habitat for one or more species of bats. As discussed in relation to endangered bats, and based on qualitative assessments undertaken on site, forest cover within the study area is not expected to function as significant habitat for bats. Notwithstanding, no detailed quantitative assessment of bat habitat function has been undertaken to date.

Alternative 1 and 2 would not be expected to require substantial removals of trees within the ROW. Pending confirmation through review of detailed design drawings, there is no expectation that additional assessment of bat habitat would be required to support Alternatives 1 and 2. Conversely, Alternative 3 would result in more substantial removal of forested cover. If selected, Alternative 3 may require a more detailed assessment of habitat function to confirm that no significant maternity roosting habitat for bats is present. A subsequent assessment of impacts and mitigation planning may need to be completed based on detailed design drawings. As a general impact mitigation measure to avoid harm to individual bats, RiverStone recommends that any tree removals required to accommodate any of the design alternatives take place outside of the season in which these species may be active, *i.e.*, April - Oct.

5.2.8.4 Turtle Nesting Areas

Shoreline sections of the river and near-shore areas of the valley system within the study area may support this habitat function. It is expected that if this function occurs within the study area, it would be limited for several reasons, including major fluctuations in water levels, steep-sided banks, and largely vegetated valley walls. In general, there is no expectation that the study area would be impacted

in such a way as to prevent continued nesting from occurring (if this activity occurs at present). For all potential design alternatives, RiverStone recommends the isolation of construction areas through appropriately-designed sediment and erosion control fencing. This would serve as a form of wildlife exclusion fencing and prevent potential access by turtles during the nesting season. A review of further potential mitigation options should be undertaken based on detailed design drawings for the preferred alternative.

5.2.8.5 Seeps and Springs

See **Section 5.2.2** for an impact assessment on seeps and springs as a stand-alone KNHF.

5.2.8.6 Special Concern and Rare Wildlife Species

Midland Painted Turtle

Potential habitat within the study area for Midland Painted Turtle is likely limited to general movement and basking functions, with turtle nesting habitat function discussed in **Section 5.2.8.4** as an individual category of SWH. Aside from those impacts discussed pertaining to potential nesting habitat functions, there is no expectation that any of the potential alternatives would be expected to negatively impact continued use of the study area as movement and basking habitat for this species.

Snapping Turtle

As with Midland Painted Turtle, potential habitat within the study area for Snapping Turtle is likely limited to general movement and basking functions, with turtle nesting habitat function discussed in **Section 5.2.8.4** as an individual category of SWH. Aside from those impacts discussed pertaining to potential nesting habitat functions, there is no expectation that any of the potential alternatives would be expected to negatively impact continued use of the study area as movement and basking habitat for this species.

Monarch

It is reasonably expected that Monarch could utilize the study area to carry out various life processes, including feeding and reproduction. Milkweed was documented as occurring within the ROW but was not noted as a prominent plant species in any of the vegetation communities described within the study area. Milkweed species are dependent on successional communities, meaning that regular disturbance is required to facilitate continued occurrence. Individual Milkweed plants may be removed through implementation of any of the potential alternatives; however, it is expected that plants would quickly re-establish within the ROW post-construction. As such, there is no expectation that any of the potential alternatives would result in a net loss of habitat for Monarch. Consistent with other wildlife habitat mitigation measures, any vegetation removals should take place outside of the active season for Monarch (*e.g.*, April – Oct). Additionally, supplemental seeding of Milkweed species could occur as part of post-construction restoration activities. It is noted that additional successional habitat may actually be created following construction.

Northern Brook Lamprey

Potentials impacts to this species should be considered in the context of potential impacts to broader fish habitat features and functions. See **Section 5.2.4** for an impact assessment on fish habitat as a stand-alone KNHF.

Silver Lamprey

Potentials impacts to this species should be considered in the context of potential impacts to broader fish habitat features and functions. See **Section 5.2.4** for an impact assessment on fish habitat as a stand-alone KNHF.

5.2.9 Sand Barren

The sand barren vegetation community in the southeastern portion of the study area appears to be located primarily outside of the ROW, with a very small portion potentially occurring within the ROW. As previously discussed, the origin and context for this feature is unknown; however, a high density of exotic species (*e.g.*, Scots Pine) may be indicative of past anthropogenic disturbance in this location. Alternatively, the feature may occur naturally, with degraded vegetation cover resulting from its adjacency to the roadway. Given its small size (*i.e.*, ~0.15ha) and degraded vegetation cover, there are no significant functions ascribed to this feature of the feature.

It is expected that Alternatives 1 and 2 would avoid encroachment into this community; however, the proposed re-alignment associated with Alternative 3 may result in minor encroachment into any portions of this feature that occur within the ROW. If portions of the feature would be removed to accommodate an alternative road footprint, then restoration opportunities may be available in association with post-construction naturalization measures. Following selection of the preferred alternative and preparation of detailed design drawings, a more detailed impact assessment would be required to quantify the degree of encroachment into this feature. There is no expectation that any development or alteration within the identified sand barren feature would require additional regulatory authorizations or approvals.

6 SUMMARY & CONCLUSIONS

RiverStone has undertaken this assessment to support the preparation of a municipal class EA in the Township of Essa. The EA contemplates multiple alternative options for rehabilitation or replacement of an existing bridge crossing over the Nottawasaga River and through a feature designated by the province as an ANSI. Our study characterizes natural heritage features and functions within a defined study area associated with the existing bridge and associated ROW north and south of the crossing. Several KNHF were identified, including some that have the potential to be impacted by one or more of the alternative options being assessed through the EA. RiverStone has provide a preliminary assessment of those potential impacts based on our understanding of the various alternatives, including providing a discussion on preliminary impact mitigation measures and requirements for additional assessment and authorizations following selection of the preferred alternative.

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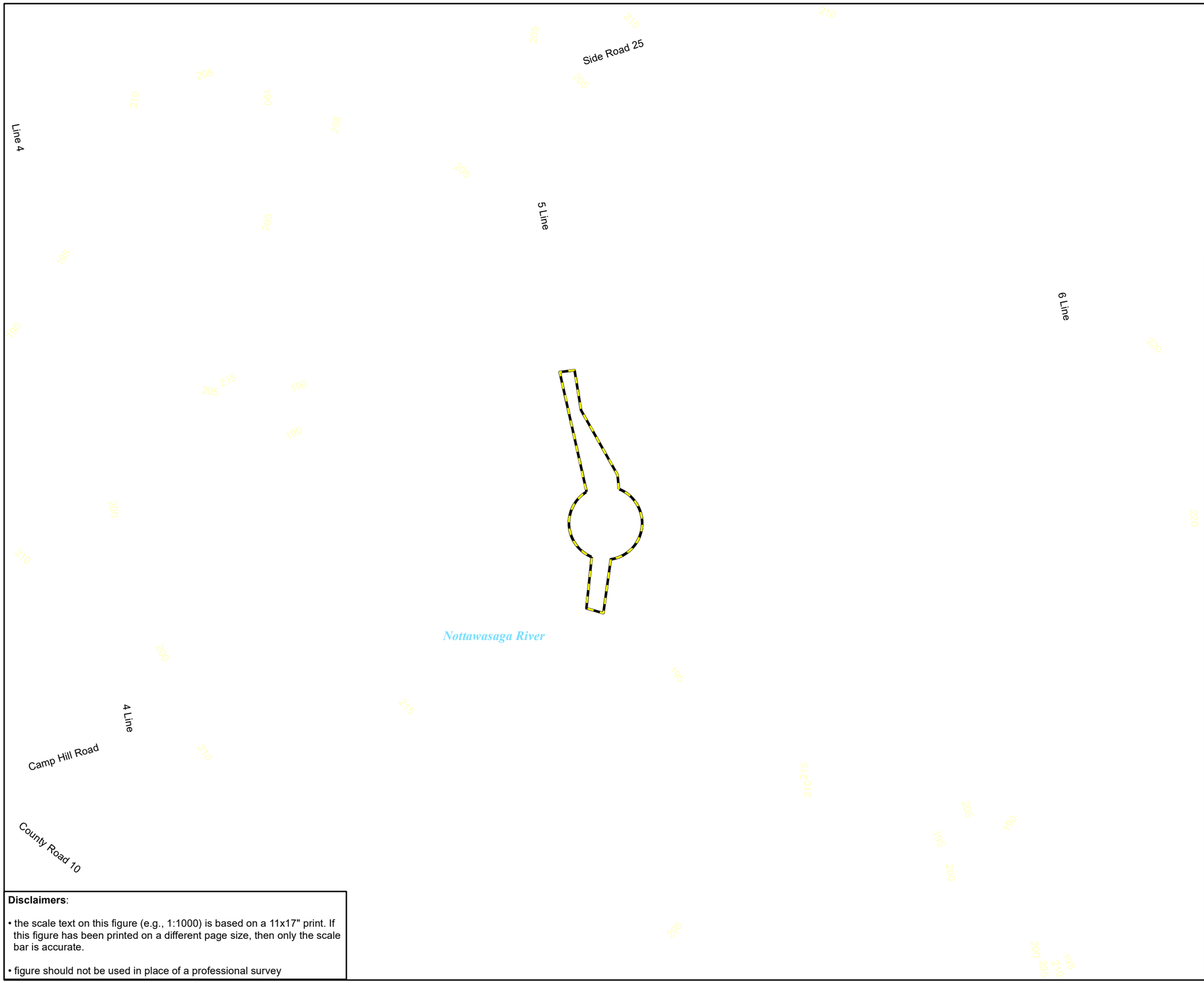
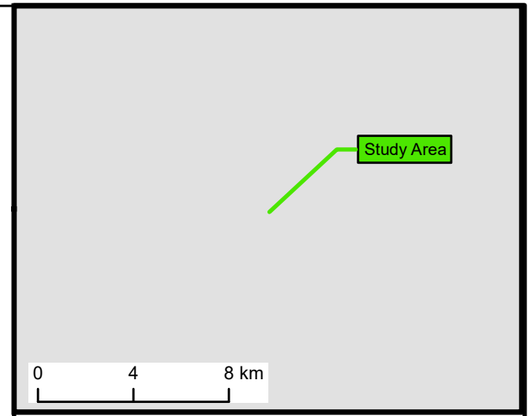
Figure 1. Location of the Study Area





Legend

N

Ontario Base Mapping (OBM)

- Roads
- 5 m Contours

Planning Boundaries

- Study Area

Features with Recognized Natural Heritage Value - Identified by the Province or the Relevant Approval Authorities

- Nottawasaga River Life Science ANSI

Orthorectified aerial photo - spring 2018

Scale	RS Project No.	Date Last Updated	By
1:10,000	2019-091	Oct 18, 2021	JG

0 150 300 Metres

Figure 1. Location of Study Area, Bridge #9.
5th Line, Township of Essa.

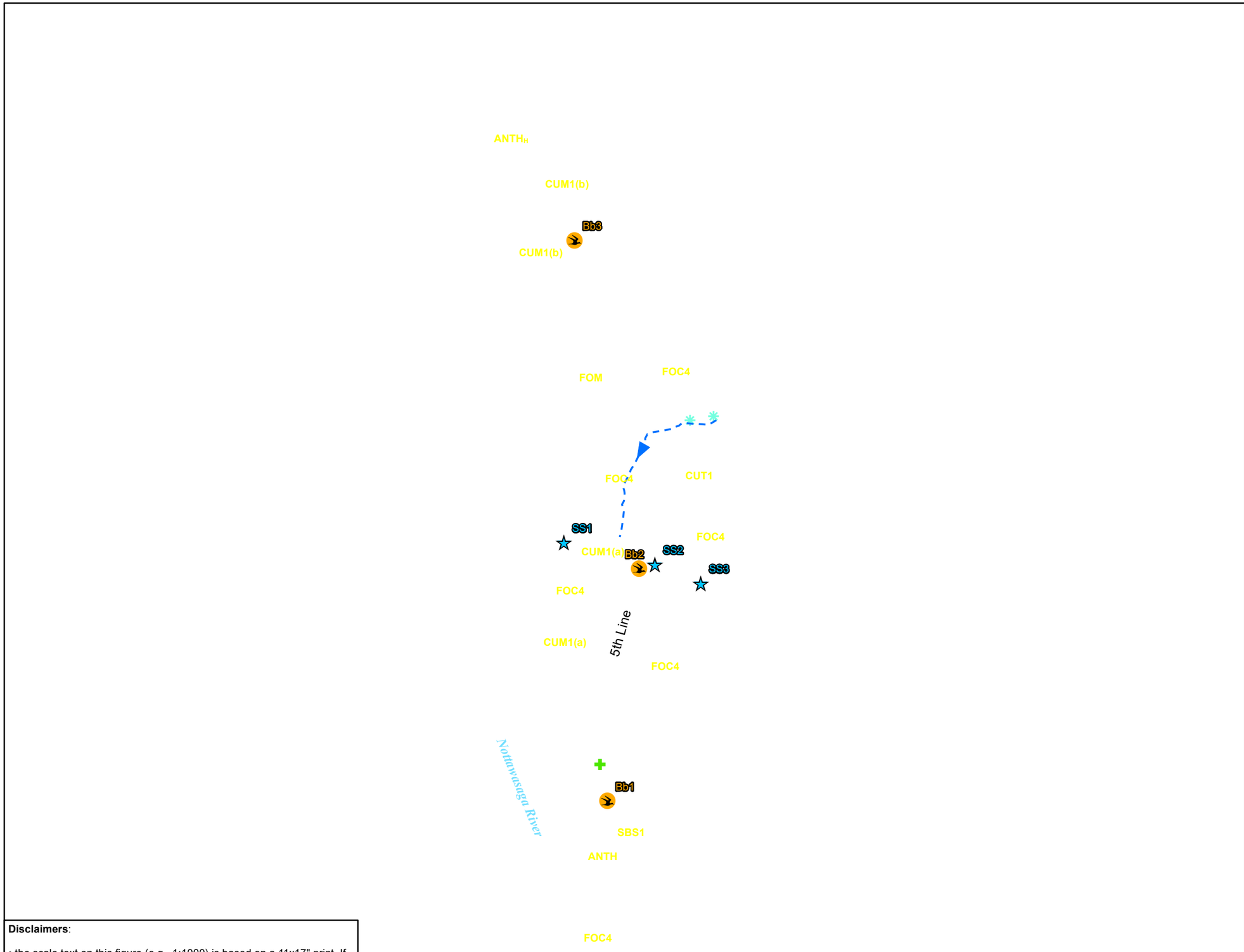
Prepared for
Ainley and Associates Limited

Inset: General Location of Study Area

Disclaimers:

- the scale text on this figure (e.g., 1:1000) is based on a 11x17" print. If this figure has been printed on a different page size, then only the scale bar is accurate.
- figure should not be used in place of a professional survey

Figure 2. Biophysical Features and Functions



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- figure should not be used in place of a professional survey

Legend

N

Ontario Base Mapping (OBM)

- Roads

Planning Boundaries

- Study Area

Man-made Features Existing at Time of Site Visit (Aug 25, 2021)

- Bridge #9

Biophysical Features+Functions-RiverStone

- Nottawasaga River

Ecological Communities

- ANTH: Anthropogenic (Built Roadway)
- ANTH$_H$: Anthropogenic (Hayfield)
- CUM1(a): Moist Mineral Cultural Meadow Ecosite
- CUM1(b): Dry - Fresh Mineral Cultural Meadow Ecosite
- CUT1: Fresh Mineral Cultural Thicket Ecosite
- FOC4: Fresh - Moist Cedar Coniferous Forest Ecosite
- FOM: Dry Scots Pine - Aspen Mixed Forest
- SBS1: Shrub Sand Barren Ecosite

Features with Recognized Natural Heritage Value - Identified by RiverStone

- Drainage Feature
- Seep Points
- Butternut Tree

Site Visit Observations

- Stream Survey Station
- Breeding Bird Survey Station

Orthorectified aerial photo - spring 2018

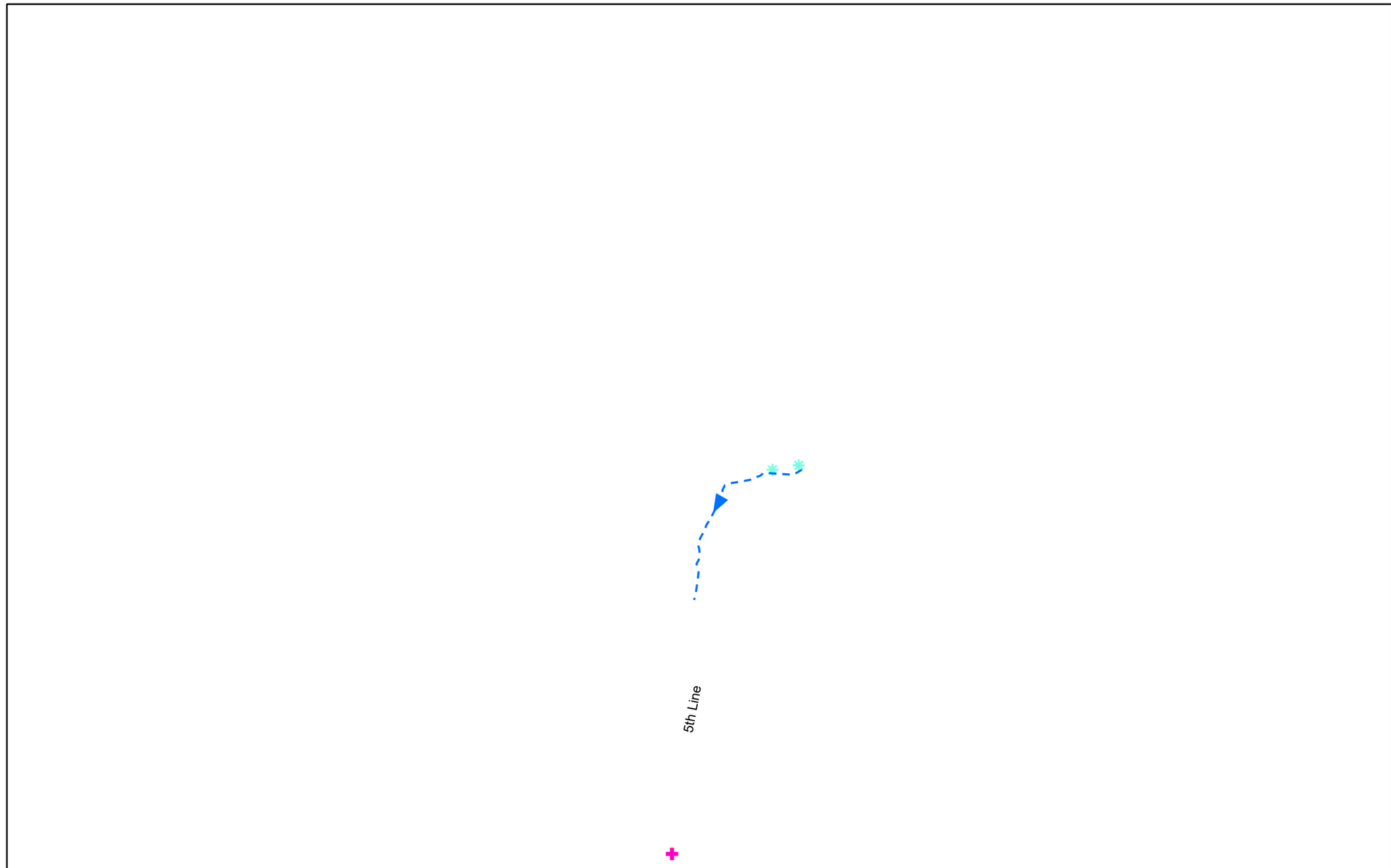
Scale	RS Project No.	Date Last Updated	By
1:3,000	2019-091	Oct 20, 2021	JG

0 40 80 Metres

Figure 2. Existing Conditions, Bridge #9.
5th Line, Township of Essa

Prepared for
Ainley and Associates Limited

Figure 3. Key Natural Heritage Features and Key Hydrologic Features in Relation to Proposed Development



Legend

Ontario Base Mapping (OBM)

Roads

Planning Boundaries

Study Area

Features with Recognized Natural Heritage Value - Identified by the Province or the Relevant Approval Authorities

Nottawasaga River ANSI

Man-made Features Existing at Time of Site Visit (Aug 25, 2021)

Bridge #9

Biophysical Features+Functions-RiverStone

Nottawasaga River

Features with Recognized Natural Heritage Value - Identified by RiverStone

Drainage Feature

Seep Points

Butternut Tree

Fish Habitat

Significant Woodland

Seepage Zone

Sand Barren

Proposed Development and Site Alteration

Road Alignment

Orthorectified aerial photo - spring 2018

Scale	RS Project No.	Date Last Updated	By
1:3,000	2019-091	Oct 21, 2021	JG

0 40 80 Metres

Figure 3. Key Natural Heritage Features and Key Hydrologic Features in Relation to Proposed Development. Bridge #9.
5th Line, Township of Essa

Prepared for
Ainley and Associates Limited

Disclaimers:

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- figure should not be used in place of a professional survey

Appendix 1. Select Photos from the Site Investigations

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Photo 1. Facing south from center of bridge (June 17, 2021).

Photo 2. Facing approximately southwest downstream of bridge; note eroded sections of south bank adjacent to bridge (June 17, 2021).

Photo 3. Facing west downstream of bridge; downstream extent of large log-jam surrounding bridge (June 17, 2021).

Photo 4. Facing northwest downstream of bridge; note overhanging trees and minor erosion along north bank; approximate location of small drainage feature outlet (June 17, 2021).

Photo 5. Facing south; underside of bridge (June 17, 2021).

Photo 6. Facing north; underside of bridge (June 17, 2021).

Photo 7. NW of bridge, facing south toward river; small drainage feature in cedar forest within ROW (Aug 28, 2021).

Photo 8. Facing east (upstream), under bridge along north bank; note log-jam along center of channel; approximate location of poorly-defined drainage feature outlet (June 17, 2021).

Photo 9. Outlet of small drainage feature within north bank (June 17, 2019).

Photo 10. Origins of small drainage feature east of Line 5, NE of bridge (June 17, 2021).

Photo 11. Iron precipitate from groundwater seepage NE of bridge in cedar forest (June 17, 2021).

Photo 12. Small sand barren feature in SE portion of study area (June 17, 2021).

Photo 13. Facing south from north end of study area; forested ROW in center of frame; active hayfield to right of frame (June 28, 2021).

Photo 14. Small cultural meadow/meadow marsh community west of Line 5, SW of bridge (June 17, 2021).

Photo 15. Small area of cultural thicket on steeply sloping hillside; NE of bridge (June 28, 2019).

Photo 16. Small area of riffles associated with gravel bar and submerged logs; directly downstream of bridge along south bank (Aug 28, 2021).

Photo 17. Upstream of bridge; typical summer conditions within study area following period of drought (silty substrate, high turbidity, sparse algae, and aquatic vegetation) (Aug 28, 2021).

Photo 18. Facing downstream toward bridge; upstream extent of log-jam; small section of riffles along south bank (Aug 28, 2021).

Appendix 2. Breeding Bird Survey Data

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Appendix 2 - Breeding Bird Survey Data [Surveyed June 17 and June 28, 2021]

SCIENTIFIC NAME	COMMON NAME	Survey 1 (June 17, 2021)			Survey 2 (June 28, 2021)			Notes	Breeding Assessment
		Station 1	Station 2	Station 3	Station 1	Station 2	Station 3		
Cardinalis cardinalis	Northern Cardinal	H	S	H	H	H	H		Possible
Pheucticus ludovicianus	Rose-breasted Grosbeak	S			S				Probable
Cathartes aura	Turkey Vulture							Incidental (F/O)	N/A
Zenaida macroura	Mourning Dove				H	H			Possible
Corvus brachyrhynchos	American Crow		X	X		F/O	X		N/A
Cyanocitta cristata	Blue Jay	X				H			Possible
Melospiza melodia	Song Sparrow	S	S	S	S	S			Probable
Spizella passerina	Chipping Sparrow			H			H		Possible
Carduelis tristis	American Goldfinch				H				Possible
Quiscalus quiscula	Common Grackle							Incidental (F/O)	N/A
Poecile atricapillus	Black-capped Chickadee	H		H	H	H	H		Possible
Geothlypis trichas	Common Yellowthroat	S	S	S	S	S	S		Probable
Mniotilta varia	Black-and-white Warbler		S		P/D	S			Probable
Setophaga ruticilla	American Redstart							Active nest observed in ROW [CUM1(a)]	Confirmed
Setophaga virens	Black-throated Green Warbler							Incidental (call)	N/A
Meleagris gallopavis	Wild Turkey	C		C				Estimated 100m+ outside of study area	Possible
Dryocopus pileatus	Pileated Woodpecker	H							Possible
Picoides villosus	Hairy Woodpecker		H						Possible
Sitta canadensis	Red-breasted Nuthatch			H					Possible
Sturnus vulgaris	European Starling							Incidental (F/O)	N/A
Catharus fuscescens	Veery		S		S	S	S	Common within valley forests, in and outside of study area	Probable
Turdus migratorius	American Robin			H					Possible
Myiarchus crinitus	Great-crested Flycatcher				H				Possible
Vireo olivaceus	Red-eyed Vireo		S	S		S	S		Probable
Hylocichla mustelina	Wood Thrush							Incidental (heard calling on one occasion (June 17) from 100m+ west of bridge)	N/A
Contopus virens	Eastern Wood-pewee							Incidental (heard calling on one occasion (June 17) from ~50m east of bridge)	N/A
Sayornis phoebe	Eastern Phoebe							Incidental (observed foraging from bridge)	N/A
Megaceryle alcyon	Belted Kingfisher							Incidental (observed fishing from bridge)	N/A
Pandion haliaetus	Osprey							Incidental (F/O)	N/A
Agelaius phoeniceus	Red-winged Blackbird		H	X			H		Possible
Ammodramus savannarum	Grasshopper Sparrow						V	Active in core of hayfield; outside of study area	Probable
Passerina cyanea	Indigo Bunting		A				S	Aggressive response to taped call	Probable
Toxostoma rufum	Brown Thrasher			X				In roadside thicket	N/A
Coccyzus erythropthalmus	Black-billed Cuckoo			X				100m+ N of study area	N/A
Setophaga petechia	Yellow Warbler	H							Possible
Sita carolinensis	White-breasted Nuthatch				H				Possible
Dolichonyx oryzivorus	Bobolink							Incidental (single male observed flying over hayfield)	N/A

Appendix 2 - Breeding Bird Survey Data [Surveyed June 17 and June 28, 2021]

Breeding Evidence Codes: Entry examples S,S - Singing Male detected during first survey and second survey; S, Singing male detected during first survey only ,S Singing male detected during second survey only

Breeding Evidence Codes:

None FO - Species observed Flying Over showing no signs of use of subject or adjacent lands
None X - Species observed, no evidence of breeding

Possible (Po)
H - Species observed in its breeding season in suitable nesting habitat
S or C - Singing male(s) present (S), or breeding calls heard (C), in suitable nesting habitat in breeding season***

Probable (Pr)
P - Pair observed in suitable nesting habitat in nesting season
D - Courtship or display, including interaction between a male and a female or two males, including courtship feeding or copulation.
V - Visiting probable nest site
A - Agitated behaviour or anxiety calls of an adult
B - Brood Patch on adult female or cloacal protuberance on adult male
N - Nest-building or excavation of nest hole.

Confirmed (Co)
DD - Distraction display or injury feigning.
NU - Used nest or egg shells found (occupied or laid within the period of the survey)
FY - Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight
AE - Adult leaving or entering nest sites in circumstances indicating occupied nest
FS - Adult carying fecal sac.
CF - Adult carying food for young.
NE - Nest containing eggs.
NY - Nest with young seen or heard

***Possible if only one observation of S or C, Probable if evidence of S or C in same place on two or more dates a week or more apart

Appendix 3. Vascular Plant List

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Appendix 3 - Vascular Plant List [Surveyed June 17 and August 25 2021]

SCIENTIFIC NAME	COMMON NAME	GRANK	SRANK	COSEWIC	MNRF	TRACK
Abies balsamea	Balsam Fir	G5	S5			N
Acer negundo	Manitoba Maple	G5	S5			N
Acer rubrum	Red Maple	G5	S5			N
Acer saccharum	Sugar Maple	G5	S5			N
Achillea millefolium	Common Yarrow	G5	SE			N
Agrimonia gryposepala	Hooked Agrimony	G5	S5			N
Amelanchier arborea	Downy Serviceberry	G5	S5			N
Amphicarpaea bracteata	American Hog-peanut	G5	S5			N
Anemone canadensis	Canada Anemone	G5	S5			N
Anemone cylindrica	Long-fruited Anemone	G5	S4			N
Anemone virginiana var. virginiana	Virginia Anemone	G5T5	S5			N
Antennaria neglecta	Field Pussytoes	G5	S5			N
Apocynum androsaemifolium	Spreading Dogbane	G5	S5			N
Aquilegia canadensis	Wild Columbine	G5	S5			N
Arisaema triphyllum	Jack-in-the-pulpit	G5	S5			N
Asclepias incarnata	Swamp Milkweed	G5	S5			N
Asclepias syriaca	Common Milkweed	G5	S5			N
Betula papyrifera	Paper Birch	G5	S5			N
Bromus inermis	Awnless Brome	G5TNR	SE5			N
Carex aurea	Golden-fruited Sedge	G5	S5			N
Carex eburnea	Ebony Sedge	G5	S5			N
Carex flava	Yellow Sedge	G5	S5			N
Carex gracillima	Graceful Sedge	G5	S5			N
Carex granularis	Meadow Sedge	G5	S5			N
Carex hystericina	Porcupine Sedge	G5	S5			N
Carex pedunculata	Long-stalked Sedge	G5	S5			N
Celtis occidentalis	Common Hackberry	G5	S4			N
Chelone glabra	White Turtlehead	G5	S5			N
Circaea canadensis	Broad-leaved Enchanter's Nightshade	G5T5	S5			N
Cirsium arvense	Canada Thistle	GNR	SE5			N
Cirsium vulgare	Bull Thistle	GNR	SE5			N
Clematis virginiana	Virginia Virgin's-bower	G5	S5			N
Cornus alternifolia	Alternate-leaved Dogwood	G5	S5			N
Cornus stolonifera	Red-osier Dogwood	G5	S5			N
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-slipper	G5T5	S5			N
Cystopteris bulbifera	Bulblet Fern	G5	S5			N
Dactylis glomerata	Orchard Grass	GNR	SE5			N
Danthonia spicata	Poverty Oatgrass	G5	S5			N
Daucus carota	Wild Carrot	GNR	SE5			N
Dryopteris marginalis	Marginal Wood Fern	G5	S5			N
Echium vulgare	Common Viper's-bugloss	GNR	SE5			N
Epipactis helleborine	Eastern Helleborine	GNR	SE5			N
Equisetum fluviatile	Water Horsetail	G5	S5			N
Equisetum hyemale	Common Scouring-rush	G5	S5			N
Equisetum scirpoides	Dwarf Scouring-rush	G5	S5			N
Eriophorum viridicarinatum	Green Keeled Cottongrass	G5	S5			N
Euthamia graminifolia	Grass-leaved Goldenrod	G5	S5			N

Appendix 3 - Vascular Plant List [Surveyed June 17 and August 25 2021]

Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	G5T5	S5			N
Fragaria virginiana	Wild Strawberry	G5	S5			N
Frangula alnus	Glossy Buckthorn	GNR	SE5			N
Fraxinus americana	White Ash	G5	S4			N
Gentianopsis crinita	Fringed Gentian	G5	S5			N
Geum canadense	White Avens	G5	S5			N
Glyceria canadensis var. canadensis	Canada Mannagrass	G5TNR	S4S5			N
Glyceria striata	Fowl Mannagrass	G5	S5			N
Hypericum perforatum	Common St. John's-wort	GNR	SE5			N
Impatiens capensis	Spotted Jewelweed	G5	S5			N
Juglans cinerea	Butternut	G4	S3?	END	END	Y
Juglans nigra	Black Walnut	G5	S4			N
Lactuca biennis	Tall Blue Lettuce	G5	S5			N
Leucanthemum vulgare	Oxeye Daisy	GNR	SE5			N
Linaria vulgaris	Butter-and-eggs	GNR	SE5			N
Lonicera canadensis	Canada Fly Honeysuckle	G5	S5			N
Lonicera dioica	Limber Honeysuckle	G5	S5			N
Lonicera tatarica	Tartarian Honeysuckle	GNR	SE5			N
Lotus corniculatus	Garden Bird's-foot Trefoil	GNR	SE5			N
Lycopus uniflorus	Northern Water-horehound	G5	S5			N
Lysimachia ciliata	Fringed Loosestrife	G5	S5			N
Lythrum salicaria	Purple Loosestrife	G5	SE5			N
Maianthemum canadense	Wild Lily-of-the-valley	G5	S5			N
Maianthemum racemosum	False Solomon's-seal	G5	S5			N
Maianthemum stellatum	Star-flowered False Solomon's-seal	G5	S5			N
Matricaria discoidea	Pineapple-weed Chamomile	G5	SE5			N
Matteuccia struthiopteris	Ostrich Fern	G5	S5			N
Medicago lupulina	Black Medic	GNR	SE5			N
Melilotus albus	White Sweet-clover	G5	SE5			N
Menispermum canadense	Canada Moonseed	G5	S4			N
Mitchella repens	Partridge-berry	G5	S5			N
Oenothera biennis	Common Evening Primrose	G5	S5			N
Onoclea sensibilis	Sensitive Fern	G5	S5			N
Ostrya virginiana	Eastern Hop-hornbeam	G5	S5			N
Oxalis stricta	European Wood-sorrel	G5	S5			N
Parthenocissus quinquefolia	Virginia Creeper	G5	S4?			N
Phleum pratense	Common Timothy	GNR	SE5			N
Picea glauca	White Spruce	G5	S5			N
Pinus strobus	Eastern White Pine	G5	S5			N
Pinus sylvestris	Scotch Pine	GNR	SE5			N
Plantago lanceolata	English Plantain	G5	SE5			N
Plantago major	Common Plantain	G5	S5			N
Poa compressa	Canada Bluegrass	GNR	SE5			N
Polystichum acrostichoides	Christmas Fern	G5	S5			N
Populus balsamifera	Balsam Poplar	G5	S5			N
Populus tremuloides	Trembling Aspen	G5	S5			N
Potentilla simplex	Old-field Cinquefoil	G5	S5			N

Appendix 3 - Vascular Plant List [Surveyed June 17 and August 25 2021]

Prunella vulgaris	Self-heal	G5T5	S5			N
Prunus serotina	Wild Black Cherry	G5	S5			N
Prunus virginiana	Choke Cherry	G5	S5			N
Pteridium aquilinum	Bracken Fern	G5	S5			N
Pyrola asarifolia	Pink Pyrola	G5	S5			N
Pyrola elliptica	Shinleaf	G5	S5			N
Quercus rubra	Northern Red Oak	G5	S5			N
Ranunculus acris	Tall Buttercup	G5	SE5			N
Rhamnus cathartica	Common Buckthorn	GNR	SE5			N
Rhus typhina	Staghorn Sumac	G5	S5			N
Rubus allegheniensis	Alleghany Blackberry	G5	S5			N
Rubus idaeus ssp. idaeus	Common Red Raspberry	G5T5	SE1			N
Rubus pubescens	Dewberry	G5	S5			N
Rudbeckia hirta	Black-eyed Susan	G5T5	S5			N
Sagittaria latifolia	Broad-leaved Arrowhead	G5	S5			N
Salix discolor	Pussy Willow	G5	S5			N
Salix eriocephala	Heart-leaved Willow	G5	S5			N
Salix euxina	Crack Willow	GNR	SE			N
Saponaria officinalis	Bouncing-bet	GNR	SE5			N
Scirpus atrovirens	Dark-green Bulrush	G5?	S5			N
Scirpus cyperinus	Cottongrass Bulrush	G5	S5			N
Silene vulgaris	Maiden's Tears	GNR	SE5			N
Sinapis arvensis	Corn Mustard	GNR	SE5			N
Sisyrinchium montanum var. montanum	Strict Blue-eyed-grass	G5T4T5	S5			N
Smilax herbacea	Herbaceous Carrionflower	G5	S4			N
Solanum dulcamara	Climbing Nightshade	GNR	SE5			N
Solidago altissima ssp. altissima	Eastern Late Goldenrod	GNR	S5			N
Solidago canadensis var. canadensis	Canada Goldenrod	G5T5	S5			N
Solidago nemoralis ssp. nemoralis	Gray-stemmed Goldenrod	G5T5	S5			N
Solidago rugosa var. rugosa	Northern Rough-leaved Goldenrod	G5T5	S5			N
Sonchus arvensis ssp. arvensis	Field Sow-thistle	GNRTNR	SE5			N
Spiranthes cernua	Nodding Ladies'-tresses	G5	S5			N
Sporobolus cryptandrus	Sand Dropseed	G5	S4			N
Symphyotrichum cordifolium	Heart-leaved Aster	G5	S5			N
Symphyotrichum lanceolatum ssp. lanceolatum	Panicled Aster	G5T5	S5			N
Symphyotrichum lateriflorum	Starved Aster	G5	S5			N
Symphyotrichum novae-angliae	New England Aster	G5	S5			N
Symphyotrichum puniceum	Swamp Aster	G5	S5			N
Symphyotrichum urophyllum	Arrow-leaved Aster	G4G5	S4			N
Taraxacum officinale	Common Dandelion	G5	SE5			N
Thalictrum pubescens	Tall Meadow-rue	G5	S5			N
Thuja occidentalis	Eastern White Cedar	G5	S5			N
Tiarella cordifolia	Heart-leaved Foam-flower	G5	S5			N
Tilia americana	American Basswood	G5	S5			N
Toxicodendron radicans	Climbing Poison Ivy	G5	S5			N
Trifolium pratense	Red Clover	GNR	SE5			N
Tussilago farfara	Colt's-foot	GNR	SE5			N

Appendix 3 - Vascular Plant List [Surveyed June 17 and August 25 2021]

Typha latifolia	Broad-leaved Cattail	G5	S5			N
Ulmus americana	American Elm	G5?	S5			N
Urtica dioica ssp. dioica	European Stinging Nettle	G5T5?	SE2			N
Verbascum thapsus	Common Mullein	GNR	SE5			N
Veronica officinalis	Common Speedwell	G5	SE5			N
Vicia cracca	Tufted Vetch	GNR	SE5			N
Viola pubescens var. pubescens	Downy Yellow Violet	G5T5	S5			N
Vitis riparia	Riverbank Grape	G5	S5			N

Appendix 4. Significant Wildlife Habitat Assessment

RIVERSTONE
ENVIRONMENTAL SOLUTIONS INC.

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Seasonal Concentration Areas of Animals			
Waterfowl Stopover and Staging Areas (Terrestrial)	Fields with sheet water during Spring (mid March to May) Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. Agricultural fields with waste grains are commonly used by waterflow, these are not considered SWH unless they have spring sheet water available.	CUM1 , CUT1 Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Waterfowl Stopover and Staging Areas (Aquatic)	Ponds, marshes, lakes, bays, coastal inlest, and watercourses used during migration. Sewage treatment Ponds and storm water Ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify. These habitats have an abundance food supply (mostly aquatic invertebrates and vegetation in shallow water)	MAS1 , MAS2, MAS3, SAS1, SAM1, SAF1 , SWD1 , SWD2, SWD3, SWD4, SWD5, SWD6, SWD7	**The Nottawasaga River within the study area has the potential to function as a waterfowl stopover and staging area. See report for further discussion.**
Shorebird Migratory Stopover Areas	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH.	BBO1, BBO2, BBS1, BBS2, BBT1, BBT2, SDO1, SDS2, SDT1, MAM1 , MAM2, MAM3, MAM4, MAM5	**The Nottawasaga River and associated shoreline within the study area has the potential to function as a shorebird migratory stopover area. See report for further discussion.**
Raptor Wintering Areas	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites (hawk/owl) need to be >20 ha with a combination of forest and upland. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting.	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. Bald Eagle: Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. Active mine sites are not SWH. The locations of bat hibernacula are relatively poorly known.	Bat Hibernacula may be found in these ecosites: CCR1, CCR2, CCA1, CCA2. (Note: buildings are not considered to be SWH).	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Bat Maternity Colonies	Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario Maternity colonies located in Mature (dominant trees > 80yrs old) deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees Female Bats prefer wildlife trees (snags) in early stages of decay, class 1-3 . Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred.	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD, FOM, SWD, SWM.	**One or more woodland communities within the study area have the potential to function as a bat maternity colony. See report for further discussion.**
Turtle Wintering Areas	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.	Snapping and Midland Painted Turtles; ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO. Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as overwintering habitat.	Applicable criteria partially met; however, this section of the Nottawasaga River would be unlikely to support over-wintering areas for turtles. The generally sandy/silty bottom does not provide optimum substrate, and the high-energy nature of the river may preclude over-wintering function. Species such as Map Turtle are not considered common in this system, and observations are limited to the lower reaches of the river. There is not expectation that the study area is functioning as a significant turtle wintering area. No further assessment undertaken.
Reptile Hibernaculum	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures.	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1, FOC3.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	Any site or areas with exposed soil banks, sandy hills, borrow pits, steep slopes, and sand piles that are undisturbed or naturally eroding that is not a licensed/permitted aggregate area. Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation.	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles. Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1, CUT1, CUS1, BLO1, BLS1, BLT1, CLO1, CLS1, CLT1.	Applicable criteria partially met; however, identified exposed/eroding banks appear unstable, and evidence of relevant species was not identified through on-site assessment. No further assessment undertaken.
Colonially - Nesting Bird Breeding Habitat Breeding Habitat (Tree/Shrubs)	Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. Most nests in trees are 11 to 15 m from ground, near the top of the tree.	SWM2, SWM3, SWM5, SWM6, SWD1, SWD2, SWD3, SWD4, SWD5, SWD6, SWD7, FET1.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

*as per Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (January 2015)

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Colonially - Nesting Bird Breeding Habitat (Ground)	Nesting colonies of gulls and terns are on islands or peninsulas (natural or artificial) associated with open water, marshy areas, lake or large river (two-lined on a 1;50,000 NTS map). Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands.	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6, MAS1 – 3, CUM, CUT, CUS	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Migratory Butterfly Stopover Areas	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario. The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south. The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat. Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes.	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field:</u> CUM, CUT, CUS <u>Forest:</u> FOC, FOD, FOM, CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Landbird Migratory Stopover Areas	Woodlots need to be > 10 ha in size and within 5 km of Lake Ontario. If multiple woodlands are located along the shoreline of those woodlands <2 km from Lake Ontario are more significant. Sites have a variety of habitats; forest, grassland and wetland complexes. The largest sites are more significant. Woodlots and forest fragments are important habitats to migrating birds, these features location along the shore and located within 5 km of Lake Ontario are Candidate SWH.	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Deer Yarding Areas	Deer wintering areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20 cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30 cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. The Core of a deer yard (Stratum I) is located within Stratum II and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%. OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual".	Note: OMNRF to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include; FOM, FOC, SWM and SWC. Or these ELC Ecosites; CUP2, CUP3, FOD3, CUT	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Deer Winter Congregation Areas	Woodlots will typically be >100 ha in size. Woodlots <100 ha may be considered as significant based on MNRF studies or assessment. Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha. Woodlots with high densities of deer due to artificial feeding are not significant	All Forested Ecosites with these ELC Community Series; FOC , FOM, FOD, SWC, SWM, SWD . Conifer plantations much smaller than 50 ha may also be used.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Rare Vegetation Communities			
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Sand Barren	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	ELC Ecosites: SBO1, SBS1, SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always < 60%.	Applicable criteria partially met. A small community with sand barren characteristics was identified within the study area; however, the feature does not meet the minimum size threshold of 0.5 ha to be considered SWH. No further assessment undertaken.
Alvar	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars may be complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover.	ALO1, ALS1, ALT1, FOC1, FOC2, CUM2, CUS2, CUT2-1, CUW2 Five Alvar Indicator Species: 1) Carex crawei, 2) Panicum philadelphicum, 3) Eleocharis compressa, 4) Scutellaria parvula, 5) Trichostema brachiatum These indicator species are very specific to Alvars within	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Old Growth Forest	Old Growth forests are characterized by exhibiting the greatest number of old-growth characteristics, such as mature forest with large trees that has been undisturbed. Heavy mortality or turnover of overstorey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Forest Community Series: FOD, FOC, FOM, SWD, SWC, SWM	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Savannah	A Savannah is a tallgrass prairie habitat that has tree cover between 25–60%.	TPS1, TPS2, TPW1, TPW2, CUS2	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Tallgrass Prairie	Tallgrass Prairie is an open vegetation with less than < 25% tree cover, and dominated by prairie species, including grasses.	TPO1, TPO2	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Other Rare Vegetation Community	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M. The OMNRF/NHIC will have up to date listing for rare vegetation communities.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

*as per Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (January 2015)

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Specialized Habitats for Wildlife			
Waterfowl Nesting Area	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. Upland areas should be at least 120 m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. Wood Ducks, Bufflehead, Common Goldeneye and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites.	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 Note: includes adjacency to provincially Significant Wetlands	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms).	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	Applicable criteria partially met; however, no nesting sites were identified through on-site assessments. No further assessment undertaken.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat. Interior habitat determined with a 200m buffer. In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest.	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. Specifically, interior woodland habitat is absent from the study area due to the presence of several prominent edges features, e.g., roads, fields, and the Nottawasaga River. Additionally, no nests or relevant indicator species were identified through on-site assessments. No further assessment undertaken.
Turtle Nesting Areas	Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	Exposed mineral soil (sand or gravel) areas adjacent (<100m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1	**The Nottawasaga River shoreline and adjacent areas within the study area have the potential to function as turtle nesting areas. See report for further discussion.**
Seeps and Springs	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system. Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species.	Seeps/Springs are areas where groundwater comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	**Seepage areas are present in association with woodlands within the study area. See report for further discussion.**
Amphibian Breeding Habitat (Woodland)	Presence of a wetland or pond >500 m^2 (about 25 m diameter) within or adjacent (within 120m) to a woodland (no minimum size). The wetland, lake or pond and surrounding forest, would be the Candidate SWH. Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. An early-season calling anuran survey did not document activity within the ROW, and areas of potential breeding habitat (e.g., vernal pooling) were not observed during site surveys. No further assessment undertaken.

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Amphibian Breeding Habitat (Wetlands)	Wetlands and pools (including vernal pools) >500 m^2 (about 25 m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators.	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. An early-season calling anuran survey did not document activity within the ROW, and areas of potential breeding habitat (e.g., vernal pooling) were not observed during site surveys. No further assessment undertaken.
Area-Sensitive Bird Breeding Habitat	Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. Interior forest habitat is at least 200 m from forest edge habitat.	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD.	Applicable criteria not met. Relevant features, biophysical parameters, and/or sufficient diversity of indicator species not identified through background review and/or site assessment. Specifically, interior woodland habitat is absent from the study area due to the presence of several prominent edges features, *e.g.*, roads, fields, and the Nottawasaga River. Additionally, targeted breeding bird surveys identified probable breeding evidence for only one indicator species (Veery) within the study area (out of the minimum requirement of three species). No further assessment undertaken.
Habitat for Species of Conservation Concern (not including Endangered or Threatened Species)			
Marsh Bird Breeding Habitat	Nesting occurs in wetlands. All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present. For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water.	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, FEO1, BOO1. For Green Heron: All SW, MA and CUM1 sites.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Open Country Bird Breeding Habitat	Large grassland areas (includes natural and cultural fields and meadows) >30 ha Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e., no row cropping or intensive hay or livestock pasturing in the last 5 years). Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.	CUM1, CUM2	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Shrub/Early Successional Bird Breeding Habitat	Large field areas succeeding to shrub and thicket habitats >30 ha in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row-cropping, haying or livestock pasturing in the last 5 years). Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or lightly grazed pasturelands.	CUT1, CUT2, CUS1, CUS2, CUW1, CUW2. Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

*as per Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (January 2015)

Ecoregion 6E	Candidate Significant Wildlife Habitat	ELC Ecosites	Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from available information sources and on-site assessment indicate that candidate SHW might be present?
Terrestrial Crayfish	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed.	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SWD, SWT, SWM, CUM1 with inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Special Concern and Rare Wildlife Species	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or Provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. All plant and animal element occurrences (EO) within a 1 or 10 km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	**One or more species designated as special concern are present within the study area. See report for further discussion.**
Animal Movement Corridors			
Amphibian Movement Corridors	Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat –Wetland) of this Schedule.	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for these species (see above).	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.
Deer Movement Corridors	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH (see above). A deer wintering habitat identified by the OMNRF as SWH will have corridors that the deer use during fall migration and spring dispersion. Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges).	Applicable criteria not met. Relevant features, biophysical parameters, and/or indicator species not identified through background review and/or site assessment. No further assessment undertaken.

Appendix 5. Impact Assessment Summary

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Appendix 6 - Preliminary Impact Assessment and Mitigation Summary

KNHF/KHF	Design Alternative	Potential Impacts to Features	Potential Mitigation Actions and/or Required Authorizations	Estimated Net Impacts
Permanent and Intermittent Streams	1	Potential temporary re-alignment of tributary; construction disturbance resulting in reduced surface water quality.	Erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning.	No anticipated net impacts with appropriate construction mitigation practises.
	2	Potential temporary re-alignment of tributary; construction disturbance resulting in reduced surface water quality.	Erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning.	No anticipated net impacts with appropriate construction mitigation practises.
	3	Temporary and/or permanent re-alignment of tributary; construction disturbance resulting in reduced surface water quality	Erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning.	No anticipated net impacts to stream function; potential permanent re-alignment of feature.
Seeps and Springs	1	No impacts anticipated to documented seeps and springs.	N/A	N/A
	2	No impacts anticipated to documented seeps and springs.	N/A	N/A
	3	No impacts anticipated to documented seeps and springs.	N/A	N/A
Endangered and Threatened Species: Butternut	1	No impacts anticipated to documented Butternut tree.	N/A	N/A
	2	No impacts anticipated to documented Butternut tree.	N/A	N/A
	3	Potential removal required to accommodate re-alignment; potential construction disturbance resulting in death of tree.	Genetic testing to confirm genetic status of tree; health testing as per provincial Butternut Health Assessment protocols; potential compensation planning and/or authorizations as per ESA requirements.	Potentially no net impacts to individual tree through either retention or compensation process.

Appendix 6 - Preliminary Impact Assessment and Mitigation Summary

Endangered and Threatened Species: Lake Sturgeon	1	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential ESA and Fisheries Act authorizations.	No anticipated net impacts with appropriate construction mitigation practises, *i.e* ., no harm to individuals or significant habitat features.
	2	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential ESA and Fisheries Act authorizations.	No anticipated net impacts with appropriate construction mitigation practises, *i.e* ., no harm to individuals or significant habitat features.
	3	Disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Minimization of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential ESA authorization; Fisheries Act authorizations.	No anticipated net impacts with appropriate construction mitigation practises, *i.e* ., no harm to individuals or significant habitat features.
Endangered and Threatened Species: Endangered Bat Species	1	Minimal potential for impacts to individuals of endangered bat species through minor tree removals to facilitate construction.	Restrictive tree clearing timing windows.	No anticipated net impacts, *i.e* ., no harm to individual bats or bat habitat.
	2	Minimal potential for impacts to individuals of endangered bat species through minor tree removals to facilitate construction.	Restrictive tree clearing timing windows.	No anticipated net impacts, *i.e* ., no harm to individual bats or bat habitat.
	3	Potential impacts to individuals and habitat of endangered bat species through major tree removals within ROW.	Restrictive tree clearing timing windows; further assessment of significance of bat habitat function; habitat mitigation and compensation; consultation with MECP and potential ESA authorizations.	No anticipated harm to individual bats with adherence to timing windows; potential localized loss of bat roosting habitat within ROW.

Appendix 6 - Preliminary Impact Assessment and Mitigation Summary

Fish Habitat	1	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.
	2	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.
	3	Disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Minimization of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises and post-construction restoration.
Area of Natural and Scientific Interest	1	No anticipated impacts to features and functions represented by ANSI designation.	N/A	N/A
	2	No anticipated impacts to features and functions represented by ANSI designation.	N/A	N/A
	3	Alteration to valley landform and loss of forested cover within the ROW; potential temporary impacts to habitat functions within valley forests.	Post-construction restoration planning for area of former road alignment.	Permanent alteration to valley landform and long-term loss of forest cover.
Significant Valleylands	1	No anticipated impacts to valleyland form or function.	N/A	N/A
	2	No anticipated impacts to valleyland form or function.	N/A	N/A
	3	Alteration to valley landform and loss of forested cover within the ROW; potential temporary impacts to habitat functions within valley forests.	Post-construction restoration planning for area of former road alignment.	Permanent alteration to valley landform and long-term loss of forest cover.

Significant Woodlands	1	No anticipated impacts to significant woodland functions.	N/A	N/A
	2	No anticipated impacts to significant woodland functions.	N/A	N/A
	3	Loss of forested cover within the ROW; potential temporary impacts to habitat functions within valley forests.	Post-construction restoration planning for area of former road alignment.	Long-term loss of forest cover, with potential for reduced or no net impact following long-term restoration.
Significant Wildlife Habitat: Waterfowl Stopover and Staging Area	1	No anticipated impacts to this potential habitat function.	N/A	N/A
	2	No anticipated impacts to this potential habitat function.	N/A	N/A
	3	No anticipated impacts to this potential habitat function.	N/A	N/A
Significant Wildlife Habitat: Shorebird Migratory Stopover Area	1	No anticipated impacts to this potential habitat function.	N/A	N/A
	2	No anticipated impacts to this potential habitat function.	N/A	N/A
	3	No anticipated impacts to this potential habitat function.	N/A	N/A
Significant Wildlife Habitat: Bat Maternity Colonies	1	Minimal potential for impacts to individual bats through minor tree removals to facilitate construction.	Restrictive tree clearing timing windows.	No anticipated net impacts to candidate habitat feature.
	2	Minimal potential for impacts to individual bats through minor tree removals to facilitate construction.	Restrictive tree clearing timing windows.	No anticipated net impacts to candidate habitat feature.
	3	Potential impacts to individual bats and bat habitat through major tree removals with ROW.	Restrictive tree clearing timing windows; further assessment of significance of bat habitat function; habitat mitigation and compensation (e.g., installation of bat habitat structures).	Potential localized loss of bat roosting habitat within ROW.

Significant Wildlife Habitat: Turtle Nesting Areas	1	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	2	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	3	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
Significant Wildlife Habitat: Seeps and Springs	1	No impacts anticipated to documented seeps and springs.	N/A	N/A
	2	No impacts anticipated to documented seeps and springs.	N/A	N/A
	3	No impacts anticipated to documented seeps and springs.	N/A	N/A
Significant Wildlife Habitat: Special Concern and Rare Wildlife Habitat (Midland Painted Turtle)	1	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	2	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	3	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.

Significant Wildlife Habitat: Special Concern and Rare Wildlife Habitat (Snapping Turtle)	1	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	2	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
	3	Minimal potential for impacts to individual nesting turtles through construction-related activities and disturbances.	Worksite isolation through wildlife exclusion fencing	No anticipated net impacts to candidate habitat feature.
Significant Wildlife Habitat: Special Concern and Rare Wildlife Habitat (Monarch)	1	Minimal potential for impacts to individuals and host plant (Milkweeds) through construction-related activities and disturbances.	Restrictive vegetation removal timing windows (*e.g* ., outside of period between April - Oct); inclusion of native forb species in post-construction restoration activities.	No anticipated net impacts to candidate habitat feature.
	2	Minimal potential for impacts to individuals and host plant (Milkweeds) through construction-related activities and disturbances.	Restrictive vegetation removal timing windows (*e.g* ., outside of period between April - Oct); inclusion of native forb species in post-construction restoration activities.	No anticipated net impacts to candidate habitat feature.
	3	Minimal potential for impacts to individuals and host plant (Milkweeds) through construction-related activities and disturbances.	Restrictive vegetation removal timing windows (*e.g* ., outside of period between April - Oct); inclusion of native forb species in post-construction restoration activities.	Potential net increase in habitat availability following construction.
Significant Wildlife Habitat: Special Concern and Rare Wildlife Habitat (Northern Brook Lamprey)	1	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.
	2	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.

	3	Disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Minimization of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises and post-construction restoration.
Significant Wildlife Habitat: Special Concern and Rare Wildlife Habitat (Silver Lamprey)	1	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.
	2	Potential disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Complete avoidance of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; potential Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises.
	3	Disturbance/alteration to in-channel structure and general fish habitat cover; potential reduction in surface water quality or release of construction contaminants into river.	Minimization of in-water works where feasible; avoidance of in-water works during specified timing windows; erosion and sediment control planning in accordance with best management practises; post-construction stabilization/naturalization planning; Fisheries Act authorizations.	Potentially no net impacts to individuals or significant habitat features with appropriate construction mitigation practises and post-construction restoration.
Sand Barren	1	No anticipated impacts to this feature.	N/A	N/A
	2	No anticipated impacts to this feature.	N/A	N/A
	3	Potential disturbance/alteration to any portion of the feature that occurs within the ROW.	Post-construction restoration/naturalization for areas of former road alignment.	Potential minor loss of feature extent; no anticipated loss in function.

Appendix 6. NVCA Regulated Area

RIVERSTONE
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Nottawasaga Valley Conservation Authority

Property Screening Report

22-Oct-2021

Information Resources for Regulated Properties

Do I need a permit?

Submit a Property Inquiry

Google Driving Directions

Info Regarding Covid-19

Email the Regulations Department
permits@nvca.on.ca

NVCA Contact Information

(705) 424-1479

8195 8th Line,
Utopia, ON L0M 1T0

www.nvca.on.ca

Monday to Friday
8:30 a.m. to 4:30 p.m.
except between 12:00 p.m. - 1:00 p.m.

Appendix C

Fluvial Geomorphological Assessment

September 8, 2021
WE 21018

Ms. Jody Marks
Environmental Planner
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L9Y 4J5

Dear Ms. Jody Marks:

RE: Township of Essa – Nottawasaga River Class EA
Fluvial Geomorphologic Assessment

The Township of Essa has initiated a Schedule C Class EA for the bridge on the 5th Line over the Nottawasaga River in the Township of Essa. The Township is exploring options for the repair or realignment of the bridge over the river. Ainley Group has been retained to complete this task and to prepare alternatives for the Township. In order to determine the feasibility and conformance to regulatory guidelines of the alternatives a fluvial geomorphic assessment of the Nottawasaga River is required.

Water's Edge Environmental Solutions Team has been tasked with this assessment which will characterize the river, its processes, and the current state of adjustment. This includes a review of the general Study Area characteristics such as watershed characteristics, geology, and river characteristics. The assessment will also identify areas of concern in regard to erosion and deposition. An analysis of historical air photos will also be completed in order to understand historical trends of the river and therefore attempt to predict future movement. The results will be used to assess the potential impacts of proposed alternatives.

Site inspections of the Study Area (**Figure 1**) were completed by Water's Edge staff on July 6th, 2021.

Figure 1: Study Area Location

1.0 EXISTING CONDITIONS

1.1 Geology & Physiography

Reviewing the site area's surficial materials is important to evaluate active channel processes and to understand the contributing sediment and substrate of the site. River channel form and sediment supply are controlled by the region's physiography and underlying surficial geology. The study area is located within the Simcoe Lowlands physiographic region. The surficial geology of the area, as shown in **Figure 2**, is older alluvial deposits which consist of clay, silt, sand, and gravel. Deposits of each of these particle types are evident in the Study Site. The surrounding areas are glaciofluvial in origin and tills of this nature can be seen in the banks of the valley.

1.2 General Watershed Characteristics

The following data was acquired using the Ontario Flow Assessment Tool III (OFAT III). The landcover percentages are based on the subwatershed upstream of the study area. Nottawasaga River is a 5th order river that has a total drainage area of roughly 1266 km^2 upstream of the Study Area. The river originates to the west of the site and has approximately 91.5 kms of length in the main channel before the Study Site. The general slope of the Nottawasaga River above the Study Area is 0.004%. The major land cover/use for the Nottawasaga River subwatershed is agricultural at 68% while the rest of the land cover is generally vegetated areas. Only 5.2% of the upstream area land use is considered 'Community/Infrastructure' (OFAT III).

Figure 2: Surficial Geology (data Ontario Geological Survey)

1.3 Nottawasaga River Channel Characterization

1.3.1 Reach Delineation

Channel morphology and substrate characteristics can change along a watercourse. Hence, it becomes important to account for these changes by delineating lengths of a watercourse that exhibit similar planform, sediment substrate, land use, local geology, valley confinement, hydrology and slope. In this study because of the large size of the river and relatively small size of the Study Area there is no change in the typical characteristics of the river and therefore no need to break the Study Area into distinct river reaches.

1.3.2 General Study Reach Characteristics

For the purposes of this assessment the Study Reach of the Nottawasaga River is roughly 1 km in length. This is broken into two sections of river 500 m upstream and downstream of the bridge. The majority of the Study Reach is part of one large meander, which the 5th Line bridge is situated in the middle of. The river is highly sinuous, as is typical for the Nottawasaga River in this area. It winds across the landscape in a deep valley which it is easily confined to. The confinement of the channel is an important part of interpreting the potential future migration of the river. It also determines the type or size of offset required from a regulatory perspective, which will be discussed in a following section. The Nottawasaga River is a confined system with valley walls regularly higher than 15 m above the river. The valley has very little floodplain as the valley walls typically slope straight into the river channel.

The Study Reach has a wide and densely vegetated riparian buffer. The vegetation is a mix of trees, shrubs, and grasses, with cedars and willows being common. The high amount of vegetation on the banks and close proximity to the channel is noticeable in the form of woody debris in the channel. Copious amounts of logs and branches have accumulated on the banks and on the upstream side of the bridge in particular. Logjams are likely common at this location and are an erosion concern while also increasing the potential for upstream flooding.

The quantity of woody debris in the channel leads to the conclusion that the river is actively eroding the riverbanks. Evidence of erosion in the form of basal scour, fallen trees, and minimally vegetated banks is common through the Study Reach. Scour is typically occurring on the outside bends of the river while the inside bends of the river are depositional areas. A significant depositional zone in the Study Reach is on the downstream side of the centre bridge pier, where an island has formed with vegetation growing on it. **Figure 3** shows the areas of erosion and deposition through the Study Area.

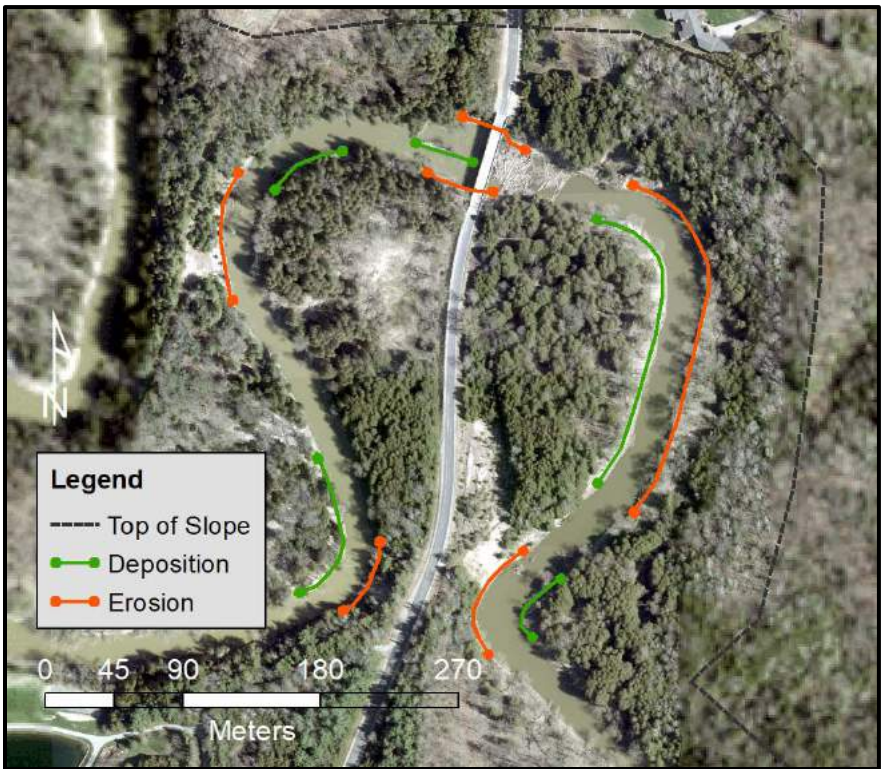


Figure 3: Areas of Erosion and Deposition

1.3.3 Detailed Study Reach Characteristics

A geomorphic survey was undertaken to characterize various physical river parameters for the bankfull channel. The term 'bankfull' refers to the point at which water is entirely contained within the channel banks before spilling onto the floodplain. The bankfull discharge is the channel-forming or dominant flow which dictates the existing dimensions and characteristics of a river. This generally occurs with a frequency between 1 and 2 years. In degraded rivers with high banks, the bankfull flow is often contained within a larger cross-section. To survey the bankfull channel, therefore, fluvial geomorphologists use indicators such as vegetation, sediment deposits, and inflection points in the surface to delineate the bankfull elevation. From this, bankfull dimensions and hydraulics can be calculated, which are often used during natural channel design, depending on the project requirements.

Multiple cross sections and a channel profile were surveyed in the Study Area. The data collected is used to determine typical bankfull characteristics and to analyze and describe the existing conditions of the river. The average bankfull width, which is typically what is seen as the top of bank along the river, was 24.7 m in riffles and slightly wider in pools at 29.6 m. Riffles were difficult to assess due to the high water at the time of survey and also the lack of typical indicators. Riffles are not controlled by large cobbles or boulders in this Study Area, instead they would be controlled by woody debris. Riffles were instead determined by assessing the cross sections and profile to determine the shallower or deeper sections of the river. The average maximum depth across the river at bankfull was 2.70 m and 4.70 m in riffles and pools, respectively. The average bankfull area of the river in riffles and pools is 47.2 m^2 and 87.7 m^2. The bankfull slope along the Study Reach is very low and was calculated to be 0.001 m/m. All geomorphic parameters are listed in **Table 1**.

No sediment samples or pebble counts were conducted due to the high water at the time of survey. However, the substrate and bank composition are apparent through site observations. The substrate found within the river is sourced from the alluvial deposits and tills of the area. These

are typically made up of clay, silt, sand, and small gravels which are all present in the river. No large boulders or cobbles were observed during the site visit.

Table 1: Average Geomorphic Parameters

Parameter	Riffles	Pools
Bankfull Width (m)	24.70	29.60
Bankfull Mean Depth (m)	1.90	3.00
Bankfull Max Depth (m)	2.70	4.70
Bankfull Area (m^2)	47.20	87.70
Wetted Perimeter (m)	26.00	32.20
Hydraulic Radius (m)	1.81	2.73
Width-Depth Ratio	12.90	10.00
Entrenchment Ratio	3.20	2.80
Feature Slope (m/m)	0.008	0.001
Bankfull Slope (m/m)	0.001	
Channel Substrate	Small Gravels/Silty Clay	Silty Clay

1.3.4 Channel Hydraulics

Using data from the geomorphic field work, and a friction factor as determined in the field, bankfull flows were determined for the study reach. Riffle cross-sections provide the best estimate of bankfull discharge for this river, and the average bankfull flow was estimated at 58.18 m^3/s and a velocity of 1.24 m/s. The corresponding maximum bed shear stress is 26.5 N/m^2. At this flow, a median grainsize of 34.82 mm will become mobilized. The very low slope of this reach pushes this grainsize down, where typically a river of this size is capable of transporting much larger particles.

2.0 RAPID ASSESSMENT SCORES

In addition to classification of a river system, various techniques for geomorphic assessments are used to better understand general river conditions (stability, habitat, erosion/degradation, riparian, etc.). In our assessment of Nottawasaga River, we used Rapid Geomorphic Assessment and Rapid Stream Assessment Technique.

2.1 Rapid Geomorphic Assessment (RGA)

Watercourse stability was assessed using a Rapid Geomorphic Assessment (RGA), which was developed to characterize components of channel adjustment and assign a stability score based on field observations (MOE, 2004). Indications of geomorphic change are documented and relate to of one of four general forms of adjustment: aggradation, widening, degradation, and planimetric adjustment. Each general trend has an individual score which can be used to describe primary and secondary forms of adjustment, and the total score indicates the overall stability of the system. **Table 3.1** summarizes RGA scores and classifications, then how they can be interpreted.

The study reach was found to be *transitional* with a score of 0.30. Widening and aggradation were the primary forms of adjustment, with no observations of degradation or planimetric form adjustment. The occurrence of large woody debris, leaning trees, and fracture lines along the top of the banks indicated that the channel is widening. Heavy siltation in the pools and accretion on the point bars provided evidence of aggradation. Widening and aggradation often occur at the same time.

Table 2: Interpretation of RGA Score

Stability Index (SI) Value	Classification	Interpretation
SI ≤ 0.20	In Regime	The channel morphology is within a range of variance for rivers of similar hydrographic characteristics and evidence of instability is isolated or associated with normal river meander processes.
0.21 ≤ SI ≤0.40	**Transitional/Stressed**	**Channel morphology is within a range of variance for rivers of similar hydrographic characteristics, but the evidence of instability is frequent.**
SI ≥ 0.40	In Adjustment	Channel morphology is not within the range of variance and evidence of instability is widespread.

1.1.1 Rapid Stream Assessment Technique (RSAT)

Another rapid assessment is the Rapid Stream Assessment Technique (RSAT), developed by John Galli and other staff of the Metropolitan Washington (DC) Council of Governments (Galli et al, 1996). This method systematically focuses on conditions reflecting aquatic-system response to watershed urbanization. It groups responses into six categories, presumed to adequately evaluate the conditions for the river system at the time of measurement. The six categories are:

1. Channel stability,
2. Channel scouring and sediment deposition,
3. Physical in-stream habitat,
4. Water quality,
5. Riparian habitat conditions, and
6. Biological conditions.

River channel stability and cross-sectional characterization is a critical component of RSAT. The entire channel was inspected for signs of instability (such as bank sloughing, recently exposed non-woody tree roots, general absence of vegetation within bottom third of the bank, recent tree falls, etc.) and channel degradation or downcutting (such as high banks in small headwater streams and erosion around man-made structures). Observations were noted and cross-section measurements were made.

A rapid assessment of soil conditions along the riverbanks is also conducted to determine soil texture and potential erodibility of the watercourse bank. Qualitative water quality measurements were also made along with an indication of substrate fouling (i.e., the unwanted accumulation of sediment).

RSAT also typically involves a quantitative sampling and evaluation of benthic organisms. As no benthic sampling was undertaken, the score was based on site conditions and general observations of water quality.

Each category was assigned a value which was then summed to provide an overall score and ranking. **Table 3** details the range of scores and rankings with a higher score suggesting a healthier system.

Within these broad categories, we evaluated the study area and determined an RSAT score of 23, ranking the channel in Fair quality. A lack of diverse flow structures, highly erodible banks, high suspended load of the river, and evidence of bank failure reduced the score.

Table 3: Interpretation of RSAT score

RSAT Score	Ranking
41-50	Excellent
31-40	Good
21-30	**Fair**
11-20	Poor
0-10	Degraded

Table 4: RSAT Scores and Ranking

River	Score	Verbal Ranking
Nottawasaga	23	Fair

3.0 EROSION HAZARD ASSESSMENT

3.1 Historical Air Photo Analysis

Air photos from 1978, 1989, 2002, 2013, 2016, and 2018 were analyzed using GIS mapping for changes in the river's planform. The air photos are used to trace the bankfull limits of the river and then compared to each other to determine any variation and trends. The 1978 air photo was not useful during the analysis due to the poor quality of the image. The remaining years provided clear enough resolution to delineate the approximate bankfull channel and other features.

At first inspection of the air photos a few specific issues are noticeable. **Figure 4** locates the key areas of historical change that have been observed from the air photos. The first is the island formation at the downstream side of the bridge pier. The pier slows the velocity of the water on the downstream side of the pier creating an area of deposition. This deposition has continued to accumulate over time creating a sizeable formation in the river, as the island extends for more than 55 m downstream from the bridge pier. Because of this loss of channel area, the banks of the river on either side of the island have eroded outwards. The location of these riverbanks changes regularly, however the alignment of the river through this section is stable, likely in part due to the bridge abutments protecting the bank. Log jams due to the bridge pier also occur regularly and could play a part in the bank erosion through this section.

Another change is the significant lateral migration of the river at the noted location on **Figure 4**. This location upstream of the bridge has migrated from west to east approximately 14.0 m in 29 years. The left bank has followed with the right bank as deposition continues to build up on what is the inside bend of the meander. As the progression will likely continue in this direction it will create a tighter radius which may change the channel processes downstream. Contours show that this could potentially continue for another 20 m before the river comes into contact with the toe of the valley slope.

Two other concerns to note are the locations where the outside bend of a meander is migrating back towards itself. Although not likely to happen in the near future, the river in these locations can eventually break through the narrow strip of land and cutoff a large part of the river, creating an oxbow. One of these is at the south end of the Study Area where the river is pinching towards the road. Erosion is occurring at the toe of this slope, particularly on the downstream side of the river. On the other side of the road an exposed, unvegetated slope is also a concern. The other location is just downstream of the bridge where the slope has partially failed already. Looking through the historical air photos this large slump occurred between 1989 and 2002. The strip of land between the river at this location is only 55 m, although it is still a large embankment.

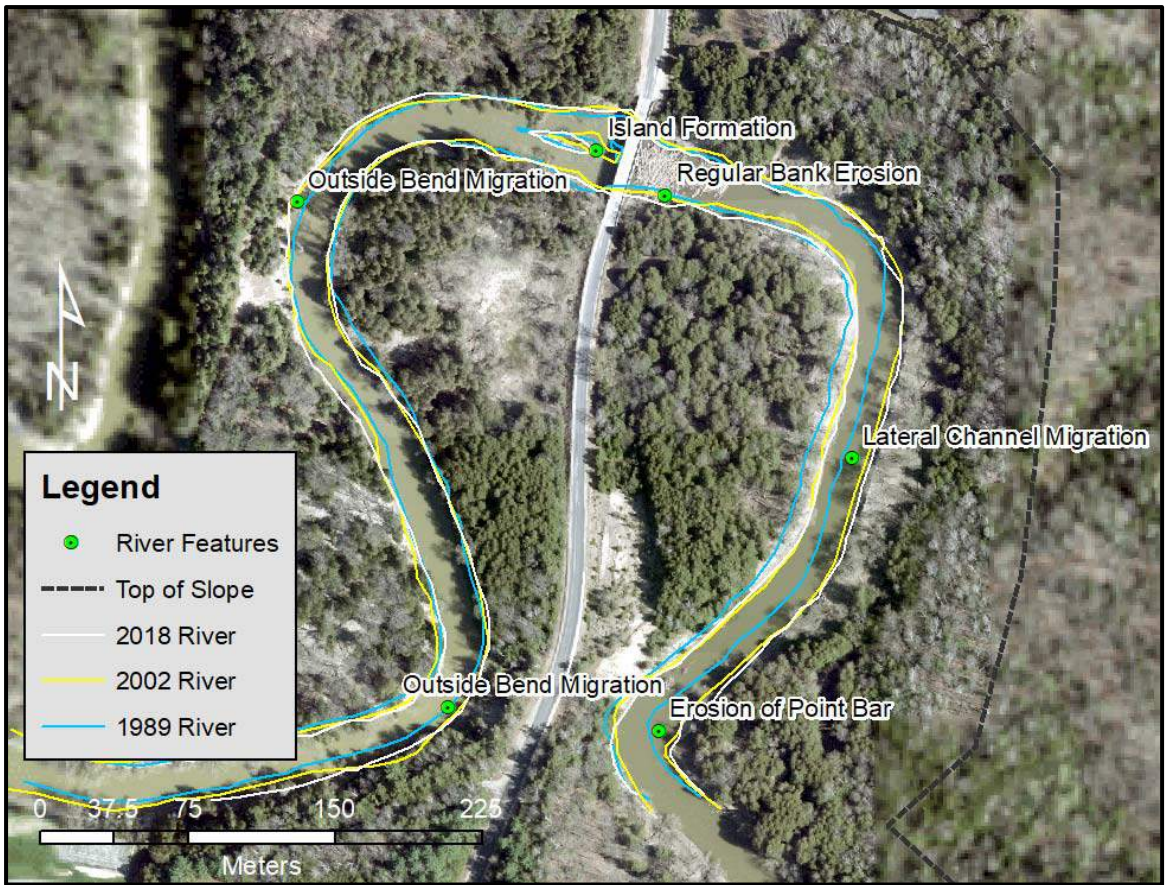


Figure 4: Key Historical Changes

3.2 100-Year Erosion Analysis

Over time, rivers typically meander in a down valley and outwards direction because of two simultaneous events. First, the erosive forces acting on the outside bends of the river scour out the bank and produce sediment. Then the opposite event happens on the inside bend of a river where the water is slower and therefore deposits these sediments. These two processes are what continue to move rivers in this down valley and outwards direction. In the Study Area there are a number of locations where this exchange is occurring. **Figure 3** shows the area of erosion and deposition, and it is generally in these locations where we can look for historical trends in the air photos to determine the rate at which the river is moving.

Measurements were taken along the channel in locations that were easily distinguished to be eroding, typically on the outside bend of a meander. The stream bank in 3 locations was carefully delineated and then measured against the other years. The erosion measurements are based on the 1989 to 2018 difference and then extrapolated to a 100-year rate. Each measurement location displayed a progression from 1989 to 2018. The result of the three erosion measurements in the Study Reach is an average of 9.2 m over the 29-year measurement period. This equals an average rate of erosion of 0.32 m per year which equals a 31.8 m 100-year erosion rate. **Table 6** shows results of the measurements and **Map 1** in **Appendix A** displays the erosion measurement locations.

The erosion measurements include a location with a significant change over the analyzed time period. At this location the total change was 14 m over 29 years, while the other two locations averaged only 6.9 m or 23.6 m/100-yrs. This specific location is in an area where flat floodplain bench is occurs. This location is prime for bank erosion with its low, soft, silty banks particularly in comparison to the other erosion measurement locations which are located at the toe of large valley

walls where the height of these banks makes it difficult to make significant progress over time. This should be kept in mind during discussions of alternative bridge locations and designs.

Table 5: Summary of Erosion Measurements from Air Photos

Measurement Location	Measurement Year Range		Total Change	100-yr Erosion Rate
	1989 to 2002 (m)	2002 to 2018 (m)		
1	5.6	2.0	7.6	26.2
2	11.6	2.4	14.0	48.3
3	4.3	1.8	6.1	21.0
Average	7.2	2.1	9.2	31.8

3.3 Erosion Hazard Application

The NVCA 2009 Planning and Regulation Guidelines lays out how erosion hazards from rivers are to be defined. There are various scenarios within the guideline generally referring to valley confinement, slope stability, and toe erosion. The scenario which is applicable to this Study Site is a confined river with unstable slopes and evidence of toe erosion. As per the guidelines a river with active toe erosion requires an estimation of how far the toe of slope could move over the next 100 years. As noted in **Table 5** the 100-year erosion rate for the Study Site is 31.8 m. This could however be less when noting the erosion at the toe of the large slopes is less than that of sections of low bank height. The toe erosion rate is applied to the edge of the existing river, after which the stable slope line and offset would be applied.

4.0 BRIDGE ALTERNATIVES

The project team is currently evaluating 4 proposed alternatives which will also be evaluated from a fluvial geomorphological perspective. These alternatives are:

1. Do nothing,
2. Rehabilitate bridge in current location,
3. Replace bridge in current location to a two-span structure and clear vegetation along 5th Line to improve sightlines, and
4. Replace and relocate bridge 55 m to the west and adjust 350 m of road alignment.

Often, options for 'do nothing' have the least impact from a fluvial perspective as it is usually best to avoid disruptions to a stream corridor. However, in this case the existing bridge pier is causing the formation of the island, major logjams, and erosion along the upstream and downstream banks. The bridge pier has also forced the widening of the river in the area of the bridge. Bridge piers affect the river in a number of ways including reducing channel velocities, limiting sediment transport, and increasing erosion potential at the pier and bridge abutments. The Nottawasaga River at this location is a relatively narrow and deep river and the bridge pier is a major obstruction to this natural shape. Bridge piers work best in large rivers with shallow and wide sections where the river flow can spread across the channel and floodplain, dissipating energy. Should the existing bridge be retained these issues would continue to occur, potentially causing serious scour to the abutments or upstream flooding due to logjams.

The second alternative includes the rehabilitation of the existing bridge in the current location, and from a fluvial geomorphological perspective this would have the same effect as the 'do nothing' alternative. However, this alternative could include bank protection adjacent to the existing

abutments to prevent scouring in the future. If no changes to the bridge setup are proposed, then the same issues as the first option apply.

The third alternative of replacing the bridge in the current location using a similar two-span structure would generally have the same effect as the first two alternatives if the location and design of the bridge do not change. Specifically, issues regarding the bridge pier which would be located in the centre of the channel would still apply. However, differences for this alternative could potentially include increased span and therefore a greater setback from the river for the abutments. Any increased setback from the river is positive as it removes the bridge abutments from any future migration and allows the river to naturally meander without obstruction. Alternatively, this option could also include increased bank protection adjacent to the abutments if they were to remain in the current location with no increased setback.

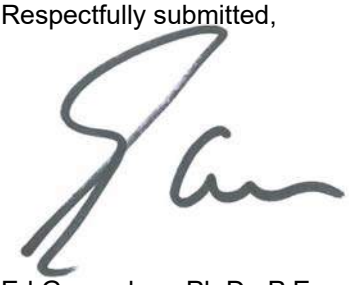
The fourth alternative includes the replacement and relocation of the bridge 55 m to the west. This option provides the possibility for the construction of a full span bridge over the river. The ideal situation for river crossings is a large span bridge with abutments outside of the erosion hazard limits and no piers. The Nottawasaga River is a large river within a large valley which makes spanning such a distance costly, however avoiding bank erosion repairs and logjams could potentially offset future repair costs. The alignment of the bridge over the river is also important when considering the alternatives. The existing bridge is perpendicular to the river alignment, meaning it crosses at 90 degrees. This is the ideal situation as it limits the area of impact to the river valley and also generally provides the widest buffer from the river to the bridge abutments. This may not be applicable if the proposed bridge spans well outside of the erosion hazard limits. If the bridge is within the erosion hazard limits, then it is preferred to align it perfectly perpendicular to the river alignment.

5.0 SUMMARY

Based on our field work and desktop analyses, we conclude the following:

1. The Nottawasaga River is a well-defined river with distinguishable bankfull parameters,
2. The dominant substrate and bank material at the site are silt, sand, and small gravel,
3. The river through the Study Area was assessed to determine the typical river characteristics, the details of which are outlined in **Table 1**,
4. The river was assessed using field forms and received an ‘Transitional’ verbal ranking for the RGA and a ‘Fair’ ranking using the RSAT,
5. Erosion measurements and aerial photo analyses were used in the determination of the 100-year erosion hazard for the river, as outlined in **Table 5**,
6. The proposed bridge alternatives have been assessed and generally an alternative that spans the river and has abutments outside of the erosion hazard is preferred, and
7. **Appendix** A includes Map 1 and photographs of typical river features are shown in **Appendix B**.

Respectfully submitted,



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Fluvial Geomorphic Technician

Attachments:
Appendix A: Map 1
Appendix B: Photographs

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Appendix D

Geotechnical Investigation Report

Geotechnical Investigation
5th Line Nottawasaga Bridge Improvements (Bridge No. 9), Township of Essa, Ontario

Client
Ainley Group

Project Number
BRM-00049317-A0

Prepared By:
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December 15, 2017

TABLE OF CONTENTS

1. Introduction

As requested, **EXP** Services Inc. (**EXP**) performed a geotechnical investigation for the Nottawasaga River crossing on 5th Line in the Township of Essa, Ontario. The existing structure comprises a two-lane, two-span concrete cast-in-place structure with an unpaved concrete travel surface.

Bridge rehabilitation or reconstruction may be required in the future. We understand that at the present time, it is anticipated that the bridge may be rehabilitated; however, if replacement is required the proposed bridge is expected to be a multi-span, integral or semi-integral abutment structure and will be founded on pile foundations.

The purpose of this investigation was to determine the general subsoil and groundwater conditions at the site by putting down two (2) boreholes and based on an assessment of the factual borehole data provide an engineering report containing geotechnical recommendations pertinent to the proposed construction.

Specifically, recommendations and/or comments regarding foundation types, pile capacities, geotechnical resistances, groundwater conditions, excavation and backfill, scour protection, seismic site classification, and pavement construction are provided.

The comments and recommendations given in this report assume that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations or the requirement of additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description

The existing concrete bridge is located along 5th Line within a rural area in the municipality of Essa Township, Ontario. The two-span bridge spans the Nottawasaga River, approximately 1.2 km south of Side Road 25. The site area generally slopes from the south to north. The Nottawasaga River meanders from the south, draining into Georgian Bay at Wasaga Beach.

A site location plan is presented as Drawing 1 in Appendix B.

3. Procedure

The fieldwork was undertaken on October 11 and 12, 2017. At that time two boreholes were advanced by a specialist drilling subcontractor to depths of 27.8 m and 31.0 m using continuous flight augers. Samples were retrieved at regular intervals with a split barrel sampler driven in accordance with the standard penetration test procedures.

Water level observations were made in the open boreholes during and at the completion of the drilling operations, and in a piezometer installed in one of the boreholes.

The fieldwork was supervised on a full-time basis by a field technician from **EXP** Services Inc. (**EXP**) engineering staff who directed the drilling and sampling operation, logged borehole data, and retrieved soil samples for subsequent examination and testing.

In the laboratory, all samples were examined by the project engineer and then tested for moisture content and natural unit weight. One sample was subjected to a plasticity index test (Atterberg Limits). The results of the laboratory testing are presented on the borehole logs, Drawings 2 and 3.

4. Subsurface Conditions

The borehole locations are shown on Drawing 1 and detailed subsurface conditions are presented on the borehole logs, Drawings 2 and 3. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change.

The "Notes on Sample Descriptions" preceding the borehole logs form an integral part and should be read in conjunction with this report.

Beneath pavement structure the site is underlain by fill and then clayey silt which overlies compact to dense silty sand to silty sand till, over shale bedrock. The following is a brief description of the subsurface conditions encountered during the investigation:

4.1. Subsoils

4.1.1. Pavement Structure

The existing pavement structure in comprised of 100 mm asphaltic concrete and approximately 0.6 m to 1.3 m of pavement granular fill. The pavement granular fill consisted of gravelly sand, with a trace to some silt.

Laboratory testing performed on selected samples consisted of moisture content testing. The test results are as follows:

Moisture content:

- 3% to 8%.

4.1.2. Fill: Sand and Silt to Clayey Silt

Beneath the granular road base in Borehole 2, a thick layer of fill was encountered, extending from 0.7 m to about 3.7 m depth. The fill layer comprised sand and silt in upper levels grading to clayey silt below about 1.5 m depth. The fill was dark brown to brown and contained random debris.

SPT “N” values of 6 and 20 blows were obtained in the fill corresponding to a loose to compact condition.

Laboratory testing performed on selected samples consisted of moisture content testing. The test results are as follows:

Moisture content:

- 12% to 65% of dry mass.

4.1.3. Upper Silt / Sand and Silt

A native silt / sand and silt layer was encountered directly below the fill at depth of 0.9 m and 3.7 m below ground level extending to a depth of 5.5 m and 4.5 m below ground level in Boreholes 1 and 2, respectively. This layer contained trace topsoil inclusions.

SPT "N" values of 3 to 10 blows per 300 mm were obtained corresponding to a very loose to compact, but generally loose compactness condition.

Laboratory testing performed on selected samples consisted of moisture content determinations. The test results are as follows:

Moisture content:

- 12% to 25% of dry mass.

4.1.4. Silty Clay

A native silty clay layer was encountered below the silt in Borehole 1, extending to a depth of 12.5 m below ground level. The explored thickness of this deposit was approximately 7.0 m. This layer was brown and generally of low plasticity. This stratum was absent in Borehole 2.

SPT "N" values of 3 to 6 were obtained, corresponding to a soft to firm consistency.

Laboratory testing performed on retrieved samples consisted of moisture content, Atterberg limits and grain size Testingtesting. The test results are as follows:

Moisture content:

- 25% to 42% of dry mass.

Atterberg limits:

- Liquid Limit: 41%
- Plasticity Index: 21%

Grain Size Analysis:

- Sand: 1%
- Silt: 31%
- Clay: 68%

4.1.5. Upper Sand

Sand was encountered beneath the sand and silt layer in Borehole 2, extending to 14.9 m below ground level. This layer was brown in upper levels becoming grey below approximately 6 m depth and a trace to some of silt.

SPT "N" values of 6 to 58 blows per 300 mm were obtained corresponding to a loose to very dense compactness condition. The sand became dense to very dense below approximately 10.5 m depth.

Laboratory testing performed on the soil samples consisted of moisture content determinations and a grain size analysis. The test results are as follows:

Moisture content:

- 14% to 23% of dry mass.

Grain Size Analysis:

- Sand: 93%
- Silt: 7%

4.1.6. Silty Sand Till

Beneath the silty clay in Borehole 1 and the upper sand layer in Borehole 2, a silty sand till was encountered at depths of 12.5 m and 14.9 m below ground level extending to depths of 20.1 m and 26.1 m, respectively. The explored thickness of this deposit was between 7.6 m and 11.2 m, respectively. This layered deposit was generally grey in colour and contained trace to some gravel and trace clay. Although none were encountered, cobbles and boulders should always be anticipated within glacial till deposits due to their mode of deposition.

SPT “N” values of 14 to greater than 100 blows for 300 mm penetration of the SPT spoon were obtained corresponding to a compact to very dense, but generally a very dense compactness condition.

Laboratory testing performed on all samples consisted of moisture content determinations. The test results are as follows:

Moisture content:

- 7% to 17% of dry mass.

Grain Size Analysis:

- Gravel: 17%
- Sand: 58%
- Silt: 25%

4.1.7. Gravelly Sand Till

Beneath the silty sand till in Borehole 1 a thin layer of gravelly sand till was encountered from an estimated 20.1 m to 23.0 m below ground level. This deposit was grey in colour contained some silt. Although none were encountered, cobbles and boulders should always be anticipated within glacial till deposits due to their mode of deposition.

An SPT “N” value of 33 blows for 300 mm penetration of the SPT spoon indicates a compact condition.

Laboratory testing performed on the sample consisted of a moisture content determination. The test result was as follows:

Moisture content:

- 13% of dry mass.

4.1.8. Silt to Clayey Silt

Beneath the gravelly sand till in Borehole 1 layers of silt to clayey silt were encountered from an estimated 23.0 m to the termination depth of the borehole at 31.0 m below ground level. The strata were found to be grey in colour contained traces of sand.

SPT "N" values of 97 to 70 blows for 100 mm penetration of the SPT spoon were obtained corresponding to a very dense compactness or a hard consistency.

Laboratory testing performed on all samples consisted of moisture content determinations. The test results are as follows:

Moisture content:

- 17% to 23% of dry mass.

4.1.9. Lower Sand

Sand was encountered beneath the silty sand till layer in Borehole 2, extending from 26.1 m to the termination depth of the borehole at 27.8 m below ground level. This layer was grey contained traces of silt.

An SPT "N" value of 131 blows for 220 mm penetration of the SPT spoon indicates a very dense compactness condition.

Laboratory testing performed on the sample consisted of a moisture content determination. The test result was as follows:

Moisture content:

- 16% of dry mass.

4.2. Groundwater Conditions

Groundwater levels were observed in the exploratory boreholes and one observation well during the investigation and after completion of the boreholes.

A summary of the groundwater levels observed during and after the investigations is presented in Table 1 and on the Record of Borehole Sheets in Appendix D.

Table 1. Summary of observed groundwater levels

BH No.	Ground Surface Elev. (m)	Depth/ Elevation of Tip of Piezometer (m)	Water Level Measurement Depth/ Elevation (m)	Date
1	194.58	N/A	6.94 / 187.64	November 25, 2017[1]
2	193.39	9.1 / 184.3	6.7 / 186.69	November 25, 2017 (after 44 days)

These data were reviewed and **exp**'s interpretation of them is discussed in the design section of the report. It should be noted that fluctuations in the level of the groundwater may occur due to seasonal variations, (precipitation, snowmelt, rainfall, tides), local soil permeability, construction/remediation activities, and other factors not evident at the time of measurement.'

[1] Water level measured in monitoring well, installed by others approximately 6 m north of Borehole 1.

5. Discussion and Recommendations

5.1. General

The existing structure comprises a two-lane, two-span concrete cast-in-place structure with an unpaved concrete travel surface.

Bridge rehabilitation or reconstruction may be required in the future. We understand that at the present time, it is anticipated that the bridge may be rehabilitated; however, if replacement is required the proposed bridge is expected to be a multi-span, integral or semi-integral abutment structure and will be founded on pile foundations.

If the bridge is to be rehabilitated, depending on the final program, then the existing foundations for the mid-span pier and abutments can be utilized. Our recommendations are therefore limited to replacement of the bridge. We can only provide general recommendations, as the final design details are not available.

The terms of reference for this project were specified by the client as follows:

- geotechnical design recommendations addressing:
  - foundation requirements including pile capacities and/or bearing capacities,
  - groundwater levels and anticipated dewatering requirements,
  - excavation, backfill and compaction requirements including temporary shoring
  - recommendations,
  - scour protection,
  - pavement design recommendations including GBE (granular base equivalency)
  - and required depth of granular and asphalt,
  - any settlement concerns associated with changes (increase) in road grade,
  - any concerns/issues with off-site disposal of excess native soil,
  - any other geotechnical constraints and construction issues,
- geotechnical design parameters including soil unit weights, effective friction angles, lateral earth pressure coefficients, and horizontal soil subgrade modulus (for integral abutment option)

5.2. Foundations

Until the bridge replacement design is completed, we can only provide general comments and recommendations. For the design of new foundations in the water course, boreholes will have to be drilled at the new pier location in the river. (Note that the MTO will not allow any borehole information that is more than 10 m away from the foundation locations to be used for design purposes.)

Several foundation options for support of abutments were analysed in this report including spread footings and driven piles. Because of the presence of soft silty clay soil layers, the use of spread footings to support the abutments on the north side may be problematic as this type of foundation would be susceptible to unacceptable total (and differential) settlement.

The sub-soil conditions are suitable for integral abutments founded on deep foundations subject to the implementation of the specific development recommendations provided in the following sections.

Steel H-piles driven to refusal within the lower deposits of very dense/hard sand to clayey silt can be used to provide foundation support for abutments and piers. Steel piles have advantages as they can be driven into a relatively strong (dense) stratum offering relatively high carrying capacity, can be readily lengthened or cut to size, and they can be relatively roughly handled during delivery with little hazard of damage.

It should be noted that deposits of soft to stiff silty clay were encountered overlying the deep foundation founding strata.

Slopes with 2H:1V are proposed to be used for the approach embankments and as forward slope the abutments for this bridge.

Water level readings were made in the exploratory borings and observation wells at the times and under the conditions stated. Ground water levels were recorded in standpipe piezometers at depths corresponding to between Elevation 186.69 m and 187.67 m.

5.2.1. Deep Foundations

The design parameters given in Table 2 are suggested for the purpose of the CHBDC/CSA S6.06. The table also provides the recommended pile tip elevations for estimating the pile lengths. Derived soil resistance within the potential scour depth has been ignored when calculating the design factored resistance due to unknown scour depth.

For steel piles the driving stress shall not exceed 90 percent of the yield point of the pile material.

The pile capacity is based on a minimum spacing of three pile diameters. If the pile spacing is less than three diameters, pile group efficiency can be calculated as follows (Converse-Labarre Formula):

$$Eg = 1 - (\theta (n-1) m + (m-1) n)/90 m n$$

Where: m=number of columns of piles in a group
n= number of rows
$\theta = \tan^{-1}(d/s)$ in degrees
d = diameter of pile
s = spacing of piles center to center

Table 2. Summary of recommended deep foundations

Foundation Unit	Relevant Borehole	Estimated Tip Elevation[1] (m)	Approximate Design Pile Length (m)	Factored Axial Geotechnical Resistance at ULS (kN/pile)[2]		Axial Geotechnical Resistance at SLS (kN/pile)[2,3]		Pile Founding Stratum
				HP 310 x 79	HP 310 x 110	HP 310 x 79	HP 310 x 110	
North Abutment	1	~167.0	27.5	1,300	1,600	1,100	1,400	very dense '100-blow' Sand/ Silty Sand
South Abutment	2	~168.9	24.5	1,300	1,800	1,100	1,600	

Notes:
(1) based on cut off Elev. as per Nash Road & Black Creek Overpass at East Durham Link Drawings.
(2) values as per MTO structural office policy memo 98-01, 1998
(3) for ≤25mm total settlement.

5.2.2. Resistance to Lateral Loads

In integral abutments, the resistance to the lateral load will have to be derived from the soil in front of the vertical piles. The resistance to lateral load in front of a vertical pile may be calculated using subgrade reaction theory, Broms' Method where the coefficient of lateral subgrade reaction, K_h (MPa/m), is based on the following equations:

For noncohesive soils:

$K_h = n_h (z/d)$

For cohesive soils:

$K_h = 67 S_u/d$

Where:

K_h coefficient of horizontal subgrade reaction (MPa/m)

d pile diameter/ width (m)

n_h constant of horizontal subgrade reaction (MPa/m)

z depth below ground surface (m)

S_u Undrained Shear Strength (kPa)

As an alternative, the resistance to lateral load in front of a vertical pile may be calculated using the following geotechnical design parameters to determine a PY curve (Lateral deflection Vs resistance).

The following Tables 3 and 4 present the estimated soil properties and their geotechnical parameters for the two abutments. The data presented in the tables can be used for lateral load analyses using the L-pile software or equivalent.

The notations (other than those explained above) used in the table are defined below:

N_{SPT}	Standard Penetration Test, N-value
γ	bulk unit weight (kN/m^3)
ϕ	internal friction angle (deg)
δ	friction angle between steel pile and soils (deg)
ε_{50}	strain corresponding to 50% of the maximum principal stress difference
K_p	coefficient of passive earth pressure

Group action for lateral loading should be considered by Reese method using reduction factors on the single pile capacity depending on the geometry of the pile layout.

The reduction factors are as follows:

1. Reduction factors for the piles in a row.

$e = 1$ for $s/b \geq 3.75$

$e = 0.64\ (s/b)^{0.34}$ for $1 \leq s/b < 3.75$

2. Reduction factors for leading piles in a line

$e = 1$ for $s/b \geq 4.0$

$e = 0.7\ (s/b)^{0.26}$ for $1 \leq s/b < 4.0$

3. Reduction factors for trailing piles in a line

$e = 1$ for $s/b \geq 7.0$

$e = 0.48\ (s/b)^{0.38}$ for $1 \leq s/b < 7.0$

Table 3. Parameters for lateral load analyses North Abutment

Strata	Elevation (m)	Type of Soil	N_{SPT}	γ (kN/m^3)	c_u (kPa)	ϕ (^{o})	δ (^{o})	K_{py} (MN/m^3)		ε_{50}	n_h (MN/m^3)	K_p
								Static	Cyclic			
Engineered Fill	-	non-cohesive	-	21.0	-	30	14	15.0* 10.0**	15.0* 10.0**	-	8.0* 6.6**	3.0
Silt Soft to Firm	193.2 – 189.0	cohesive	3 - 5	19.0	25	-	11	8	-	0.02	-	1.0
Silty Clay Soft to Firm	.189.0 – 182.1	cohesive	3 - 6	18.0	30	-	24	15	-	0.015	-	1.0
Silty sand till Dense to Very Dense	182.1 – 174.5	non-cohesive	14 – 78	21.0	-	35	14	45	-	-	5.0	3.7
Gravelly Sand Till Dense	174.5 – 171.6	non-cohesive	33	22.0	-	38	22	60	-	-	12.5	4.2
Silt hard	171.6 – 168.8	cohesive	>50	20.0	150	-	11	300	120	0.004	-	1.0
Clayey Silt hard	168.8 – 163.6	cohesive	>50	21.0	200	-	14	500	200	0.005	-	1.0

Table 4. Parameters for lateral load analyses South Abutment

Strata	Elevation (m)	Type of Soil	N_{SPT}	γ (kN/m^3)	c_u (kPa)	ϕ (^{o})	δ (^{o})	K_{py} (MN/m^3)		ε_{50}	n_h (MN/m^3)	K_p
								Static	Cyclic			
Engineered Fill	-	non-cohesive	-	21.0	-	30	14	15.0* 10.0**	15.0* 10.0**	-	8.0* 6.6**	3.0
Sand and Silt Loose	189.7 – 188.9	non-cohesive	10	19.0	-	28	14	6.0	-	-	5.0	2.8
Sand, some silt Loose to Compact	188.9 – 178.5	non-cohesive	6 – 58	21.0	-	32	14	12.0	-	-	5.0	3.2
Silty sand till Very Dense	178.5 – 167.3	non-cohesive	33 – >50	22.0	-	36	14	15.0	-	-	10.0	3.9
Sand Very Dense	167.3 – 165.6	non-cohesive	>50	22.0	-	38	14	16.0	-	-	13.0	4.2

*Note: ** Below Groundwater*
** Above Groundwater*

5.2.3. Downdrag

The amount of relative settlement between soil and pile that is necessary to mobilize negative shaft resistance/ downdrag is more than 10 mm. Therefore, negative shaft resistance will occur on the pile shaft in each soil layer or portion of a soil layer with a settlement greater than 10 mm. On the basis of these assumptions, the maximum negative skin friction is approximately 20 kN (unfactored ULS) per H pile. The downdrag should be treated as an additional load to the piles.

Methods for reducing negative shaft resistance forces:

1. Reduce soil settlement
   Preconsolidation of compressible soils can be achieved by preloading and consolidating the soils prior to pile installation. Wick drains are often used in conjunction with preloading in order to shorten the time required for consolidation.
2. Use lightweight fill material
   Construct structural fills using lightweight fill material such as foam concrete, geofoam, blast furnace slag, expanded shales fill to reduce the downdrag loads.
3. Use a friction reducer
   Bitumen coating and plastic wrap are two methods commonly used to reduce the friction at the pile-soil interface. Bitumen coating should only be applied to the portion of the pile which will be embedded in the negative shaft resistance zone. The application of a bitumen coating can increase the cost per pile by 15 to 50% over the cost of an uncoated pile. Case studies have indicated that bitumen coated piles will reduce 85% of downdrag load (*Machan, Squier, 1983*) to 98% (*Walker, Darval, Le, 1973*)

5.2.4. Pile Installation

Piles should be installed in accordance with OPSS 903. The possibility of piles encountering potential cobbles and boulders in the till layers should be anticipated. In view of this, the piles should be stiffened as per OPSD 3000.100, Type I to minimize damage to the piles in anticipation of heavy driving conditions. The piles should incorporate pile flange reinforcement, or be fitted with a driving shoe section to offer some protection against buckling at the toe as the piles are driven through the glacial till deposits. Care must be taken to avoid overdriving and damaging the pile tip (i.e., the structural capacity of the piles should not be exceeded).

Prior to driving piles, a wave equation (WEAP) analysis should be performed in order to assess the driving stresses and the anticipated penetration resistance required to develop the required pile capacity. This analysis considers the complete driving system. The piles should be driven to adequate set cognizant of the pile driving equipment chosen for the particular piles. Development of the design capacity will depend on the chosen pile dimensions and driving techniques. Accordingly, a pile hammer will be required that can develop sufficient energy to efficiently drive the piles to the requisite driving resistance compatible with the design loads, yet limit the input energy so as not to overstress the pile during driving. For the conditions at this site, piles shall be driven with an approved hammer with a manufacturer's maximum rated potential energy of not less than

95 kJ (70,000 ft-lbs) per hammer blow and measured energy >50 kJ. The final driving resistance required to achieve the design load can be determined by the Pile Driving Analyzer. Dynamic testing (PDA testing) on a number of piles with the Pile Driving Analyser must be performed near the beginning of the pile driving phase of construction to confirm the pile capacities. Alternatively, static load tests can be performed, although these are typically much more difficult to set up and are costlier.

In addition, all piles should be visually monitored by experienced personnel during installation to check for plumbness, set, damage, etc. All damaged piles should be rejected and if the damage is considered to be minor, the pile can be dynamically tested to determine the available pile capacity.

Piles in groups should be spaced no closer than 3 effective pile diameters. All piles in a group should be checked for heaving during the driving of the adjacent piles.

Given the nature of founding materials at this site (very dense silty glacial tills below the GWT), relaxation after initial pile driving is possible. In the field, a number of piles should be monitored with the Pile Driving Analyzer for the end of initial driving and restrike conditions to check for relaxation as well as to confirm the ultimate bearing capacity of the piles. Ten percent of the piles, but no fewer than three per site should be tested to confirm that pile capacities have been achieved. If the termination levels of adjacent piles penetrate deeper than a 3 horizontal to 2 vertical line drawn down from the toe of the previously driven higher piles, the higher piles should be redriven to the established penetration resistance. During the driving of piles in a group, the vertical elevation of the piles should be monitored. If more than 5 mm of heaving occurs during the driving of adjacent piles, the heaved piles should be redriven to the established penetration resistance. Additionally, selected piles should be restruck to check for relaxation. The actual amount of restriking could vary from 10% or a minimum of 2 piles at the site, to in excess of 100% of the piles depending on the presence or absence of relaxation conditions (some piles may have to be restruck more than once). In conditions where some relaxation is expected or is observed, an alternative approach is to overdrive piles (without inducing damage) to a set such that the final set after relaxation meets the established penetration resistance. This would reduce the need for restriking at locations where relaxation might occur, provided that a test program is carried out to determine the driving requirements.

Wherever practical, embankments should be constructed first, before installing piles and other foundation elements in accordance with OPSS 903. If not practical due to construction sequence issues, negative skin friction/drag load must be treated as an additional load to the piles. This is particularly important where significant consolidation settlements are anticipated based on the geometry and subsoil conditions. With this sequencing, some consolidation will occur before pile installation, thereby mitigating issues related to differential settlements at the approaches and down drag on the piles. It will also permit better compaction conditions for embankment materials in the area of the piles.

The specific period of delay between the two events that would be required to reduce the continuing movements to levels acceptable for service and/or permit the ignoring of negative skin friction issues, must be assessed on a case by case basis. For those construction conditions where the piles are installed prior to embankment construction, the requirements for reducing post construction

settlements of the embankment to acceptable levels and accommodation of down drag on the piles must be assessed and included in the design and construction. This includes such measures as the need for preloads and surcharges and/or wick drains and associated instrumentation and monitoring, as well as specific delays of final paving.

5.2.5. Seismic and Liquefaction Potential Consideration

The potential for seismic loading must be considered for design of abutment in accordance with Section 4.4.5 of the CHDBC. The subsoil and groundwater information at this site have been examined in relation to Section 4.4.3.2 of the CHDBC.

From the NBCC seismic calculation, the damped reference spectral accelerations for the project site are Sa(0.2)=0.033g, Sa(0.5)=0.048g, Sa(1.0)=0.021g, Sa(2.0)=0.009g and the reference peak ground acceleration (PGA) is 0.027g (g=acceleration due to gravity -9.81 m/s2). These values are associated with an earthquake having 10 percent probability of exceedance in a 50-year period, or 0.0021 per annum probability of occurrence for the 2015 NBCC Soil Class “C” (very dense soil and soft rock).

The weighted average of SPT is approximately 35 to 49, which can be classified as Site Class D. Therefore, the ground accelerations calculated above need to be adjusted to the site specific conditions as described by Finn and Wightman (2003). Hence, from the 2015 NBCC, the respective short- and long- period amplification factors Fa and Fv for Site Class “D” are 1.30 and 1.40, respectively. Based on these factors and reference spectral accelerations given above for Site Class “D”, the specific-site spectral accelerations for this project are adjusted to: Sa(0.2)=0.043g, Sa(0.5)=0.062g, Sa(1.0)=0.027g, Sa(2.0)=0.011g and PGA=0.037g.

Seismic characterization of the site must be compliant with the Canadian Highway Bridge Design Code CHBDC (CAN/CSA-S6-06). The potential for seismic loading must be considered for design of abutments in accordance with Section 4.4 of the CHDBC. With respect to soil conditions encountered at the site, the borehole information shows the presence of soft to stiff clay soils along with cohesionless soils that have very dense state of compactness. Such conditions fall into the category defined in Section 4.4.6.3 which is a Soil Profile Type III. From Table 4.4, the equivalent Site Coefficient “S” is 1.5.

Liquefiable soils typically consist of cohesionless sands and silts that are loose to very loose, and saturated. Fine grained soils (Silt & Clay) which are not highly sensitive do not liquefy because surface tension holds the water-coated flakes together, and therefore the fine grained soils are not at risk to densification by shaking.

According to the Guidelines for Analyzing and Mitigating Liquefaction in California, prepared by University of California, Seed and Idriss stated that “clayey soils” (i.e. plots above the A-line on the plastic chart) could be susceptible to liquefaction only if all three of the following conditions are met: (1) percentage of particles less than 0.005 mm is less than15%, (2) Liquid Limit is less than 35, and (3) Moisture Content/Liquid Limit is less than 0.9. The Liquid Limit is more than 35 and the percent finer than 0.005 mm for the clayey soil at this site is reported to be about 29 %, which is higher than 15%.

Using the Guidelines for Analyzing and Mitigating Liquefaction in California, (Seed and Idriss)[1] for liquefaction susceptibility of fine grained soil layers, and the consistency and index properties of the silty clay/clayey silt, it was found that fine grained soils at this site are not considered to be susceptible to liquefaction. Based on soils and groundwater condition encountered, no liquefaction is expected due to the ground motion from an earthquake magnitude 7.0 or lower seismic events.

5.3. Other Considerations

5.3.1. Static Lateral Earth Pressure on Structures

The abutment stems, and temporary shoring that may be required for excavation should be designed to resist lateral earth pressure. Where the abutment stems can be drained effectively to eliminate hydrostatic pressure on the walls, earth pressures equation can be simplified in accordance with the CHDBC.

The expression for calculating lateral earth pressure is given by:

$P = K(\gamma h + q)$ for non-braced cut, or $K\ (0.65\gamma H + q)$ for braced support

where P = earth pressure intensity at depth h, kPa

K = earth pressure coefficient

γ = unit weight of retained soil, kN/m^3

q = surcharge near wall, kPa

h = depth to point of interest, m

H = Total depth of excavation, m

The mobilization of full active or passive resistance requires a measurable and perhaps significant wall movement or rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure should be used in design.

The effect of compaction surcharge should be taken into account in the calculations of active and at- rest earth pressures. The lateral pressure due to compaction should be taken as at least 12 kPa at the surface, and its magnitude should be assumed to diminish linearly with depth to zero at the depth where the active (or at rest) pressure is equal to 12 kPa. This pressure distribution should be added to the calculated active (or at rest) pressure. Notwithstanding, lighter compaction equipment and smaller lifts should be used adjacent to walls to prevent overstressing.

For design purposes, the unfactored static earth pressure parameters given in Table 5 can be used (assuming wall friction is neglected, the back wall is vertical and the ground surface is horizontal both on the retained side as well as in front of the toe):

Table 5. Material types and unfactored earth pressure properties under static conditions

Material	Unfactored Friction Angle ϕ' (^{o})	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Coefficient of Earth Pressure at Rest (K_o)	Unit Weight γ (kN/m^3)
Compacted Granular A or Granular B Type II	35	0.27	3.69	0.43	22.0
Compacted Granular B Type I	32	0.31	3.25	0.47	21.0

5.3.2. Site Preparation

Prior to embankment construction, all organic spots (topsoil, peat, organic soils, etc), and any loose silty sand/sandy silt loose spots below the footprint of the proposed embankments require to be excavated and replaced with clean and compactible soils with minimum 95% of Standard Proctor Maximum Dry Density (SPMDD).

Considering the findings at the Structure site, the anticipated stripping depths/elevations at the borehole locations are as follows:

Table 18. Recommended stripping depths at borehole locations

Borehole No.	Existing Ground Elevation at Borehole Location (m)	Recommended Stripping Depth/ Elevation (m)
BH-1	194.58	1.38/193.2
BH-2	193.39	3.69/189.7

After stripping, the exposed subgrade should be inspected, approved and properly compacted (i.e. proof rolled) from the surface, using a heavy compactor. If necessary, the groundwater table should be lowered to at least 0.5 m below the subgrade level, before any proof rolling and the application of significant compaction effort. The interpretation of groundwater levels has been discussed in a preceding section noting also the potential for seasonal fluctuations.

5.3.3. Excavation

All excavations must be carried out in accordance with the latest edition of the Ontario Occupational Health and Safety (OHSA) and good construction practice. The native soils which should be excavated for construction of the abutments and embankment are considered as Type 3 soils above the groundwater table and Type 4 soils below the groundwater table. Temporary excavations (i.e. those that are open only for a short period) above the groundwater table may be made with side slopes not steeper than about 1H:1V, while the temporary slopes below the groundwater table have to be formed at 3H:1V unless a suitable temporary shoring system such as sheet pile wall should be installed.

5.3.4. Temporary Shoring

Temporary excavation support systems, if any, should be designed and constructed in accordance with OPSS.PROV 539. The lateral movement of the temporary shoring system should meet Performance Level 2 as specified in OPSS.PROV 539.

5.3.5. Dewatering

As noted, based on an assessment of the water levels observed in the borings/ piezometers and the subsurface conditions, groundwater is interpreted to be near Elev. 187.67 m at the north abutment and Elev. 186.69 m at the south abutment, at the time of the investigation.

Note that filtered sumps must be designed such that construction drainage water containing eroded soils and fines does not flow into the creek.

Dewatering requirements will be impacted by water levels in the creek at the time of construction activities. Dewatering shall be carried out in accordance with OPSS 517 and OPSS 518. A suitable dewatering system based on the time of construction, water levels and river flow conditions for prior approval should be applied. The method used should not undermine any existing road embankments or adjacent side slopes. In this connection, the provision of toe protection at side slopes during drawdown may be required to minimize sloughing and undercutting during dewatering.

Sheet piled cofferdams may be required at the middle foundation locations due to removal of loose and very loose soils, as a form of groundwater control. The depth of sheet pile penetration should be such that the risk of piping adjacent to the sheet piles be minimized. Pumping inside the cofferdams will be required to maintain a dry base to facilitate pile cap/ foundation construction.

An MOE permit to take water (PTTW) may be required for this site as the groundwater pumping rate may exceed 50,000 liters/ day during the construction period. This is contingent on the conditions at the time of construction and measures for effective diversion of water flow in the stream or cutoff flow via a cofferdam constructed upstream of the works area. Re-evaluation at the time of construction is recommended.

Open cut excavations can be carried out. All open unsupported excavations should be carried out in accordance with the requirements of Occupational Health and Safety Act (OSHA). For the purpose of the Act, the existing topsoil and the native silty sand/ sandy silt above groundwater table are classified as Type 3 soils, and all soils below groundwater table are classified as Type 4 soils. OSHA suggests that Type 4 soils can be excavated to 3H:1V, but even at this flat angle, seepage pressure could cause caving and unstable ground condition. To maintain the stability of open cut, the groundwater level will have to be temporarily draw down, possibly using deep sumps, wells or well points. The groundwater should be maintained at least 0.5 m below the lowest level of excavation throughout sub-structure construction.

The design of unwatering systems for the excavations is responsibility of the Contractor who is expected to retain dewatering specialists for this task to address conditions at the time of the work.

5.3.6. Frost Protection

Ontario Provincial Standard Drawing (OPSD) 3090.101 indicates that the frost penetration for the area is 1.6 m. Therefore, all foundation elements should be provided with a minimum of 1.6 m of earth cover for frost protection. The equivalent protection could be provided by using polystyrene as suggested by the "Canadian Foundation Engineering Manual 2006, Section 13.5.2. page 196". It is usually accepted that 25 mm of polystyrene provides a protection which is equivalent to 300 mm of soil.

5.3.7. The Abutment Stems Construction

The following recommendations are made concerning the abutment stems in accordance with the CHBDC:

- Select free-draining granular fill meeting the specifications of OPSS Granular 'A' or Granular 'B' Type II but with less than 5 percent passing the No. 200 sieve should be used as backfill behind the wall. This fill should be compacted in accordance with OPSS 51.
- Longitudinal drains and weep holes should be installed to provide positive drainage of the granular backfill. Other aspects of the granular backfill requirements with respect to sub drains and frost tapers should be in accordance with OPSD 3101.150, 3190.100, and 3121.150. The outlets for these sub drains should not be subject to freezing or flooding.
- Care must be taken during the compaction operation not to overstress the wall. Heavy construction equipment should be maintained at a distance of 1.0 meter away from walls where the backfill soils are being placed. Hand-operated compaction equipment should be used to compact backfill soils within a 1.0 meter zone adjacent to the walls. Other surcharge should be accounted for in the design, as required.
- The granular fill may be placed in a zone with width equal to 1.6 m behind the back of the abutment stem (Case (a) on Figure C6.20 of the Commentary to the CHBDC) with a frost taper should be included as per OPSD 3101.150 or within the wedge shaped zone defined by a line drawn at 1.5H:1V extending up and back from the rear face of the footing (Case (b) on Figure C6.20 of Commentary to the CHBDC). As an alternative OPSD 3101.150 standard drawing can be used.
- It is not recommended to re-use the silty clay fill and cobbles and boulders, since it is often subject to excessive frost action and swelling when used as wall backfill.

5.3.8. Scour

Foundation systems supporting bridge structures in flood plains, close to creeks, channels or rivers are very likely to be exposed to potentially harmful effects of stream flow, with particular concern during more significant storm events and where the river bed/ valley is set in erodible soils. The need for and nature of scour and erosion protection systems must be assessed and where required, must be designed, implemented and remain effective for the design life of the bridge. The potential for scour below pile caps, where structures are supported on deep foundations, must be incorporated into the design.

The proposed foundation design for this bridge over the Nottawasaga River incorporates pile foundations and requires such assessment and/or protection.

Foundations can be protected against structural undermining by locating the foundations at an appropriate depth, by providing riprap or rock protection and/or by using sheet piling. Sheet piling used for this purpose should be designed to accommodate the assessed scour depths. In some cases it may be possible to incorporate sheeting in temporary dewatering schemes. Typically, abutment front slopes and side slopes adjacent to the river require protection. Where riprap or rock protection is proposed conformance with OPSS 511 is required.

The scour design, nature and extent of the required protection is the responsibility of a qualified hydraulic design engineer experienced in this field. Pertinent geotechnical parameters to support this design have been provided in this report. Geotechnical soil parameters necessary for the scour analyses are: SPT N-value, in-situ moisture content, percent passing the No. 200 sieve (%200), mean grain size diameter (D50), liquid limit (LL), plastic limit (PL), and plasticity index (PI). These parameters are determined based on the soils encountered at the site during this investigation and are presented on the borehole logs attached in Appendix C and the graphs included in Appendix D. All tested soils were classified using the Unified Soil Classification System which can be used for evaluation.

Foundation recommendations outlined in this report assume that appropriate scour protection is used where required.

Bank Slopes

The design slope should not be steeper than 2H:1V. Further limits on side slope steepness may be imposed by slope instability, groundwater flows, or rapid water level recession and piping failure, all of which should be carefully considered in slope design.

Rock riprap revetments are normally continued to the top of the bank or to design water level, plus a freeboard, if the bank is not over topped. Freeboard is added to account for wave, runup, super elevation, profile irregularities, floating debris, ice and surface waves.

Toe

Toe Scour, along revetments, is thought to be the most common cause of failure. The following are commonly used to prevent undermining, as described below:

The slope is excavated and covered with rock riprap to below expected scour levels. This method is most permanent, but it may be uneconomical if the lower limit is deeply buried. Extensive disturbance of the stream bed is often strongly opposed by the environmental agencies and work should be executed with due consideration to directives from the environmental consultant.

A flexible “Launching apron” is laid horizontally on the bed at the foot of the revetment with a height of about 1.5 times the predicted revetment thickness. The intention is that when scour occurs, the apron will settle and cover the side of the scour hole on a natural slope.

A rock-filled toe trench or toe berm is constructed at the foot of the slope. This is a variant of the launching apron since the rock in the trench launches as scour develops. This method requires

encroachment into the river channel; however, a toe trench can be re-buried beneath native stream bed materials.

A sheetpile cut-off wall is installed from the toe of the revetment down to an in-erodible material or to below the expected scour depth.

5.3.9. Embankment Construction

Assuming properly compacted, acceptable inorganic earth fill materials are utilized 2H:1V side slopes can be used for the construction of the approach fills.

The materials used for the construction of the embankment fills should consist of approved, acceptable earth fill (e.g. Select Subgrade Materials - OPSS.PROV 1010).

The native sandy silt and silty sand is easy to disturbed during the rain or surface run off. The exposed slope surface should be cover with straw or plastic sheets as soon as the slope face is exposed. Care must be taken to properly compact the embankments to reduce settlements associated with fill density changes. Fill used for construction of the embankments should be in accordance with OPSS 212 and fill placement should meet or exceed the requirements of OPSS.PROV 206. Construction should be in accordance with OPSS.PROV 206. The fill should be placed in regular lifts with loose thickness not exceed 300 mm and compacted to at least 95%of SPMDD. The final lift of fill prior to placement of the roadway granular subbase and base courses should be compacted to 100% of SPMDD.

Quality assurance should be provided as per MTO standard 501.08 (OPSS.PROV 501). Inspection and field density should be carried out by qualified personnel during placement operations to ensure that appropriate materials are used and that adequate levels of compaction have been achieved.

To reduce surface erosion on the embankment side slopes, the prompt seed and cover (OPSS 804) or sodding (OPSS 803) should be carried out as soon as possible after construction of the embankment.

5.3.10. Winter Condition

In the event of construction during freezing temperatures, the foundation stratum should be protected from freezing by the use of loose straw, tarpaulins, propane heaters or other suitable means. In this regard, the base of the excavation should be insulated from sub-zero temperatures immediately upon exposure and until such time the footings are protected with sufficient soil cover to prevent freezing at the foundation level.

5.3.11. Obstructions

Cobbles and boulders were noted to be contained within the glacial till, therefore care must be taken during installation of piles (i.e. pile flange reinforcement or be fitted with a driving shoe, as explained in Section 7.2.4). These potential obstructions may also impact excavations and/or elements of temporary protection systems.

6. Closure

The recommendations made in this report are in accordance with our present understanding of the project and are provided solely for the team responsible for the design of the works described herein.

A subsurface investigation is a limited sampling of a site; the subsurface conditions have been established only at the test hole locations. Should conditions at the site be encountered which differ from those reported at the test locations, we require that we be notified immediately in order to assess this additional information and our recommendations, as appropriate. It may then be necessary to perform additional investigation and analysis.

Details of the limitations of this report are presented as Appendix A, "Limitations and Use of Report".

Yours truly,

EXP Services Inc.

Thein Aung, M. Sc., MASCE., FGS., P. Eng.
Senior Geotechnical Engineer
Geotechnical Division

LICENSED PROFESSIONAL ENGINEER
J.K. FARQUHARSON
13757018
2017-12-15
PROVINCE OF ONTARIO

James K. Farquharson, P. Eng.
Senior Engineer
Earth & Environment

Leigh H. Knegt, P. Eng.
Manager – Earth & Environment – Barrie

Encl

JKF/hal/I:\2003-Brampton\Projects\Geotechnical Engineering\0040000\BAR-00049317_EssaTownshipBridge\49317-A0GeoRep201-12-01.docx

Appendix A: Drawings
Borehole Location Plan
and Borehole Logs

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LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL

NOTES:
- PLAN PROVIDED BY SIMCOE COUNTY MAPPING

SCALE: NTS	TITLE: **BOREHOLE LOCATION PLAN**	FIGURE 1
DATE: NOV. 2017		
DRAWN: JF	PROJECT: **Geotechnical Investigation Bridge No. 9, Line 5, Essa, ON**	PROJECT NO. BAR-00049317-A0

Notes on Sample Descriptions and Soil Types Drawing 1A

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Trow also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETERS

CLAY (PLASTIC) TO SILT (NONPLASTIC)	FINE	MEDIUM	COARSE	FINE	COARSE
	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advice of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

4. Excerpt from "OHSA Regulations for Construction Projects," Part III, Section 226:

Soil Types

Type 1 Soil

a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;

b) has a low natural moisture content and a high degree of internal strength;

c) has no signs of water seepage; and

d) can be excavated only by mechanical equipment.

Type 2 Soil

a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;

b) has a low to medium natural moisture content and a medium degree of internal strength; and

c) has a damp appearance after it is excavated.

Type 3 Soil

a) is stiff to firm and compact to loose in consistency or is previously excavated soil;

b) exhibits signs of surface cracking;

c) exhibits signs of water seepage;

d) if it is dry, may run easily into a well-defined conical pile; and

e) has a low degree of internal strength.

Type 4 Soil

a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;

b) runs easily or flows, unless it is completely supported before excavating procedures;

c) has almost no internal strength;

d) is wet or muddy; and

e) exerts substantial fluid pressure on its supporting system. O. Reg. 213/91, s. 22

Log of Borehole BH 1

Project No. BAR-00049317-A0 Figure No. 2

Project: 5th Line - Nottawasaga River (Bridge No. 9) Sheet No. 1 of 3

City/ Municipality: Township of Essa

Location:

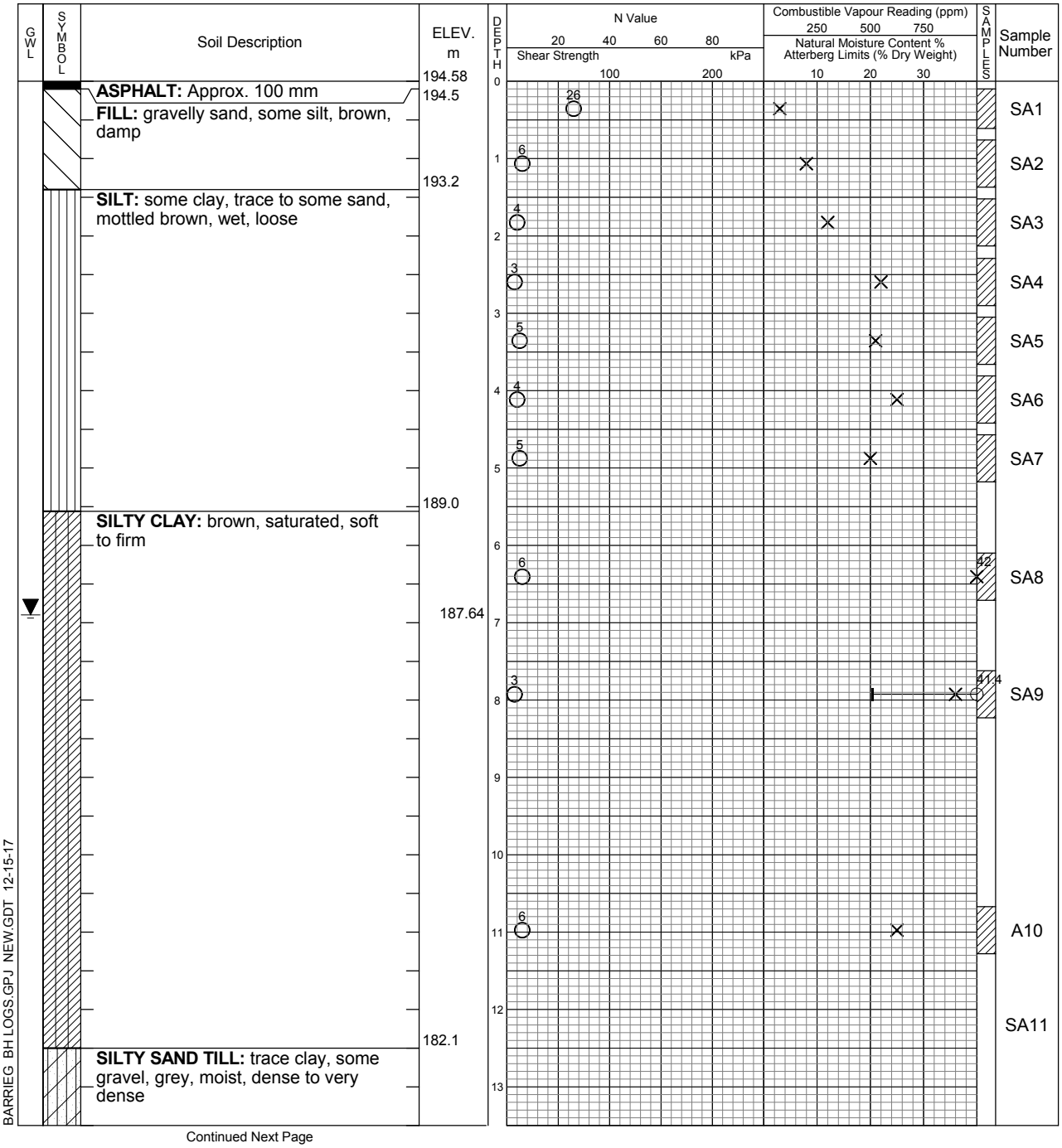
Date Drilled: October 11, 2017

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test S

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Continued Next Page

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Borehole data requires interpretation assistance from **Exp** before use by others.

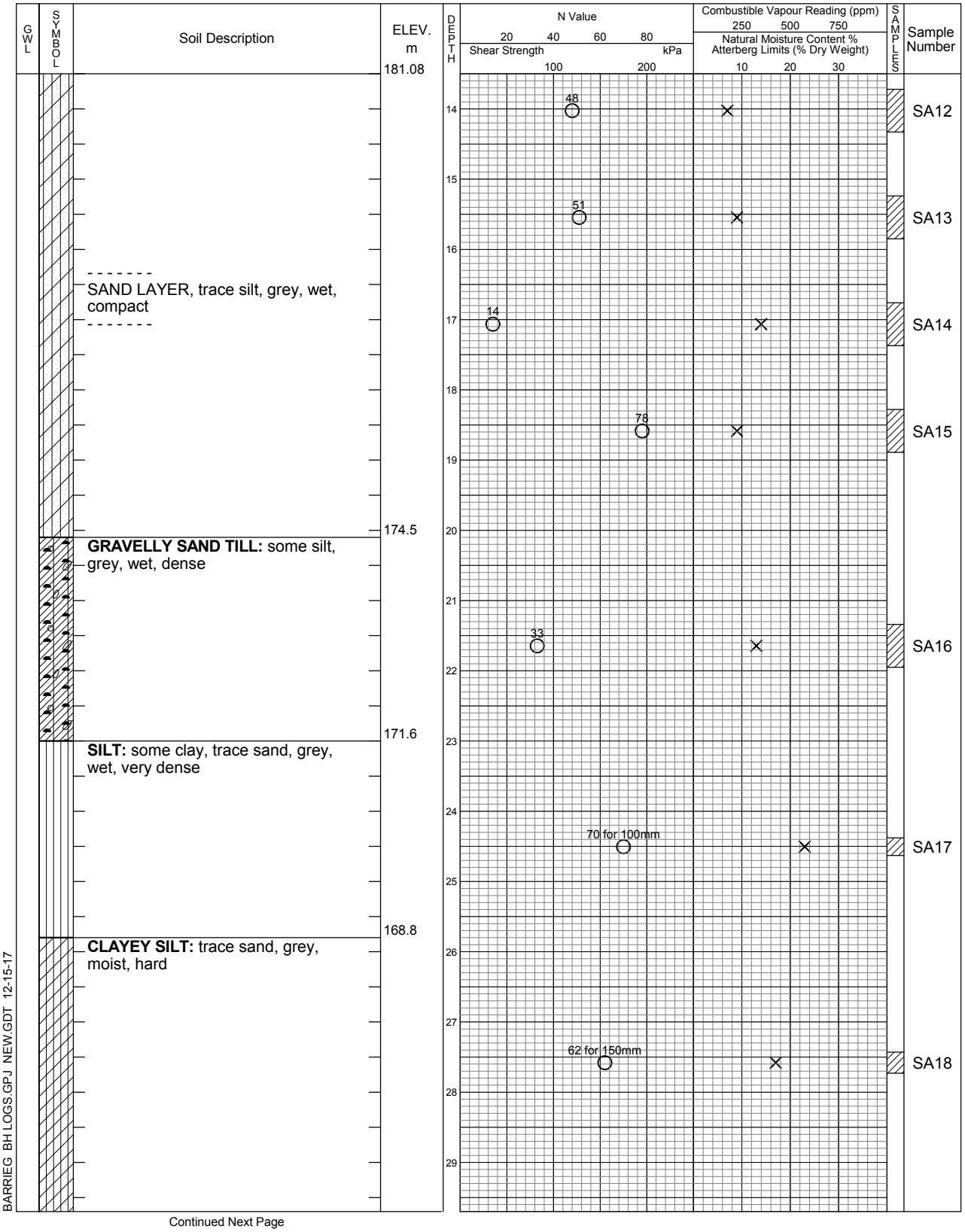
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
On completion	30	30

Log of Borehole BH 1

Project No. BAR-00049317-A0 Figure No. 2

Project: 5th Line - Nottawasaga River (Bridge No. 9) Sheet No. 2 of 3



BARRIEG BH LOGS.GPJ NEW.GDT 12-15-17

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See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
On completion	30	30

Log of Borehole BH 1

Project No. BAR-00049317-A0 Figure No. 2

Project: 5th Line - Nottawasaga River (Bridge No. 9) Sheet No. 3 of 3

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
			164.88		20 40 60 80 / 100 200	250 500 750 / 10 20 30		
				30				
					97			SA19
			163.6	31				
		End of Borehole Notes: 1. Borehole advanced to completion by a specialist drilling contractor under the direct supervision of a geotechnical technician from EXP. 2. Water level measured in monitoring well, installed by others, approximately 6 m north of borehole. 3. This drawing is to be read with the subject report and project number as presented above.						

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See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
On completion	30	30

Log of Borehole BH 2

Project No. BAR-00049317-A0 Figure No. 3

Project: 5th Line - Nottawasaga River (Bridge No. 9) Sheet No. 1 of 2

City/ Municipality: Township of Essa

Location:

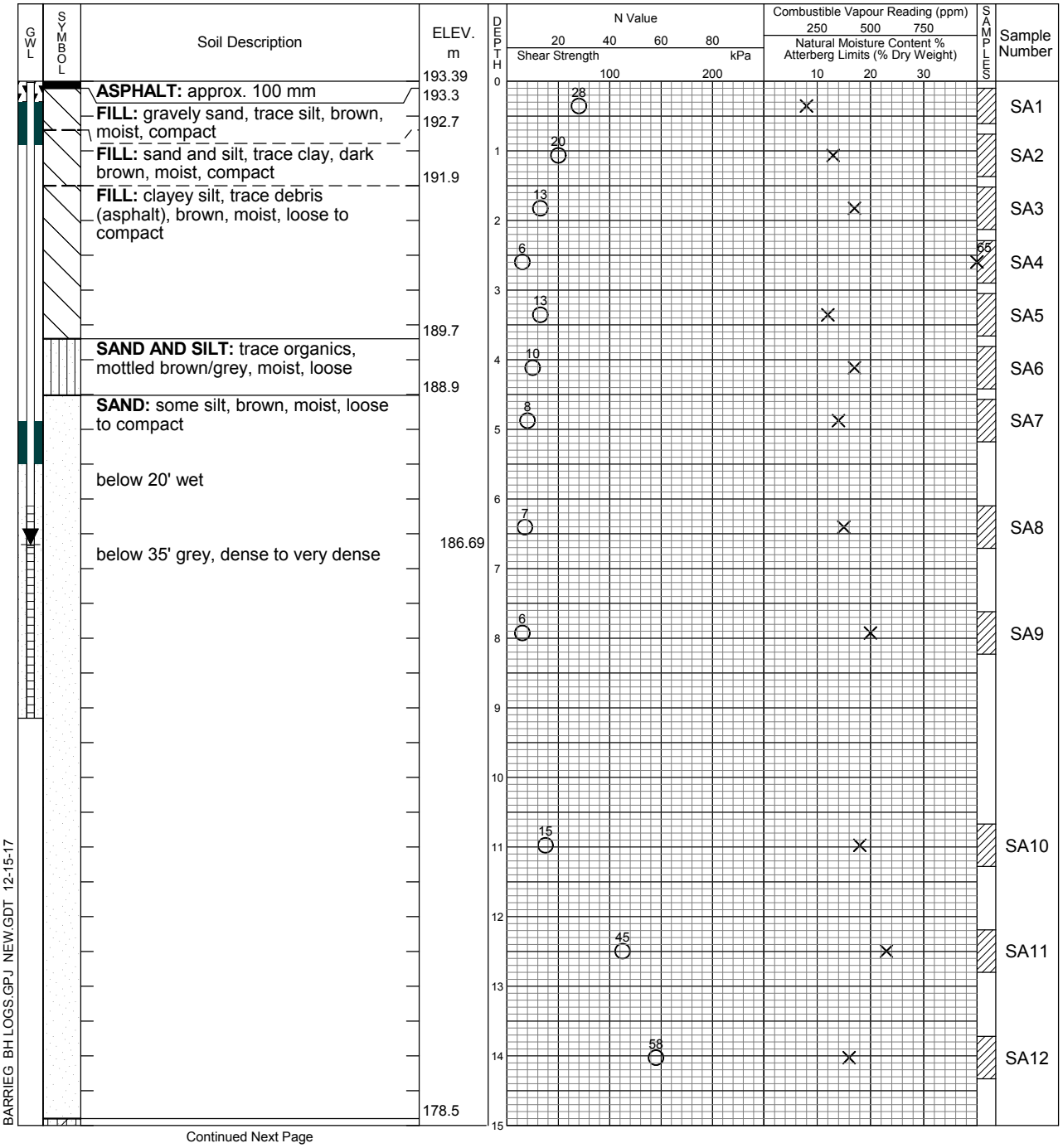
Date Drilled: October 12, 2017

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



BARRIEG BH LOGS.GPJ NEW.GDT 12-15-17

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Borehole data requires interpretation assistance from **Exp** before use by others.

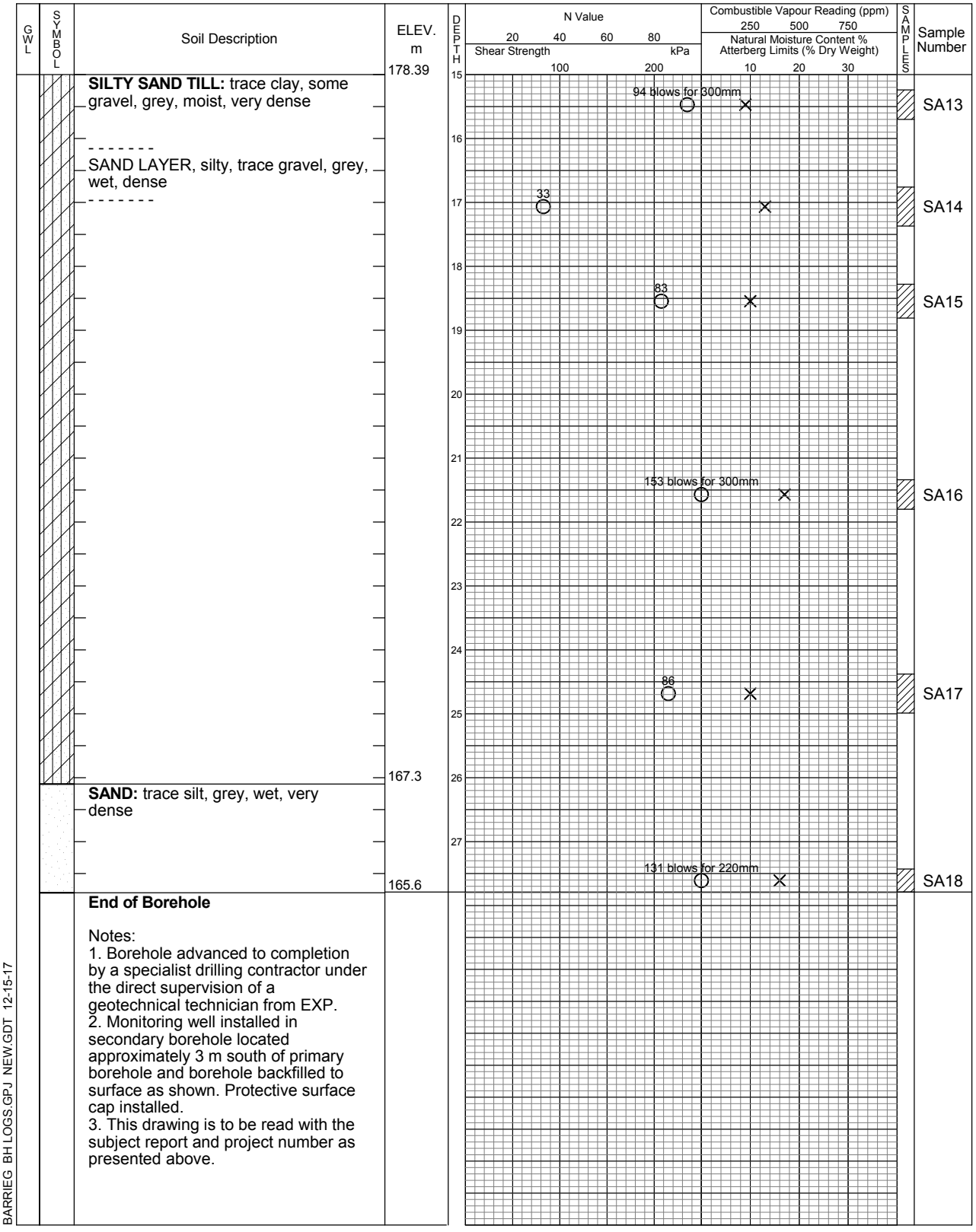
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
On completion	wet cave	21
29 days	6.63	piez.
44 days	6.70	piez.

Log of Borehole BH 2

Project No. BAR-00049317-A0 Figure No. 3

Project: 5th Line - Nottawasaga River (Bridge No. 9) Sheet No. 2 of 2



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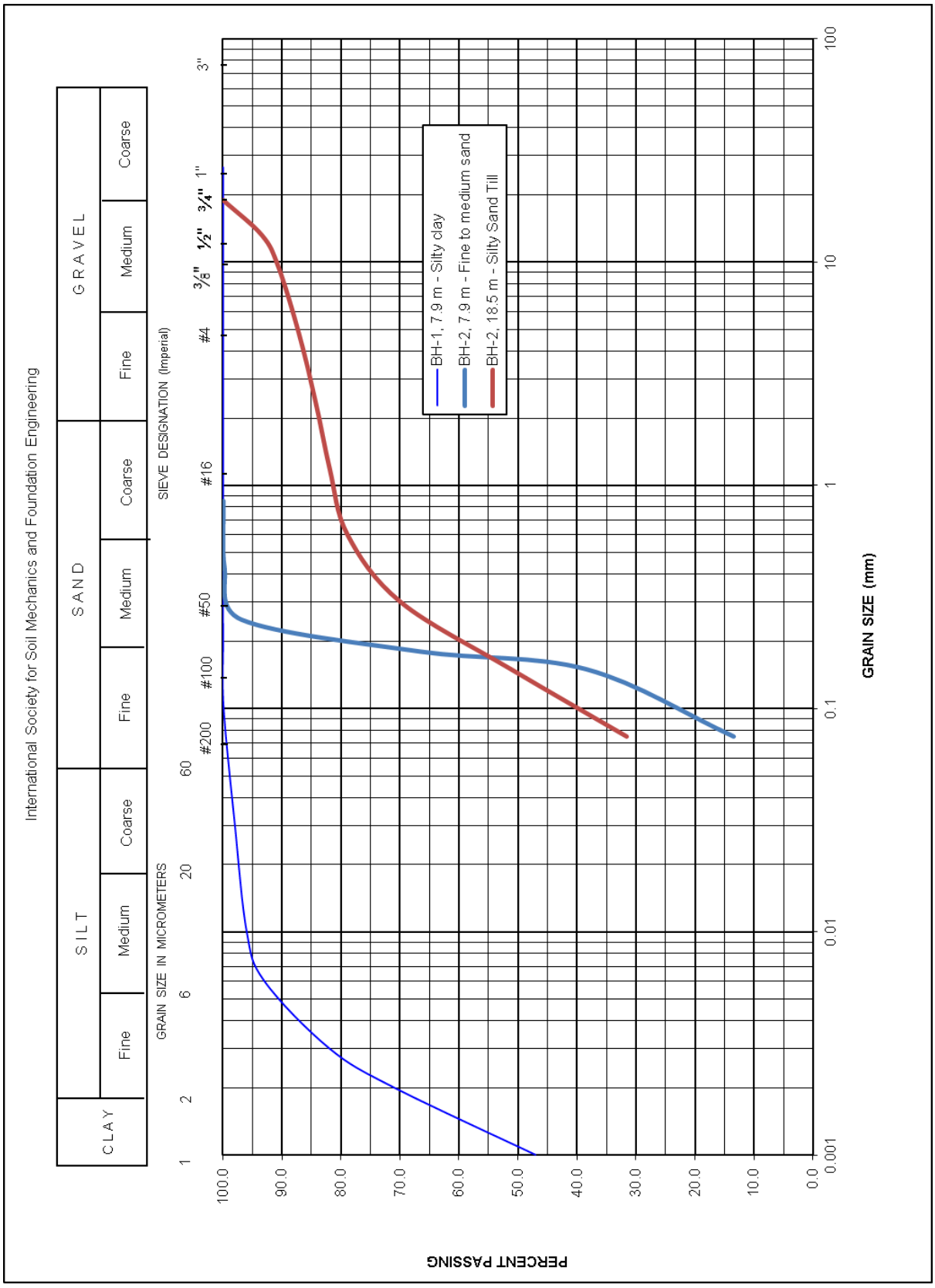
Borehole data requires interpretation assistance from **Exp** before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
On completion	wet cave	21
29 days	6.63	piez.
44 days	6.70	piez.

Appendix B: Laboratory Data


International Society for Soil Mechanics and Foundation Engineering
CLAY
SILT
Fine
Medium
Coarse
SAND
Fine
Medium
Coarse
GRAVEL
Fine
Medium
Coarse
GRAIN SIZE IN MICROMETERS
1
2
6
20
60
SIEVE DESIGNATION (Imperial)
#200
#100
#50
#16
#4
3/8"
1/2"
3/4"
1"
3"
PERCENT PASSING
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
GRAIN SIZE (mm)
100
10
1
0.1
0.01
0.001
BH-1, 7.9 m - Silty clay
BH-2, 7.9 m - Fine to medium sand
BH-2, 18.5 m - Silty Sand Till

Appendix E

Stage 1 Archaeological Assessment

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the 5th Line Bridge Improvements Municipal Class Environmental Assessment Within Parts of Lots 23-24, Concessions 4-5 and Road Allowance between Concessions 4 and 5 Township of Essa County of Simcoe Ontario

Project #: 091-ES6369-19
Licensee (#): Kassandra Aldridge (P439)
PIF#: P439-0137-2021

Original Report

February 11, 2021

Presented to:
Ainley & Associates Limited
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Prepared by:
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EXECUTIVE SUMMARY

Archeoworks Inc. was retained by *Ainley & Associates Limited* on behalf of the *Township of Essa* to conduct a Stage 1 Archaeological Assessment (AA) in support of the 5th Line Bridge Improvements Schedule 'C' Municipal Class Environmental Assessment (EA). The area under study encompasses parts of Lots 23 and 24 in Concessions 4 and 5, as well as the Road Allowance between Concessions 4 and 5, of the Geographic Township of Essa, County of Simcoe.

Stage 1 AA background research established potential for the recovery of archaeologically significant materials due to the presence of the Nottawasaga River and 5th Line being a historic road. While a desktop review of aerial and street view imagery determined that parts of the study area have low or no longer retain or archaeological potential due to steeply sloping terrain, permanently wet conditions or previous disturbance, portions in the north end will still require Stage 2 AA.

Based on the findings within this Stage 1 AA study, the following recommendations are presented:

1. Parts of the study area identified as no longer retaining archaeological potential due to previous disturbance are recommended to be exempt from further Stage 2 AA. The extents of these areas must be confirmed and documented during the Stage 2 AA in accordance with *Section 2.1.8* of the *2011 S&G*.
2. Steeply sloping or permanently wet portions of the study area identified as having no or low archaeological potential are recommended to be exempt from further Stage 2 AA. The extents of these areas must be confirmed and documented during the Stage 2 AA in accordance with *Section 2.1.8* of the *2011 S&G*.
3. A Stage 2 AA test pit survey at five-metre intervals must be undertaken in all areas retaining archaeological potential, in accordance with the standards set within *Section 2.1.2* of the *2011 S&G*.
4. Should construction activities associated with this development, including construction laydown areas, extend beyond the assessed limits of the study area, further archaeological investigation will be required prior to construction activities in order to minimize impacts to cultural heritage resources.
5. No construction activities shall take place within the study area prior to the *MHSTCI* (Archaeology Program Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

TABLE OF CONTENTS

LIST OF TABLES

PROJECT PERSONNEL

Project Director.....Kassandra Aldridge – MHSTCI licence P439

Report Preparation ..... Jay Allen Villapando

Background Research & Graphics..... Lee Templeton – MHSTCI licence R454
Jay Allen Villapando

Report Reviewer ..... Kim Slocki – MHSTCI licence P029

1.0 PROJECT CONTEXT

1.1 Objective

The objectives of a Stage 1 Archaeological Assessment (AA), as outlined by the 2011 *Standards and Guidelines for Consultant Archaeologists* (‘*2011 S&G’*) published by the *Ministry of Heritage, Sport, Tourism and Culture Industries* (*MHSTCI*) (2011), are as follows:

- To provide information about the property’s geography, history, previous archaeological fieldwork and current land condition;
- To evaluate in detail the property’s archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

1.2 Development Context

In August 2019 the *Township of Essa* initiated the 5th Line Bridge Improvements Schedule ‘C’ Municipal Class Environmental Assessment (EA), in order to evaluate various alternatives to addressing deficiencies associated with Bridge No. 9, the ca. 70-year old bridge along the 5th Line over the Nottawasaga River between 20 Sideroad and 25 Sideroad, in the Township of Essa, County of Simcoe, Ontario. Alternatives being explored include: replacing or rehabilitating the existing bridge structure; or relocating the bridge to the west and realigning the roadway.

Ainley & Associates Limited, on behalf of the *Township of Essa*, retained *Archeoworks Inc*. to conduct a Stage 1 Archaeological Assessment (AA) in support of the 5th Line Bridge Improvements Municipal Class EA. The area under study consists of Bridge No. 9 and its immediate vicinity (***see Appendix A – Map 1***), and encompasses parts of historical Lots 23 and 24, Concessions 4 and 5, as well as the Road Allowance between Concessions 4 and 5, of the Geographic Township of Essa, Simcoe County.

This study was triggered by the *Ontario Environmental Assessment Act* in support of the *Municipal Class Environmental Assessment* regulatory process. This Stage 1 AA was conducted pre-submission under the project direction of Ms. Kassandra Aldridge under the archaeological consultant licence number P439, in accordance with the *Ontario Heritage Act* (2009). Permission to investigate the study area was granted by *Ainley & Associates Limited* on July 10, 2019.

1.3 Historical Context

To establish the historical context and archaeological potential of the study area, *Archeoworks Inc.* conducted a review of Aboriginal and Euro-Canadian settlement history, and a review of available historical mapping and aerial imagery. The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research**.

1.3.1 Pre-Contact Period

The Pre-Contact Period of Southern Ontario covers the earliest period of human habitation in the region. It is broadly divided into the Paleo-Indian, Archaic and Woodland Periods. A summary is provided in **Table 1**.

Table 1: Pre-Contact Period

Period	Date	Overview and Attributes
PALEO-INDIAN		
Early	ca. 11000 to 8500 BC	Small groups of nomadic hunter-gathers use seasonal and naturally available resources; sites are rare; hunted in small family groups who periodically gathered into larger groups/bands during favourable periods in the hunting cycle; campsites used during travel episodes and found in well-drained soils in elevated locations; sites found primarily along glacial strandlines per current understanding of regional geological history; artifacts include fluted and lanceolate stone points, scrapers, dart heads. - Gainey, Barnes, Crowfield Fluted Points (Early Paleo-Indian) - Holcombe, Hi-Lo, Lanceolates (Late Paleo-Indian) (Ellis and Deller, 1990, pp.37-64; Wright, 1994, p.25).
Late	ca. 8500 to 7500 BC	
ARCHAIC		
Early	ca. 7800 to 6000 BC	Descendants of Paleo-Indians; lithic scatters are the most commonly encountered site type; trade networks appear; artifacts include reformed fluted and lanceolate stone points with notched bases to attach to wooden shafts; ground-stone tools shaped by grinding and polishing; stone axes, adzes and bow and arrow; introduction of copper tools by Shield Archaic culture in Northern Ontario. - Side-notched, corner-notched, bifurcate projectile points (Early Archaic) - Stemmed, Otter Creek/Other Side-notched, Brewerton side and corner-notched projectile points (Middle Archaic) - Narrow Point, Broad Point, Small Point projectile points (Late Archaic) (Dawson, 1983, pp.8-14; Ellis et al., 1990, pp.65-124; Ellis, 2013, pp.41-46; Wright, 1994, pp.26-28).
Middle	ca. 6000 to 2000 BC	
Late	ca. 2500 to 500 BC	
WOODLAND		
Early	ca. 800 BC to 0	Evolved out of Late Archaic Period; introduction of pottery (ceramic), earliest of which were coil-formed, under-fired and likely utilitarian; two primary cultural complexes: Meadowood (broad extent of occupation in southern Ontario) and Middlesex (restricted to Eastern Ontario); poorly understood settlement-subsistence patterns; artifacts include cache blades, and side-notched points that were often recycled into other tool forms; primarily Onondaga chert; commonly associated with Saugeen and Point Peninsula complexes; First Nations descend from Archaic Period peoples. - Meadowood side-notched projectile points (Dawson, 1983, pp.15-19; Ferris and Spence, 1995, pp.89-97; Gagné, 2015; Spence et al., 1990, pp.125-142; Williamson, 2013, pp.48-61; Wright, 1994, pp.29-30).

Period	Date	Overview and Attributes
Middle	ca. 200 BC to AD 700	Three primary cultural complexes: Point Peninsula (generally south-central and eastern Ontario), Saugeen (generally southwestern Ontario), and Couture (southwestern-most part of Ontario) – although homogeneity of these complexes have been challenged; introduction of large "house" structures; settlements have dense debris cover indicating increased degree of sedentism; incipient horticulture; burial mounds present; shared preference for stamped, scallop-edged or tooth-like decoration, but each cultural complex had distinct pottery forms; Laurel Culture (ca. 500 BC to AD 1000) established in the boreal forests of Northern Ontario. - Saugeen Point projectile points (Saugeen) - Vanport Point projectile points (Couture) - Snyder Point projectile points - Laurel stemmed and corner-notched projectile points (Dawson, 1983, pp.15-19; Ferris and Spence, 1995, pp.97-102; Gagné, 2012; Hessel, 1993, p.9; Spence et al., 1990, pp.142-170; Williamson, 2013, pp.48-61; Wright, 1994, pp.28-33; Wright, 1999, pp.629-649).
Late (Transitional)	ca. AD 600 to 1000	Algonquian-speaking Anishinaabe peoples such as the Odawa and *Michi Saagig* (Mississauga) inhabit southern Ontario and used territories northward for hunting and trapping during winter months; Mississauga oral traditions speak of Iroquoian people coming into their territory around AD 500-1000, establishing settlements and growing maize; treaties were made and the newcomers were allowed to stay in their traditional territories. Alternative theory places the Mississauga north of Lake Superior, around Georgian Bay around this time, only to later move into Southern Ontario (MCFN, 2017). Earliest Iroquoian development in Ontario: Princess Point culture, which exhibits few continuities from earlier developments with no apparent predecessors, and hypothesized to have migrated into Ontario; settlement data is limited, but oval houses are present; artifacts include 'Princess Point Ware' vessels that are cord-roughened, with horizontal lines and exterior punctation; smoking pipes and ground stone tools are rare; introduction of maize/corn horticulture; continuity between Princess Point and Late Woodland cultural groups. - Triangular projectile points (Fox, 1990, pp.171-188; Ferris and Spence, 1995, pp.102-106; Gitiga Migizi and Kapyrka, 2015, p.1).
Early Late	ca. AD 900 to 1300	Two primary Iroquoian cultures: Glen Meyer (primarily southwestern Ontario from Long Point on Lake Erie to southwestern shore of Lake Huron) and Pickering (north of Lake Ontario to Georgian Bay and Lake Nipissing); well-made and thin-walled clay vessels with stamping, incising and punctation; multi-family longhouses and some small, semi-permanent palisade villages; increase in corn-yielding sites; crudely made smoking pipes, and worked bone/antler present; evolution of ossuary burials; grave goods are rare and not usually associated with a specific individual. - Triangular-shaped, basally concave projectile points with downward projecting corners or spurs (Williamson, 1990, pp.291-320; Ferris and Spence, 1995, pp.106-109).
Middle Late	ca. AD 1300 to 1400	Two primary Southern Ontario Iroquoian cultures: Uren and Middleport; decorated clay vessels decrease; well-developed clay pipe complex that includes effigy pipes; increase in village sizes (0.5 to 1.7 ha) and campsites (0.1 to 0.6 ha) appear with some palisades; classic longhouse takes form; increasing reliance on maize and other cultigens such as beans and squash; intensive exploitation of local land and water resources; from Middleport emerged the Huron-Wendat, Petun, Neutral and Erie. - Triangular and (side of corner or corner removed) notched projectile points - Middleport Triangular and Middleport Notched projectile points (Dodd el al., 1990, pp.321-360; Ferris and Spence, 1995, pp.109-115).

Period	Date	Overview and Attributes
Late Late	ca. AD 1400 to 1600	Algonquian-speaking groups (e.g., Mississauga, Odawa) maintain stable relations with Iroquoian-speaking groups (e.g., Huron-Wendat, Petun, Neutral), who continued to establish settlements in southern Ontario. Two Iroquoian groups: the Neutral to the west of the Niagara Escarpment, and Huron-Wendat to the east. Huron-Wendat sites occur in the valleys and basins of the Humber, Rouge and Duffin Creek, upper and lower Trent, Lake Scugog and Simcoe County; longhouses; villages enlarged to 100 longhouses clustered together as horticulture (maize, squash and beans) gained importance in subsistence patterns; villages chosen for proximity to water, arable soils, available fire wood and defendable position; diet supplemented with fish; ossuaries; tribe/band formation; gradual relocation of some Iroquois bands to north of Lake Simcoe; use of Nine-Mile Portage from Kempenfeldt Bay to Willow Creek, a branch of the Nottawasaga River that connected Lake Ontario to Lake Huron through Simcoe County. Petun (*Tionnontaté* or *Khionontateronon*), possibly descended from Neutrals, arrived as early as 1580 in the Blue Mountains area between the Nottawasaga River, Niagara Escarpment and Georgian Bay from Neutral territory but origins are still in question; Petun and Huron-Wendat portage routes into Neutral territory follow the length of the Nottawasaga River via its Pine River tributary to a branch of the Grand River. - Huron-Wendat projectile points are limited but change from predominantly side-notched to unnotched triangular - Neutral Native projectile points are typically small but long and narrow, frequently side-notched (Ferris and Spence, 1995, pp.115-122; Garrad, 2014, pp.1, 147-148; Gitiga Migizi and Kapyrka, 2015, p.1; Heidenreich, 1978, pp.368-388; Jury and Jury, 1956, p.2; Ramsden, 1990, pp.361-384; Warrick, 2000, p.446; Warrick, 2008, p.15).

1.3.2 Contact Period

The Contact Period of Southern Ontario encompasses the two centuries following the arrival of the first Europeans to the region. **Table 2** provides a summary of some of the main developments that occurred during this time.

Table 2: Contact Period

Period	Date Range	Overview and Attributes
European Contact	ca. AD 1600s	Algonquian-speaking groups such as the Anishinaabe (Mississauga, Chippewa, Ojibwe, Odawa, Nippissing, etc.) continue to inhabit Ontario, alongside Iroquoian-speaking groups such as the Huron-Wendat north of Lake Simcoe and the Neutral (Attiewandaron) in the Niagara Peninsula; intermarriage and wintering between groups result in complex archaeological record; French arrival into Ontario; numerous Huron-Wendat villages documented north of Lake Simcoe in and around the City of Barrie ("Huronia"); few references to the Petun by fur traders, perhaps due to fur traders assuming they were similar to the Huron-Wendat; trade relationship between the Huron-Wendat and the French established; trade goods begin to replace traditional tools/items; Jesuit and Recollect missionaries; early Jesuits establish a mission among Algonquins in Orillia area; epidemics. (Fox and Garrad, 2004, p.124; Garrad, 2014, pp.148, 167-168, 490; Garrad and Heidenreich, 1978, pp.395-396; Gitiga Migizi and Kapyrka, 2015, p.1; Heidenreich, 1978, pp.368-388; Hunter, 1909a, p.10; McMillan and Yellowhorn, 2004, pp.110-111; Trigger, 1994, pp.47-55; Warrick, 2008, pp.12, 245).

Period	Date Range	Overview and Attributes
Haudenosaunee Arrival	ca. AD 1650s	The Five (later Six) Nations of Iroquois ("Haudenosaunee"), originally located south of the Great Lakes, engaged in warfare with other Iroquois groups in southern Ontario, as their territory no longer yielded enough furs; numerous Huron-Wendat, Petun and Neutral villages attacked and destroyed in 1649-50s; small groups that remained became widely dispersed throughout Great Lakes region, with some resettling in what are now Quebec, southwestern Ontario and the United States; what remained of the Petun migrated through Neutral territory likely via the Nottawasaga River; Haudenosaunee established settlements along the Lake Ontario shoreline (and possibly one near Orillia) after driving out other groups, at strategic locations along canoe-and-portage routes and used territory extensively for fur trade; oral tradition speaks of Anishinaabe "paddling away" to their northern hunting territories to escape disease and warfare in southern Ontario at this time; European trade and exploration continues (Abler and Tooker, 1978, p.506; Garrad, 2014, pp. 148, 501-505; Garrad and Heidenreich, 1978, p.396; Gitiga Migizi and Kapyrka, 2015, p.1; Hunter, 1909a, p.10; Robinson, 1965, pp.15-16; Schmalz, 1991, pp.12-34; Trigger, 1994, pp.53-59; Williamson, 2013, p.60).
Anishinaabe Return	ca. AD 1650s to 1700	Narratives tell of Anishinaabe groups either returning (Gitiga Migizi and Kapyrka, 2015, p.2) or moving by military conquest (MCFN, 2017) to southern Ontario in the 1690s; battles fought throughout, resulting in most of the Haudenosaunee being driven out and returning to homelands south of the Great Lakes; some Ojibway and Chippewa groups settle in present-day Simcoe County by the 18th century (Gibson, 2006, pp.35-41; Hathaway, 1930, p.433; Johnston, 2004, pp.9-10; Smith, 2013, pp.16-20; Williamson, 2013, p.60).
Trade, Peace and Conflict	ca. AD 1700 to 1770s	Great Peace of 1701 in Montreal established peace among First Nations groups around the Great Lakes, and secured their neutrality in case of conflict between France and Britain; European commerce and exploration resumed; Anishinaabe continued to trade with both the English and the French; genesis of the Métis; skirmishes between France and Britain as well as their respective First Nations allies erupt in 1754 ("French and Indian Wars") and form part of the larger Seven Years' War; French defeat transferred the territory of New France to British control; Treaty of Paris signed in 1763; Royal Proclamation of 1763 established framework for negotiation of treaties with First Nations and administration of North American territories ceded by France to Britain; uprising by several First Nations groups against British ("Pontiac's War"); fur trade continued until Euro-Canadian settlement (Hall AJ, 2019; Jaenen, 2013; Johnston, 2004, pp.13-14; Schmalz, 1991, pp.35-62, 81; Surtees, 1994, pp.92-97).
Early British Administration	ca. AD 1770s to 1800s	American Revolutionary War (1775-1783) drove large numbers of United Empire Loyalists, military claimants, and groups who faced persecution in the United States to re-settle in southern Ontario; Treaty of Paris signed in 1783/1784 and formally recognized the independence of the United States; Province of Quebec divided in 1791 into sparsely populated Upper Canada (now southern Ontario) and culturally French Lower Canada (now southern Quebec); Jay's Treaty of 1795 establishes American—Canadian border along the Great Lakes; large parts of Upper Canada opened to settlement from the British Isles and continental Europe after land cession treaties were negotiated by the British Crown with various First Nations groups (Department of Indian Affairs, 1891; Government of Ontario, 2020; Hall R, 2019; Jaenen, 2014; Sprague, 2015; Surtees, 1994, p.110; Sutherland, 2020).

1.3.3 Euro-Canadian Settlement Period (1800s to present)

1.3.3.1 Essa Township

In 1818 representatives of the Crown negotiated with certain Anishinaabe peoples to purchase much of the land that now forms the western half of Simcoe County, in what would be known as Treaty No. 18 or the Lake Simcoe-Nottawasaga Treaty (Government of Ontario, 2020). Two years later the Township of Essa was surveyed, and calculated to contain 68,000 acres of land. The first settlement — "Dinwoody" — was established by three Irish settlers in the township's southeast corner, on Lots 8 to 10, Concession 1, west of Cookstown. This settlement was small but contained an Orange Hall that was used by various religious groups, for township meetings and a schoolhouse. A community soon evolved around this early grouping of settlers. By 1851, the inhabitants of the township numbered 1,123, and there were three sawmills and one grist mill. In 1855 the Ontario, Simcoe and Huron — later renamed Northern — Railway (now part of Canadian National Railway) was completed through the northern part of the township, connecting Angus with Barrie, allowing for transportation of goods and people through the township. In 1880 it was noted that agriculture was the only other significant industry in the township aside from the lumber industry (H. Belden & Co., 1880, p.13, Hunter, 1909b, p.77-84; Smith, 1851, p. 61).

1.3.3.2 History of Angus

The community of Angus is located northwest of the study area. Angus was founded with the establishment of a saw mill along the Pine River. Around the saw mill, a village was planned in 1833 under the name "Rippon," but this did not materialize. Only two decades later, with the construction of the Ontario, Simcoe and Huron (later Northern, now CN) Railway in 1853, that the same settlement – then known as "Pine River" – began to develop (H. Belden & Co., 1880, p.17; Leisure Information Network, 2013; Hunter, 1909b, p.84).

In 1852, Jonas Tarbush purchased lands around Pine River and five years later, with the help of one Mr. Proudfoot, laid out village lots and streets and renamed the village to Angus. Angus became a busy timber village; nearby rivers as well as the Northern Railway were used to transport timber. As timber was removed from the surrounding countryside, land became available for farm crops. However, by the 1870s, numerous additional railways had been constructed through Southern Ontario, leading to the decline of Angus as a timber shipping hub. By the late 1890s, most of the timber resources had been clear-cut, and the timber business disappeared from Angus (Leisure Information Network, 2013).

1.3.3.3 Hamlet of Ivy

The hamlet of Ivy, located southeast of the study area, was first settled in 1819 by George Burgess (McEvoy & Co., 1866, p.111). The Ivy post office was established in 1858 and was closed in 1968 (LAC, 2021). By 1866, the hamlet contained one public school, and English Church, a Methodist Church, and the church services for the Presbyterian congregation held services at the public schoolhouse. By 1873, the community was estimated to contain around 100 inhabitants (Crossby, 1873, p.152).

1.3.4 Past Land Use

To further assess the study area's potential for the recovery of Euro-Canadian remains, historical maps and aerial photographs were consulted to gain an understanding of the land use history.

In *Hogg's Map of the County of Simcoe* published in 1871 (***see Map 2***), the road allowance now known as 5th Line is marked as a "given road" while the course of the Nottawasaga River is inaccurately drawn at a more northerly location. The lands flanking the road allowance are identified as under the ownerships of R. Fleming (east half of Lot 23, Concession 4), T. Willoughby (east half of Lot 24, Concession 4) and C. Miller (west half of Lot 24, Concession 5). However, no structures were illustrated in close proximity.

The *Simcoe Supplement* of the 1880 *Illustrated Atlas of the Dominion of Canada* (***see Map 2***), while depicting the Nottawasaga River course and 5th Line roadway alignment more accurately, provides no information regarding the occupants of the adjacent lands.

The first available map with sufficient topographic detail of the study area dates to 1928 (***see Map 2***). The map depicts 5th Line following a straighter route that mostly followed the original right-of-way (ROW), with a somewhat sharper westward turn in the south end of the study area. While the current bridge under study is known to have been built in 1950 (Township of Essa, 2014, p. 44), it was not yet reflected in the topographic map published that same year (***see Map 2***), which itself was based on aerial photographs taken in 1949.

An aerial photograph from 1954 (***see Map 3***) shows both the current and old bridge, along their respective road approaches north of the Nottawasaga River. The current road alignment south of the river was still unbuilt at the time and must have been constructed sometime after 1954. The sharp bend at the south end of the study area had been eliminated in favour of a straighter alignment by 1989 (***see Map 3***), and the area corresponding to the old road bend has since appeared in aerial photographs as a denuded patch of land. No further large-scale changes within study area appears to have occurred since at least the late 1980s.

In Ontario, the *2011 S&G* considers areas of early Euro-Canadian settlements (e.g., pioneer homesteads, isolated cabins, farmstead complexes, early wharf or dock complexes, pioneer churches, and early cemeteries), early historic transportation routes (e.g., trails, passes, roads, railways, portage routes), and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations are considered features or characteristics that indicate archaeological potential (per *Section 1.3.1* of the *2011 S&G*). Therefore, based on the presence of the 5th Line, a historic transportation route, this feature contributes in establishing the archaeological potential of the study area.

1.3.5 Present Land Use

The paved road alignment and much of the current road right-of-way (ROW) is used for transportation purposes. Where the study area encompasses land outside the current ROW limits, the lands are undeveloped. Under the Township of Essa's Official Plan, the land use for

much of the study area is officially categorized as "Environmental – Significant Areas," except for a small segment in the north end, which is "Agricultural" (Township of Essa, 2003).

1.4 Archaeological Context

To establish the archaeological context and further establish the archaeological potential of the study area, *Archeoworks Inc*. conducted a comprehensive review of designated and listed heritage properties, commemorative markers and pioneer churches and early cemeteries in relation to the study area. Furthermore, an examination of registered archaeological sites and previous AAs in proximity to the study area limits, and a review of the physiography of the study area were performed. The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research**.

1.4.1 Designated and Listed Cultural Heritage Resources

Per *Section 1.3.1* of the *2011 S&G*, properties listed on a municipal register or designated under the *Ontario Heritage Act*, or that is a federal, provincial, or municipal historic landmark or site, are considered features or characteristics that indicate archaeological potential. No properties designated under Part IV of the Ontario Heritage Act are found within 300 metres of the study area (Ontario Heritage Trust, 2021a). Furthermore, there are no references in the Township of Essa's official website regarding the six properties immediately adjacent to the study area (municipal addresses 7900, 7969, 8066, 8082, 8085 and 8119 5th Line) being of cultural heritage interest or significance (Township of Essa, 2021a-f). Therefore, this feature does not contribute in establishing the archaeological potential of the study area.

1.4.2 Heritage Conservation Districts

Per *Section 1.3.1* of the *2011 S&G*, heritage resources listed on a municipal register or designated under the *Ontario Heritage Act* are considered features or characteristics that indicate archaeological potential. The study area is not located in or within 300 metres of a Heritage Conservation District (Ontario Heritage Trust, 2021a). Therefore, this feature does not contribute in establishing the archaeological potential of the study area.

1.4.3 Commemorative Plaques or Monuments

Per *Section 1.3.1* of the *2011 S&G,* commemorative markers of Aboriginal and Euro-Canadian settlements and history which may include local, provincial, or federal monuments, cairns or plaques, or heritage parks are considered features or characteristics that indicate archaeological potential. The study area is not located in or within 300 metres of a commemorative plaque or monument (Ontario Heritage Trust, 2020b). Therefore, this feature does not contribute in establishing the archaeological potential of the study area.

1.4.4 Pioneer/Historic Cemeteries

Per *Section 1.3.1* of the *2011 S&G,* pioneer churches and early cemeteries are considered features or characteristics that indicate archaeological potential. The study area is not located in or within 300 metres of a pioneer/historic cemetery or church (Ontario Genealogical Society, 2021).

Therefore, this feature does not contribute in establishing the archaeological potential of the study area.

1.4.5 Registered Archaeological Sites

Per *Section 1.1, Standard 1* and *Section 7.5.8, Standard 1* of the *2011* S&G, the *Ontario Archaeological Sites Database* (OASD) maintained by the *MHSTCI* was consulted in order to provide a summary of registered or known archaeological sites within a minimum one-kilometre distance of the study area limits. According to the OASD, there is only one registered archaeological site within a one-kilometre radius of the study area (MHSTCI, 2021): the Brownley (BbGx-3) Site. According to the site record on file with the MHSTCI, the site yielded "a large collection" of points possibly dating to the Archaic Period, but — apart from it being roughly located somewhere in the central and east portions of Lots 24-25, Concession 4 of Essa Township — the exact location is not known, and no other site visits have been recorded since 1977. With the BbGx-3 Site potentially being within a 300-metre radius, this feature therefore contributes to establishing archaeological potential of the study area.

1.4.6 Previous Archaeological Assessments

Per *Section 1.1, Standard 1* and *Section 7.5.8, Standards 4-5* of the *2011* S&G, to further establish the archaeological context of the study area, a review of previous AAs carried out within the limits of, or immediately adjacent (i.e., within 50 metres) to the study area — as documented by all available reports — was undertaken. There were no such reports.

However, the site record form for BbGx-3 (***see Section 1.4.5 above***) was consulted for further information on the site's characteristics and possible location relative to the study area. Additionally, Simcoe County's Archaeological Management Plan was consulted; this document identifies the study area as still retaining archaeological potential (ASI, 2019, p.31).

1.4.7 Physical Features

1.4.7.1 Physiographic Region

The study area is situated within the Nottawasaga Basin of the physiographic region known as the Simcoe Lowlands. These lowlands were flooded by glacial Lake Algonquin and are bordered by shore cliffs, beaches, and bouldery terraces, floored by sand, silt and clay. The Nottawasaga Basin consists the broad flats bordering the said river, which were at one time part of the floor of Lake Algonquin and therefore have surface beds of lacustrine and deltaic origin rather than glacial outwash. The sand flats around Camp Borden, where the study area lies, have been drained well by rivers, but the loose and coarse-textured materials that characterize the soils here (e.g., Tioga sand or sandy loam) make them poor for agriculture and susceptible to drought (Chapman & Putnam, 1984, pp.177-179).

1.4.7.2 Soil Types and Topography

Three soils can be found natively within the study area (Department of Agriculture, 1959). The immediate valley of the Nottawasaga River is classified as Bottom Land, made of recent alluvium and of variable topography, drainage and stoniness. The flat tableland north of the river is

classified as Tioga fine sandy loam, while south of the river it is the eroded phase of Tioga loamy sand. The Tioga series is described as well-drained, stonefree to moderately stony, and having topography that can be smooth, or gently to irregular to steeply sloping.

1.4.7.3 Hydrological Features

Hydrological features such as primary water sources (i.e. lakes, rivers, creeks, streams) and secondary water sources (i.e. intermittent streams and creeks, springs, marshes, swamps) would have helped supply plant and food resources to the surrounding area and are indicators of archaeological potential (per *Section 1.3.1* of the *2011 S&G*). The Nottawasaga River's main branch bisects the study area and therefore contributes to establishing archaeological potential. However, it must be noted that post-1950 developments have artificially altered much of the area surrounding the 5th Line road alignment and river crossing.

1.4.8 Current Land Conditions

The study area consists mainly of the 5th Line paved roadway and its associated features (berms, roadside ditching, embankments, bridge structure, etc.). Significant portions immediately outside these are taken up by mostly wooded lands. The former 5th Line road alignment is now mostly wooded again, except for the westward bend in the south end, where the graded soils continue to prevent tree growth. Agricultural fields flank the study area's north end.

1.4.9 Date of Desktop Review

A desktop review using available resources (Google Earth and Street View, First Base Solutions 1m contour mapping accessed via VuMap[1]), was carried out on February 5, 2021. The purpose of the desktop review is to: identify and describe areas of high potential requiring additional archaeological research; identify and describe areas of no/low potential not warranting further archaeological concern; and to help gather information in order to formulate appropriate Stage 2 AA strategies. Results of the desktop review, combined with background research are presented in **Section 2.0**.

1.5 Confirmation of Archaeological Potential

Based on the information gathered from the background research documented in the preceding sections, the study area retains archaeological potential. Features that contribute to archaeological potential are summarized in **Appendix B**.

However, it must be noted that post-1900 developments can negate the possibility of encountering intact archaeological deposits due to deep and extensive soil disturbance. Succeeding **Section 2.0** will provide further details regarding which areas will no longer require further work due to previous disturbance, and which undisturbed areas will require further Stage 2 AA.

[1] Due to copyright restrictions, Google and FBS imagery and contour layers cannot be directly presented in this report. However, Stage 1 maps incorporating information from the desktop review are provided within **Appendix A.** Google Street View imagery of the study area can be consulted online via the following link:
https:// google.ca/maps/@44.2938432,-79.8456451,3a,75y,169.17h,81.19t/data=!3m6!1e1!3m4!1s4O3nKa8a1_u28K2nkhrJ7Q!2e0!7i13312!8i6656

2.0 ANALYSIS AND CONCLUSIONS

In combination with data gathered from the background research (***see Sections 1.3 and 1.4***) and the desktop review of current conditions, an evaluation of the established archaeological potential was performed. The resulting Stage 1 AA maps are presented in **Appendix A** as **Maps 4-7**.

3.1 Identified Deep and Extensive Disturbances

The study area was evaluated for extensive disturbances that have removed archaeological potential. Disturbances may include but are not limited to: quarrying, major landscaping involving grading below topsoil, building footprints, or sewage and infrastructure development. *Section 1.3.2* of the *2011 S&G* considers infrastructure development among those "features indicating that archaeological potential has been removed."

Historical aerial imagery (***see Map 3***) and current site plans (***see Maps 4-7***) show extensive disturbances tied to the ca. 1950 construction of the current 5th Line roadway and its associated features (e.g., berms, roadside ditching, embankments, bridge structure, etc.) as well as the remediation of the former 5th Line road alignment (now mostly wooded again, except for the south end where graded soils have prevented tree growth). Construction works tied to the roadway realignment would have resulted in severe damage to the integrity of any archaeological resources which may have been present within their footprints. These areas may be exempted from further archaeological investigation.

3.2 Physiographic Features of No or Low Archaeological Potential

The study area was also evaluated for physical features of no or low archaeological potential. These usually include but are not limited to: permanently wet areas, exposed bedrock, and steep slopes (greater than 20^{o}) except in locations likely to contain pictographs or petroglyphs, as per *Section 2.1, Standard 2.a.* of the 2011 *S&G.*

The steep slopes and low-lying/permanently wet areas associated with the Nottawasaga River and its valley are considered to be of no or low archaeological potential (***see Maps 4-6***). This includes the small island lying immediately west of the current bridge structure, which only formed sometime between 1954 and 1989 (***see Map 3***). These are therefore recommended to be exempt from further archaeological investigation.

3.3 Identified Areas of Archaeological Potential

Review of historical aerial imagery, combined with a desktop review of current conditions, indicate that only small portions of the study area neither exhibit extensively disturbed conditions nor contain physical features of low to no archaeological potential. Specifically, these

include the narrow grassed margins following both sides of 5th Line and immediately fronting 8082 5th Line (west side of road) and 8119 5th Line (east side of road) (***see Map 7***). These lands are considered to retain archaeological potential and are in suitable condition for Stage 2 test pit survey at standard five-metre intervals.

3.0 RECOMMENDATIONS

Considering the findings detailed in preceding sections, the following recommendations are presented (***see Maps 4-7***):

1. Parts of the study area identified as no longer retaining archaeological potential due to previous disturbance are recommended to be exempt from further Stage 2 AA. The extents of these areas must be confirmed and documented during the Stage 2 AA in accordance with *Section 2.1.8* of the *2011 S&G*.
2. Steeply sloping or permanently wet portions of the study area identified as having no or low archaeological potential are recommended to be exempt from further Stage 2 AA. The extents of these areas must be confirmed and documented during the Stage 2 AA in accordance with *Section 2.1.8* of the *2011 S&G*.
3. A Stage 2 AA test pit survey at five-metre intervals must be undertaken in all areas retaining archaeological potential, in accordance with the standards set within *Section 2.1.2* of the *2011 S&G*.
4. Should construction activities associated with this development, including construction laydown areas, extend beyond the assessed limits of the study area, further archaeological investigation will be required prior to construction activities in order to minimize impacts to cultural heritage resources.
5. No construction activities shall take place within the study area prior to the *MHSTCI* (Archaeology Program Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

1. This report is submitted to the *MHSTCI* as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the *MHSTCI*, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

2. It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

3. Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

4. The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the *Ministry of Consumer Services*.

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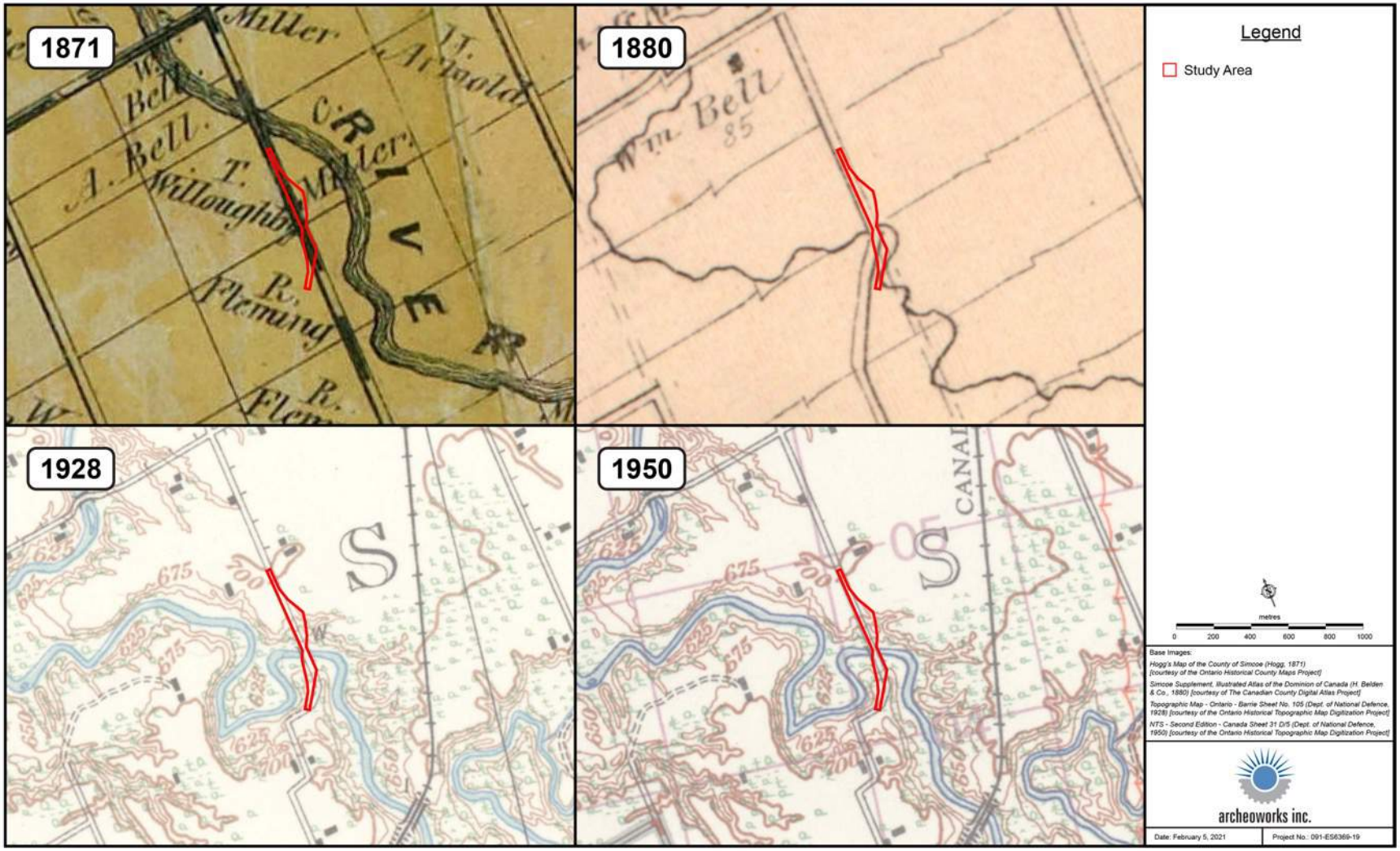
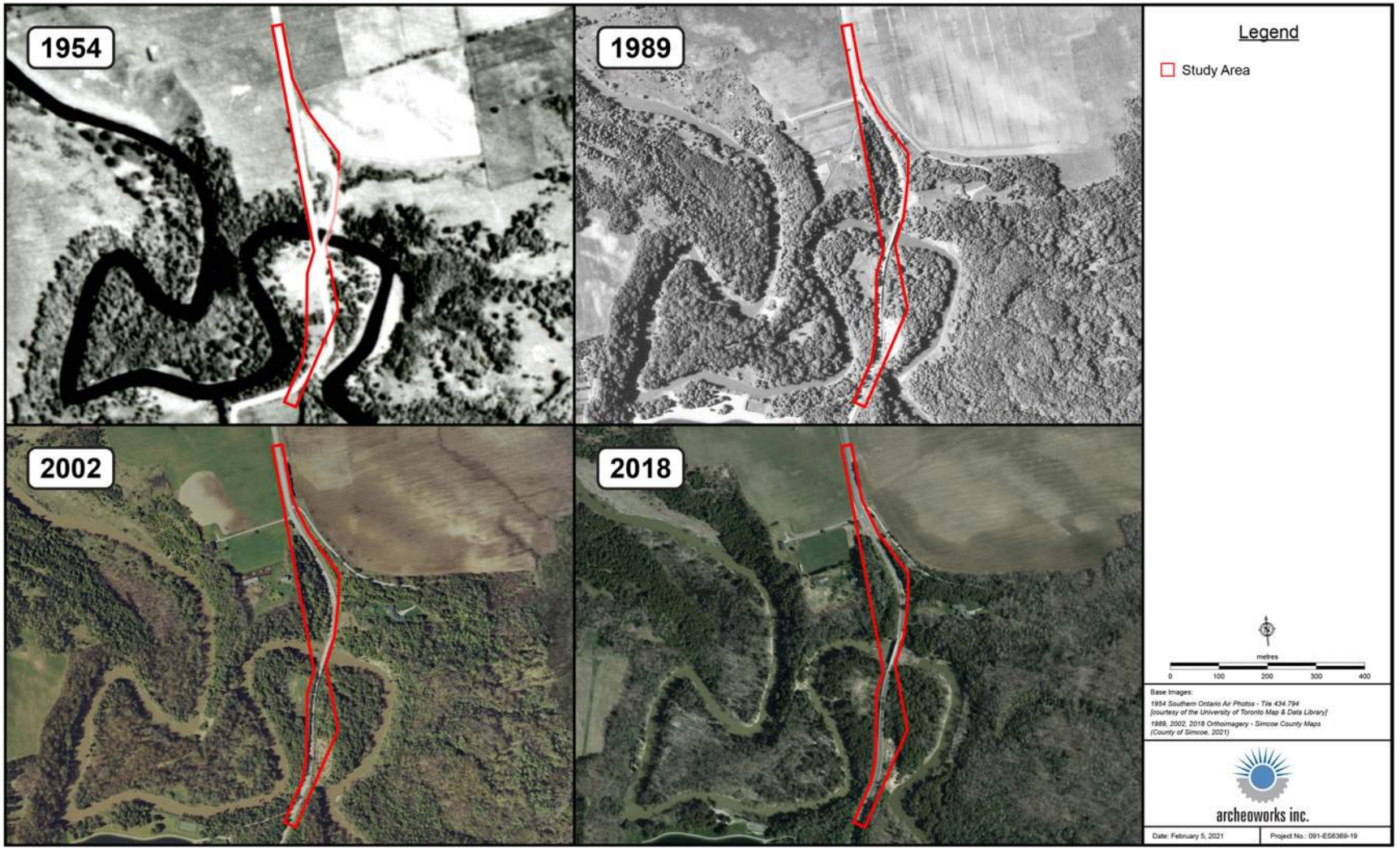
APPENDICES

APPENDIX A: MAPS

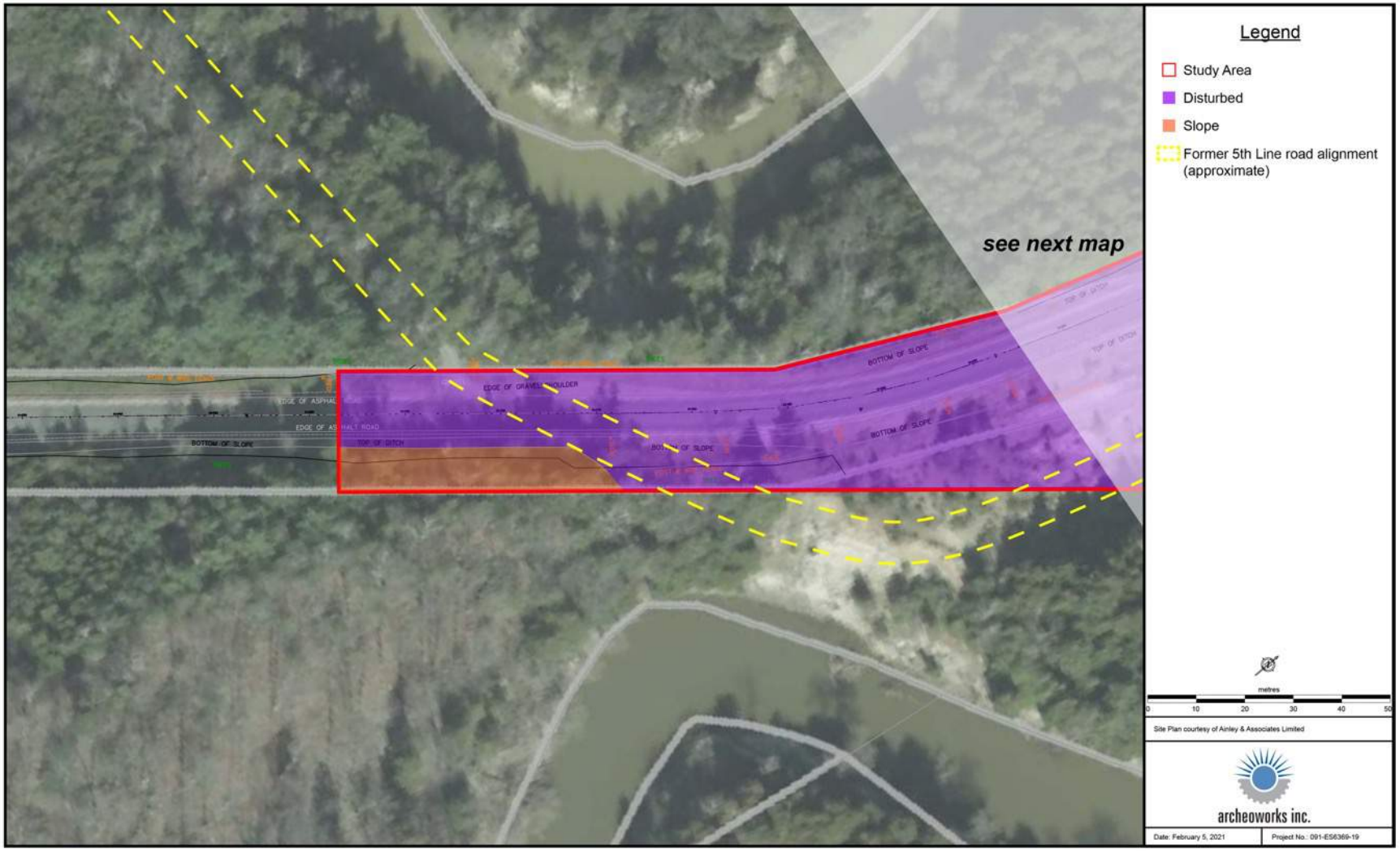
Map 1: Topographic map section identifying the Stage 1 AA study area limits.



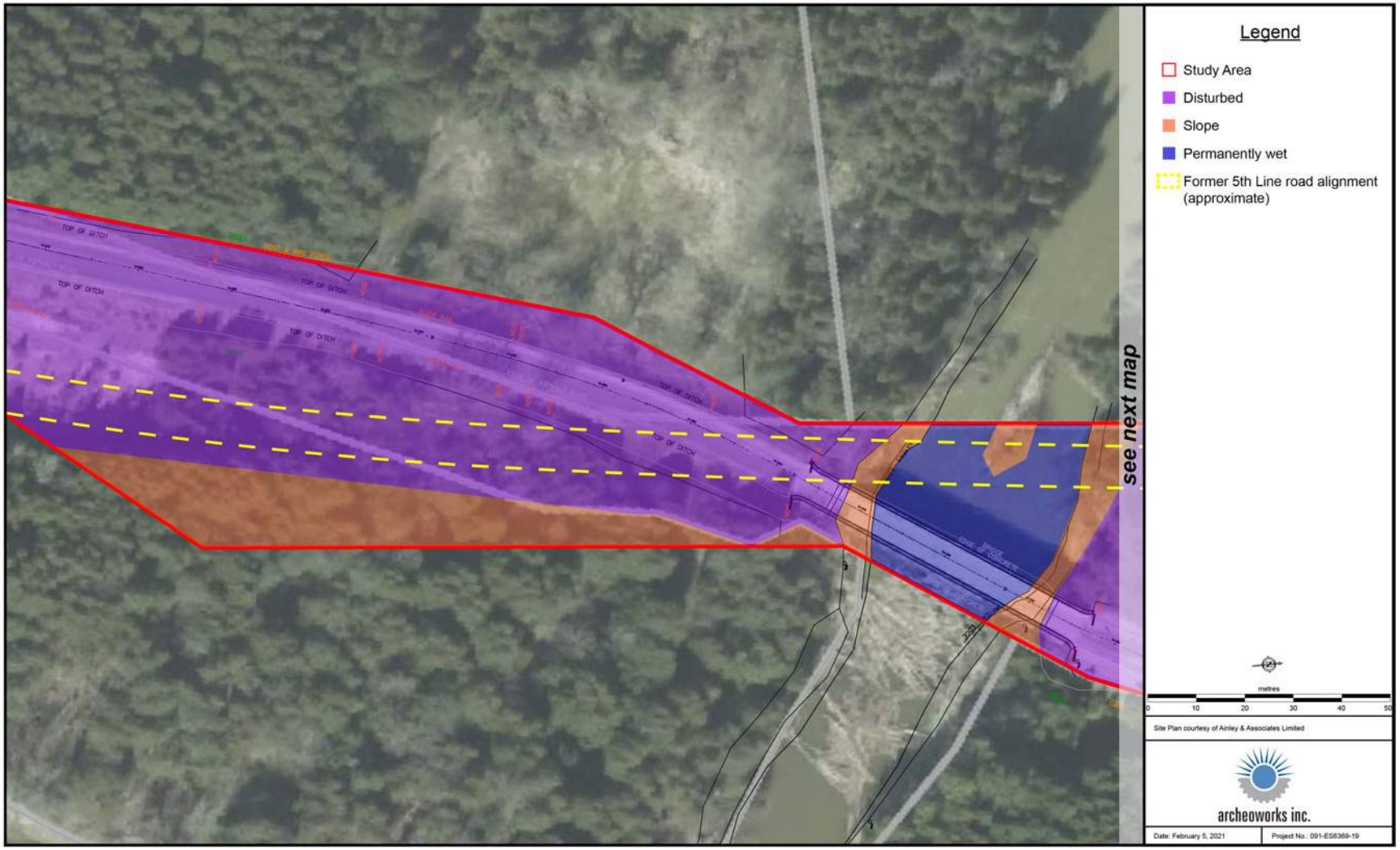
Map 2: Study area within a series of maps published in 1871, 1880, 1928 and 1950.



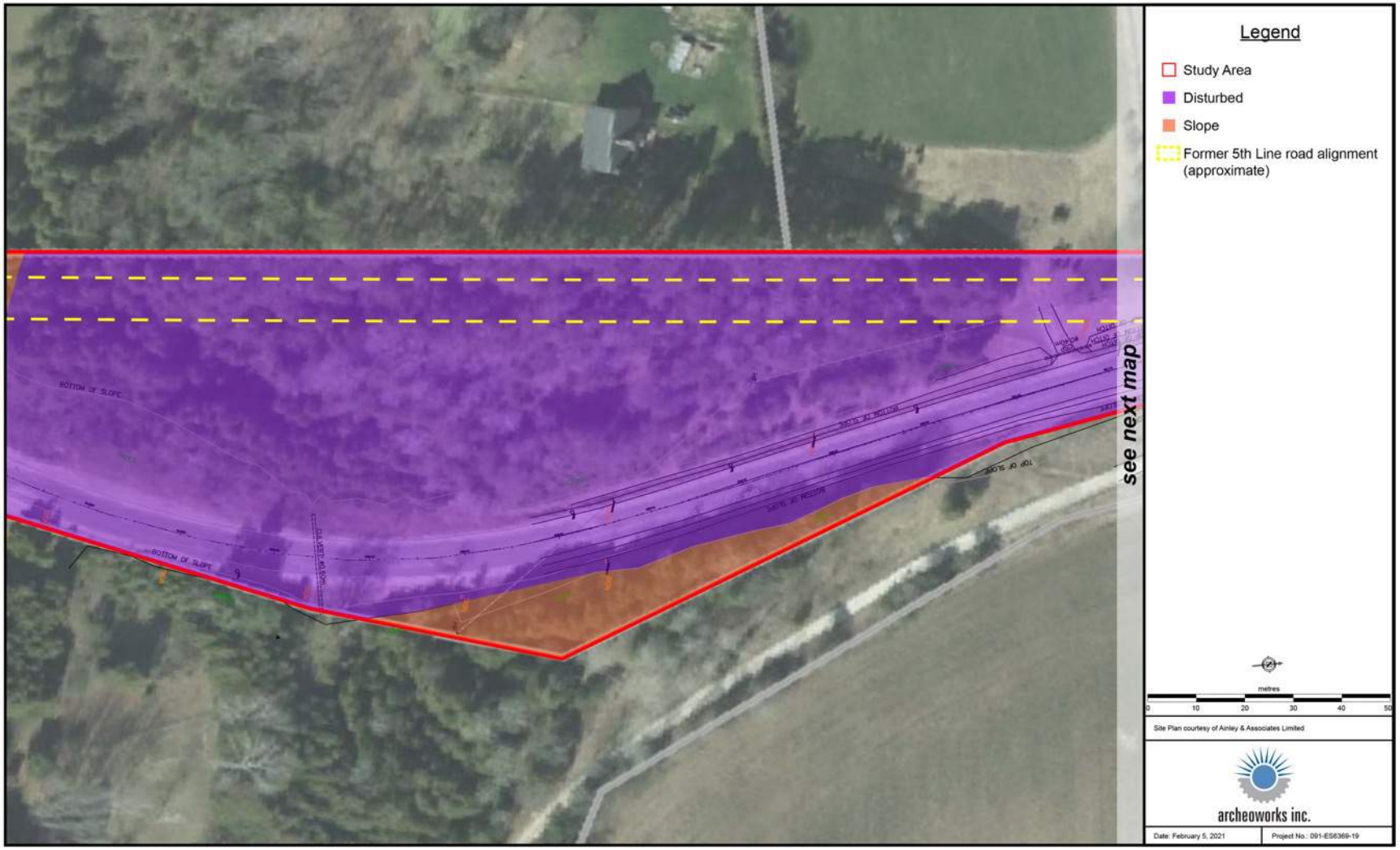
Map 3: Study area within aerial imagery dating to 1954, 1989, 2002 and 2018.



Map 4: Stage 1 AA results for the southernmost segment of the study area.



Map 5: Stage 1 AA results for the segment of the study area immediately south of the Nottawasaga River.



Map 6: Stage 1 AA results for the segment of the study area immediately north of the Nottawasaga River.

Map 7: Stage 1 AA results for the northernmost segment of the study area.

APPENDIX B: SUMMARY OF BACKGROUND RESEARCH

Feature of Archaeological Potential		Yes	No	Unknown	Comment
1	Known archaeological sites within 300 m?	X			If Yes, potential confirmed
Physical Features		**Yes**	**No**	**Unknown**	**Comment**
2	Is there water on or adjacent to the property?	X			If Yes, potential confirmed
2a	Presence of primary water source within 300 metres of the study area (lakes, rivers, streams, creeks)	X			If Yes, potential confirmed
2b	Presence of secondary water source within 300 metres of the study area (intermittent creeks and streams, springs, marshes, swamps)	X			If Yes, potential confirmed
2c	Features indicating past presence of water source within 300 metres (former shorelines, relic water channels, beach ridges)		X		If Yes, potential confirmed
2d	Accessible or inaccessible shoreline (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh)		X		If Yes, potential confirmed
3	Elevated topography (knolls, drumlins, eskers, plateaus, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
4	Pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
5	Distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
Cultural Features		**Yes**	**No**	**Unknown**	**Comment**
6	Is there a known burial site or cemetery that is registered with the Cemeteries Regulation Unit on or directly adjacent to the property?		X		If Yes, potential confirmed
7	Associated with food or scarce resource harvest areas (traditional fishing locations, food extraction areas, raw material outcrops, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
8	Indications of early Euro-Canadian settlement (monuments, cemeteries, structures, etc.) within 300 metres		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
9	Associated with historic transportation route (historic road, trail, portage, rail corridor, etc.) within 100 metres of the property	X			If Yes to two or more of 3-5 or 7-10, potential confirmed
Property-specific Information		**Yes**	**No**	**Unknown**	**Comment**
10	Contains property designated under the Ontario Heritage Act		X		If Yes, potential confirmed
11	Local knowledge (aboriginal communities, heritage organizations, municipal heritage committees, etc.)		X		If Yes, potential confirmed
12	Recent ground disturbance, not including agricultural cultivation (post-1960, extensive and deep land alterations)	X – in some parts			If Yes, low archaeological potential is determined

APPENDIX C: INVENTORY OF DOCUMENTARY AND MATERIAL RECORD

Project Information:				
Project Number:	091-ES6369-19			
Licensee:	Kassandra Aldridge (P439)			
MHSTCI PIF:	P439-0137-2021			
Document/ Material			**Location**	**Comments**
1	Research/ Analysis/ Reporting Material	Digital files stored in: /2019/091-ES6369-19 - 5th Line Essa Bridge/	Archeoworks Inc., 16715-12 Yonge St., Suite 1029, Newmarket, ON, Canada L3X 1X4	Stored on Archeoworks network servers

Under the Section 14 of the Terms and Conditions for Archaeological Licences issued under the *Ontario Heritage Act*, "the licensee shall hold in safekeeping all artifacts and records of archaeological fieldwork carried out under this licence, except where those artifacts and records are transferred by the licensee to Her Majesty the Queen in right of Ontario or the licensee is directed to deposit them in a public institution in accordance with subsection 66(1) of the Act." The collections are being stored at Archeoworks Inc. on the licensee's behalf.

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the 5th Line Bridge Improvements Municipal Class Environmental Assessment Within Parts of Lots 23-24, Concessions 4-5 and Road Allowance between Concessions 4 and 5 Township of Essa County of Simcoe Ontario

Project #: 091-ES6369-19
Licensee (#): Kassandra Aldridge (P439)
PIF#: P439-0137-2021

Supplementary Document

February 11, 2021

Presented to:
Ainley & Associates Limited
550 Welham Road
Barrie, Ontario
L4N 8Z7
T: 705.726.3371

Prepared by:
Archeoworks Inc.
16715-12 Yonge Street, Suite 1029
Newmarket, Ontario
L3X 1X4
T: 416.676.5597
F: 647.436.1938

TABLE OF CONTENTS

1.0 CORRESPONDENCE WITH MHSTCI

From: Hadlari, Wai (MHSTCI) <Wai.Hadlari@Ontario.ca>
Sent: January 27, 2021 1:43 PM
To: ltempleton@archeoworks.com
Cc: Archaeology (MHSTCI) <archaeology@ontario.ca>; kslocki@archeoworks.com; 'Brent Lawson' <blawson@archeoworks.com>
Subject: RE: Winter Strategy : 091-ES6369-19 - 5th Line Essa Bridge

Hello Lee,

This is to confirm that a Stage 1 PIF may be issued for the project 5th Line Essa Bridge.

As noted in your email, Stage 1 Property Inspection cannot be carried out under winter conditions (e.g. Snow cover, frozen ground, excessive rain) as it may reduce the chances of observing features of archaeological potential. The report must provide photo documentation to confirm that the property inspection was conducted in accordance to Standard 1.2, Standard 2 in the S&Gs, including the weather and lighting conditions.

Please review our Winter Archaeology Bulletin ***here*** for additional information on reporting requirements, excavation conditions, and strategies to consider when conducting archaeological assessment around the winter months.

Please provide a copy of this correspondence when you submit the PIF request.

Please include a PDF copy of this advice as supplementary documentation to your project report package.

As a standard part of all advice provided to licensees, please note that this advice has been provided by this ministry under the assumption that the information submitted by the licensed archaeologist is complete and accurate. The advice provided applies only to the project in question and is not to be used as a precedent for future projects. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or if the information provided by the licensed archaeologist is otherwise found to be inaccurate, incomplete, misleading, or fraudulent.'

Thanks,

Wai

From: ltempleton@archeoworks.com <ltempleton@archeoworks.com>
Sent: Wednesday, January 27, 2021 10:39 AM
To: Hadlari, Wai (MHSTCI) <Wai.Hadlari@Ontario.ca>
Cc: Archaeology (MHSTCI) <archaeology@ontario.ca>; kslocki@archeoworks.com; 'Brent Lawson' <blawson@archeoworks.com>
Subject: Winter Strategy : 091-ES6369-19 - 5th Line Essa Bridge

Hi Wai,

re. Stage 1 PIF request: 091-ES6369-19 - 5th Line Essa Bridge

It has not been determined yet if an optional property inspection will be undertaken for this project. In the event that one is needed, the property inspection will be completed in accordance to Section 1.2, Standard 2 of the 2011 S&G. Given this project is located in the Township of Essa, we will continue to monitor the temperature/weather forecast prior to scheduling the property inspection. Per the S&G, should ground conditions not be adequate to complete the property inspection, we will not undertake the inspection and postpone it to when conditions are more suitable.

Please kindly advise if further details are required,

Lee

Lee Templeton, H.B.A.

archeoworks inc.

16715-12 Yonge St., Suite 1029, Newmarket, ON, L3X 1X4
T: 416-948-6896 | F: 647-436-1938

Appendix F

Cultural Heritage Assessment

Cultural Heritage Evaluation
Township of Essa Bridge No. 9

5th Line over the Nottawasaga River
Lot 24, Concession V
Township of Essa, Simcoe County, Ontario

Prepared for:

Ainley Group
550 Welham Road
Barrie, ON L4N 8Z7

ASI File 17CH-129

November 2017 (Updated March 2018)

ASI Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T 416-966-1069 F 416-966-9723 ASIheritage.ca

Cultural Heritage Evaluation
Township of Essa Bridge No. 9

5th Line over the Nottawasaga River
Lot 24, Concession V
Township of Essa, Simcoe County, Ontario

EXECUTIVE SUMMARY

ASI was contracted by Ainley Group to conduct a Cultural Heritage Evaluation of the Township of Essa Bridge No. 9 as part of transportation improvements to 5th Line in the Township of Essa. The subject bridge is a two-span, cast-in-place concrete T-beam bridge rigidly integrated with the abutments and central pier that carries two lanes of northbound and southbound 5th Line vehicular traffic over the Nottawasaga River in the Township of Essa, Simcoe County.

This report will evaluate the cultural heritage significance of the subject bridge and, if necessary, assess impacts of the proposed undertaking in consideration of its determined cultural heritage value. The subject bridge is a two-span reinforced concrete T-beam structure and was constructed in 1950.

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and heritage evaluation, the Township of Essa Bridge No. 9 was not determined to retain cultural heritage value following application of Regulation 9/06 of the *Ontario Heritage Act*. Therefore, the following recommendations should be considered and implemented:

1. This report should be sent to the Township of Essa for review.

PROJECT PERSONNEL

Senior Project Manager:	Annie Veilleux, MA, CAHP *Senior Heritage Specialist | Manager* *Cultural Heritage Division*
Project Manager:	John Sleath, MA *Archaeologist | Cultural Heritage Associate* *Cultural Heritage Division*
Project Coordinator:	Sarah Jagelewski, Hon. BA *Archaeologist | Assistant Manager* *Environmental Assessment Division*
Project Administrator:	Carol Bella, Hon. BA *Research Archaeologist*
Archival Research:	John Sleath
Report Preparation:	John Sleath
Graphics Preparation:	Adam Burwell, MSc *Archaeologist | Geomatics Specialist ·* *Operations Division*
Report Reviewer:	Annie Veilleux

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

ASI was contracted by Ainley Group to conduct a Cultural Heritage Evaluation of the Township of Essa Bridge No. 9 as part of transportation improvements to 5th Line in the Township of Essa. The subject bridge is a two-span, cast-in-place concrete T-beam bridge rigidly integrated with the abutments and central pier that carries two lanes of northbound and southbound 5th Line vehicular traffic over the Nottawasaga River in the Township of Essa, Simcoe County (Figure 1).

This report will evaluate the cultural heritage significance of the structure and assess impacts of the proposed undertaking in consideration of its determined cultural heritage value.

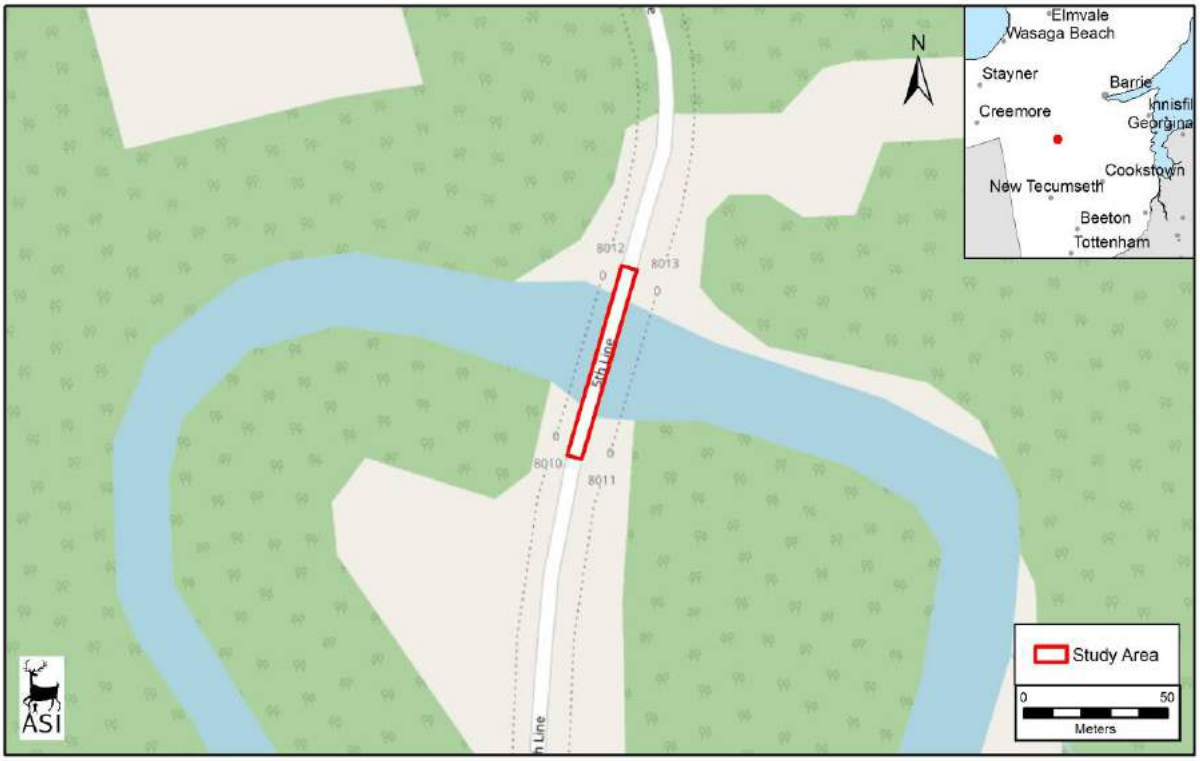


Figure 1: Location of the Study Area.
Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA ESRI Street Maps)

The following report is presented as part of an approved planning and design process subject to Environmental Assessment (EA) requirements. This portion of the EA study is intended to address the proposed replacement/rehabilitation of the subject structure. The principal aims of this report are to:

- Describe the methodology that was employed and the legislative and policy context that guides heritage evaluations of bridges over 40 years old;
- Provide an historical overview of the design and construction of the structure within the broader context of the surrounding township and bridge construction generally;
- Describe existing conditions and heritage integrity;

- Evaluate the bridge using Regulation 9/06 of the *Ontario Heritage Act* and draw conclusions about the heritage attributes of the structure; and
- Assess impacts of the undertaking, ascertaining sensitivity to change in the context of identified heritage attributes and recommend appropriate mitigation measures.

2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT

2.1 Legislation and Policy Context

This cultural heritage assessment considers cultural heritage resources in the context of improvements to specified areas, pursuant to the *Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources over 40 years old. Use of a 40-year-old threshold is a guiding principle when conducting a preliminary identification of cultural heritage resources (Ministry of Transportation 2006; Ministry of Transportation 2007). While identification of a resource that is 40 years old or older does not confer outright heritage significance, this threshold provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from retaining heritage value.

For the purposes of this assessment, the term cultural heritage resources was used to describe both cultural heritage landscapes and built heritage resources. A cultural landscape is perceived as a collection of individual built heritage resources and other related features that together form farm complexes, roadscapes and nucleated settlements. Built heritage resources are typically individual buildings or structures that may be associated with a variety of human activities, such as historical settlement and patterns of architectural development.

The analysis throughout the study process addresses cultural heritage resources under various pieces of legislation and their supporting guidelines. Under the *Environmental Assessment Act* (1990) environment is defined in Subsection 1(c) to include:

- cultural conditions that influence the life of man or a community, and;
- any building, structure, machine, or other device or thing made by man.

The Ministry of Tourism, Culture and Sport is charged under Section 2 of the *Ontario Heritage Act* with the responsibility to determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario and has published two guidelines to assist in assessing cultural heritage resources as part of an environmental assessment: *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992), and *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (1980). Accordingly, both guidelines have been utilized in this assessment process.

The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (Section 1.0) states the following:

> When speaking of man-made heritage we are concerned with the works of man and the effects of his activities in the environment rather than with movable human artifacts or those environments that are natural and completely undisturbed by man.

In addition, environment may be interpreted to include the combination and interrelationships of human artifacts with all other aspects of the physical environment, as well as with the social, economic and cultural conditions that influence the life of the people and communities in Ontario. The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* distinguish between two basic ways of visually experiencing this heritage in the environment, namely as cultural heritage landscapes and as cultural features.

Within this document, cultural heritage landscapes are defined as the following (Section 1.0):

> The use and physical appearance of the land as we see it now is a result of man's activities over time in modifying pristine landscapes for his own purposes. A cultural landscape is perceived as a collection of individual man-made features into a whole. Urban cultural landscapes are sometimes given special names such as townscapes or streetscapes that describe various scales of perception from the general scene to the particular view. Cultural landscapes in the countryside are viewed in or adjacent to natural undisturbed landscapes, or waterscapes, and include such land uses as agriculture, mining, forestry, recreation, and transportation. Like urban cultural landscapes, they too may be perceived at various scales: as a large area of homogeneous character; or as an intermediate sized area of homogeneous character or a collection of settings such as a group of farms; or as a discrete example of specific landscape character such as a single farm, or an individual village or hamlet.

A cultural feature is defined as the following (Section 1.0):

> …an individual part of a cultural landscape that may be focused upon as part of a broader scene, or viewed independently. The term refers to any man-made or modified object in or on the land or underwater, such as buildings of various types, street furniture, engineering works, plantings and landscaping, archaeological sites, or a collection of such objects seen as a group because of close physical or social relationships.

The Minister of Tourism, Culture, and Sport has also published *Standards and Guidelines for Conservation of Provincial Heritage Properties* (2014; Standards and Guidelines hereafter). These Standards and Guidelines apply to properties the Government of Ontario owns or controls that have cultural heritage value or interest. They are mandatory for ministries and prescribed public bodies and have the authority of a Management Board or Cabinet directive. Prescribed public bodies include:

- Agricultural Research Institute of Ontario
- Hydro One Inc.
- Liquor Control Board of Ontario
- McMichael Canadian Art Collection
- Metrolinx
- The Niagara Parks Commission.
- Ontario Heritage Trust
- Ontario Infrastructure Projects Corporation
- Ontario Lottery and Gaming Corporation
- Ontario Power Generation Inc.
- Ontario Realty Corporation
- Royal Botanical Gardens

- Toronto Area Transit Operating Authority
- St. Lawrence Parks Commission

The Standards and Guidelines provide a series of definitions considered during the course of the assessment:

A provincial heritage property is defined as the following (14):

> Provincial heritage property means real property, including buildings and structures on the property, that has cultural heritage value or interest and that is owned by the Crown in right of Ontario or by a prescribed public body; or that is occupied by a ministry or a prescribed public body if the terms of the occupancy agreement are such that the ministry or public body is entitled to make the alterations to the property that may be required under these heritage standards and guidelines.

A provincial heritage property of provincial significance is defined as the following (14):

> Provincial heritage property that has been evaluated using the criteria found in Ontario Heritage Act O.Reg. 10/06 and has been found to have cultural heritage value or interest of provincial significance.

A built heritage resource is defined as the following (13):

> …one or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, earthworks, monuments, installations, or remains associated with architectural, cultural, social, political, economic, or military history and identified as being important to a community. For the purposes of these Standards and Guidelines, "structures" does not include roadways in the provincial highway network and in-use electrical or telecommunications transmission towers.

A cultural heritage landscape is defined as the following (13):

> … a defined geographical area that human activity has modified and that has cultural heritage value. Such an area involves one or more groupings of individual heritage features, such as structures, spaces, archaeological sites, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements or parts. Heritage conservation districts designated under the Ontario Heritage Act, villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trails, and industrial complexes of cultural heritage value are some examples.

Additionally, the *Planning Act* (1990) and related *Provincial Policy Statement* (*PPS*), which was updated in 2014, make a number of provisions relating to heritage conservation. One of the general purposes of the *Planning Act* is to integrate matters of provincial interest in provincial and municipal planning decisions. In order to inform all those involved in planning activities of the scope of these matters of provincial interest, Section 2 of the *Planning Act* provides an extensive listing. These matters of provincial interest shall be regarded when certain authorities, including the council of a municipality, carry out their responsibilities under the *Act*. One of these provincial interests is directly concerned with:

> 2.(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest

Part 4.7 of the *PPS* states that:

> The official plan is the most important vehicle for implementation of this Provincial Policy Statement. Comprehensive, integrated and long-term planning is best achieved through official plans.
>
> Official plans shall identify provincial interests and set out appropriate land use designations and policies. To determine the significance of some natural heritage features and other resources, evaluation may be required.
>
> Official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions. Official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.
>
> In order to protect provincial interests, planning authorities shall keep their official plans up-to-date with this Provincial Policy Statement. The policies of this Provincial Policy Statement continue to apply after adoption and approval of an official plan.

Those policies of particular relevance for the conservation of heritage features are contained in Section 2-Wise Use and Management of Resources, wherein Subsection 2.6 - Cultural Heritage and Archaeological Resources, makes the following provisions:

> 2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved.

A number of definitions that have specific meanings for use in a policy context accompany the policy statement. These definitions include built heritage resources and cultural heritage landscapes.

A *built heritage resource* is defined as: "a building, structure, monument, installation or any manufactured remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Aboriginal community" (Ministry of Municipal Affairs and Housing 2014).

A *cultural heritage landscape* is defined as "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association" (Ministry of Municipal Affairs and Housing 2014). Examples may include, but are not limited to farmscapes, historic settlements, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, and industrial complexes of cultural heritage value.

In addition, significance is also more generally defined. It is assigned a specific meaning according to the subject matter or policy context, such as wetlands or ecologically important areas. With regard to cultural heritage and archaeology resources, resources of significance are those that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people (Ministry of Municipal Affairs and Housing 2014).

Criteria for determining significance for the resources are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources

may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (Ministry of Municipal Affairs and Housing 2014).

Accordingly, the foregoing guidelines and relevant policy statement were used to guide the scope and methodology of the cultural heritage assessment.

2.2 Municipal Policies

The Township of Essa has developed an Official Plan (2001), which sets out a number of policies with regard to cultural heritage resources. Policies that are relevant to this study are included below.

> SECTION 13 CULTURAL RESOURCES
>
> 13.1 INTRODUCTION
> Cultural heritage resources form an important linkage to our past and, as such, the Township of Essa recognizes their importance and will encourage the identification, conservation protection, restoration, maintenance and enhancement of cultural heritage resources. All development shall have regard to the cultural heritage resources of the Township and where possible provide appropriate protection to these resources.
>
> 13.2 POLICIES
>
> 13.2.1 In this regard the Township shall develop, administer and maintain a comprehensive Cultural Heritage Resource Inventory of the historical, cultural, architectural and archaeological significant properties in the municipality including any properties designated by the Ontario Heritage Act, or identified in Federal or County inventories.
>
> 13.2.2 Cultural Heritage Resources include but are not necessarily restricted to:
> a. A property or an area of historic value or interest, possessing one or more of the following attributes:
> (i) an example of the Township's past social, cultural, political, technological or physical development;
> (ii) a representative example of the work of an outstanding local, national or international personality;
> (iii) a property associated with a person who has made a significant contribution to the social, cultural, political, economic, technological or physical development of the Township, County, Province or Country;
> b. A property or area of architectural value or interest, possessing one of the following attributes:
> (i) a representative example of a method of construction which was used during a certain time period or is rarely used today;
> (ii) a representative example of an architectural style, design or period of building;
> (iii) an important Township landmark;
> (iv) a work of substantial engineering merit;
> (v) a property which makes an important contribution to the area composition or streetscape of which it forms a part.

c. A property or area recognized by the Province as being archaeologically significant.
d. An area in which the presence of properties collectively represent a certain aspect of the development of the Township, or which collectively are considered significant to the community as a result of their location or setting.
e. An area exhibiting landscape features such as woodlots, hedgerows, trees, fields, roadways, bridges and fences of historical or cultural significance to the Township.

13.2.3 Designation of Heritage Properties.

It is a policy of this Plan to control as fully as possible the demolition, removal, or inappropriate alteration of buildings of historic or architectural value or interest included in the Township's Cultural Heritage Resource Inventory and, for these purposes, Council may:

a. Pass by-laws pursuant to the Ontario Heritage Act to designate properties, buildings or structures to be of historic or architectural value or interest. Such by-laws include a designation of the property and a statement of the reasons for designation.
b. Pass by-laws providing for the acquisition by purchase, lease or otherwise any property designated, or for the expropriation of any such property.
c. Acquire heritage easements, apply restrictive covenants and enter into development agreements, as appropriate, for the preservation of heritage resources.
d. Encourage the documentation of heritage resources which are to be demolished or significantly altered for archival purposes.

13.2.4 Cultural Heritage Impact Assessment.

A Cultural Heritage Impact Assessment shall be required when a development proposal includes or is contiguous to a heritage resource identified in the Township's Cultural Heritage Resource Inventory. A Cultural Heritage Impact Assessment will include the following elements:

a. Identification and evaluation of the heritage resources.
b. Graphic and written inventory of the heritage resources.
c. Assessment of the proposals impact on the heritage resources.
d. Means to mitigate negative impacts.
e. Identification of, and justification for, the Assessments recommendations.

Additional information may be required by the Township depending on the nature and location of the proposal. The Township shall make available any relevant information that it maintains respecting the cultural heritage resource. A completed Cultural Heritage Impact Assessment shall be submitted to the Township, and Council shall review and approve the Report. Council may scope or waive the requirement of a Cultural Heritage Impact Assessment where the scale and nature of the proposed development would not warrant the completion of the study.

13.2.5 Council may pass by-laws:

a. To ensure the protection of heritage features.
b. To regulate development so that it is sympathetic in height, bulk, location and character to Cultural Heritage Resources.
c. To control demolition of heritage buildings or structures in a defined area

or enter into an easement agreement or covenant with the owner of any real property and register such easement or covenant against the real property in the Land Registry Office for the purpose of:

a. Conserving, protecting and preserving the heritage features of the property.
b. Preventing any demolition, construction, alteration, remodeling or any other action which would adversely affect the heritage features of the property.
c. Establishing criteria for the approval of any development affecting the heritage property.

2.2.2 Municipal Consultation

The Township of Essa was also consulted for additional information on the subject bridge.[1] Correspondence with planning staff at the Township of Essa was able to confirm that the structures are not on any municipal heritage registers, or subject to any local heritage recognition.

2.3 Cultural Heritage Evaluation and Heritage Impact Assessment Report

The scope of a Cultural Heritage Evaluation (CHE) is guided by the Ministry of Tourism, Culture and Sport's *Ontario Heritage Toolkit* (2006). Generally, CHEs include the following components:

- A general description of the history of the study area as well as a detailed historical summary of property ownership and building(s) development;
- A description of the cultural heritage landscape and built heritage resources;
- Representative photographs of the exterior and interior of a building or structure, and character-defining architectural details;
- A cultural heritage resource evaluation guided by the *Ontario Heritage Act* criteria;
- A summary of heritage attributes;
- Historical mapping, photographs; and
- A location plan.

Using background information and data collected during the site visit, the cultural heritage resource is evaluated using criteria contained within Regulation 9/06 of the *Ontario Heritage Act*.

Ontario Heritage Act Regulation 9/06 provides a set of criteria, grouped into the following categories which determine the cultural heritage value or interest of a potential heritage resource in a municipality:

i) Design/Physical Value;
ii) Historical/Associative Value; and
iii) Contextual Value.

Should the potential heritage resource meet one or more of the above mentioned criteria, a Heritage Impact Assessment (HIA) is required and the resource considered for designation under the *Ontario Heritage Act*.

[1] Correspondence was conducted by Ainley Group on behalf of ASI.

The scope of a Heritage Impact Assessment (HIA) is provided by the MTC's *Ontario Heritage Tool Kit.* An HIA is a useful tool to help identify cultural heritage value and provide guidance in supporting environmental assessment work. As part of a heritage impact assessment, proposed site alterations and project alternatives are analyzed to identify impacts of the undertaking on the heritage resource and its heritage attributes. The impact of the proposed development on the cultural heritage resource is assessed, with attention paid to identifying potential negative impacts, which may include, but not limited to:

- Destruction of any, or part of any, significant heritage attributes or features;
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance;
- Shadows created that alter the appearance of a heritage attribute or change the viability of an associated natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship;
- Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features;
- A change in land use (such as rezoning a church to a multi-unit residence) where the change in use negates the property's cultural heritage value;
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect a cultural heritage resource, including archaeological resources.

Where negative impacts of the development on the cultural heritage resource are identified, mitigative or avoidance measures or alternative development or site alteration approaches are considered.

3.0 HISTORICAL CONTEXT AND CONSTRUCTION

3.1 Introduction

The subject bridge is a two-span, cast-in-place concrete T-beam bridge rigidly integrated with the abutments and central pier that carries two lanes of 5th Line vehicular traffic over the Nottawasaga River in an south-north orientation in the Township of Essa, Ontario. Historically, the study area is located within Lot 24, Concession V in the Township of Essa, Simcoe County (Figures 2 and 3).

Cultural heritage resources are those buildings or structures that have one or more heritage attributes. Heritage attributes are constituted by and linked to historical associations, architectural or engineering qualities and contextual values. Inevitably many, if not all, heritage resources are inherently tied to "place"; geographical space, within which they are uniquely linked to local themes of historical activity and from which many of their heritage attributes are directly distinguished today. In certain cases, however, heritage features may also be viewed within a much broader context. The following section of this report details a brief historical background to the settlement of the surrounding area. A description is also provided of the construction of the bridge within its historical context.

3.2 Local History and Settlement

3.2.1 Township of Essa

Essa Township was surveyed between 1820 by S.M. Benson, who potentially named the area in honour of the daughter of a local Indigenous leader. Early Euro-Canadian settlement began soon after the initial survey with three families from County Monaghan, Ireland. Initial settlement was slow, due to the lack of local mills to grind grain and settlements to buy supplies. Early settlers had to travel to either Newmarket or Holland Landing, often by foot as the swampy terrain made travel with animals difficult (Mika and Mika 1977; Rayburn 1997).

Settlement increased in the 1850s, when the Northern Railway branch connecting Allendale to Collingwood was constructed and obtaining supplies and bringing goods to market was more easily accomplished. The first saw mill in the Township was constructed in 1853, and the settlement of Pine Rivers quickly sprang up around it. The Village of Angus was laid out in 1857 and became a lumbering hub in the local area. Agriculture was also productive in the township in the nineteenth century due to the highly productive soil (Mika and Mika 1977; Rayburn 1997).

3.3 History of the Study Area, 5th Line, and Previous Bridge Crossings

Historically, the study area is located within Lot 24, Concession V in the Township of Essa, Simcoe County. A review of historical mapping, archival records, and periodicals suggests that an earlier bridge crossing was originally constructed in the location of the present structure. This earlier bridge was a wooden structure of unknown construction, and was removed when the extant structure was erected in the mid-twentieth century.

The 1871 *Hoggs Map of Essa Township* (Hogg 1871) and the 1881 *Map of Essa Township* (Belden 1881) were examined to determine the presence of historic features within the study area during the nineteenth century (Figures 2 and 3). The 1871 *Hoggs Map of Essa Township* depicts 5th Line in a straight north-south orientation, unlike the 1881 mapping, which depicts a jog in the road immediately south of the Nottawasaga River crossing. The Nottawasaga River is illustrated as crossing 5th Line one lot north of the actual location at the southern limit of Lot 24. The study area is depicted as rural in the nineteenth century, with no structures illustrated in the vicinity of the crossing. The 1871 Hoggs Map lists the west half of Lot 24, Concession V as owned by C. Miller, and the east half of Lot 24 Concession IV as owned by T. Willoughby. No bridge is illustrated at the 5th Line crossing of the Nottawasaga River in either nineteenth-century map.

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases. In addition, the use of historical map sources to reconstruct/predict the location of former features within the modern landscape generally proceeds by using common reference points between the various sources. These sources are then geo-referenced in order to provide the most accurate determination of the location of any property on historic mapping sources. The results of such exercises are often imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including the vagaries of map production (both past and present), the need to resolve differences of scale and resolution, and distortions introduced by reproduction of the sources. To a large degree, the significance of such margins of error is dependent on the size of the feature one is attempting to plot, the constancy of reference points, the distances between them, and the consistency with which both they and the target feature are depicted on the period mapping.

In addition to nineteenth-century mapping, topographical maps and aerial photographs from 1928, 1954, and 1986 were examined as part of this study.

The 1928 *Topographical Map* (Figure 4) depicts 5th Line in its present alignment with a wooden bridge carrying the roadway over the Nottawasaga River. There are no structures depicted in the vicinity of the bridge. Topographical mapping from 1943 and 1950 were also examined as part of this assessment (mapping is not depicted in this report). The 1943 Topographical map depicts a wooden bridge at the crossing, as in the earlier 1928 mapping, while the 1950 Topographical Map does not list the material of the bridge. The subject bridge was constructed in 1950, and as such, it is unclear if the earlier wooden bridge or the extant concrete bridge is depicted. The Canadian Pacific Railway is illustrated to the east of 5th Line, with an iron bridge carrying it over the Nottawasaga River to the south (upstream) of the subject bridge. In general, the early- and mid-twentieth-century topographical maps indicate that the general area retained a rural agricultural context into the mid-twentieth century.

The 1954 aerial photograph (Figure 5) demonstrates the study area retained a rural agricultural context into the mid-twentieth century, with the immediate environs consisting of heavily wooded Nottawasaga River floodplain surrounded by active farmland. 5th Line appears to have been recently modified from its original alignment, with the northern approach moved to the east and the southern approach moved to the west. The alignment of 5th Line is further modified south of the subject bridge in several locations. The subject bridge is not clearly visible due to the low resolution of the photograph, however, 5th Line appears to be carried over the Nottawasaga River by the subject bridge, and not by the earlier wooden bridge. Based on the review of historical mapping, it appears as though 5th Line was realigned in the early-to-mid 1950s as part of the construction of the subject bridge.

The 1986 Topographical map (Figure 6) demonstrates that the study area underwent minimal changes during the latter half of the twentieth century. To compensate for the topographic relief in the area adjacent to the river valley, 5th Line is illustrated with an embankment to the north of the bridge, and a cutting to the south. The subject bridge is depicted in a slightly different alignment than earlier topographical maps with 5th line diverting to the east slightly in the immediate vicinity of the subject bridge. Landscape features in the general area, including farms and the wooded Nottawasaga River floodplain, are depicted as previously described. The general area surrounding the subject bridge is depicted as maintaining a rural agricultural context into the late twentieth century.

Figure 2: The study area overlaid on the 1871 Hogg's Map of Essa Township

Base Map: Hogg 1871

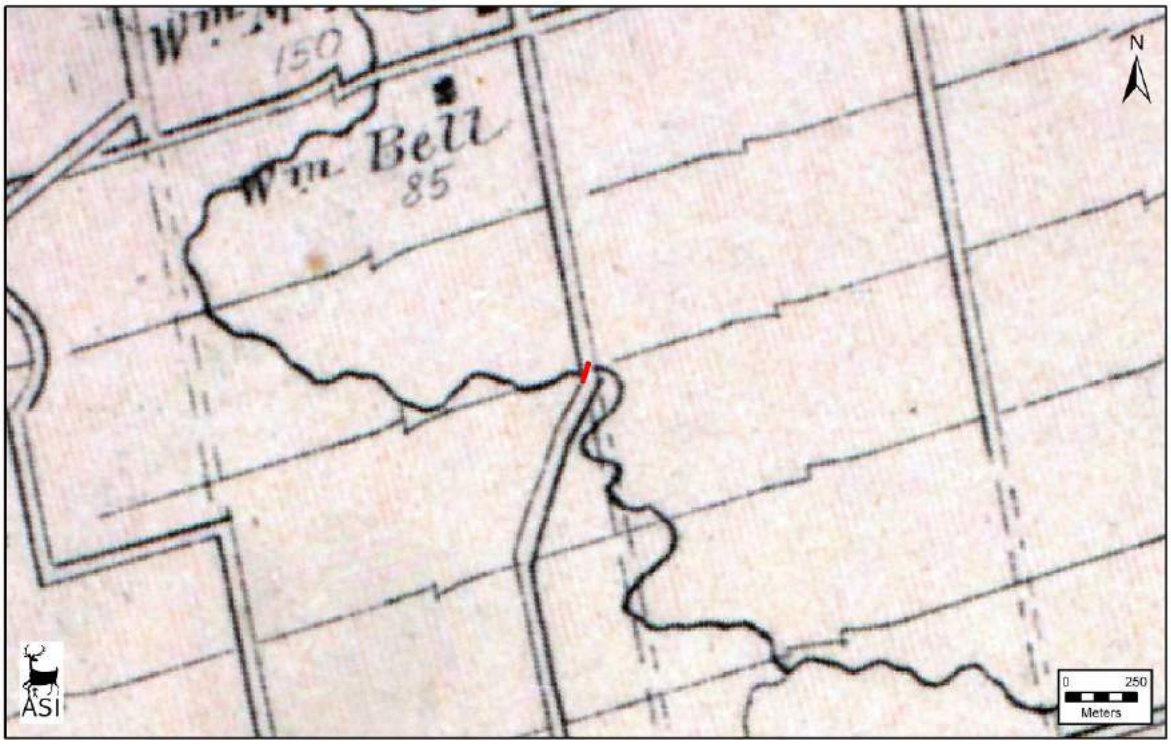


Figure 3: The study area overlaid on the 1881 *Illustrated Historical Atlas*

Base Map: Belden 1881

Figure 4: The study area overlaid on the 1928 NTS map
Base Map: NTS Sheet No. 105 (Barrie)(Department of National Defense 1928)

Figure 5: The study area overlaid on the 1954 aerial photograph
Base Map: Plate 443.794, Hunting Survey Corporation 1954

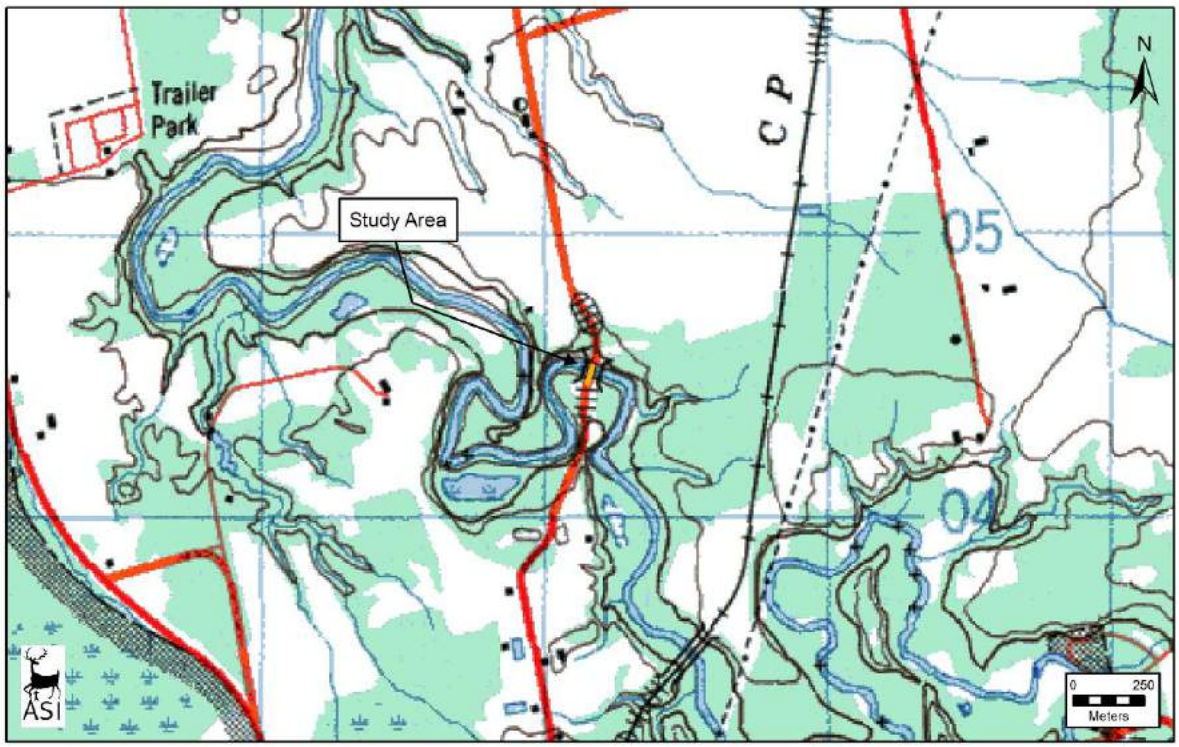


Figure 6: The study area overlaid on the 1986 NTS map
Base Map: NTS Sheet 31D-05 (Barrie) (Department of Energy, Mines and Resources 1986)

3.4 Bridge Construction

3.4.1 Early Bridge Building in Ontario

Up until the 1890s, timber truss bridges were the most common bridge type built in southern Ontario. Stone and wrought iron materials were also employed, but due to their higher costs and a lack of skilled craftsman, these structures were generally restricted to market towns. By the 1890s, steel was becoming the material of choice when constructing bridges given that it was less expensive and more durable than its wood and wrought iron predecessors. Steel truss structures were very common by 1900, as were steel girder bridges. The use of concrete in constructing bridges was introduced at the beginning of the twentieth century, and by the 1930s it was challenging steel as the primary bridge construction material in Ontario (Heritage Resource Centre 2008:7-8).

The increased use of automobiles in the 1930s directly impacted the course of highway design and planning, which in turn affected the design and construction of highway bridges. In an effort to reduce traffic congestion and improve the province's tourism initiatives, the Department of Highways, Ontario (DHO) began to work towards introducing the controlled access freeways concept to Ontario. The first of these, the Middle Road Highway, connecting Highway 27 to Hamilton, was located north of the heavily used Highway 2, and was redesigned in the mid 1930s and extended to St. Catharines as a dual-lane, divided highway. Upon its completion in 1939, it was dedicated as the Queen Elizabeth Way (QEW). The development and construction of controlled access highways continued in the 1940s and 1950s with the Toronto-Oshawa Highway in Oshawa, the Toronto-Barrie Highway, and the Toronto Bypass (Cuming 1983).

Factors impacting bridge design included increasing road allowances and clearance requirements, heavier traffic, higher speeds, safety standards, and most importantly, cost limitations (Cuming 1983:56). From the 1930s to the early 1950s, fewer bridges were constructed as a result of a steel shortage, and builders were challenged to develop more efficient ways to build structures with a heavier emphasis on concrete and minimal steel usage. Some of the new techniques developed included: pre-casting concrete components off site; "Hi-bond type" of reinforcing concrete; and pre-stressed concrete beam construction (Heritage Resource Centre 2008:9). The rigid frame, hollow concrete box beam and post-tensioned voided slab are some of the bridge types to develop during this period.

3.4.2 Construction of Township of Essa Bridge No. 9

The original structural drawings are not available and were therefore not reviewed as part of this assessment. Research at the local Simcoe County archives was unable to uncover details of the tendering process for the construction, or the winning contractor in the 1949-1951 Council Minutes (Essa Township 1943-1959). Based on a review of available data, the subject bridge was constructed in 1950, during which time the District Municipal Engineer was James Ludgate and the Township Engineer was F.M Eagleson. While it is likely one or both of these engineers at the very least granted approval for the construction, the engineer responsible for designing the subject bridge is unknown.

4.0 EXISTING CONDITIONS AND INTEGRITY

A field review was undertaken by John Sleath on 17 October 2017 to conduct photographic documentation of the crossing and to collect data relevant for completing a heritage evaluation of the

structure. Results of the field review and bridge inspection reports received from the client were then utilized to describe the existing conditions of the bridge crossing. This section provides a general description of the bridge crossing and associated cultural heritage features. The location of the subject bridge is provided in Figure 7, and photographic documentation of the bridge crossing is provided in Appendix A (Plates 1-19).

Historically, the study area is located within Lot 24, Concession V in the Township of Essa, Simcoe County. Township of Essa Bridge No. 9 is a two-span, cast-in-place concrete T-beam bridge rigidly integrated with the abutments and central pier, and was built in 1950 to carry two lanes of 5th Line traffic over the Nottawasaga River.

The substructure of the subject bridge features reinforced, cast-in-place concrete abutments with the formwork joints visible on the exterior surfaces. Both the north and south abutments are rigidly integrated with the cast-in-place concrete superstructure. The central pier is also integrated monolithically with the superstructure, and features pointed metal ice floe protection on the upstream (east) side. The approach embankments are stabilized by vegetation.

The superstructure of the subject bridge features three variable-depth reinforced cast-in-place concrete T-beams monolithically integrated with the abutments and pier. The bridge deck is cast-in-place concrete with a concrete wearing surface, and measures 51 metres in length and 7.5 metres in overall width. The road surface measure 6.1 metres in with, and is bound by concrete curbs on both sides 0.7 metres in width. Drainage is provided by 16 drain holes in the deck that divert water into the river below. Concrete horizontal bar railings are located at the outer margins of the deck.

The approaches to the bridge are elevated above grade on the south side, and bound by post and cable barriers. The north approach is similarly elevated above the surrounding grade level, but lacks any barriers. Both approaches slope downward to the subject bridge, and feature signage immediately adjacent to the bridge on both the east and west railings.

The subject bridge is currently owned/maintained by the Township of Essa. According to inspections undertaken in 2008, the structure was in generally good/fair condition, but was noted as being an insufficient width based on the Municipal Bridge Appraisal Manual and having insufficient barrier systems to meet current Canadian Highway Bridge Code requirements (TSH 2008). The 2015 Municipal Bridge Appraisal (AECOM 2015) lists the structure in generally good condition, and recommends the following repairs: replacement of the bridge deck with an increased width; installation of guiderails on approaches; and repair of south embankment.

The bridge crossing is bounded by wooded floodplains to the north and south of the bridge. A residence is located approximately 120 metres northeast, and another residence is located approximately 140 metres northwest of the north abutment.

According to the data received from the client, there is no indication that the bridge has ever been rehabilitated by the Township of Essa. However, deck wearing surface repair was evident at the time of field inspection with small sections of asphalt used to fill potholes and other imperfections.

Figure 7: Orthographic image of the subject bridge

Base Map: ESRI DigitalGlobe

4.1 Comparative Geographic and Historic Context of Concrete T-Beam Bridges

The Township of Essa Bridge No. 9 is a two-span, cast-in-place concrete T-beam bridge constructed in 1950, measuring 51 metres in length and 7.5 metres in width. No municipal inventory of bridges within the Township of Essa was available, and so the following comparative analysis is based on the MTO Bridge Inventory for the Central Region of Ontario. According to the MTO bridge inventory, an additional 16 reinforced concrete T-beam bridges in the Central Region of Ontario are owned and maintained by the province (Appendix B).

The subject bridge, constructed in 1950, is the seventh oldest of 17 bridges, with the Glass's Bridge, constructed in 1913, being the oldest. The subject bridge is not significant in terms of its age of construction.

The subject bridge, featuring two spans, is the 13th longest of 17 bridges in terms of number of spans (along with three other two-span bridges), with the Highway 401/Lakeridge Rd Underpass, with a total of seven spans, being the longest. The subject bridge is not significant in terms of the total number of spans.

The subject bridge, measuring 51 metres in overall length, is the eighth longest of 17 bridges, with the Highway 401/Lakeridge Rd Underpass, with a total length of 118 metres, being the longest. The subject bridge is not significant in terms of the overall length.

Based on the review and comparison of the available bridges in this comparative sample, the two-span Township of Essa Bridge No. 9, constructed in 1950 and measuring 51 metres in length is not considered to be significant in terms of age or overall length. However, its arched, variable-depth T-beam design demonstrates an elevated concern for aesthetic value in addition to reducing the weight of the individual spans. While this technique is featured on similar structures in the mid-twentieth century (Figures 8-10), it enhances the aesthetic of the natural riverine setting in the context of the subject bridge. Further, the subject bridge retains the original concrete bar railings on the margins of the deck, which were found to be in good condition at the time of field inspection. Therefore, the subject bridge is considered to be a unique example of a reinforced-concrete T-beam bridge with an emphasis on aesthetic design in the Central Region of Ontario.

The following images are included to provide a comparison between like structures (Figures 8–11).

Figure 8: Esquesing Township Bridge No. 5, a two-span T-beam structure built in 1960 (Google Streetview)

Figure 9: Lyon's Creek Bridge, a single-span T-beam structure built in 1941 (Google Streetview)

Figure 10: Highway 401-Sixth Line Underpass, a four-span T-beam structure constructed in 1958 (Google Streetview)

Figure 11: Highway 405-QEW Underpass, a three-span T-beam structure built in 1962 (Google Streetview)

4.2 Additional Cultural Heritage Resources

There are no previously identified cultural heritage resources located adjacent to the subject bridges.

5.0 HERITAGE EVALUATION OF TOWNSHIP OF ESSA BRIDGE NO. 9

Table 1 contains the evaluation of the subject against criteria as set out in Regulation 9/06 of the *Ontario Heritage* Act. Within the Municipal EA process, Regulation 9/06 is the prevailing evaluation tool when determining if a heritage resource, in this case bridges, have cultural heritage value.

Table 1: Evaluation of the Township of Essa Bridge No. 9 using Ontario Regulation 9/06

1. The property has design value or physical value because it:

Ontario Heritage Act Criteria	Analysis
i. is a rare, unique, representative or early example of a style, type, expression, material or construction method;	The Township of Essa Bridge No. 9 is a two-span cast-in-place reinforced concrete T-beam bridge rigidly integrated with the abutments and central pier. It was built in 1950 to carry two lanes of 5th Line traffic over the Nottawasaga River, and measures 51 metres in length and 7.5 metres in overall width. While cast-in-place concrete T-beam bridges are common in Southern Ontario, the inclusion of original concrete horizontal bar railings is becoming increasingly rare as they are replaced with more modern varieties due to changing highway safety regulations. However, the Township of Essa Bridge No. 9 is not considered to be an increasingly rare and unique example of mid-twentieth century bridge type. The subject structure does not meet this criterion.
ii. displays a high degree of craftsmanship or artistic merit, or;	The subject bridge exhibits an arched variable-depth profile, with the T-beam depth thinning towards the center of the spans. While serving a practical function by reducing weight, it also increases the aesthetic value of the structure. However, this structure does not display a high degree of craftsmanship or artistic merit. Therefore, the subject bridge does not meet this criterion.
iii. demonstrates a high degree of technical or scientific achievement.	The subject bridge exhibits a low degree of technical achievement, and as such, does not meet this criterion.

2. The property has historical value or associative value because it:

Ontario Heritage Act Criteria	Analysis
i. has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community;	The structure was constructed in the mid-twentieth century in a rural agricultural area that maintains its rural character into the present. While 5th Line is an historically surveyed road, the extant structure is not original to the roadway, and was constructed as a replacement to an earlier, unknown wooden structure. The subject structure does not meet this criterion.
ii. yields, or has the potential to yield, information that contributes	This criterion is not satisfied given that the structures do not contribute to an understanding of a community or culture.

Table 1: Evaluation of the Township of Essa Bridge No. 9 using Ontario Regulation 9/06

to an understanding of a community or culture, or;	
iii. demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.	The subject bridge was designed and built by unknown individuals, although it was most likely approved by James Ludgate, District Municipal Engineer, and F.M. Eagleson, Township Engineer. The impact of these two individuals in the local context is unknown, and as such, the subject structure does not meet this criterion.

3. The property has contextual value because it:

Ontario Heritage Act Criteria	Analysis
i. is important in defining, maintaining or supporting the character of an area;	The subject bridge provides access to 5th Line motorists over the Nottawasaga River and supports the picturesque natural riverine character of the area. However, it is the bridging point and not the structure that maintain this character. Therefore, the subject structure does not meet this criterion.
ii. is physically, functionally, visually or historically linked to its surroundings, or;	The location of the subject bridge has served as an historical bridging point for vehicles over the Nottawasaga River and is physically associated with 5th Line, an historically surveyed road. However, the subject bridge is not original to the crossing, and replaced an earlier, unknown wooden structure. As such, the subject bridge does not meet this criterion.
iii. is a landmark.	While visible to motorists on 5th Line and recreational paddlers on the Nottawasaga River, the subject bridge is not considered a defining element to the agricultural and woodland setting or a waypoint along the roadway, and does not meet this criterion.

The above evaluation confirms that this structure does not meet the criteria contained in Regulation 9/06 of the *Ontario Heritage Act* and therefore is currently not considered to be a cultural heritage resource eligible for designation under the *Ontario Heritage Act.*

6.0 CONCLUSIONS

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and application of Regulation 9/06 of the *Ontario Heritage Act*, the Township of Essa Bridge No. 9 was not determined to possess heritage value.

7.0 RECOMMENDATIONS

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and heritage evaluation, the Township of Essa Bridge No. 9 was not determined to retain cultural heritage value following application of Regulation 9/06 of the *Ontario Heritage Act*. Therefore, the following recommendations should be considered and implemented:

1. This report should be sent to the Township of Essa for review.

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APPENDIX A: Photographic Plates

Plate 1: West elevation of the subject bridge, looking southeast.

Plate 2: West elevation of the northern span and north abutment, looking east.

Plate 3: West elevation of the central pier, looking southeast.

Plate 4: West elevation of the southern span and southern abutment, looking southeast.

Plate 5: East and north elevations of the central pier, looking southwest. Note the ice floe protection on the upstream side of the pier.

Plate 6: East elevation showing soffit and north elevation of central pier, looking southwest.

Plate 7: Bridge soffit showing variable-depth arched T-beams and cast-in-place concrete deck, looking south from north abutment.

Plate 8: North elevation of the pier, looking south.

Plate 9: North abutment, looking northwest.

Plate 10: Ice floe protection on the east (upstream) elevation of the pier.

Plate 11: West elevation of south abutment, looking east.

Plate 12: North approach showing eastern railing, looking southeast.

Plate 13: West railing on north approach, showing where the plaque for the bridge was originally located, looking west.

Plate 14: Bridge deck, looking south on 5th Line over the structure.

Plate 15: East railing on north portion of the bridge deck, looking east.

Plate 16: Drainage hole through the bridge deck, with the curb at right.

Plate 17: North approach, looking south on 5th Line.

Plate 18: 5th Line south of the subject bridge, looking south from the south approaches.

Plate 19: Nottawasaga River and river valley, looking northeast from south approaches.

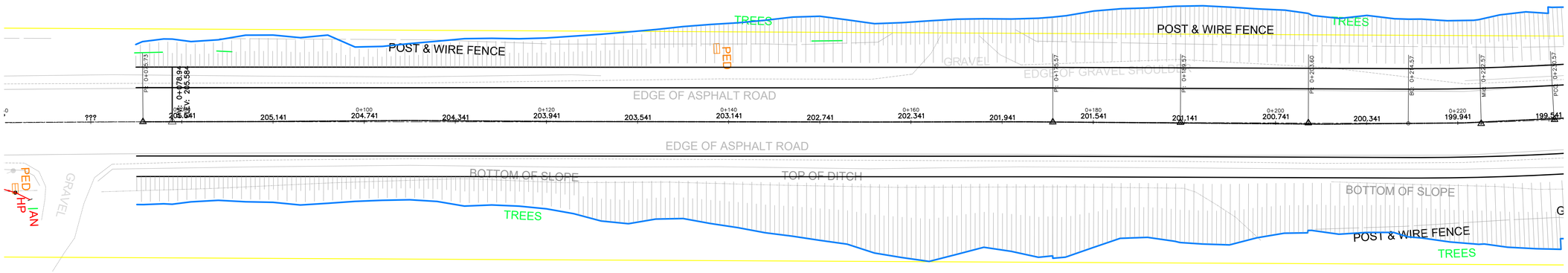
APPENDIX B: Comparative Bridges in MTO Central Region Inventory

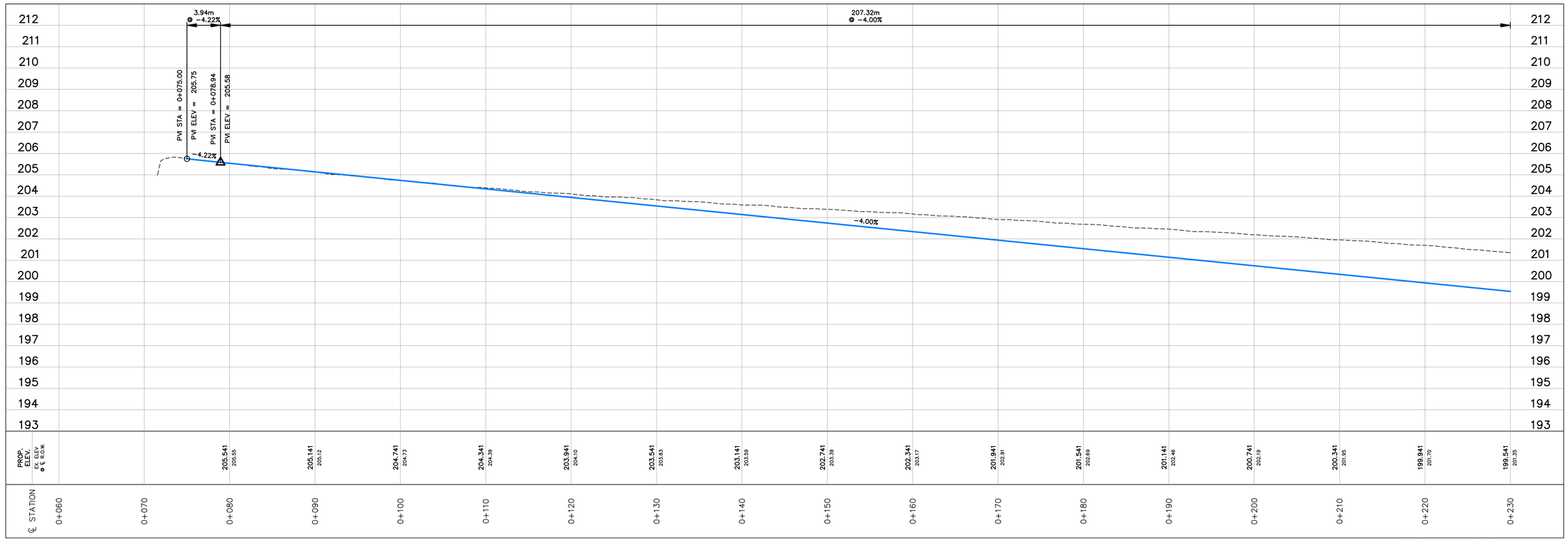
ID	STRUCTURE	TYPE 1	MATERIAL 1	HWY NAME	YEAR BUILT	LATITUDE	LONGITUDE	# OF SPANS	SPAN DETAILS	DECK LENGTH	WIDTH TOTAL	OVERALL DECK AREA
30 - 254/	GLASS'S BRIDGE	T Beam	Reinforced Cast-In-Place Concrete	89	1913	44.197455	-79.667404	1	Total=7.6 (1)=7.6;	8.7	10.7	93.1
34 - 66/2	Lyons Creek - SBL	T Beam	Reinforced Cast-In-Place Concrete	1	1941	43.031132	-79.110951	3	Total=30 (1)=5;(2)=20;(3)=5;	30.2	12.36	373.3
34 - 67/1	Tee Creek Bridge NBL	T Beam	Reinforced Cast-In-Place Concrete	1	1941	43.029123	-79.108487	3	Total=30 (1)=5;(2)=20;(3)=5;	30.2	13.89	419.5
34 - 66/1	Lyons Creek Bridge (NBL)	T Beam	Reinforced Cast-In-Place Concrete	1	1941	43.031246	-79.110776	3	Total=30 (1)=5;(2)=20;(3)=5;	30.2	14.4	434.9
34 - 128/2	BLACK CREEK BRIDGE, WBL	T Beam	Reinforced Cast-In-Place Concrete	1	1942	42.963272	-79.022115	3	Total=30 (1)=5;(2)=20;(3)=5;	30.2	14.48	437.3
34 - 128/1	BLACK CREEK BRIDGE, EBL	T Beam	Reinforced Cast-In-Place Concrete	1	1942	42.96338	-79.02194	3	Total=30 (1)=5;(2)=20;(3)=5;	30.2	14	422.8
24 - 193/	DIXIE ROAD UNDERPASS. AT Q.E.W	T Beam	Reinforced Cast-In-Place Concrete	1	1953	43.5966	-79.568959	3	Total=61.6 (1)=15.4;(2)=30.8;(3)=15.4;	61.6	18	1108.8
10 - 77/	6TH LINE WEST UNDERPASS	T Beam	Reinforced Cast-In-Place Concrete	401	1958	43.56142	-79.840363			62.8	10.5	659.4
10 - 56/	ESQUESING TWP BR NO 5	T Beam	Reinforced Cast-In-Place Concrete	401	1960	43.528114	-79.905254	2	Total=40 (1)=20;(2)=20;	43	17.28	743
22 - 122/	Hwy. 401/Lakeridge Road Underpass	T Beam	Reinforced Precast Concrete	401	1961	43.861583	-78.98263	7	Total=118 (1)=14;(2)=18;(3)=18;(4)=18;(5)=18;(6)=18;(7)=14;	118	10.36	1222.5
18 - 163/	Hwy 405 - Mewburn Rd. Underpass (formerly GRAVEL RD. BR.)	T Beam	Reinforced Cast-In-Place Concrete	405	1962	43.153335	-79.134074	4	Total=63.8 (1)=11.5;(2)=20.4;(3)=20.4;(4)=11.5;	64.5	10.5	677.3

18 - 162/	Hwy 405/NIAGARA TWP. QEW. INT.O/P	T Beam	Post-Tensioned Cast-In-Place Concrete	405	1962	43.151986	-79.150315	3	Total=116 (1)=34;(2)=48;(3)=34;	116	11.03	1279.5
10 - 194/	FLAMBOROUGH E. BR. #12 U/P	T Beam	Post-Tensioned Cast-In-Place Concrete	403	1962	43.31213	-79.859974	4	Total=72; (1)=13;(2)=23;(3)=23;(4)=13;	72.2	17.98	1298.2
10 - 195/	King's Rd. U'Pass	T Beam	Post-Tensioned Cast-In-Place Concrete	403	1962	43.328795	-79.842478	4	Total=74; (1)=15;(2)=22;(3)=22;(4)=15;	75.3	10.36	780.1
37 - 205/1	Bayview Ave O/P EB Coll	T Beam	Prestressed Precast Concrete	401	1966	43.762992	-79.386847	2	Total=31 (1)=15.5;(2)=15.5;	31	21.33	661.2
37 - 205/2	Bayview Avenue O/P WB Coll	T Beam	Prestressed Precast Concrete	401	1967	43.763592	-79.386875	2	Total=31.14 (1)=15.57;(2)=15.57;	31	21.33	661.2

Appendix G

Vertical Road Alignment Design Options





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DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

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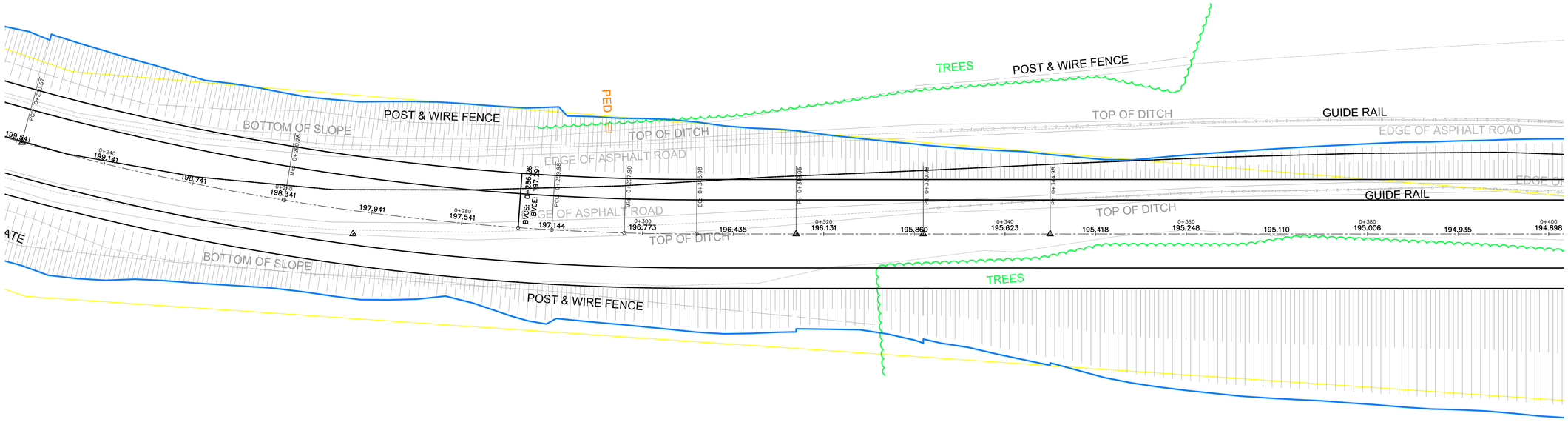

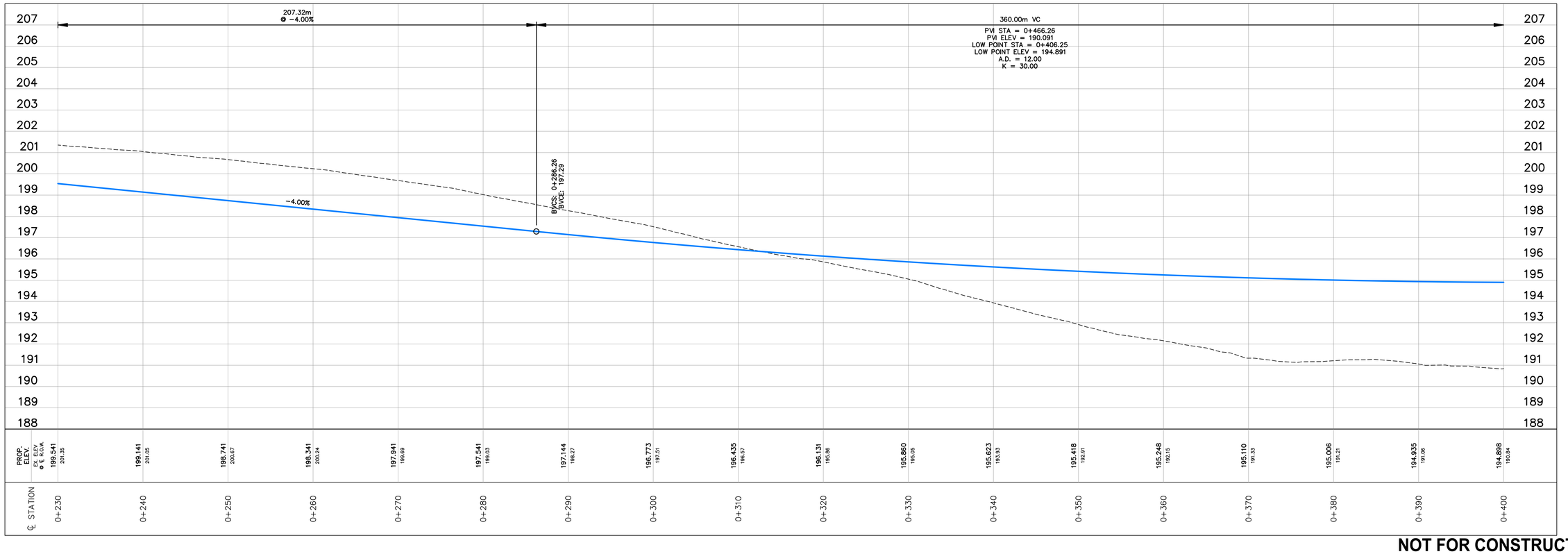

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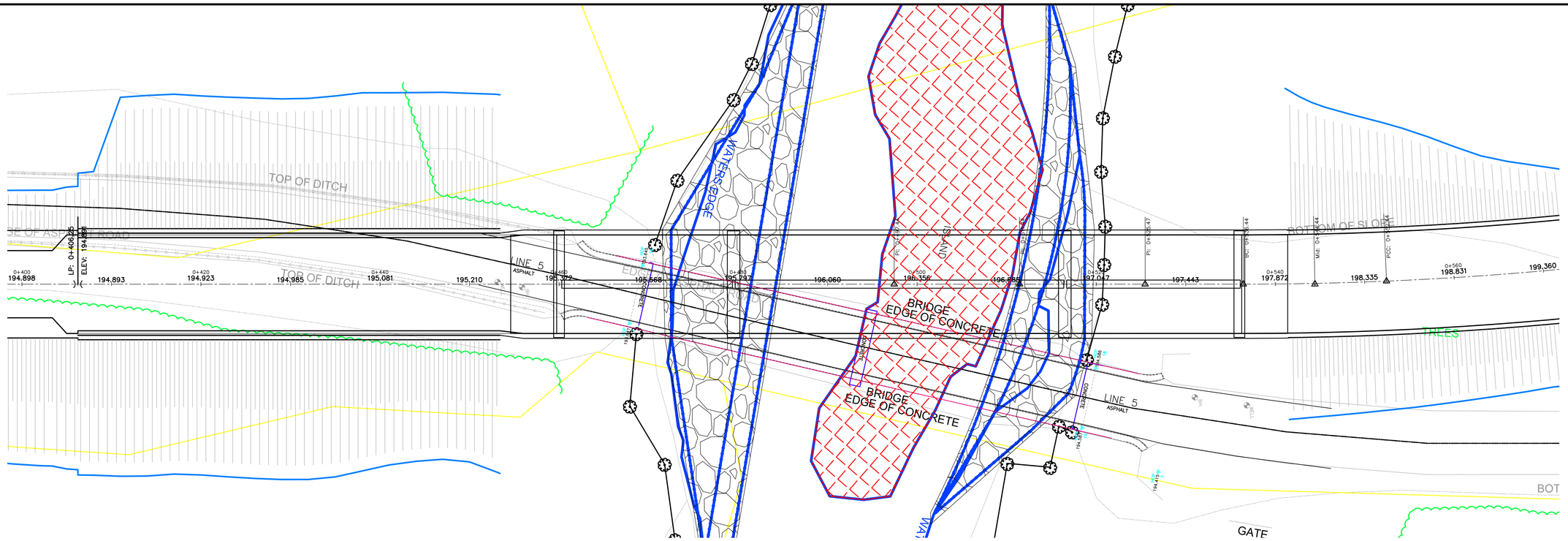

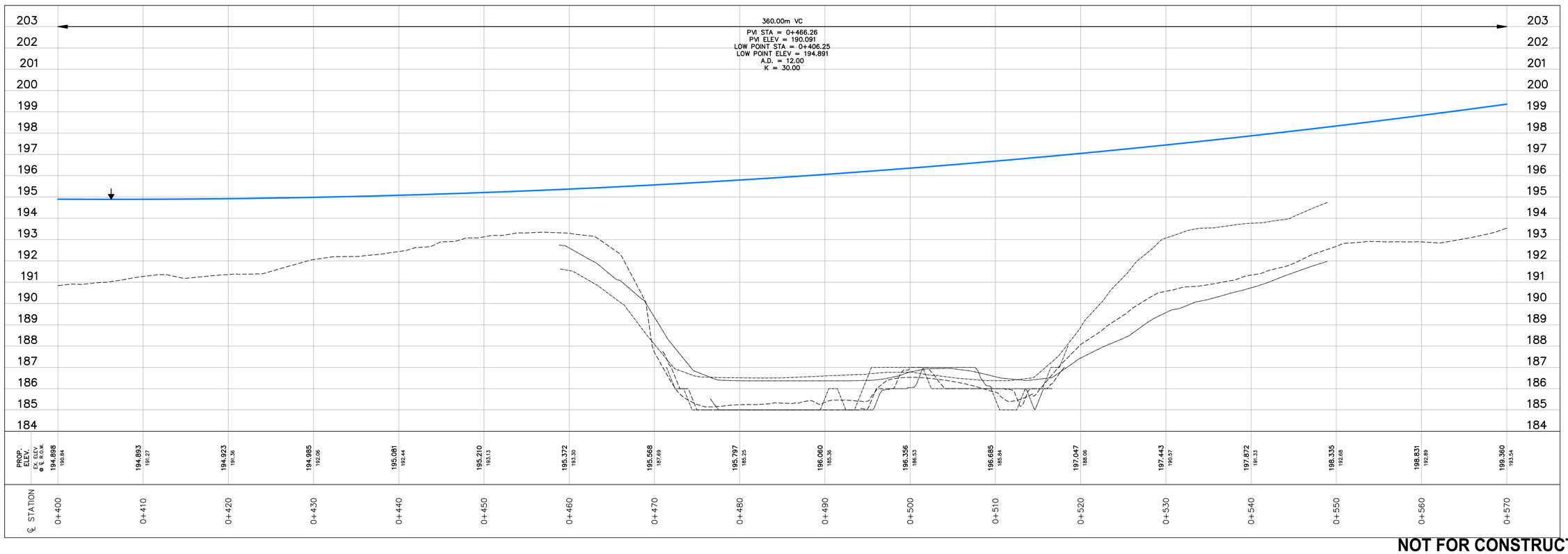

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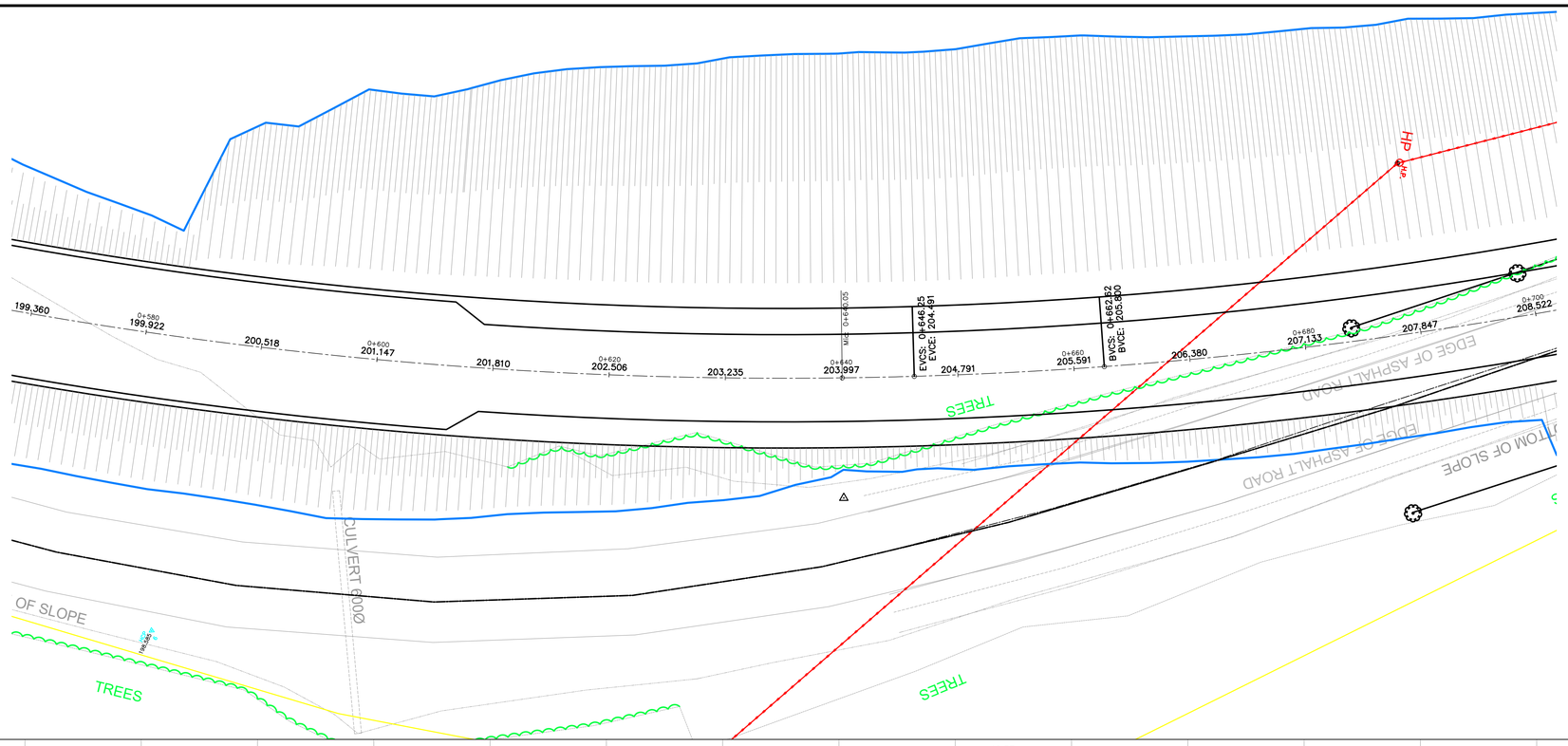

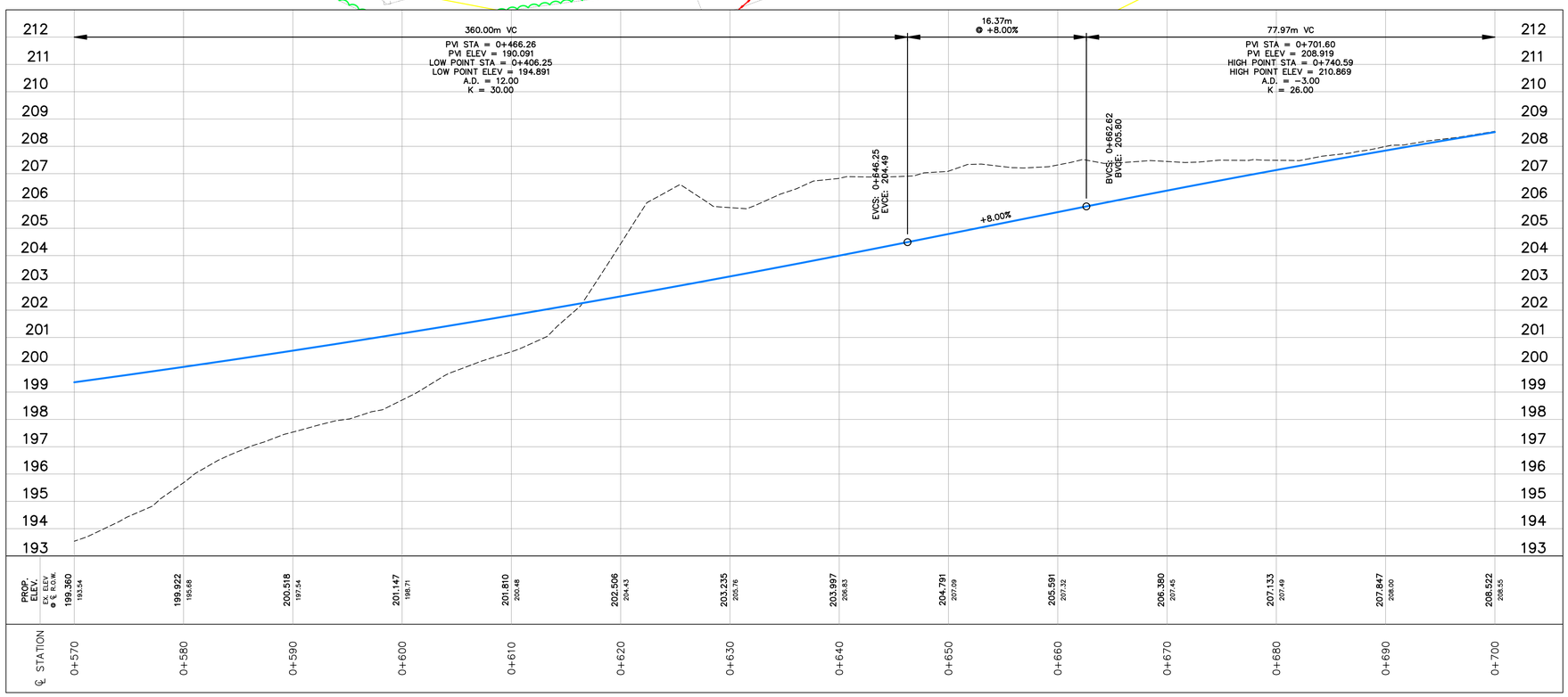

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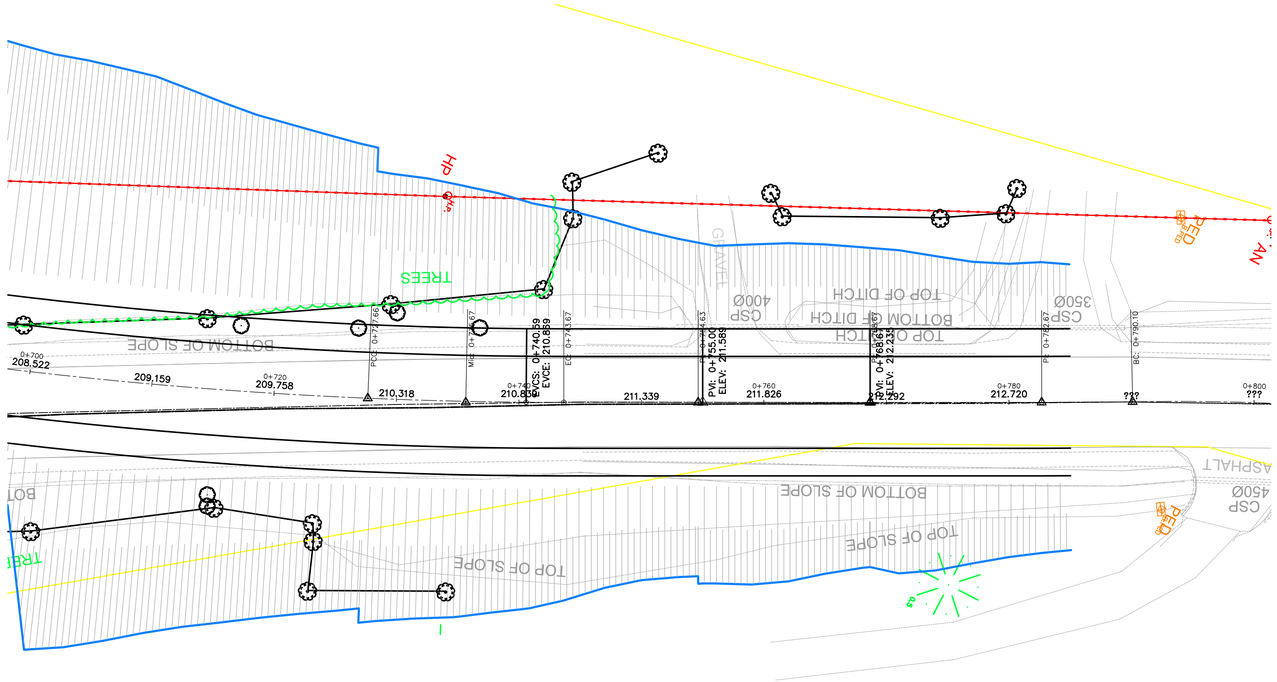

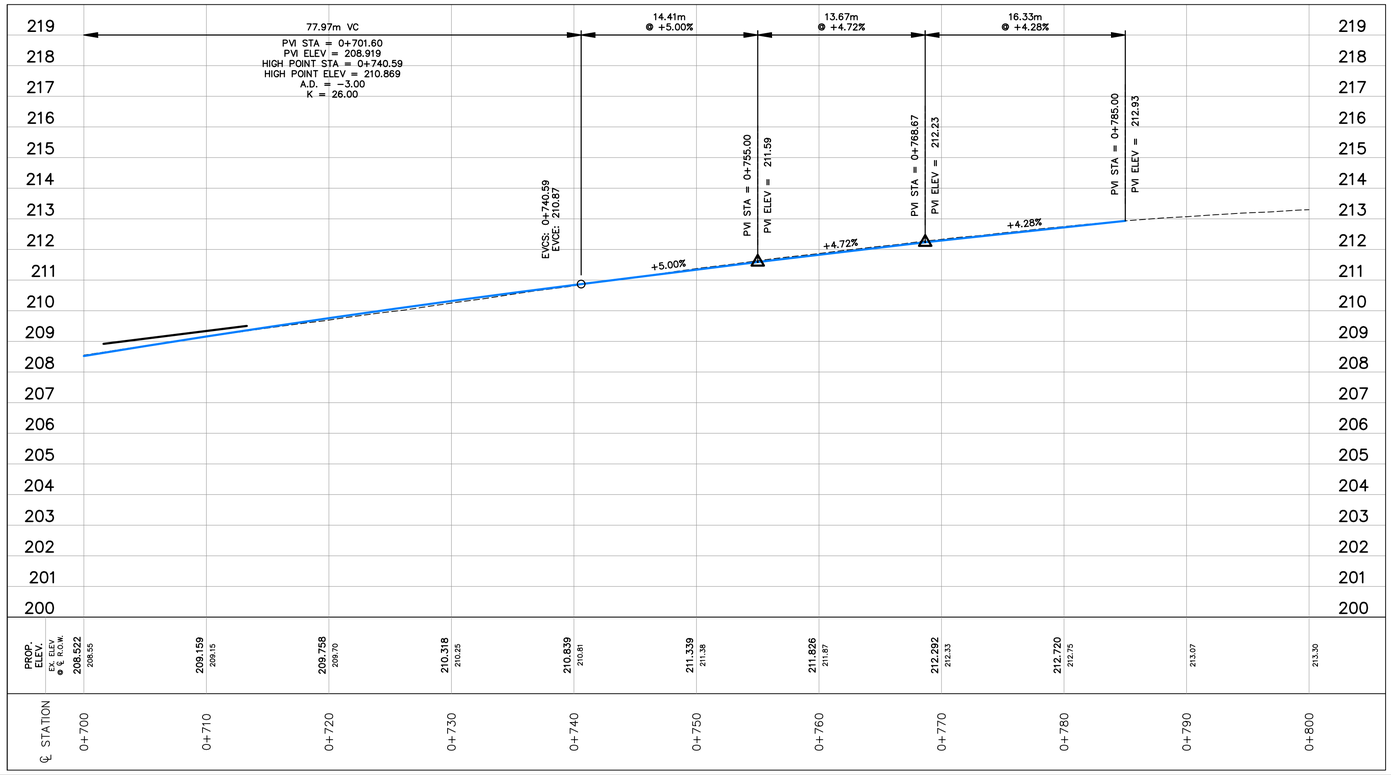

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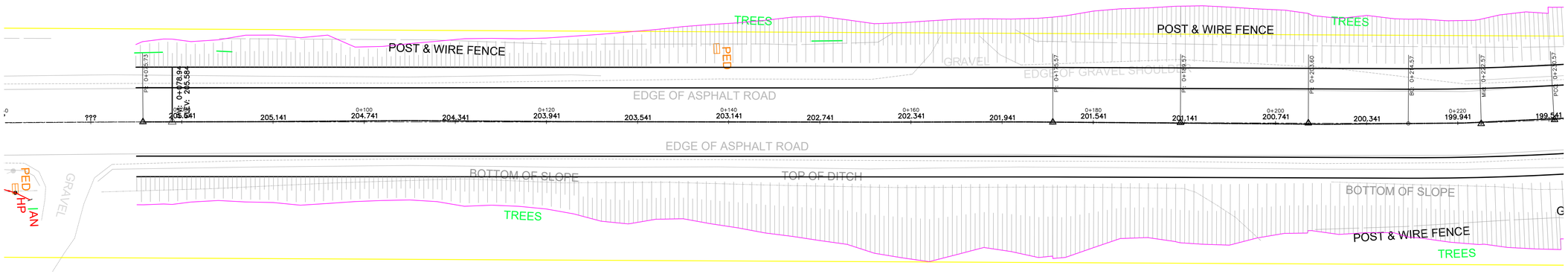

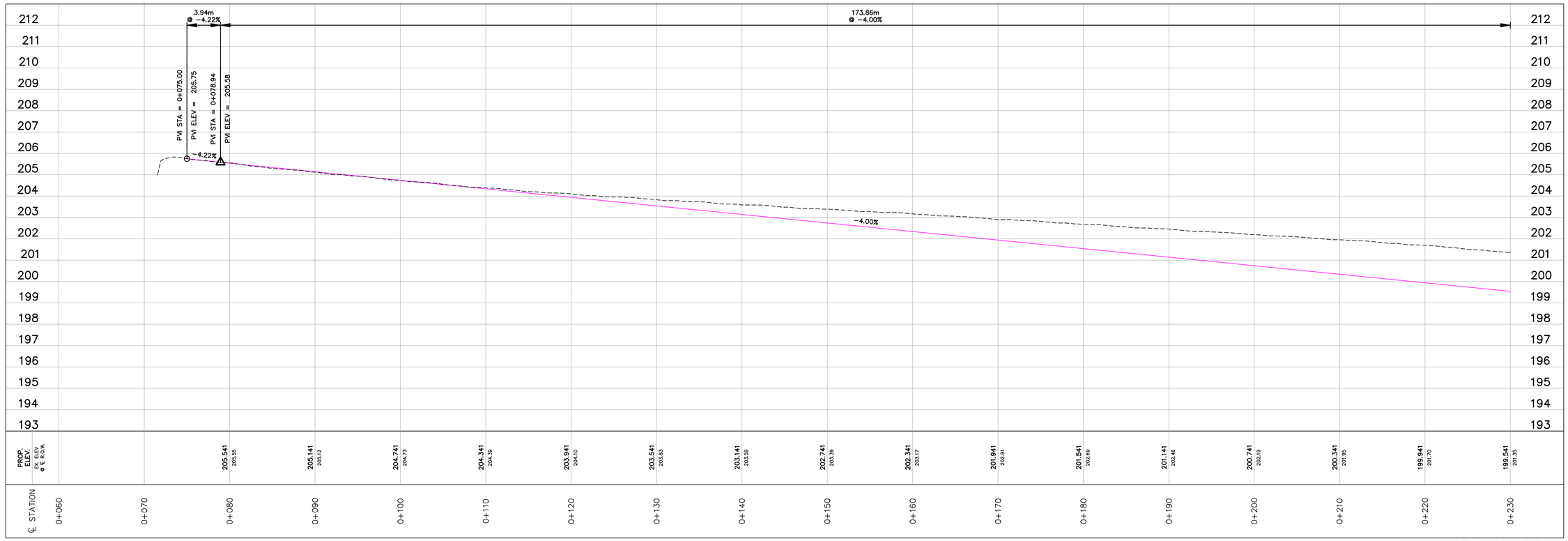

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CONTRACT No. XXXX

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DRAWING No.	OPT2PP1

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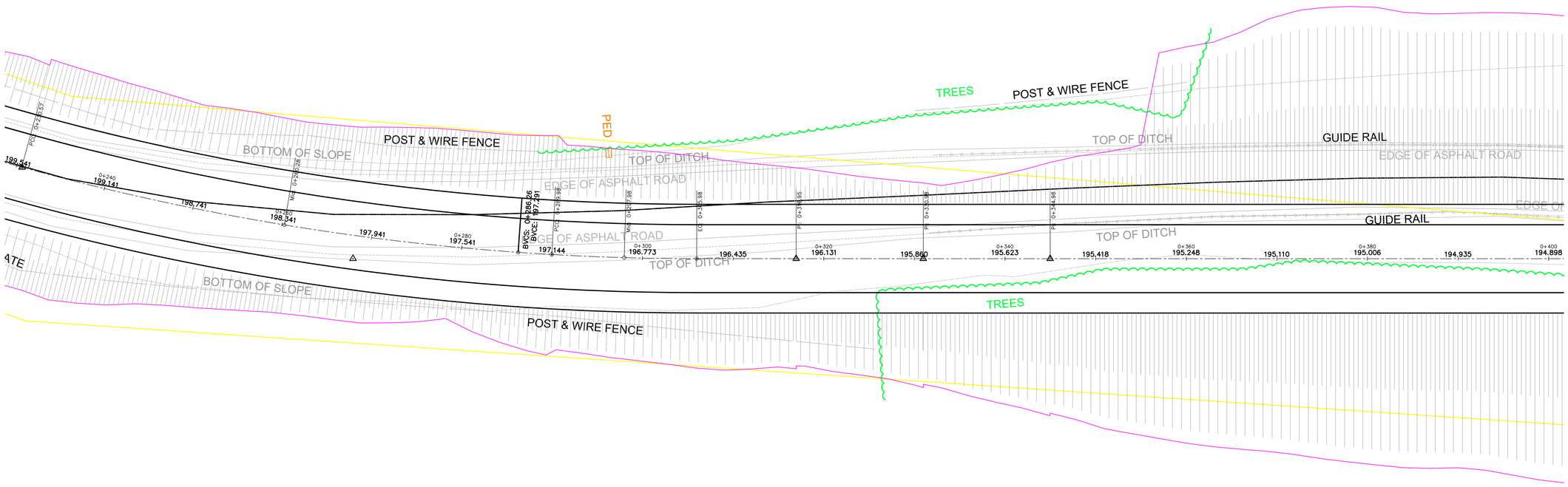

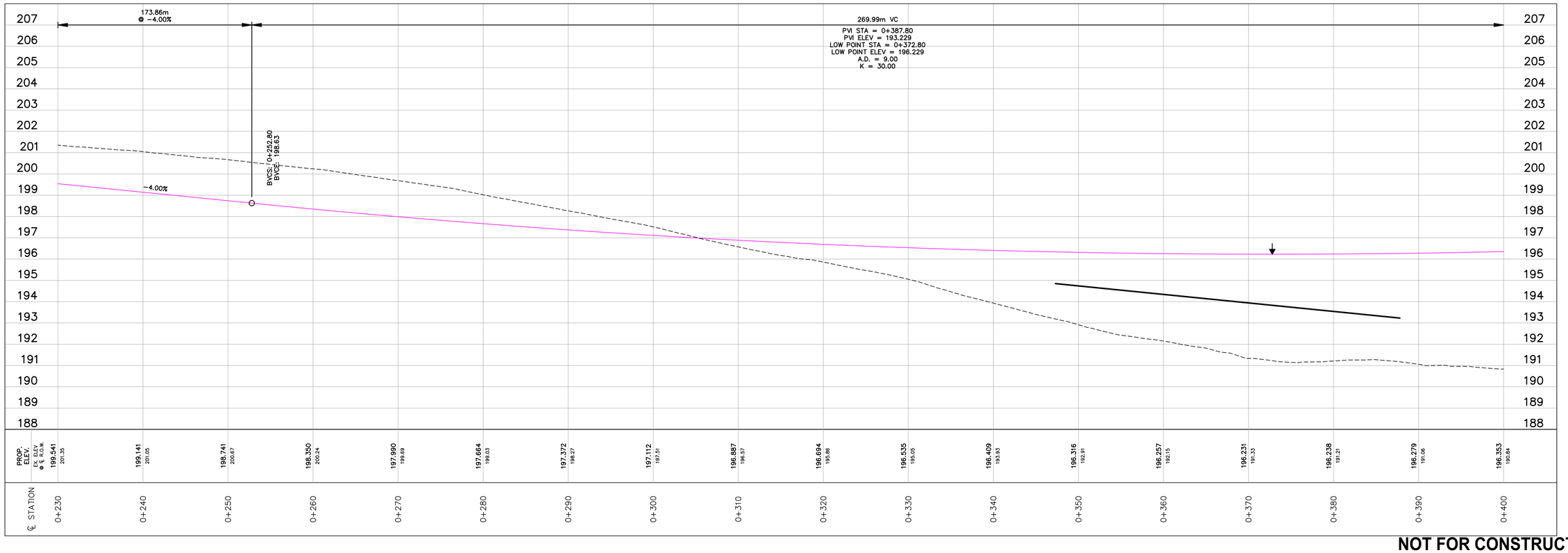

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NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

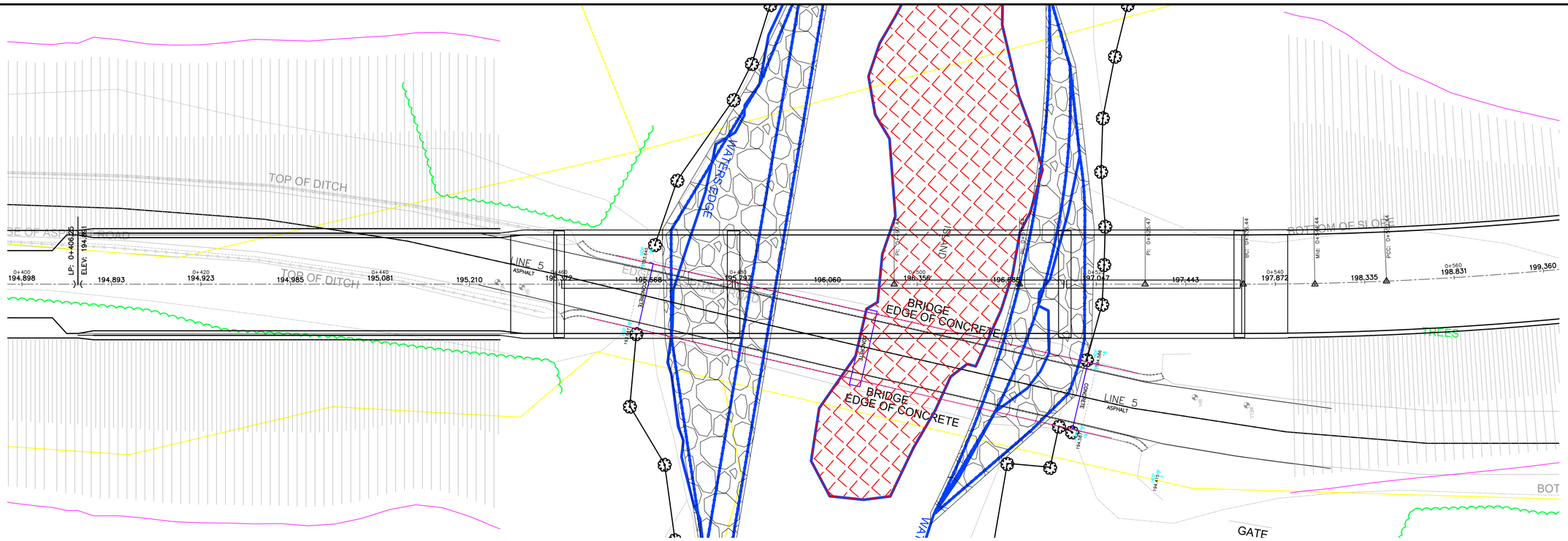
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

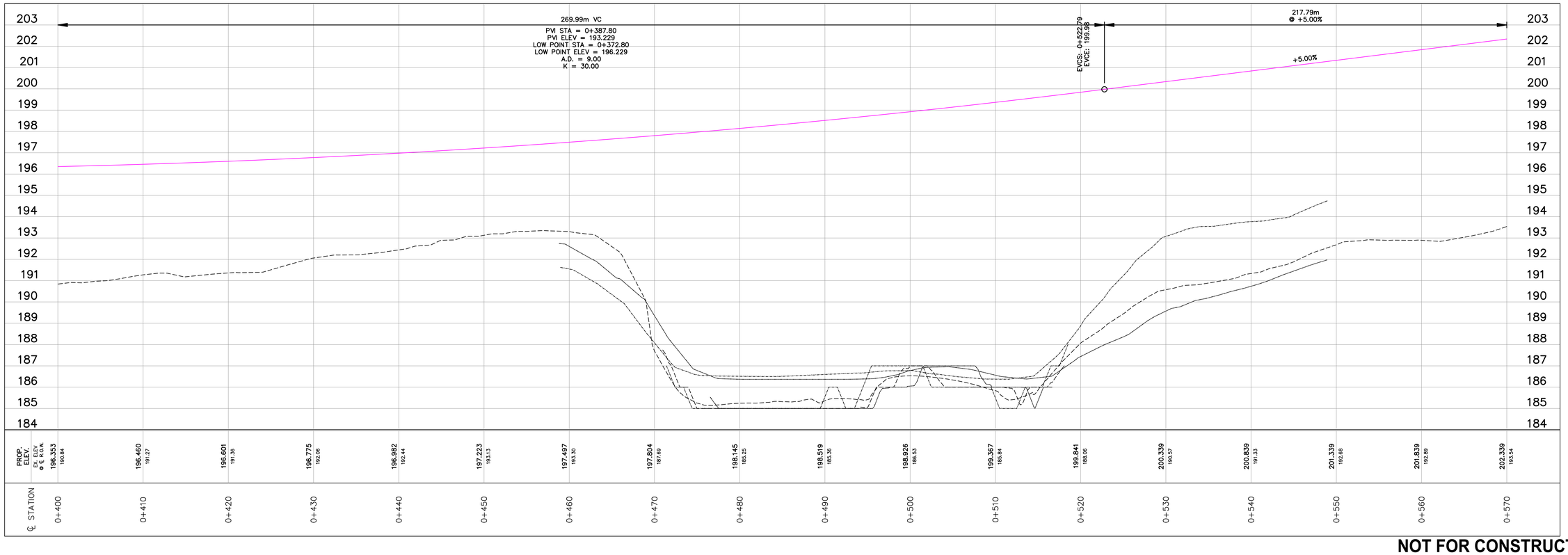
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT2PP2

Plotted by: JBAUTHIER on April 5, 2023 at 5:21 PM
File: \\10-storm\Vol1\Drafting Service\217031\Drawings\217031-Option.dwg Layout: OPT2PP2





NOT FOR CONSTRUCTION

NOTES

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NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

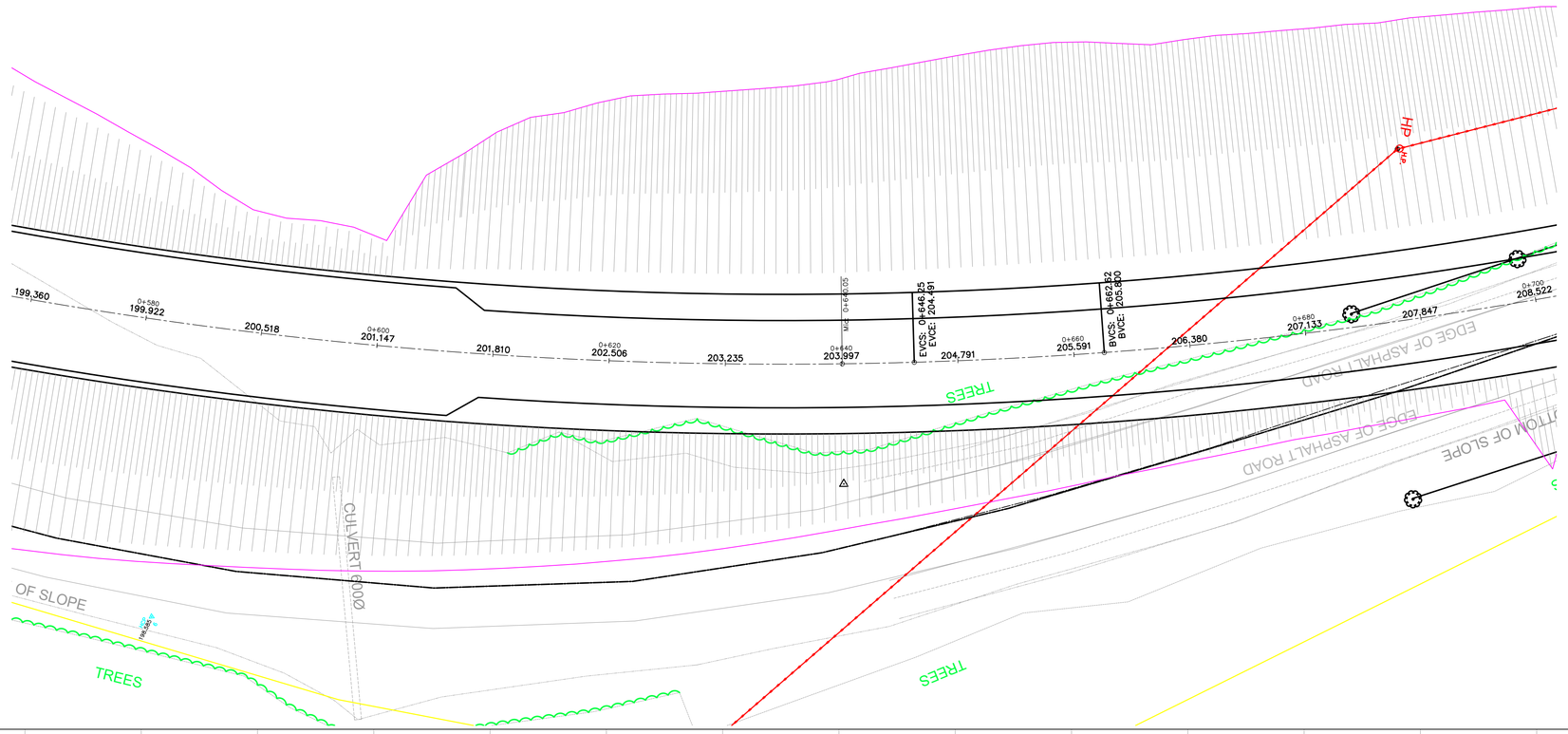
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

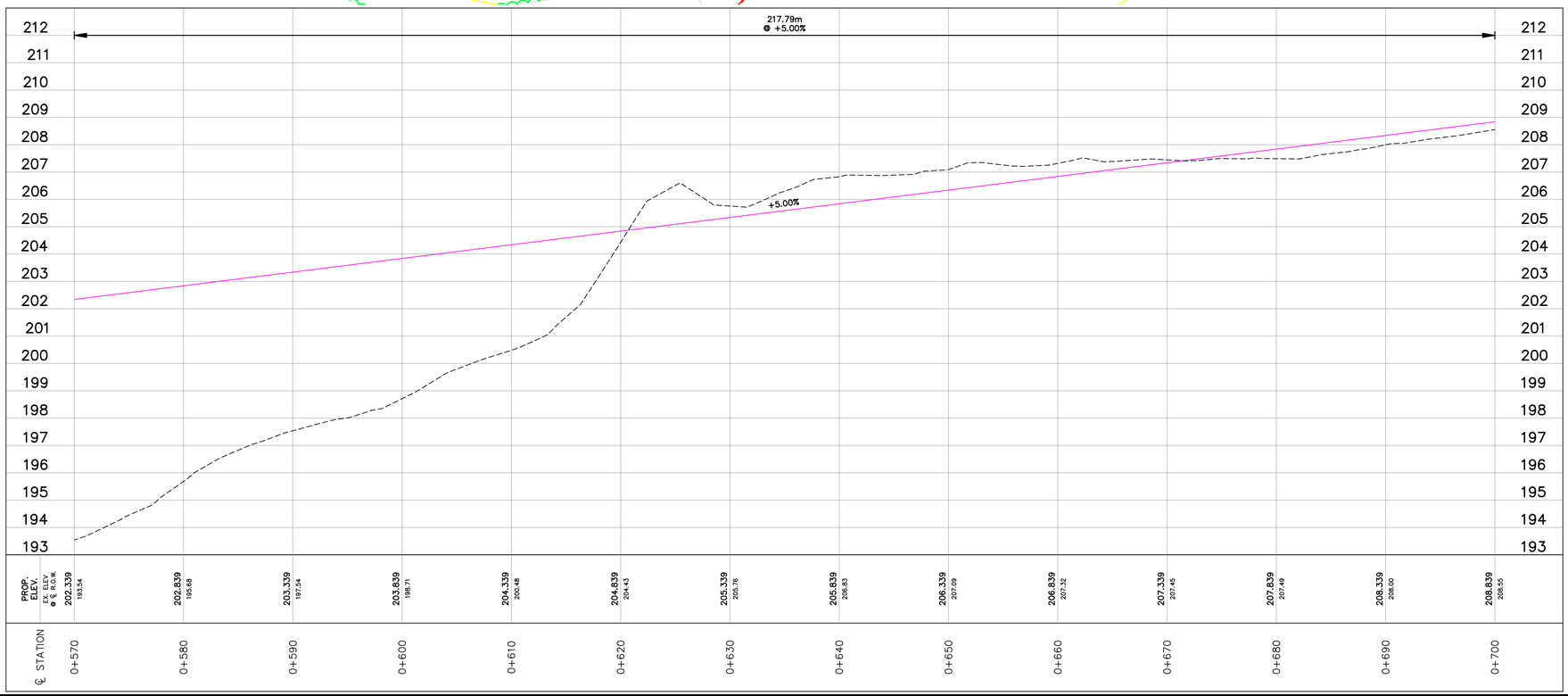
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE: 217031
BRIDGE No. 9
DRAWING No. OPT2PP3

Plotted by: BMURPHY on Apr 5, 2023 at 5:22 PM
File: \\ag-server\vol1\Drafting (Server)\217031\Drawings\217031—Option.dwg Layout: OPT2PP3





NOT FOR CONSTRUCTION

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NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

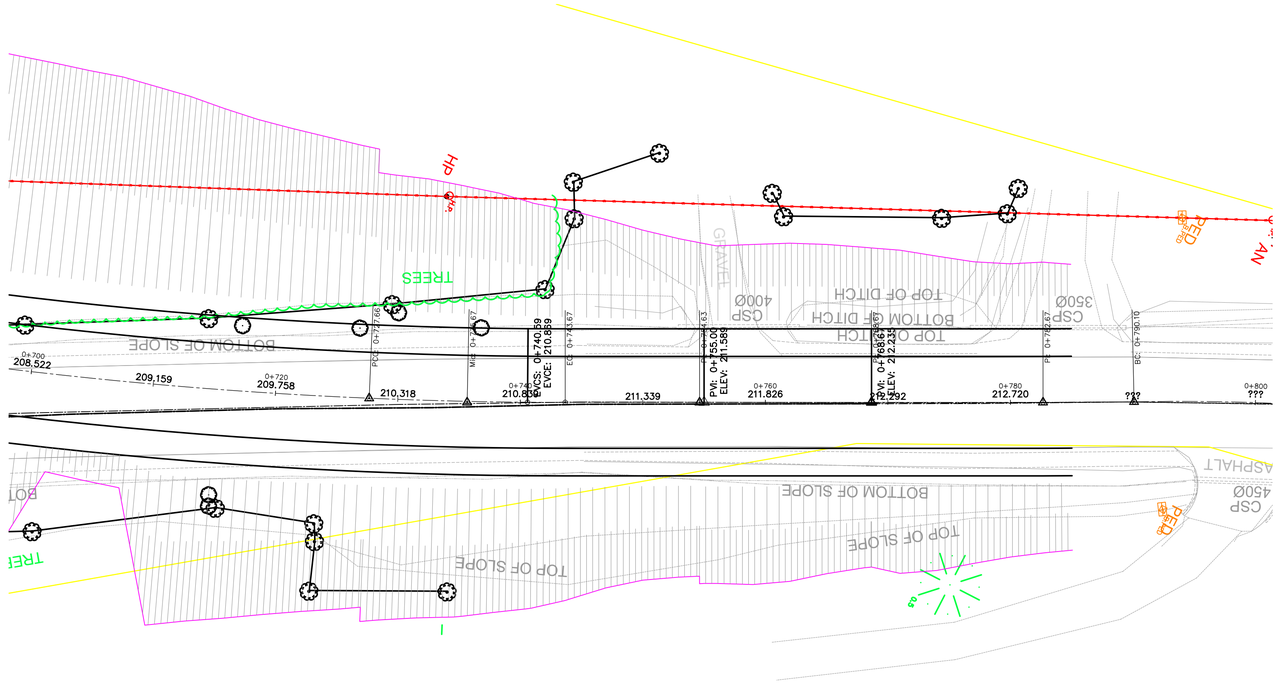
PRELIMINARY

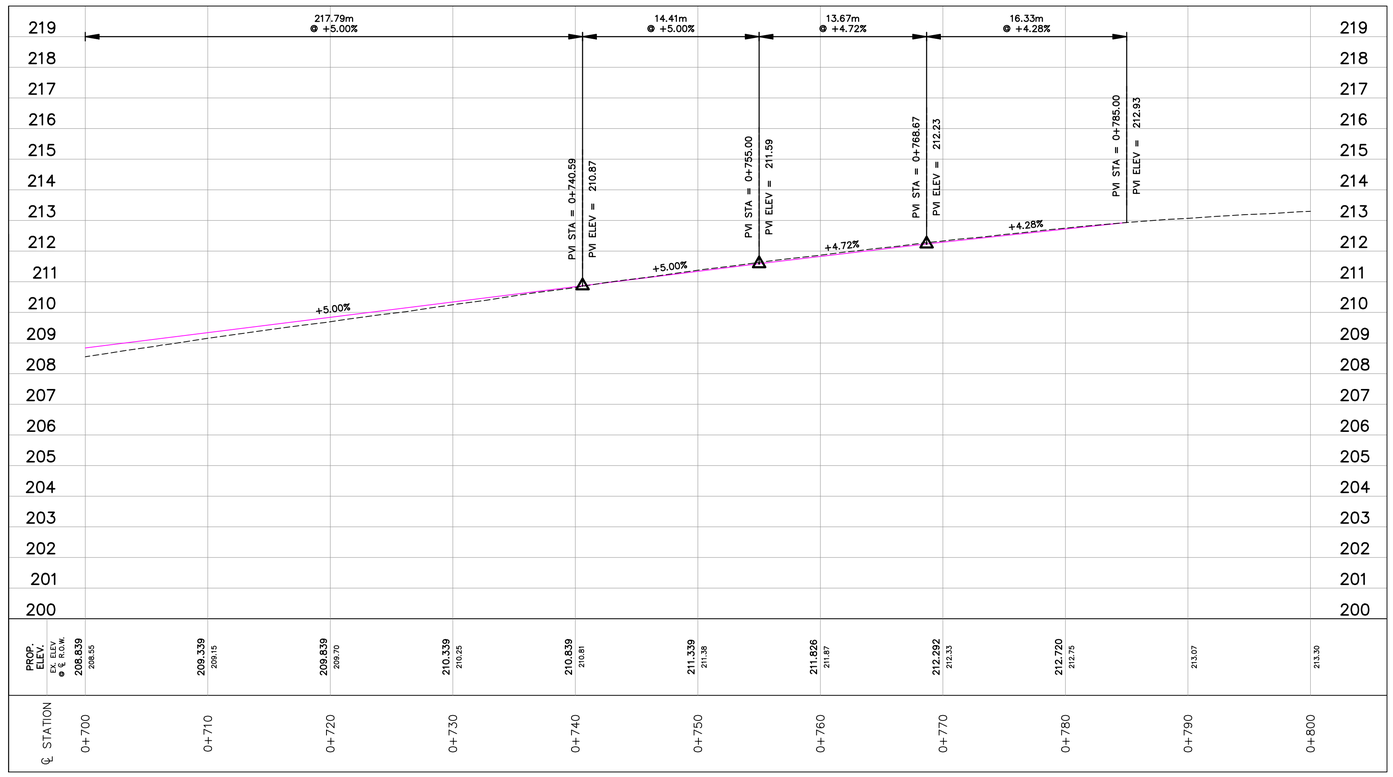
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE: 217031
BRIDGE No. 9
DRAWING No. OPT2PP4





NOT FOR CONSTRUCTION

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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

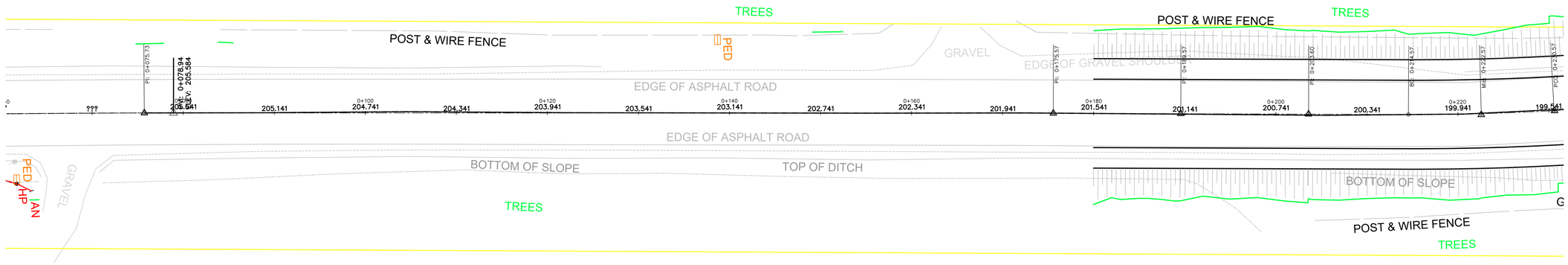
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

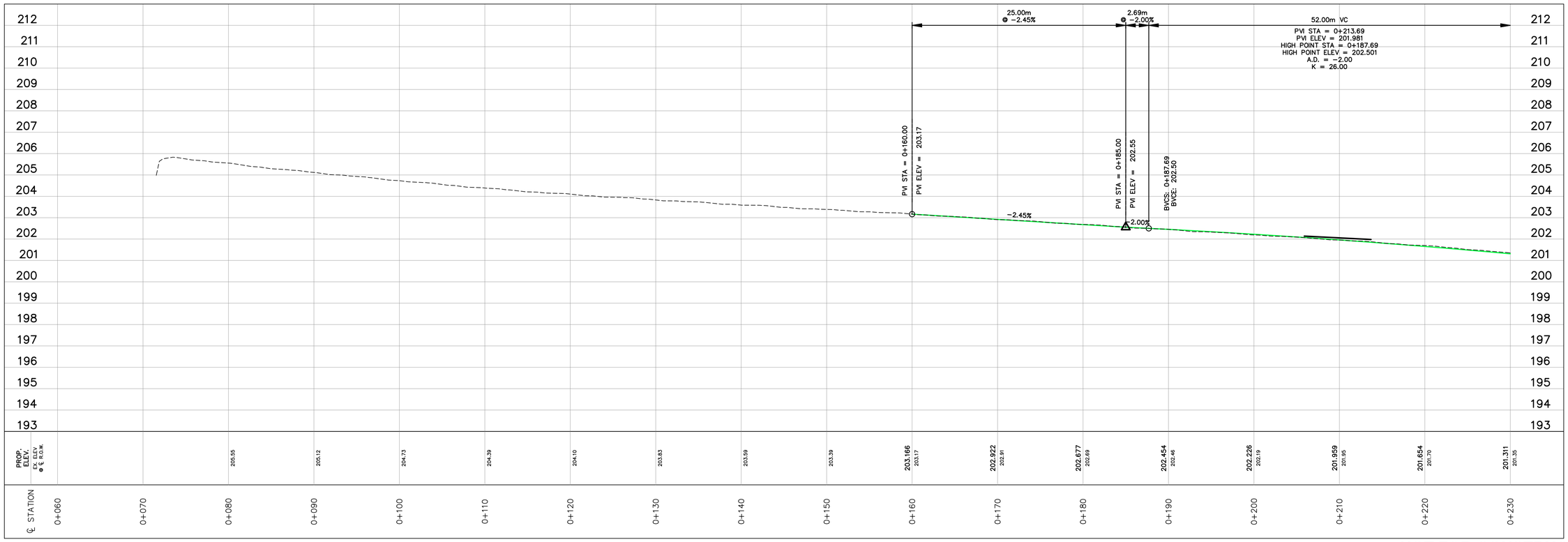
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT2PP5

Plotted by: @AuthorName on Apr 5, 2023 at 5:34 PM
File: \\ag-sarnia\vol1\Drafting Sarnia\217031\Drawings\217031-Option.dwg Layout: OPT2PP5





NOT FOR CONSTRUCTION

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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

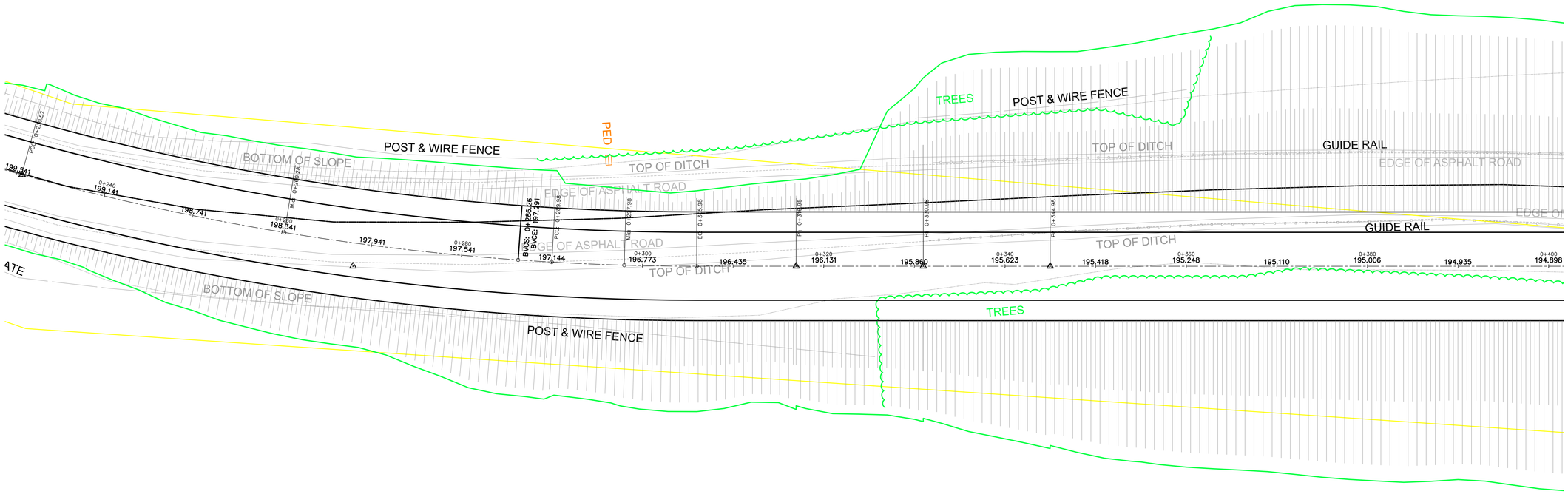
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

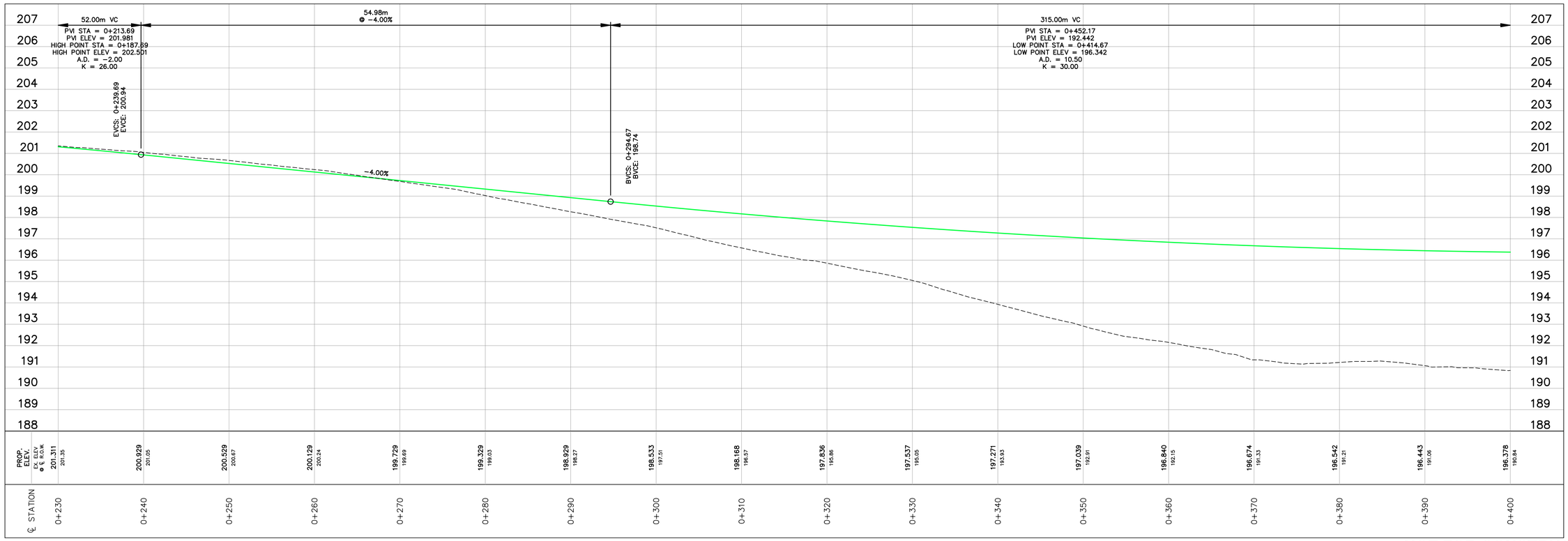
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT3PP1

Plotted by: JBALDWIN on April 5, 2023 at 5:54 PM
File: \\Sgs-barrie\vol1\Drafting\Barrie\217031\Drawings\217031-Oplan.dwg Layout: OPT3PP1





NOT FOR CONSTRUCTION

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PRELIMINARY

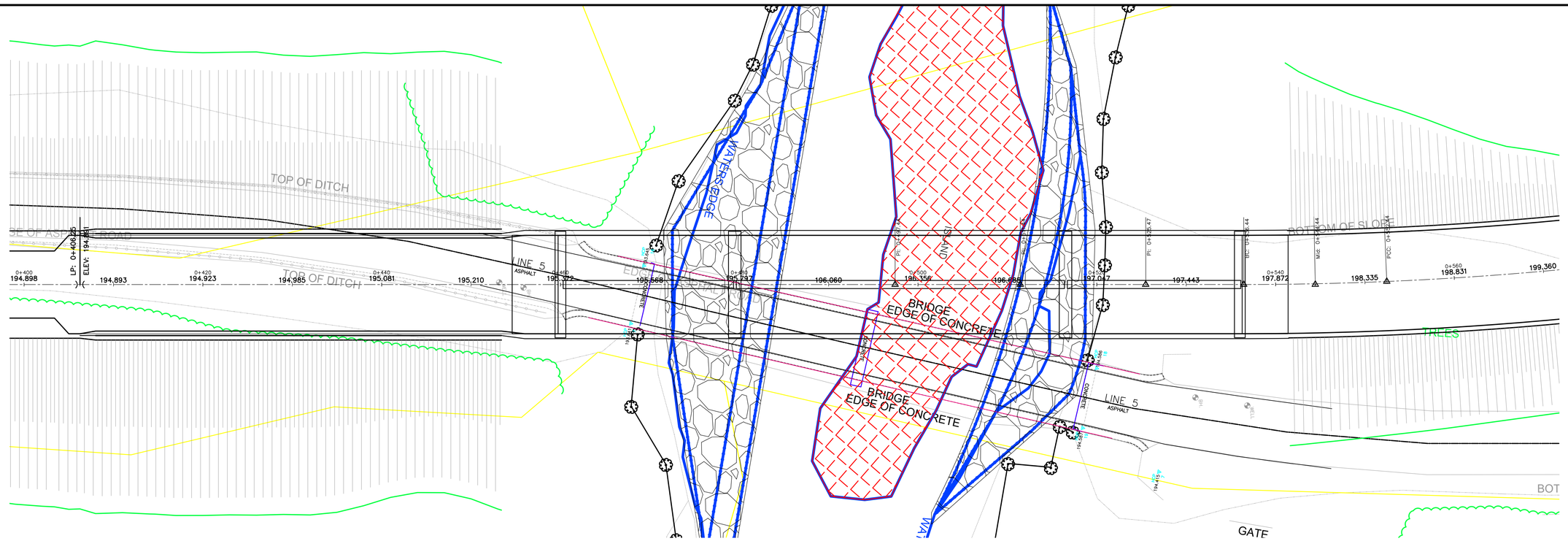
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

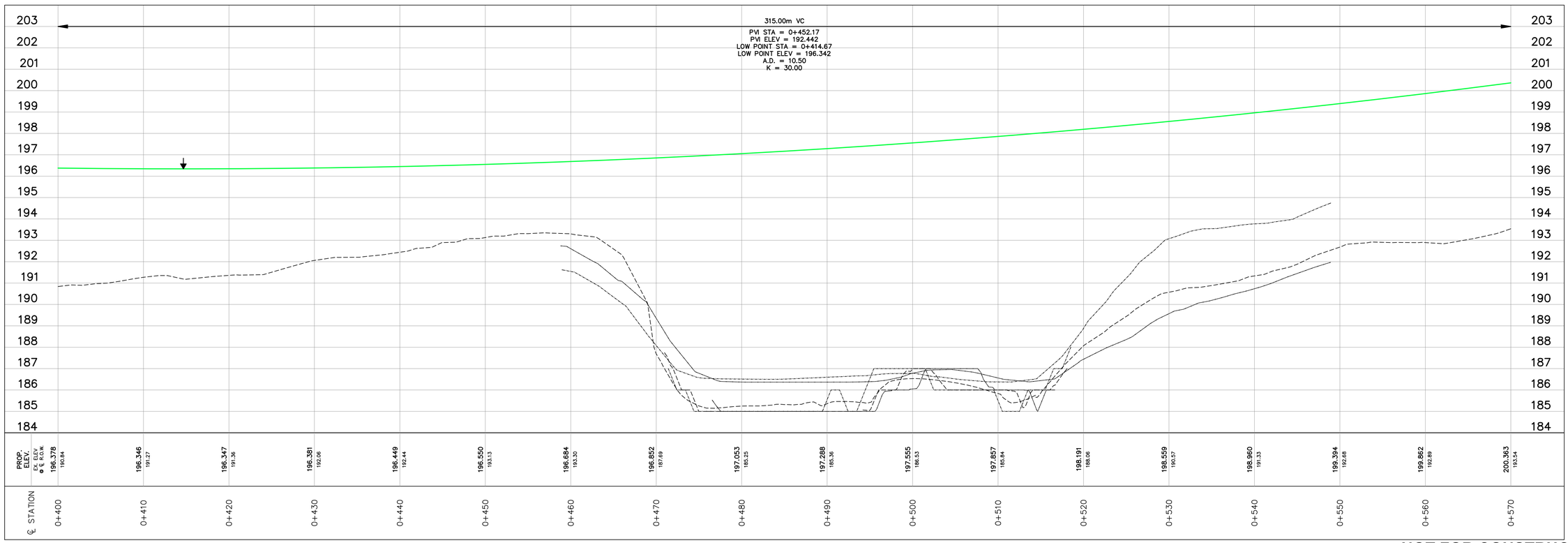
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT3PP2

Plotted by: dBALDWIN on: Apr 5, 2023 - 5:25 PM
File: \\vgr-ripenv\vol1\Drafting Boards\2170311\Drawings\217031--Oplan.dwg Layout: OPT3PP2





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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

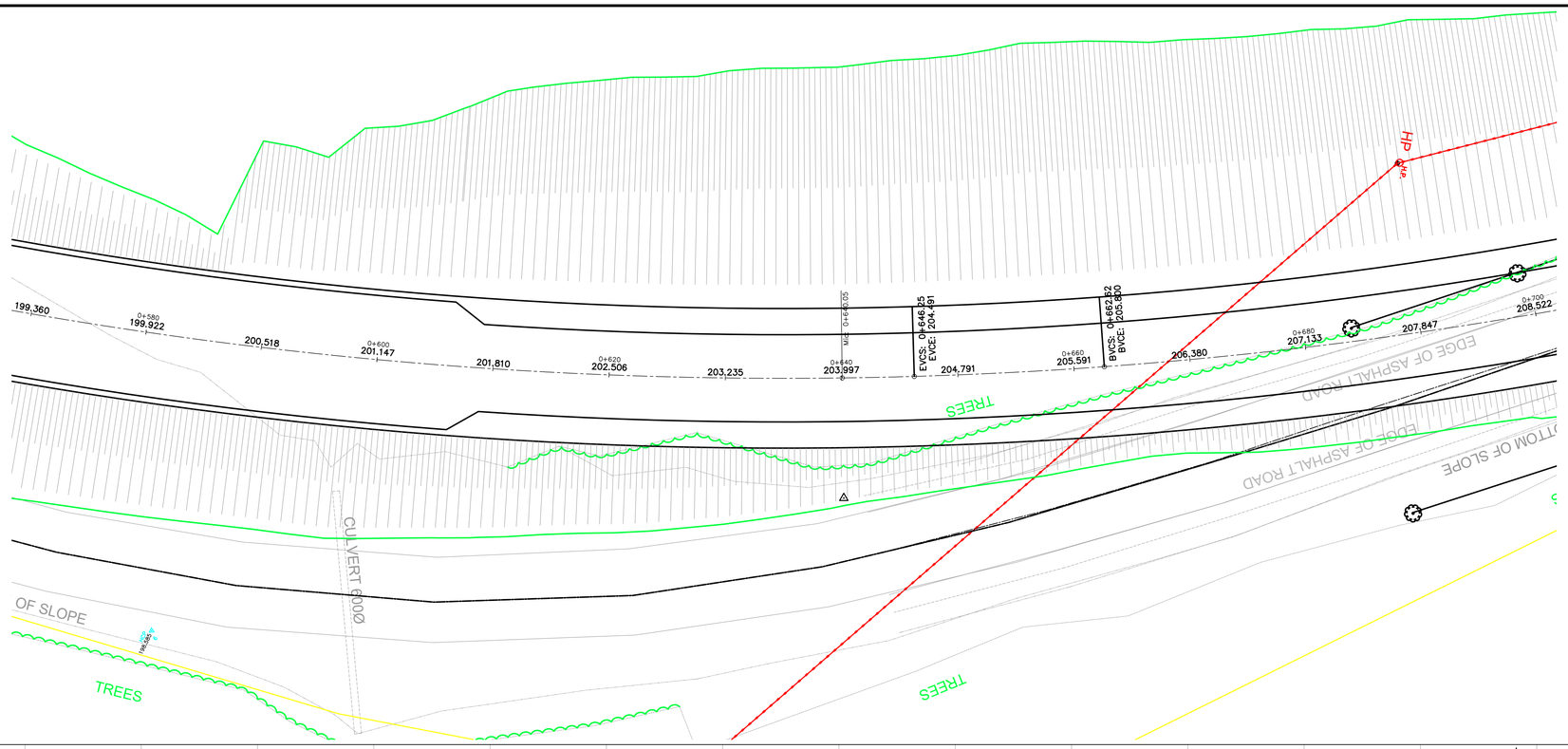
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

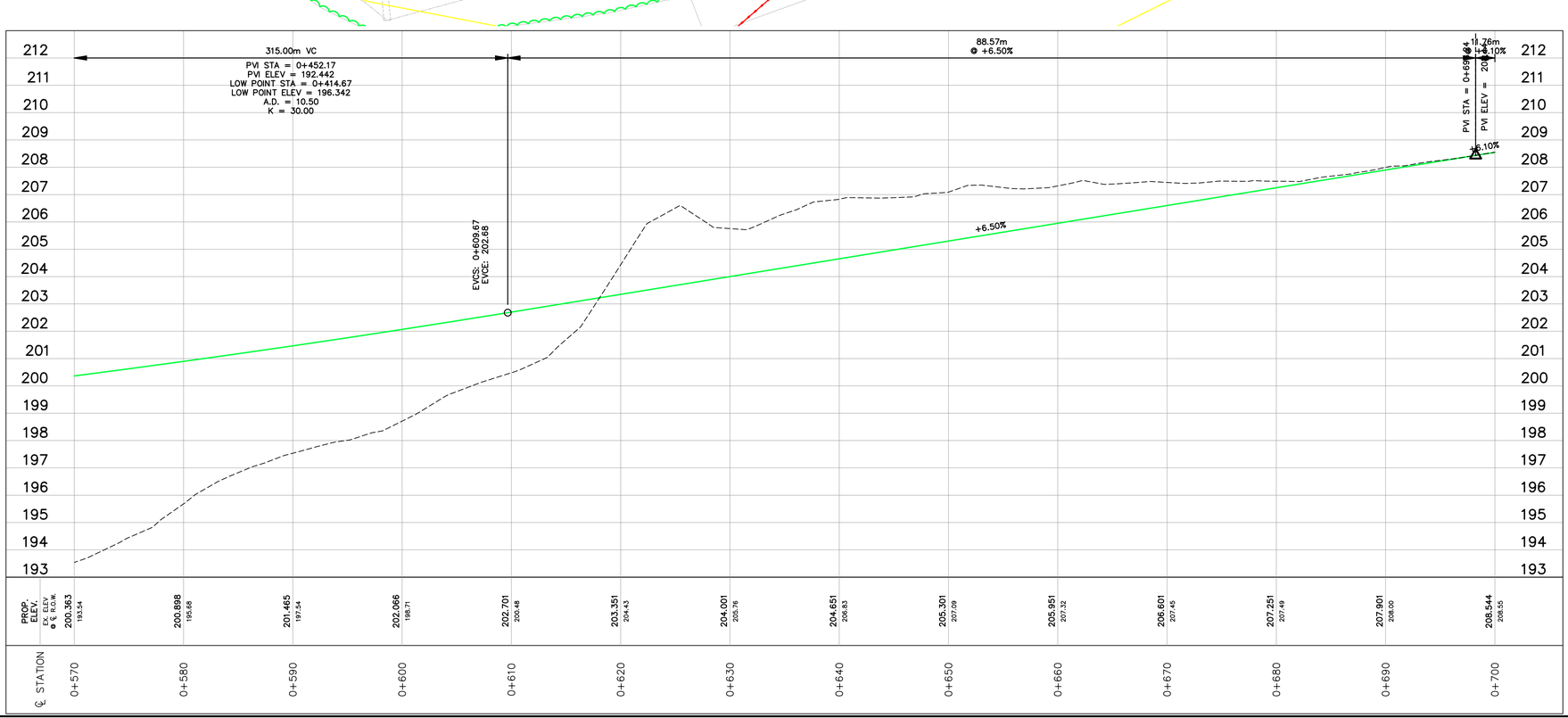
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT3PP3

Plotted by: dBALDWIN on: Apr 5, 2023 - 4:56 PM
File: \\cgc-barrie\vol1\Drafting Barrie\217031\Drawings\217031--Option.dwg Layout: OPT3PP3





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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

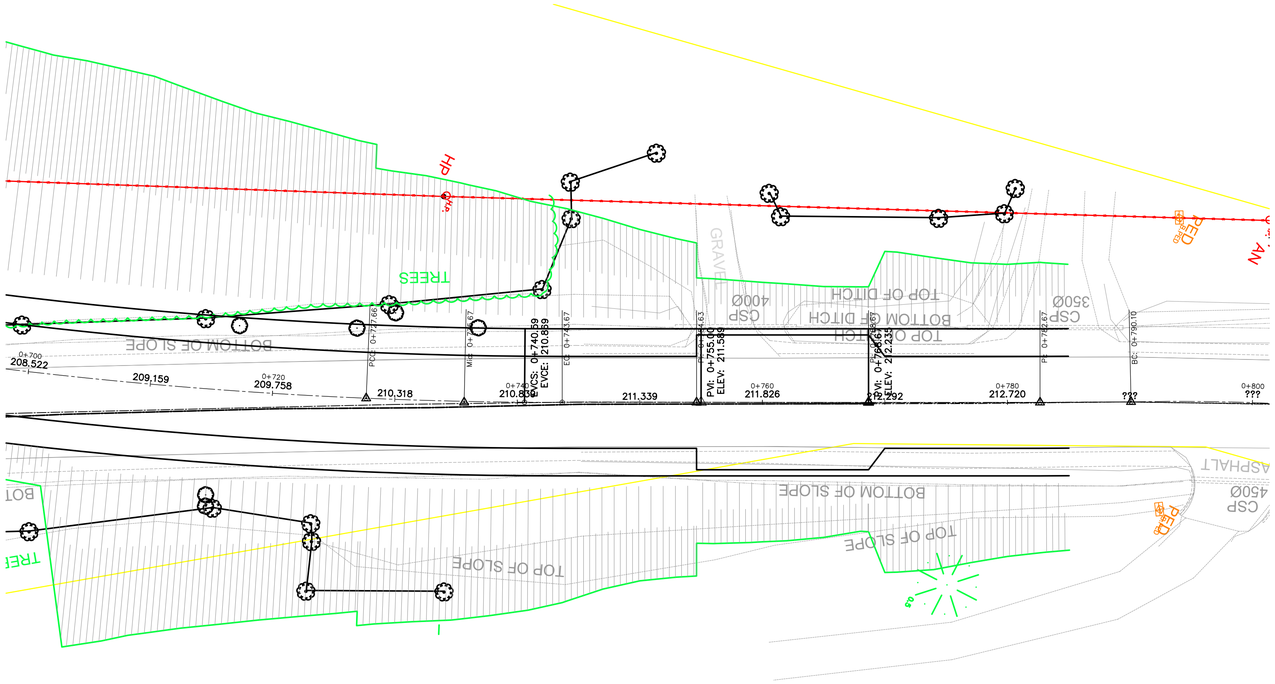
PRELIMINARY

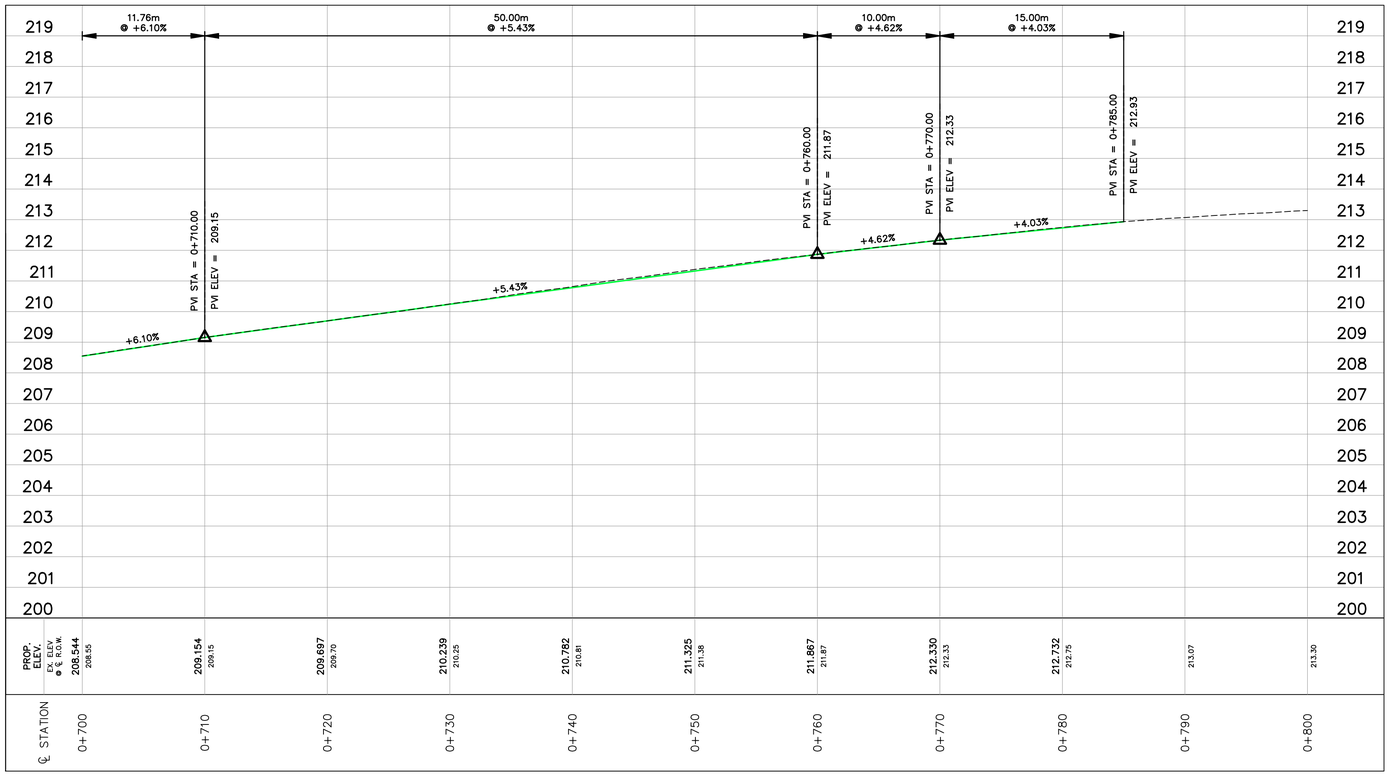
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT3PP4





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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

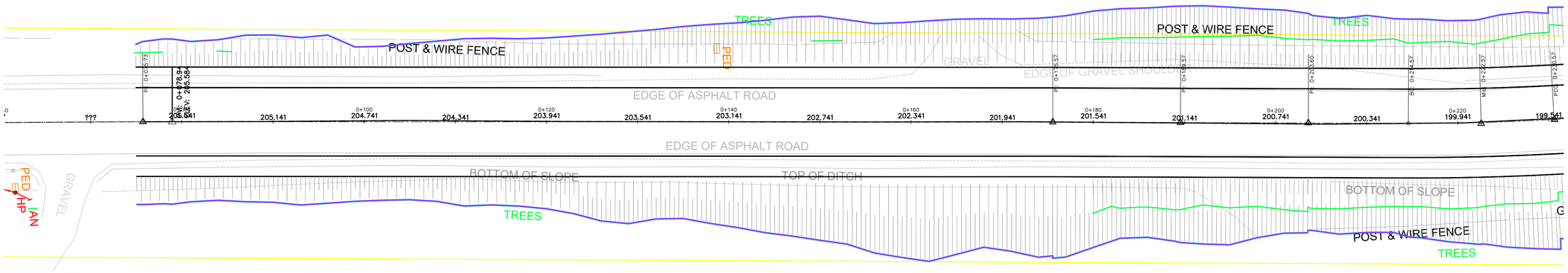
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

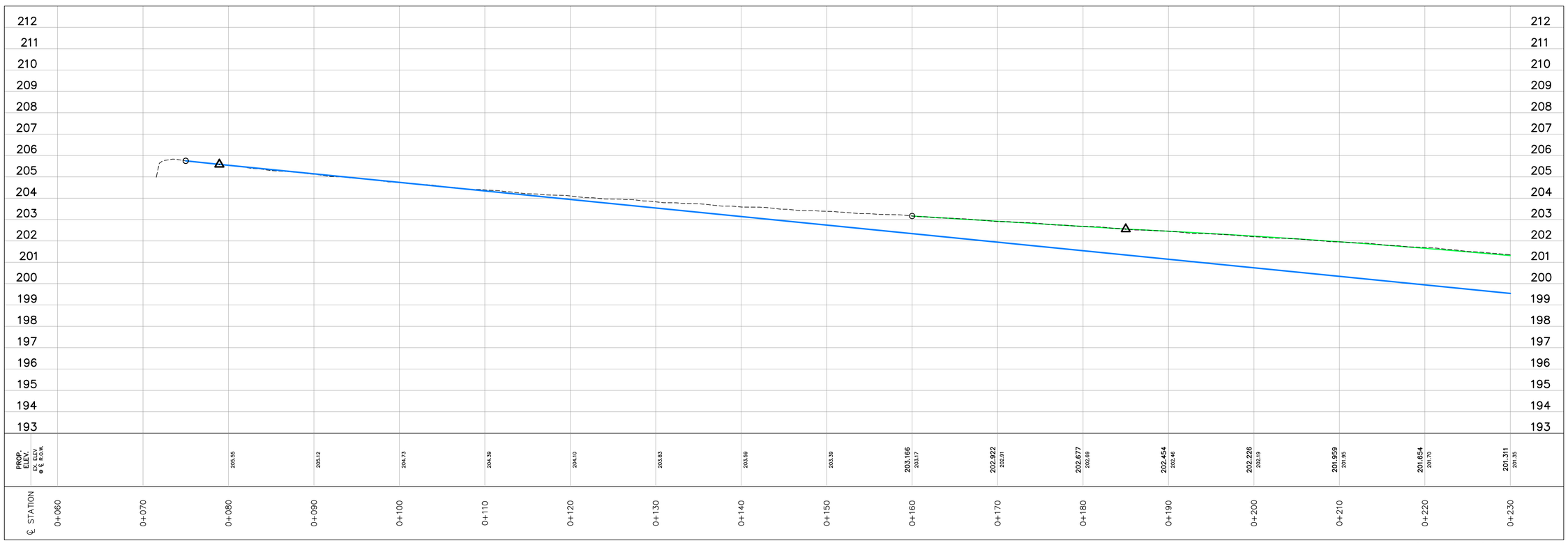
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	OPT3PP5

Plotted by: JBALDWIN on April 5, 2023 at 5:58 PM
File: \\ag-pdc\ne\yr\t\[Drafting \Survey \217031\Drawings\217031 – Option.dwg Layout: OPT3PP5





NOT FOR CONSTRUCTION

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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

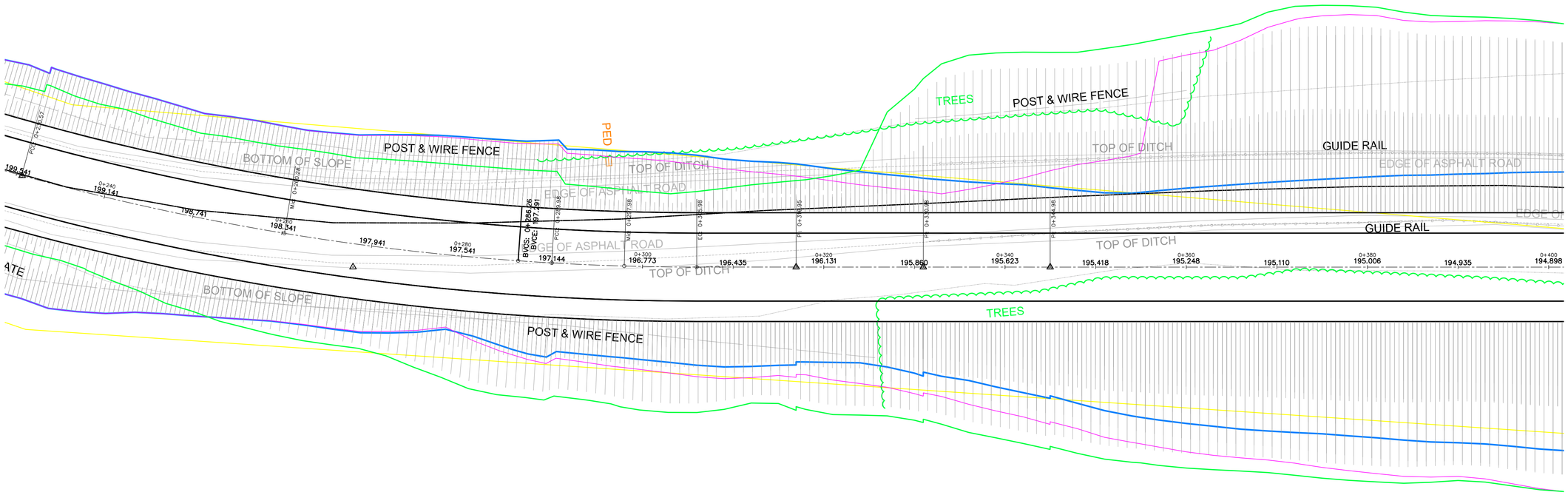
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

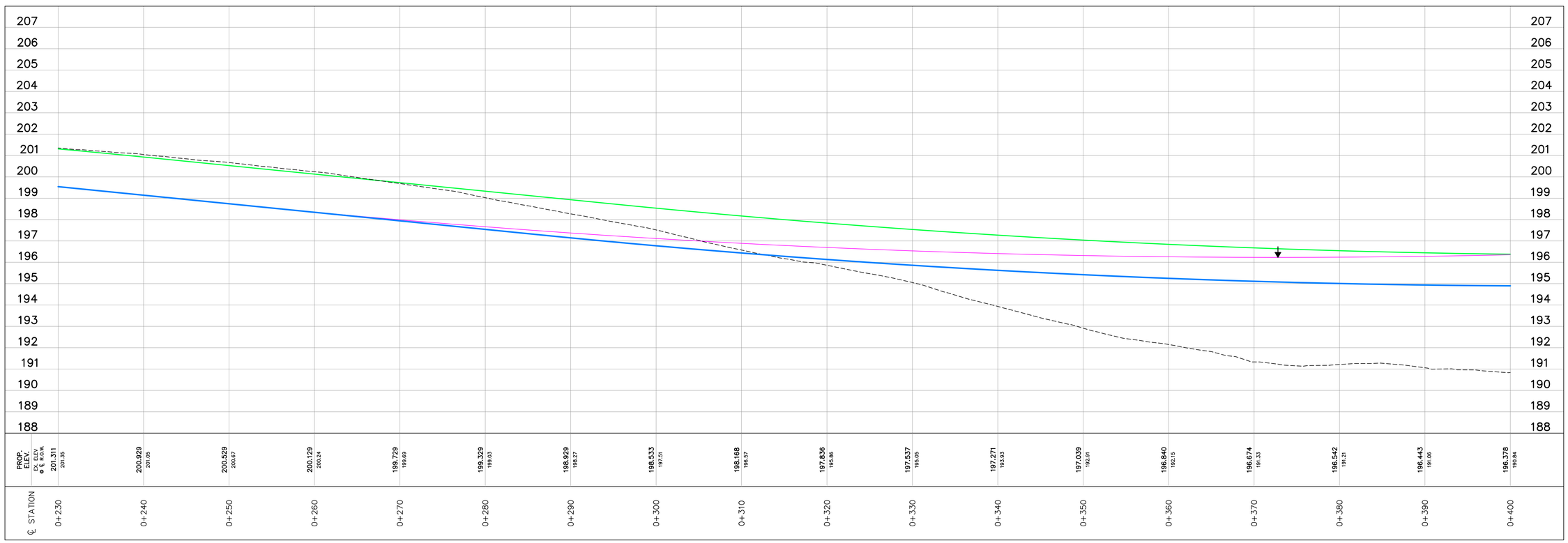
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE: 217031
BRIDGE No. 9
DRAWING No. PP1

Plotted by: JBALDWIN on: April 5, 2023 at 5:59 PM
File: \\Orp-bpsrvfs\vol1\Drafting\Barrie\217031\Drawings\217031--Qplan.dwg Layout: PP1





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P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

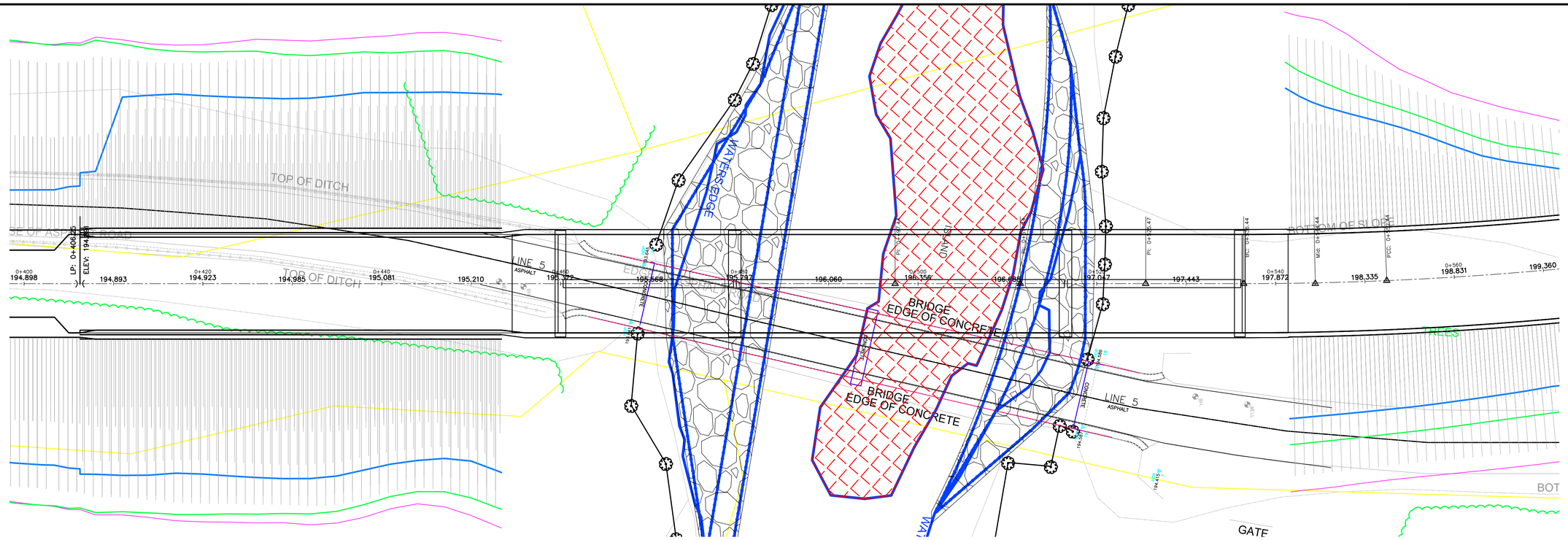
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

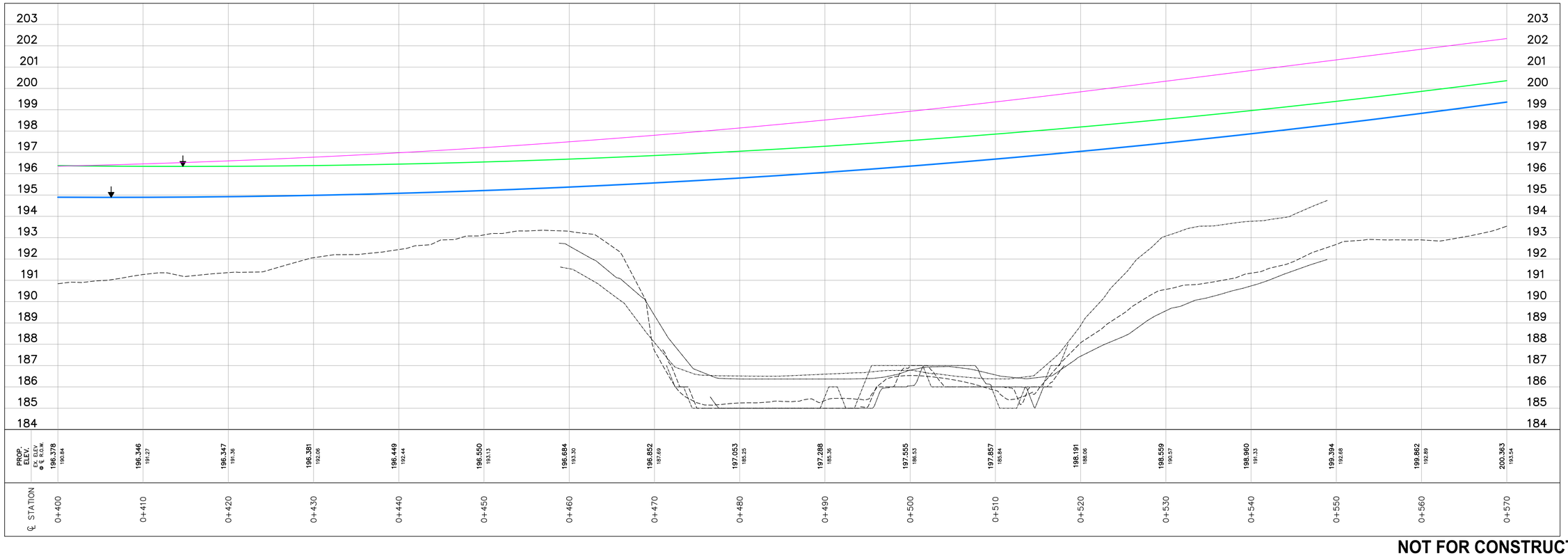
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	PP2

Plotted by: JBAUDAIN on April 5, 2023 at 5:59 PM
File: \\ainley\vol1\Working\Barrie\217031\Drawings\217031-Option.dwg Layout: PP2





℄ STATION	0+400	0+410	0+420	0+430	0+440	0+450	0+460	0+470	0+480	0+490	0+500	0+510	0+520	0+530	0+540	0+550	0+560	0+570
PROP. ELEV.	196.378	196.346	196.347	196.381	196.449	196.550	196.684	196.852	197.053	197.288	197.555	197.857	198.191	198.559	198.960	199.394	199.862	200.363
EX. GRD. @ ℄ R.O.W.	190.84	191.27	191.36	192.06	192.44	193.13	193.30	187.69	185.25	185.36	186.53	185.84	188.06	190.57	191.33	192.08	192.89	193.54

NOT FOR CONSTRUCTION

NOTES

CONTRACT DRAWINGS
Contractor must verify all dimensions and be responsible for same. Any discrepancies must be reported to the Engineer before commencing work. Drawings are not to be scaled. Drawings may not be used for any purpose other than that stipulated in the contract agreement between the owner/client and the Engineer without the express written consent of Ainley & Associates Limited. Use of these drawings by any party for any other purpose is subject to the following caution.

CAUTION: *The information contained in this drawing is solely for the intended recipient. Any copying, distribution or use by others without the express written consent of Ainley & Associates Limited is prohibited. The recipient is responsible for confirming the accuracy and completeness of the information with the originator. The recipient assumes all risks and liabilities associated with the use of the drawings. The recipient will save and hold harmless Ainley & Associates Limited from any claims whatsoever associated with or related to the use of the drawings. The recipient will not reuse any portion of the drawings for any future project without the express written permission of Ainley & Associates Limited.*

NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

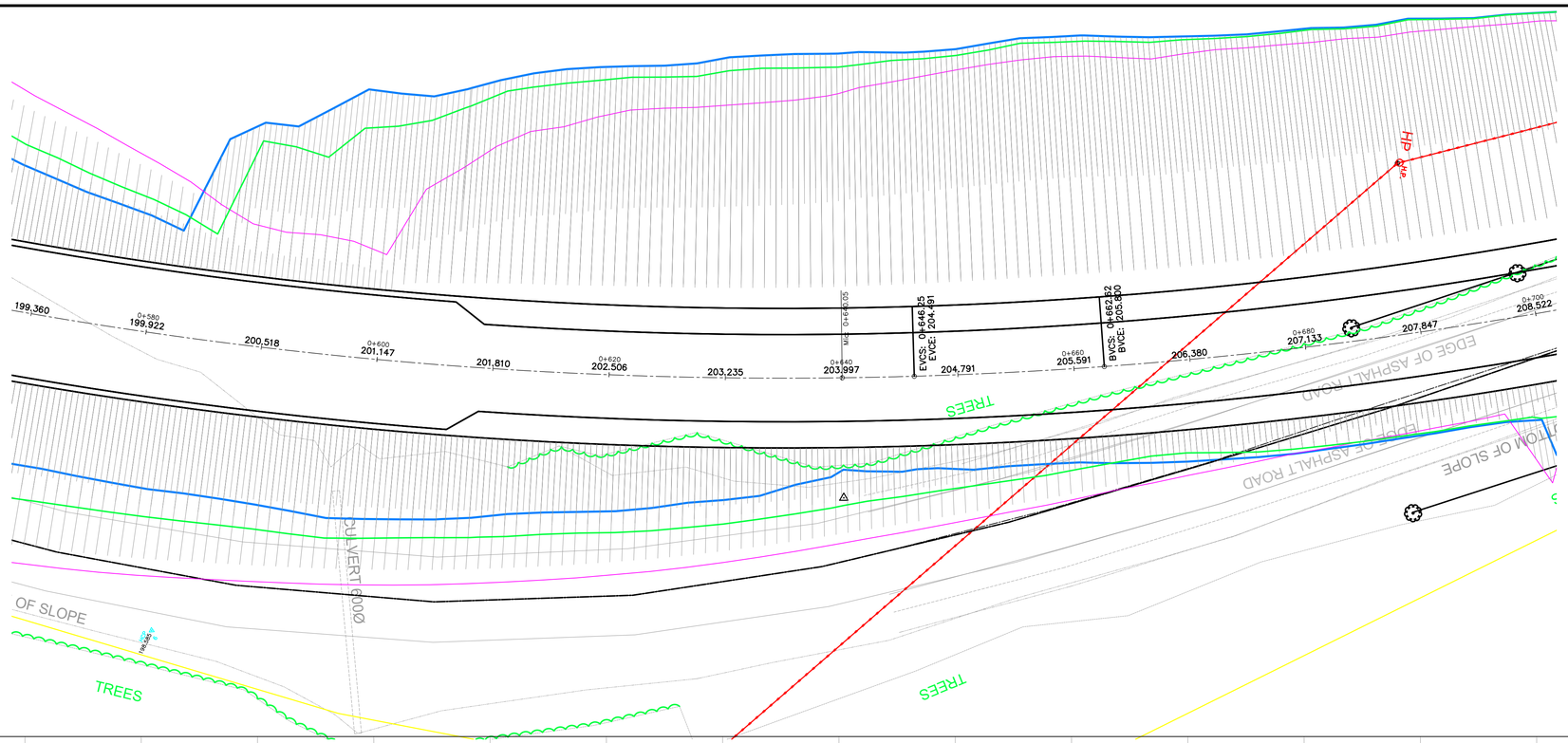
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

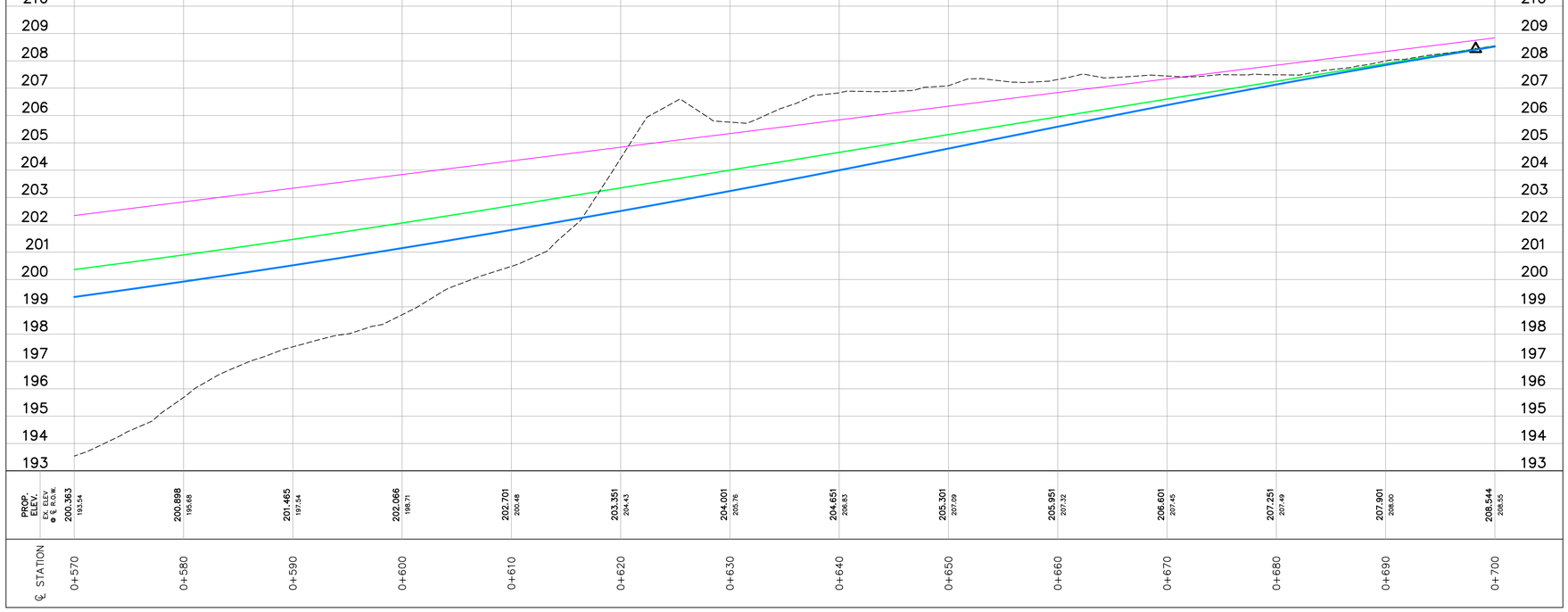
TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE:	217031
BRIDGE No.	9
DRAWING No.	PP3

Plotted by: JBAUTHIER on April 5, 2023 at 5:30 PM
File: \\ainleygroup.com\Shared\Drafting Service\217031\02-design\217031-02plan.dwg Layout: PP3





PROP. ELEV. / EX. ELEV / ℄ R.O.W.														
	200.363 / 193.54	200.898 / 195.68	201.465 / 197.54	202.066 / 198.71	202.701 / 200.48	203.351 / 204.43	204.001 / 205.76	204.651 / 206.83	205.301 / 207.09	205.951 / 207.32	206.601 / 207.45	207.251 / 207.49	207.901 / 208.00	208.544 / 208.55
℄ STATION	0+570	0+580	0+590	0+600	0+610	0+620	0+630	0+640	0+650	0+660	0+670	0+680	0+690	0+700

NOT FOR CONSTRUCTION

NOTES

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NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

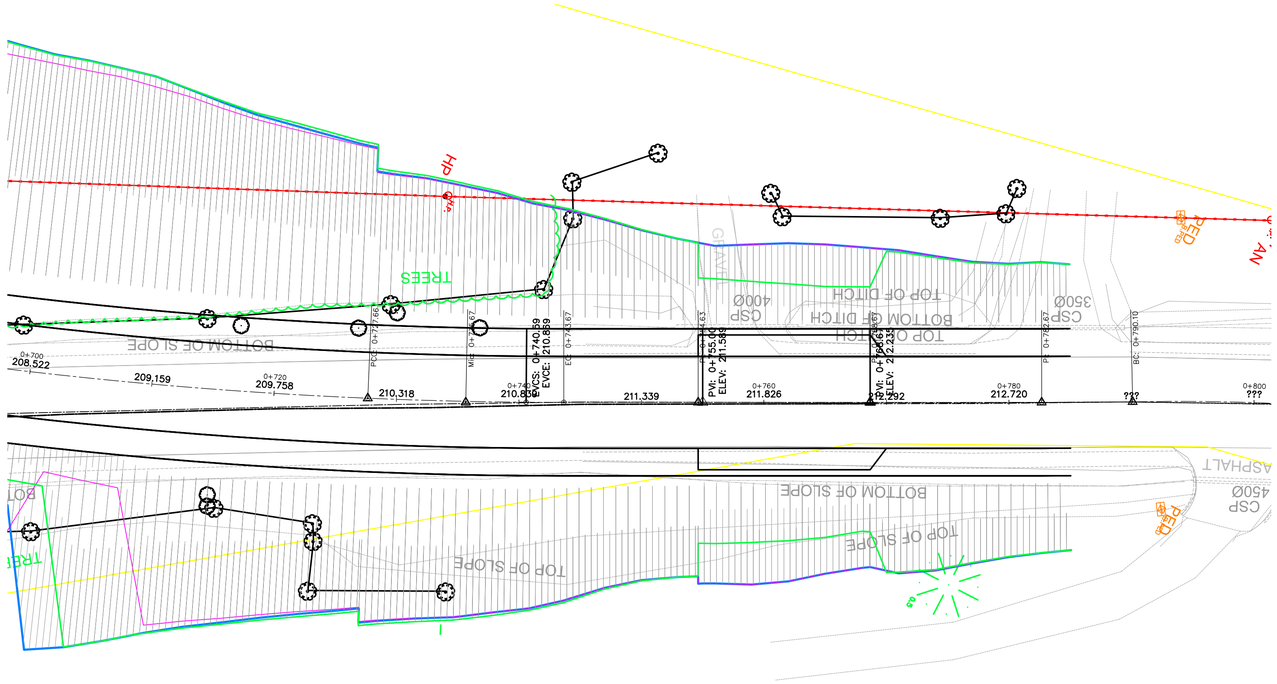
PRELIMINARY

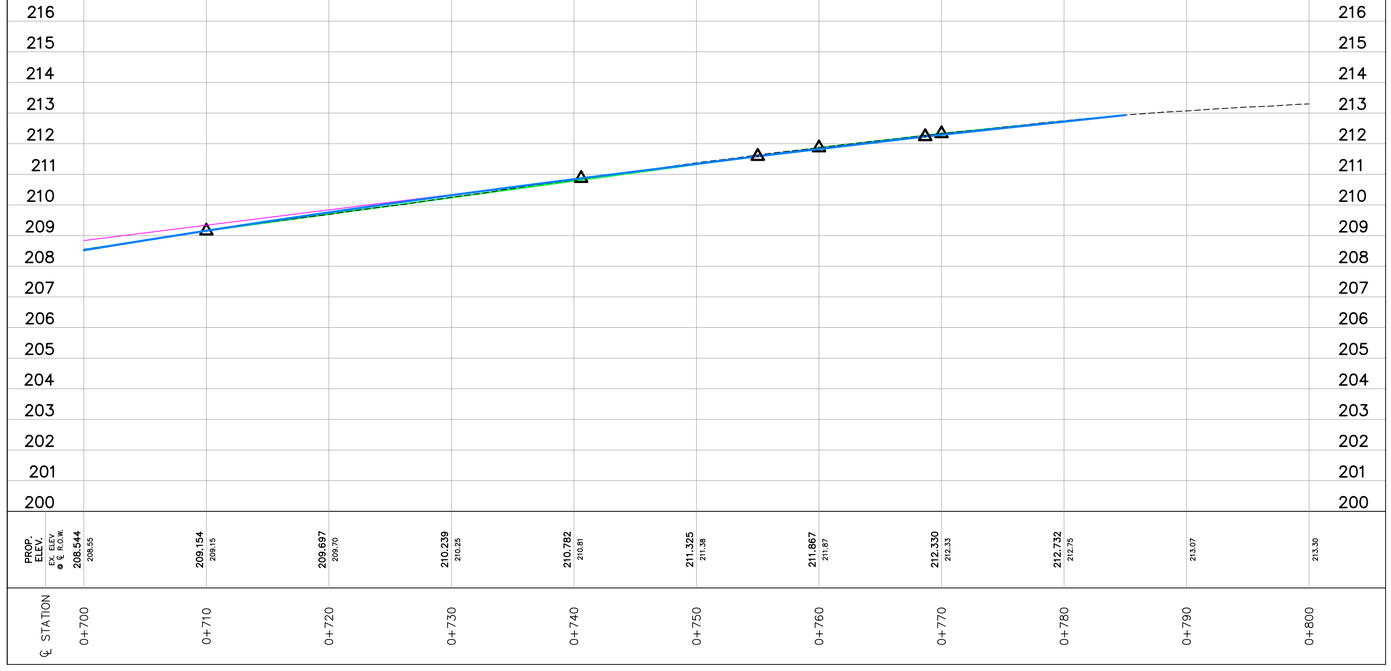
SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

Ainley GROUP

AINLEY FILE: 217031
BRIDGE No. 9
DRAWING No. PP4





NOT FOR CONSTRUCTION

NOTES

CONTRACT DRAWINGS
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NO.	REVISIONS	DATE	INITIAL
P1	PIC PRELIMINARY DESIGN CONCEPTS	APR. 2023	T.M.K

PRELIMINARY

SCALE:	H = 1:250 V = 1:100
DESIGN:	J.C.B.
DRAWN:	J.C.B.
CHECKED:	B.R.W.
DATE:	APR./2023

TOWNSHIP OF ESSA
5TH LINE
BRIDGE REPLACEMENT & ROAD RECONSTRUCTION
CONTRACT No. XXXX

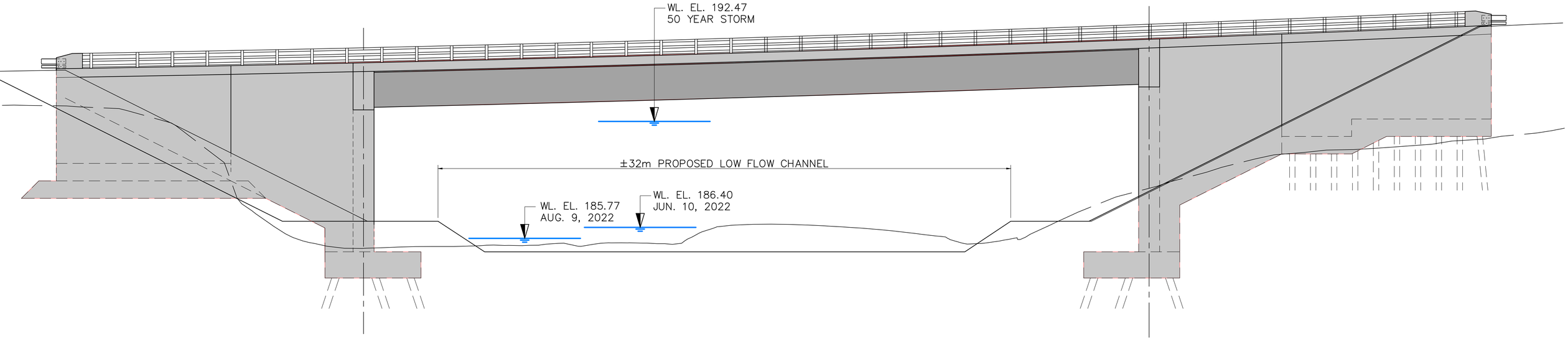
Ainley GROUP

AINLEY FILE: 217031
BRIDGE No. 9
DRAWING No. PP5

Plotted by: JBALDWIN on April 5, 2023 at 5:53 PM
File: \\cg-barrie\vol1\Drafting\Barrie\217031\Drawings\217031-Option.dwg Layout: PP5

Appendix H

Structure Configuration Design Options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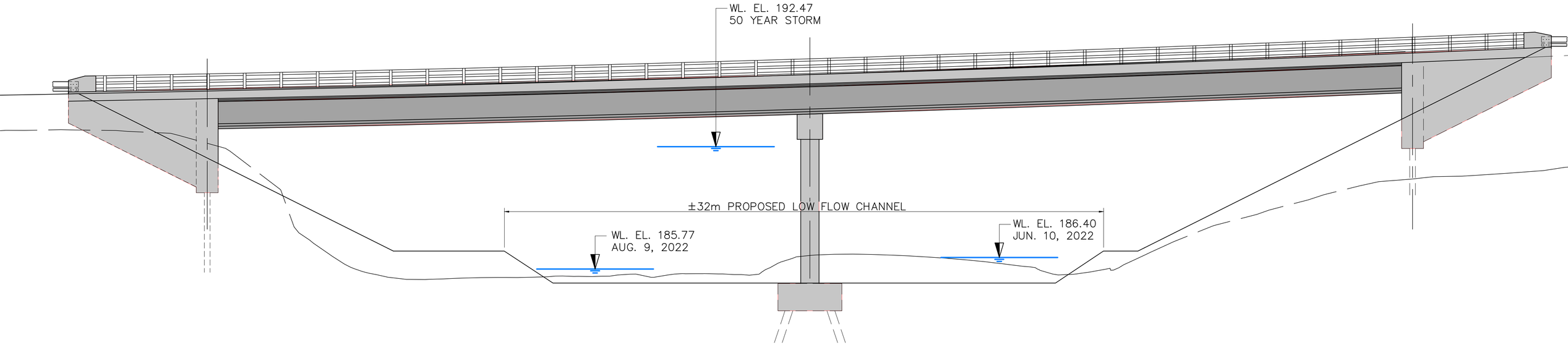
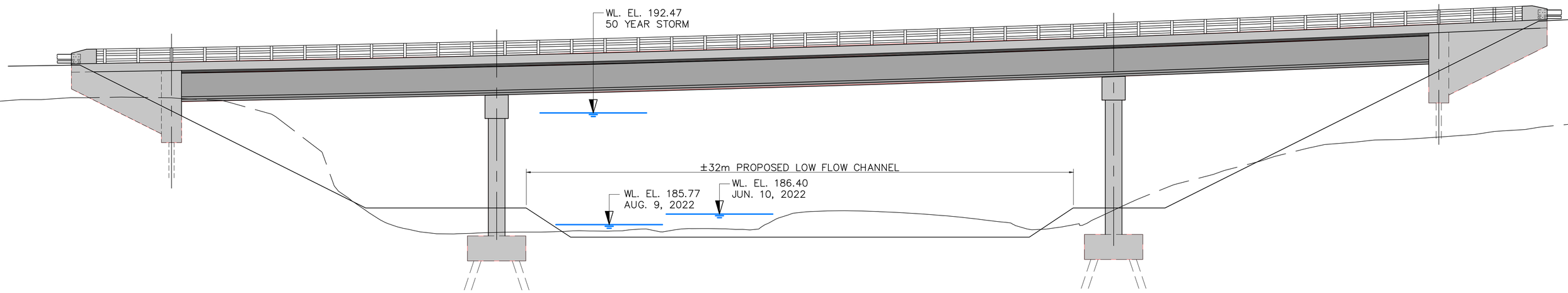
±32m PROPOSED LOW FLOW CHANNEL
WL. EL. 185.77
AUG. 9, 2022
WL. EL. 186.40
JUN. 10, 2022


WL. EL. 192.47
50 YEAR STORM
±32m PROPOSED LOW FLOW CHANNEL
WL. EL. 185.77
AUG. 9, 2022
WL. EL. 186.40
JUN. 10, 2022


WL. EL. 192.47
50 YEAR STORM
±32m PROPOSED LOW FLOW CHANNEL
WL. EL. 185.77
AUG. 9, 2022
WL. EL. 186.40
JUN. 10, 2022

Appendix I
Consultation Records

Appendix I-1

Notice of Study Commencement
Agency and Property Owner Contact Lists
Comments and Responses

TOWNSHIP OF ESSA
5th Line Bridge Improvements
Schedule 'C' Municipal Class Environmental Assessment
Notice of Study Commencement

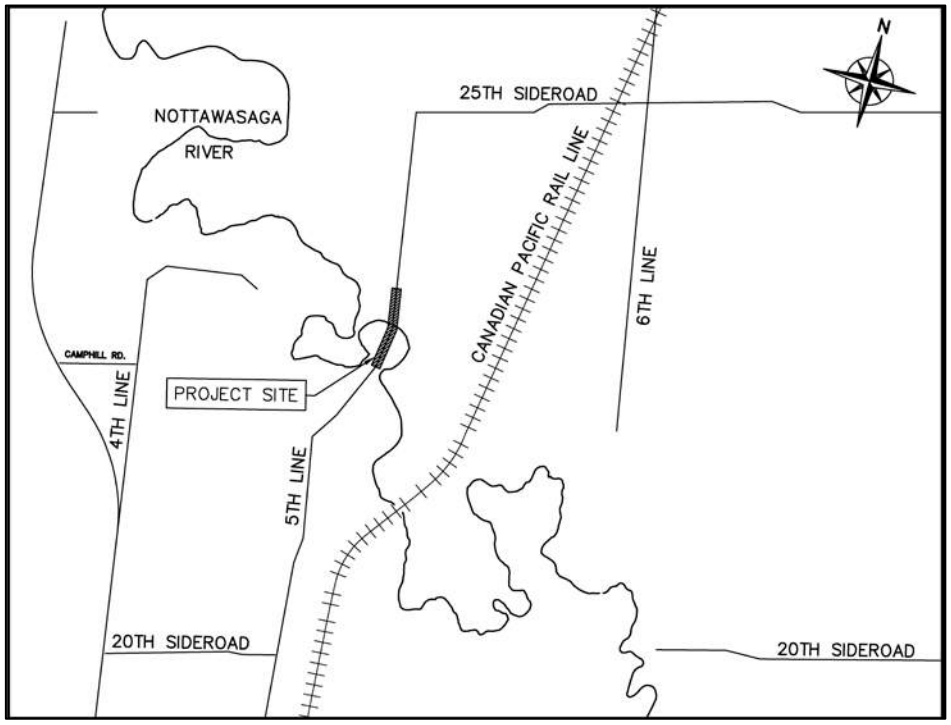
The Project

The Township of Essa has retained the services of the Ainley Group to undertake a Municipal Class Environmental Assessment (Class EA) to address deficiencies associated with the bridge on the 5th Line over the Nottawasga River, at the location indicated on the accompanying study map. This project has been initiated to accommodate two lanes of traffic over the bridge and improve the horizontal and vertical alignment of the approaches, over an approximate distance of 700 m. As part of this project, improvements and stabilization will be made to the embankments in the project area.

The Process

This project will follow the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (Oct. 2000, as amended 2007, 2011 & 2015).* Public Open Houses will be scheduled during this process and notification will be provided in advance. Interested parties will have the opportunity to review the design alternatives under consideration and to provide input in the selection of the preferred design.

During the course of the project there will be on-going field investigations and data collection in the area of the Bridge. Public cooperation is greatly appreciated.



Comments Invited

Public input is encouraged throughout this process and will be given consideration during the planning and design of this project. Information will be collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. Project updates and notices will be posted on the Town's website www.essatownship.on.ca to inform the public of the Class EA process. With the exception of personal information, all comments will become part of the public record. To obtain additional information or to provide input, please contact either of the following members of the study team:

Bob Morrison
Manager of Public Works
Township of Essa
5786 Simcoe County Road 21
Utopia, ON L0M 1T0
Phone: 705-424-9770
Fax: 705-424-2367
Email: bmorrison@essatownship.on.ca

Brian Wickenheiser
Bridges and Structures Group Lead
Ainley Group
550 Welham Road
Barrie, Ontario L4N 8Z7
Tel: 705-726-3371
Fax: 705-726-4391
Email: wickenheiser@ainleygroup.com

This notice first issued August 8th, 2019.

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of Study Commencement
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Provincial & Federal Agencies										
Mr.	Rob	Dobos	Manager, Environmental Assessment Section	Environment Canada - Environmental Protection Operations Division - Ontario Region	867 Lakeshore Road	P.O. Box 5050	Burlington, ON	L7R 4A6	905-336-4953	
Ms.	Chunmei	Liu	Environmental Resource Planner & EA Coordinator - Air, Pesticides and Environmental Planner *(Barrie, Orillia & County of Simcoe)*	Central Region Ministry of Environment, Conservation and Parks	5775 Yonge Street	8th Floor	North York, ON	M2M 4J1	416-326-4886	chunmei.liu@ontario.ca
Ms.	Cindy	Hood	District Manager	Barrie District Office Ministry of Environment, Conservation and Parks	54 Cedar Point Drive	Unit 1201	Barrie, ON	L4N 5R7	705-739-6436	cindy.hood@ontario.ca
Mr.	Shawn	Carey	District Manager	Midhurst District Ministry of Natural Resources and Forestry	2284 Nursery Road		Midhurst, ON	L0L 1N8	705-725-7561	shawn.carey@ontario.ca
Ms.	Karla	Barboza	Team Lead, Heritage	Ministry of Tourism, Culture & Sport	401 Bay Street	Suite 1700	Toronto, ON	M7A 0A7	416-314-7120	karla.barboza@ontario.ca
Ms.	Carol	Neumann	Rural Planner	Ontario Ministry of Agriculture, Food and Rural Affairs	6484 Wellington Rd. 7	Unit 10	Elora, ON	N0B 1S0	519-846-3393	carol.neumann@ontario.ca
Mr.	Teepu	Khawja	Regional Director	Ministry of Transportation, Central Region	1201 Wilson Avenue		Toronto, ON	M3M 1J8	416-235-5400	teepu.khawja@ontario.ca
Mr.	Chris	Gauer	Executive Vice President Major Projects, Roads & Transit	Infrastructure Ontario	777 Bay Street	6th Floor, Suite 602	Toronto, ON	M5G 2C8	416-327-8037	Chris.Gauer@infrastructureontario.ca
Mr.	Tim	Haldenby	Municipal Planning Advisor - Team Lead Central Ontario	Ministry of Municipal Affairs and Housing	777 Bay Street	13th Floor	Toronto, ON	M5G 2E5	416-585-6559	tim.haldenby@ontario.ca
Mr.	David	Aldersey	Senior Business Advisor	Ministry of Economy Development & Growth	2284 Nursery Road		Midhurst, ON	L0L 1N8		
Local Government, Adjacent Municipalities & Other Agencies										
Mr.	Christian	Meile	Director, Construction & Transportation Maintenance	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	christian.meile@simcoe.ca
Mr.	Dave	Parks	Director, Planning, Development & Tourism	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	dave.parks@simcoe.ca
Mr.	John	Fisher	Park Superintendent	Wasaga Beach Provincial Park	11-22nd Street North		Wasaga Beach, ON	L9Z 2W9	705-429-6629	
Mr.	Charles	Burgess	Senior Planner	Lake Simcoe Region Conservation Authority	120 Bayview Parkway	Box 282	Newmarket, ON	L3Y 4X1	905-895-1281 x299	c.burgess@lsrca.on.ca
Mr.	Chris	Hibberd	Director, Watershed Management Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0	705-424-1479	c.hibberd@nvca.on.ca
Mr.	Lee	Bull	Manager, Planning Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0		
			Simcoe County District Health Unit		280 Pretty River Parkway		Collingwood, ON	L9Y 4J5	705-445-6498	
Mr.	George	Vadeboncoeur	CAO	Town of Wasaga Beach	30 Lewis Street		Wasaga Beach, ON	L9Z 1A1		
Mr.	Greg	Murphy	CAO	Township of Essa	5786 County Road 12		Utopia, ON	L0M 1T0		
Mr.	Blaine	Parkin	CAO	Town of New Tecumseth	10 Wellingston Street East		Alliston, ON	L9R 1A1	705-435-3900	
Ms.	Michael	Prowse	CAO	City of Barrie	70 Collier Street	P.O. Box 400	Barrie, ON	L4M 4T5	705-739-4220	
Ms.	Barb	Fox	Planning Officer	Simcoe Muskoka Catholic District School Board	46 Alliance Blvd.		Barrie, ON	L4M 5K3	705-722-3559 ext. 250	bfox.smcdsb.on.ca
Ms.	Holly	Spacek	Planning Officer	Simcoe County District School Board	1170 Highway 26		Midhurst, ON	L0L 1X0	705-728-7570 ext. 11311	hspacek@scdsb.on.ca
Mr.	Miguel	Ladouceur	Director of Building, Maintenance and Planning	Conseil Scolaire Viamonde	116 Cornelius Parkway		Toronto, ON	M6L 2K5	1-416-614-5917	ladouceurm@csviamonde.ca
Ms.	Nathalie	Huard	Transportation Technician, Service de Transport Francobus	Association Franco-Ontarienne Des Conseils Scolaires Catholiques	138 rue Main Est	Bureau 205	Welland, ON	L3B 3W6	1-800-749-0002	huardn@francobus.ca
Ms.	Bonnie	Branch	Transportation Coordinator	Simcoe County Student Transportation Consortium	64 Cedar Pointe Drive	Unit 1403	Barrie, ON	L4N 5R7	705-733-8965, ext. 107	bbranch@scstc.ca
Mr.	Earl	Elliott	President	Simcoe County Historical Association		P.O. Box 144	Barrie, ON	L4M 4S9	705-796-7649	earl.elliott@rogers.com
Emergency Services										

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of Study Commencement
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Mr.	JC	Gilbert	Deputy Chief Operations	County of Simcoe Paramedic Services	1110 Highway 26		Midhurst, ON	L0L 1X0	705-726-9300	ic.gilbert@simcoe.ca
Ms.	Donna	Danyluk	Communications Representative	Royal Victoria Regional Health Centre	201 Georgian Drive		Barrie, ON	L4M 6M2	705-728-9090 ext. 41610	danylukd@rvh.on.ca
Ms.	Cynthia	Ross	Fire Chief	Essa Fire Department					705-424-5828	crosstustin@essatownship.on.ca
Ms.	Lori	Dedora	Administration Coordinator	Essa Fire Department					705-424-5828	ldedora@essatownship.on.ca
Ms.	Paula	Brown	Operational Policy & Strategic Planning	Ontario Provincial Police	777 Memorial Ave., 2nd Floor		Orillia, ON	L3V 7V3		
Attn: General			(Prefer to receive Fax)	Nottawasaga OPP Detachment Office	4601 Industrial Pkwy		Alliston, ON	L9R 1V2	705 434 1939	Fax: 705 434 9109
Special Interest Groups										
Attn: General				Angus and Area Chambers of Commerce	P.O Box 2003		Angus, ON	L0M 1B0	705 424 4878	info@anguschamber.com
Ms.	Diana	Robinson	President	Cookstown and District Chamber of Commerce	P.O.Box 1102		Cookstown, ON	L0L 1L0	705.458.7007	
Attn: General				Alliston & District Snowmobile Club Trail					705-435-0101	volunteer@adsc.ca
Attn: General				Essa Recreation Centre	8529 Simcoe County Road 10		Angus, ON	L0M 1B2	705 424 9303	
Attn: General				Essa Public Library	8505 County Road 10	Unit 1	Angus, ON	L0M 1B1	705 424 6531	
Mr.	Jeffrey	McGarvey	General Manager, Golf and Operations	CFB Borden Golf Club	31 Louisbourg Rd.	Box 1000	Borden, ON	L0M 1C0	705-424-1200	jeffrey.mcgarvey@forces.gc.ca
Consultants & Developers										
Ms.	Rayna	Thompson		Brookfield Residential					905 948 5003	Rayna.Thompson@brookfieldrp.com
Mr.	Phil	Sheridan		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2270	psheridan@scsconsultinggroup.com
Mr.	Doug	Woo		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2228	dwoo@scsconsultinggroup.com
Aboriginal Consultation *(contact list updated as per MOECC email June 27, 2017)*										
Att: Consultation Unit				Ministry of Indigenous Relations & Reconciliation (MIRR)	160 Bloor St. East	9th Floor	Toronto, ON	M7A 2E6	416-326-4757	maa.ea.review@ontario.ca
(INAC (formerly AANDC) not contacted for this project as project is not on Aboriginal lands)				~~Indigenous & Northern Affairs Canada Consultation Unit (formerly Aboriginal Affairs & Northern Development Canada)~~	~~25 St. Clair Avenue East~~	~~8th Floor~~	~~Toronto, ON~~	~~M4T 1M2~~	~~1-800-567-9604~~	
Mr.	Brian	Tucker	Manager of Way of Life Framework	The Metis Nation of Ontario	500 Old St. Patrick St.	Unit 3	Ottawa, ON	K1N 9G4	807-274-1386 (direct)	Prefers digital - briant@metisnation.org
Ms.	Lynette	Davis	Director of Operations	Metis National Council	4-340 MacLaren Street		Ottawa, ON	K2P 0M6	613-232-3216	info@metisnation.ca
Mr.	Allen	Vallee	President	Georgian Bay Metis Council	355 Cranston Crescent	P.O. Box 400	Midland, ON	L4R 4K6	705-526-6335	'gbmccontact@gmail.com'
Mr.	Tony	Muscat	President Interim	Moon River Metis Council	B26360 Cedarhurst Beach Road	R.R. 1	Beaverton, ON	L0K 1A0	705-426-1381	tonymuscat@rogers.com
First Nation Communities										
Chief	Mary	McQue-King		Beausoleil First Nation	General Delivery		Cedar Point, ON	L0K 1C0	705-247-2051	bfnchief@chimnissing.ca
Chief	Donna	Big Canoe		Chippewas of Georgina Island	R.R. #2	P.O. Box 13	Sutton West, ON	L0E 1R0	705-437-1337	donna.bigcanoe@georginaisland.com
Ms.	Sharday	James		Chippewas of Rama First Nation	200-5884-Rama Road		Rama, ON	L3V 6H6	705-325-3611	
Chief	Greg	Nadjiwon		Chippewas of Nawash First Nation	R.R. #5		Wiarton, ON	N0H 2T0	519-534-1689	
Chief	Lester	Anoquot		Saugeen First Nation	R.R.#1		Southhampton, ON	N0H 2L0	519-797-2781	
Ms.	Tina	Durand	Executive Secretary	Huron-Wendat Nation						tina.durand@cnhw.qc.ca
Utilities										
Ms.	Joanna	MacDarmid	Planning Department	Hydro One	40 Olympic Drive		Dundas, ON	L9H 7P5	905-627-6058	
Ms.	Carol	O'Brien		Bell Canada	136 Bayfield Street	2nd Floor	Barrie, ON	L4M 3B1	705-722-2405	carol.obrien@bell.ca
Mr.	Tony	Dominguez		Rogers	1 Sperling Drive		Barrie, ON	L4N 6B8	705-737-4660 xt 6907	tony.dominguez@rci.rogers.com
Mr.	Tom	Jedemann		Enbridge Gas	101 Honda Blvd		Markham, ON	L6C 0M6	905-927-3184	tom.jedemann@enbridge.com

[redacted]
7743 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7883 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7757 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7783 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7901 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7631 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7969 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
125 BELLA VISTA TRAIL
ALLISTON ON L9R 2E2

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7850 5TH LINE
ANGUS ON L0M 1B0

[redacted]
6219 25TH SIDEROAD
ANGUS ON L0M 1B1

[redacted]
7832 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7900 5TH LINE PO BOX 2079
ANGUS ON L0M 1B0

[redacted]
7740 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7804 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7780 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
8082 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7790 5TH LINE PO BOX 2053
THORNTON ON L0L 2N0

[redacted]
8066 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7616 5TH LINE
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8206 5TH LINE
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7766 5TH LINE
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[redacted]
4108 FIELDGATE DR
MISSISSAUGA ON L4W 2C4

[redacted]
7634 5TH LINE
ANGUS ON L0M 1B1

[redacted]
6273 25TH SIDEROAD
ANGUS ON L0M 1B1

[redacted]
7654 5TH LINE RR 1
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[redacted]
7692 5TH LINE RR 1
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[redacted]
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ANGUS ON L0M 1B1

[redacted]
7865 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7653 5TH LINE RR 1
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[redacted]
8063 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7765 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7801 5TH LINE
ANGUS ON L0M 1B1

[redacted]
125 BELLA VISTA TRAIL
ALLISTON ON L9R 2E2

[redacted]
7819 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7831 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7839 5TH LINE
ANGUS ON L0M 1B1

Ministry of the Environment, Conservation and Parks
Drinking Water and Environmental Compliance Division

Central Region,
Technical Support Section
5775 Yonge Street, 9th Floor
North York, ON M2M 4J1
Tel. (416) 326-6700
Fax (416) 325-6347

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Division de la conformité en matière d'eau potable et d'environnement

Région du Centre
Section d'appui technique
5775, rue Yonge, 8ième étage
North York, Ontario M2M 4J1
Tél. : (416) 326-6700
Téléc. : (416) 325-6347

August 8, 2019

File No.: EA 01-06-05

Bob Morrison
Manager of Public Works
Township of Essa
5786 Simcoe County Road 21
Utopia, ON L0M 1T0

Re: **5th Line Bridge Improvements**
Township of Essa
Municipal Class Environmental Assessment
Response to Notice of Commencement

Dear Mr. Morrison,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the Township of Essa has indicated that the study is following the approved environmental planning process for a Schedule C project under the Municipal Class Environmental Assessment (Class EA).

The attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please identify the areas of interest which are applicable to the project and ensure they are addressed. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule.

The Crown has a legal duty to consult Indigenous communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project.

- Chippewas of Georgina Island
- Chippewas of Rama First Nation (Chippewas of Mnjikaning)
- Beausoleil First Nation
- Chippewas of Nawash First Nation
- Chippewas of Saugeen
- Huron-Wendat Nation (if there is potential for the project to impact archeological resources)
- Métis Nation of Ontario
    - MNO Georgian Bay Métis Council
        - please cc Métis Nation of Ontario (MNO) on any correspondence going to the Councils

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process" which can be found at the following link: https://www.ontario.ca/page/consultation-ontarios-environmental-assessment-process Additional information related to Ontario's *Environmental Assessment Act* is available online at: www.ontario.ca/environmentalassessments

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information.

The proponent must contact the Director of Environmental Assessment and Permissions Branch under the following circumstances after initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to the proponent by the communities
- The proponent has reason to believe that the proposed project may adversely affect an Aboriginal or treaty right
- Consultation has reached an impasse
- A Part II Order request or elevation request is expected

The Director of the Environmental Assessment and Permissions Branch can be notified either by email with the subject line "Potential Duty to Consult" to enviropermissions@ontario.ca or by mail or fax at the address provided below:

Email:	enviropermissions@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Assessment and Permissions Branch 135 St. Clair Avenue West, 1st Floor Toronto, ON, M4V 1P5

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role the proponent will be asked to play in them.

Should you or any members of your project team have any questions regarding the material above, please contact me at chunmei.liu@ontario.ca or 416-326-4886.

Yours truly,

Chunmei Liu
Regional Environmental Assessment Coordinator
Air, Pesticides and Environmental Planning

cc: C. Hood, Manager, Barrie District Office, MECP
P. Martin, APEP Supervisor, Central Region, MECP
B. Wickenheiser, Bridges and Structures Group Lead, Ainley Group

Central Region EA File
A & P File

Attach: Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities

AREAS OF INTEREST

It is suggested that you check off each applicable area after you have considered / addressed it.

☐ **Source Water Protection (all projects)**

The Clean Water Act, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- As you may be aware, in October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the Project File/ESR on source water protection.**
    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area. If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the project file or ESR how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php.The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.
- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the Report and include all communication documents/correspondence.**

More Information
For more information on the Clean Water Act, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the Clean Water Act. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

Climate Change

Ontario is leading the fight against climate change through the Climate Change Action Plan. Recently released, the plan lays out the specific actions Ontario will take in the next five years to meet its 2020 greenhouse gas reduction targets and establishes the framework necessary to meet its long-term targets. As a commitment of the action plan, **the province has now finalized a guide, "Considering Climate Change in the Environmental Assessment Process" (Guide), which is found online at: https://www.ontario.ca/page/considering-climate-change-environmental-assessment-process**

The Guide is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. **Proponents should review this Guide in detail.**

- The MECP expects proponents to:

    1. Take into account during the assessment of alternative solutions and alternative designs, the following:
        a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
        b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
    2. Include a discrete section in the Project File/ESR detailing how climate change was considered in the EA.

    How climate change is considered can be qualitative or quantitative in nature, and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered. Please ensure climate change is considered in the report.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Planning and Policy

- Parts of the study area may be subject to the Oak Ridges Moraine Conservation Plan, Niagara Escarpment Plan, Greenbelt Plan, Lake Simcoe Protection Plan, or Growth Plan for the Greater Golden Horseshoe. Applicable policies should be referenced in the Project File/ESR, and the proponent should describe how the proposed study adheres to the relevant policies in these plans. **The new 2017 provincial plans are now in effect.**

- The Provincial Policy Statement (2014) contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the Project File/ESR, and the proponent should describe how this proposed project is consistent with these policies.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, an air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- **If a full Air Quality Impact Assessment is not required for the project, the Project File/ESR should still contain:**

    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities*. Report prepared for Environment Canada. March 2005.

- The Project File/ESR should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Surface Water

- The Project File/ESR must include a sufficient level of information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the Project File/ESR and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the Ontario Water Resources Act (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the Project File/ESR should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the Project File/ESR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the Project File/ESR.

- If the potential construction or decommissioning of water wells is identified as an issue, the Project File/ESR should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the Project File/ESR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

Contaminated Soils

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the ministry's District Offices for further consultation if contaminated sites are present.

- Any current or historical waste disposal sites should be identified in the Project File/ESR. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites.

- The location of any underground storage tanks should be investigated in the Project File/ESR. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- The Project File/ESR should identify any underground transmission lines in the study area. The owners should be consulted to avoid impacts to this infrastructure, including potential spills.

Excess Materials Management

- Activities involving the management of excess soil should be completed in accordance with the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) available online (http://www.ontario.ca/document/management-excess-soil-guide-best-management-practices).

- All waste generated during construction must be disposed of in accordance with ministry requirements.

Servicing and Facilities

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with the Environmental Approvals Access and Service Integration Branch (EAASIB) to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's "D-Series" guidelines – Land Use Compatibility to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the Project File/ESR and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the Project File/ESR, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The Project File/ESR must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the Project File/ESR that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The Class EA also directs proponents to include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments.

Class EA Process

- The Project File/ESR should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. The Master Plan should clearly indicate the selected approach for conducting the plan, in particular by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the *Environmental Assessment Act* (EAA), although the plan itself would not be.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The Project File/ESR should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments) such that all potential impacts can be identified and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the Project File/ESR.

- Please include in the Project File/ESR a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, and approvals under the *Canadian Environmental Assessment Act* (CEAA).

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the Project File/ESR.

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors,

where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

Ministry of Tourism, Culture and Sport

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416.314.7133

Ministère du Tourisme, de la Culture et du Sport

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416.314.7133

Ontario

August 13, 2019 EMAIL ONLY

Brian Wickenheiser
Bridges and Structures Group Lead
Ainley and Associates Limited
550 Welham Road
Barrie, ON L4N 8Z7
wickenheiser@ainleygroup.com

MTCS File	**:**	**0011204**
Proponent	**:**	**Township of Essa**
Subject	**:**	**Notice of Commencement– Schedule C– Municipal Class EA**
Project	**:**	**5th Line Bridge Improvements**
Location	**:**	**5th Line over Nottawasaga River, Township of Essa, County of Simcoe**

Dear Mr. Wickenheiser:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Commencement for the above-referenced project. MTCS's interest in this environmental assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources (including land and marine)
- built heritage resources (including bridges and monuments)
- cultural heritage landscapes

Project Summary
The Township of Essa is undertaking a Municipal Class EA to address deficiencies associated with the bridge on 5th Lone over the Nottawasaga River. The project has been initiated to accommodate two lanes of traffic over the bridge and improve the horizontal and vertical alignment of approaches, over an approximate distance of 700m. As part of the project, improvements and stabilization will be made to the embankments in the project area.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Municipal Heritage Bridges: Cultural, Heritage & Archaeological Resources Assessment Checklist

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources. The Municipal Engineers Association provides screening criteria for work on bridges that falls under the Municipal Class EA with a *checklist* and *background material* available online, developed in coordination with MTCS.

Part A – Municipal Class EA Activity Selection

Please use the *checklist* and *background material* to determine the Municipal Class EA schedule (A, A+, B or C) for the project. Completing the remainder of this checklist determines what technical cultural heritage studies may be required.

Part B - Cultural Heritage Assessment

If Part B of the checklist determines that the bridge or study area warrants the preparation of a Cultural Heritage Evaluation Report (CHER), and the undertaking of a Heritage Impact Assessment (HIA), our ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. CHERs and HIAs are to be prepared by qualified consultants. Please send HIAs to MTCS for review, and make copies available to local organizations or individuals who have expressed an interest in cultural heritage.

Part C – Heritage Assessment

If Part C of the checklist determines that the CHER has identified heritage features on the project and recommends that a Heritage Impact Assessment (HIA) be undertaken, our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. CHERs and HIAs are to be prepared by qualified consultants. Please send HIAs to MTCS for review, and make copies available to local organizations or individuals who have expressed an interest in cultural heritage.

Part D – Archaeological Resources Assessment

If Part D of the checklist establishes that an archaeological assessment is required, it is to be conducted by an archaeologist licenced under the *Ontario Heritage Act* (*OHA*), who is responsible for submitting the report directly to MTCS for review. MTCS archaeological sites data are available at *archaeology@ontario.ca*.

After completing the checklist, please update MTCS on the project Class EA schedule and whether any technical cultural heritage studies will be completed for the project. Please provide all technical heritage studies to MTCS before issuing a Notice of Completion or commencing any of work on site.

Environmental Assessment Reporting

All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. If the screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MTCS on this project. Please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Kimberly Livingstone
Heritage Planner (A)
Heritage Planning Unit
kimberly.livingstone@ontario.ca

Copied to: Bob Morrison, Manager of Public Works, Township of Essa, bmorrison@essatownship.on.ca

Jody Marks

From: Bob Morrison <bmorrison@essatownship.on.ca>
Sent: Tuesday, August 6, 2019 2:30 PM
To: Sharday James
Cc: Jodi Moore
Subject: RE: 5th Line Bridge Improvements Study Commencement

Mr. James
Thank you for your email. I have copied Ainsley's and they will be able to give you a report when the study is complete.

Bob Morrison, CRS-I
Manager of Public Works
Township Of Essa
Public Works Dept.
5786 Simcoe County Road 21, Utopia ON L0M 1T0
Office. 705 424-9770 ext. 135
Fax. 705 424-2367
Email: bmorrison@essatownship.on.ca

From: Sharday James <shardayj@ramafirstnation.ca>
Sent: August 6, 2019 1:58 PM
To: Bob Morrison <bmorrison@essatownship.on.ca>
Subject: 5th Line Bridge Improvements Study Commencement

Hello,
I am sending this email in regards to a notice we received from you dated July 30th about the study commencement for improvements to the 5th Line Bridge in Essa Township. Thank you for contacting us. We are interested in this project and have some concerns regarding the potential impact on the aquatic habitat of the Nottawasaga River. Could you please send us any reports upon their completion particularly impact assessments.

Thank you,
Sharday James

Sharday James
Community Consultation Worker, Communications
Chippewas of Rama First Nation
(ph) 705-325-3611,1633
(cell)
(fax)
(url) www.ramafirstnation.ca

Please consider the environment before printing this e-mail.

Jody Marks

From: Georgian Bay Métis Council <gbmccontact@gmail.com>
Sent: Thursday, August 1, 2019 11:28 AM
To: Jodi Moore
Cc: briant@metisnation.org; Caryn MacLoghlin
Subject: Re: 217031 - 5th Line Notice of Commencement - Georgian Bay Metis Council
Attachments: image001.jpg

Thank you. I have included our consultation in this email for future communications.

Greg Garratt

On Thu, Aug 1, 2019, 09:46 Jodi Moore <moore@ainleygroup.com> wrote:

> Dear Mr. Allan Vallee,
>
> Please see attached the Notice of Commencement. Cc'ing The Metis Nation of Ontario as per direction from the Ministry of Environment, Conservation and Parks.
>
> Thank you,
>
> Jodi Moore
>
> Environmental Planning Assistant
>
> 
>
> www.ainleygroup.com
>
> Tel: (705) 726-3371 Ext. 239
>
> ---
>
>
>
> ---

Jody Marks

From: Bob Morrison <bmorrison@essatownship.on.ca>
Sent: Wednesday, July 31, 2019 9:37 AM
To: Maxime Picard
Cc: Jodi Moore
Subject: RE: Township of Essa - 5th Line Bridge Improvements

We will do that.

Bob Morrison, CRS-I
Manager of Public Works
Township Of Essa
Public Works Dept.
5786 Simcoe County Road 21, Utopia ON L0M 1T0
Office. 705 424-9770 ext. 135
Fax. 705 424-2367
Email: bmorrison@essatownship.on.ca

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: July 31, 2019 8:41 AM
To: Bob Morrison <bmorrison@essatownship.on.ca>
Subject: RE: Township of Essa - 5th Line Bridge Improvements

Thanks for following-up Bob.

Please provide us with the reports once completed.

Best,

Maxime

NATION HURONNE-WENDAT
Bureau du Nionwentsïo

Maxime Picard, B. Sc. A.
Coordonnateur de projets - Ontario
255, Place Chef Michel-Laveau
Wendake (Qc) G0A 4V0
Téléphone : 418-843-3767 # 2105
Courriel : maxime.picard@cnhw.qc.ca

Devez-vous vraiment imprimer ce courriel?
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De : Bob Morrison [mailto:bmorrison@essatownship.on.ca]
Envoyé : 30 juillet 2019 15:35
À : maxime.picard@cnhw.qc.ca
Objet : FW: Township of Essa - 5th Line Bridge Improvements

Mr. Picard
Please see the comments from our engineering firm.

Bob Morrison, CRS-I
Manager of Public Works
Township Of Essa
Public Works Dept.
5786 Simcoe County Road 21, Utopia ON L0M 1T0
Office. 705 424-9770 ext. 135
Fax. 705 424-2367
Email: bmorrison@essatownship.on.ca

From: Jodi Moore <moore@ainleygroup.com>
Sent: July 30, 2019 2:34 PM
To: Bob Morrison <bmorrison@essatownship.on.ca>
Subject: RE: Township of Essa - 5th Line Bridge Improvements

Yes, there will be an archaeological assessment completed for this project. A stage 1 and 2 Archaeological Assessment will be completed for this project.

Thank you,
Jodi Moore
Environmental Planning Assistant

Ainley

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 239

From: Bob Morrison [mailto:bmorrison@essatownship.on.ca]
Sent: Tuesday, July 30, 2019 2:09 PM
To: Jodi Moore
Subject: FW: Township of Essa - 5th Line Bridge Improvements

Jodi
Can you comment on this ? Will there be a archaeological assessment done as part of the EA?

Bob Morrison, CRS-I
Manager of Public Works
Township Of Essa
Public Works Dept.
5786 Simcoe County Road 21, Utopia ON L0M 1T0
Office. 705 424-9770 ext. 135
Fax. 705 424-2367
Email: bmorrison@essatownship.on.ca

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: July 30, 2019 2:00 PM
To: Bob Morrison <bmorrison@essatownship.on.ca>
Subject: Township of Essa - 5th Line Bridge Improvements

Good afternoon Mr Morrison,

This is to acknowledge reception of the attached letter on the Township of Essa - 5th Line Bridge Improvements Project.

Could you please clarify if any archaeological assessment is anticipated as part of the EA ?

Thanks and best regards,

Maxime Picard

NATION HURONNE-WENDAT
Bureau du Nionwentsïo

Maxime Picard, B. Sc. A.
Coordonnateur de projets - Ontario

255, Place Chef Michel-Laveau
Wendake (Qc) G0A 4V0
Téléphone : 418-843-3767 # 2105
Courriel : maxime.picard@cnhw.qc.ca

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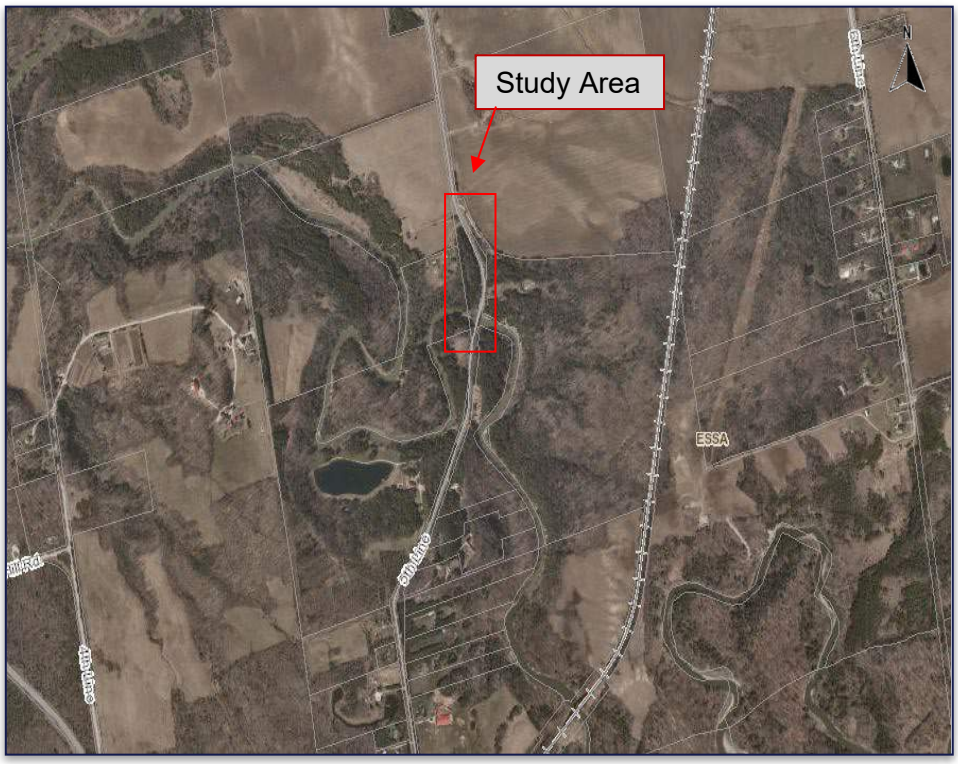
Appendix I-2

Notice of PIC#1
Agency and Property Owner Contact Lists
PIC#1 Presentation Material
Comments

TOWNSHIP OF ESSA
5th Line Bridge Rehabilitation
Schedule 'C' Municipal Class Environmental Assessment
Notice of Public Information Centre No. 1

The Project

The Township of Essa has retained the services of Ainley Group to undertake a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25 and provide a key transportation link between the communities of Angus, Baxter, and Alliston. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit. This project will follow the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (Oct. 2000, as amended 2007, 2011 & 2015).*



Public Information Centre

A virtual Public Information Centre (PIC) will be held on **Monday, November 29, 2021 from 6:00pm to 7:00pm.** The purpose of the PIC will be to provide information on the project and to allow interested parties an opportunity to review alternative solutions. To participate in the virtual PIC please register no later than 4:00 p.m. on Friday November 26, 2021 by e-mailing Krista Pascoe at kpascoe@essatownship.on.ca

Comments Invited

Public input is encouraged throughout this process and will be given consideration during the planning and design of this project. A recording of the PIC presentation and copy of presentation material will be available on the Township's website at https://www.essatownship.on.ca/government/publicnotices along with project information and comment sheet. Comments on the information presented will be received until **December 13, 2021**. To obtain additional information or to provide input, please contact either of the following members of the study team:

Michael Mikael, Project Manager
Township of Essa
5786 Simcoe County Road 21
Utopia, ON L0M 1T0
Tel: 705-424-9770
Email: mmikael@essatownship.on.ca

Brian Wickenheiser, Bridges and Structures Group Lead
Ainley Group
550 Welham Road
Barrie, Ontario L4N 8Z7
Tel: 705-726-3371
Email: wickenheiser@ainleygroup.com

This notice first issued November 18, 2021.

Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of PIC No. 1
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Provincial & Federal Agencies										
Ms.	Chunmei	Liu	Environmental Resource Planner & EA Coordinator - Air, Pesticides and	Central Region Ministry of Environment, Conservation and	5775 Yonge Street	8th Floor	North York, ON	M2M 4J1	416-326-4886	chunmei.liu@ontario.ca
Ms.	Cindy	Hood	District Manager	Barrie District Office Ministry of Environment, Conservation and	54 Cedar Point Drive	Unit 1201	Barrie, ON	L4N 5R7	705-739-6436	cindy.hood@ontario.ca
Mr.	Ken	Mott	District Planner	Midhurst District Ministry of Northern Development, Mines,	2284 Nursery Road		Midhurst, ON	L0L 1N8	705-725-7546	Ken.mott@ontario.ca
Ms.	Karla	Barboza	Team Lead, Heritage	Ministry of Heritage, Sport, Tourism and Cultural Industries	401 Bay Street	Suite 1700	Toronto, ON	M7A 0A7	416-660-1027	karla.barboza@ontario.ca
Mr.	Dan	Minkin	Heritage Planner	Ministry of Heritage, Sport, Tourism and Cultural Industries	401 Bay Street	Suite 1700	Toronto, ON	M7A 0A7	416-786-7553	dan.minkin@ontario.ca
Ms.	Carol	Neumann	Rural Planner	Ontario Ministry of Agriculture, Food and Rural Affairs	6484 Wellington Rd. 7	Unit 10	Elora, ON	N0B 1S0	519-846-3393	carol.neumann@ontario.ca
Mr.	Teepu	Khawja	Regional Director	Ministry of Transportation, Central Region	1201 Wilson Avenue		Toronto, ON	M3M 1J8	416-235-5400	teepu.khawja@ontario.ca
Mr.	Patrick	Grace	Director	Infrastructure Ontario	777 Bay Street	6th Floor, Suite 602	Toronto, ON	M5G 2C8		patrick.grace@ontario.ca
Mr.	Aldo	Ingraldi	Municipal Planning Advisor - Team Lead Central Ontario	Ministry of Municipal Affairs and Housing	777 Bay Street	13th Floor	Toronto, ON	M5G 2E5	416-585-6559	Aldo.Ingraldi@ontario.ca
Local Government, Adjacent Municipalities & Other Agencies										
Mr.	Christian	Meile	Director, Construction & Transportation Maintenance	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	christian.meile@simcoe.ca
Mr.	Dave	Parks	Director, Planning, Development & Tourism	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	dave.parks@simcoe.ca
Mr.	Chris	Hibberd	Director, Watershed Management Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0	705-424-1479	c.hibberd@nvca.on.ca
Mr.	Brad	Krul	Manager, Planning Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0		bkrul@nvca.on.ca
Mr.	Bill	Kemeny	Sr. Public Health Inspector, Safe Water Program		15 Sperling Drive		Barrie, ON	L9Y 4J5	705-721-7520 ext. 7285	Bill.Kemeny@smdhu.org
Ms.	Colleen	Healey-Dowdall	CAO	Township of Essa	5786 County Road 12		Utopia, ON	L0M 1T0		chealey@essatownship.on.ca
Mr.	Blaine	Parkin	CAO	Town of New Tecumseth	10 Wellington Street East		Alliston, ON	L9R 1A1	705-435-3900	
Ms.	Michael	Prowse	CAO	City of Barrie	70 Collier Street	P.O. Box 400	Barrie, ON	L4M 4T5	705-739-4220	Ashley.Harrison@barrie.ca
Ms.	Kristin	Pechkovsky	Planning Officer	Simcoe Muskoka Catholic District School Board	46 Alliance Blvd.		Barrie, ON	L4M 5K3	705-722-3555	kdpechkovsky@smcdsb.on.ca
Ms.	Holly	Spacek	Planning Officer	Simcoe County District School Board	1170 Highway 26		Midhurst, ON	L0L 1X0	705-728-7570 ext. 11311	hspacek@scdsb.on.ca
Mr.	Miguel	Ladouceur	Director of Building, Maintenance and Planning	Conseil Scolaire Viamonde	116 Cornelius Parkway		Toronto, ON	M6L 2K5	1-416-614-5917	ladouceurm@csviamonde.ca
Ms.	Nathalie	Huard	Transportation Technician, Service de Transport Francobus	Association Franco-Ontarienne Des Conseils Scolaires Catholiques	138 rue Main Est	Bureau 205	Welland, ON	L3B 3W6	1-800-749-0002	huardn@francobus.ca
Ms.	Bonnie	Branch	Transportation Coordinator	Simcoe County Student Transportation Consortium	64 Cedar Pointe Drive	Unit 1403	Barrie, ON	L4N 5R7	705-733-8965, ext. 107	bbranch@scstc.ca
Mr.	Earl	Elliott	President	Simcoe County Historical Association		P.O. Box 144	Barrie, ON	L4M 4S9	705-796-7649	earl.elliott@rogers.com
Emergency Services										
Mr.	Andrew	Robert	Deputy Chief Operations	County of Simcoe Paramedic Services	1110 Highway 26		Midhurst, ON	L0L 1X0	705-726-9300	
Ms.	Donna	Danyluk	Communications Representative	Royal Victoria Regional Health Centre	201 Georgian Drive		Barrie, ON	L4M 6M2	705-728-9090 ext. 41610	danylukd@rvh.on.ca
Mr.	Doug	Burgin	Deputy Fire Chief	Essa Fire Department					705-424-5828	dburgin@essatownship.on.ca
Ms.	Lori	Dedora	Administration Assistant	Essa Fire Department					705-424-5828	ldedora@essatownship.on.ca
Ms.	Paula	Brown	Operational Policy & Strategic Planning	Ontario Provincial Police	777 Memorial Ave., 2nd Floor		Orillia, ON	L3V 7V3		
Attn: General			(Prefer to receive Fax)	Nottawasaga OPP Detachment Office	4601 Industrial Pkwy		Alliston, ON	L9R 1V2	705 434 1939	Fax: 705 434 9109
Special Interest Groups										
Attn: General				Angus and Area Chambers of Commerce	P.O Box 2003		Angus, ON	L0M 1B0	705 424 4878	info@anguschamber.com
Attn: General				Alliston & District Snowmobile Club Trail					705-435-0101	volunteer@adsc.ca
Attn: General				Essa Recreation Centre	8529 Simcoe County Road 10		Angus, ON	L0M 1B2	705 424 9303	
Attn: General				Essa Public Library	8505 County Road 10	Unit 1	Angus, ON	L0M 1B1	705 424 6531	
Mr.	Jeffrey	McGarvey	General Manager, Golf and Operations	CFB Borden Golf Club	31 Louisbourg Rd.	Box 1000	Borden, ON	L0M 1C0	705-424-1200	jeffrey.mcgarvey@forces.gc.ca

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of PIC No. 1
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Consultants & Developers										
Ms.	Rayna	Thompson		Brookfield Residential					905 948 5003	Rayna.Thompson@brookfieldrp.com
Mr.	Phil	Sheridan		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2270	psheridan@scsconsultinggroup.com
Mr.	Doug	Woo		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2228	dwoo@scsconsultinggroup.com
Aboriginal Consultation										
	Francois	Lachance	Senior Advisor	Ministry of Indigenous Affairs, Indigenous Relations Branch	160 Bloor St. East, 9th Floor		Toronto, ON	M7A 2E6	416-326-4754	Jean-Francois.Lachance@canada.ca
Chief	Donna	Big Canoe		Chippewas of Georgina Island*	R.R. #2	P.O. Box N-13	Sutton West, ON	L0E 1R0	705-437-1337	donna.bigcanoe@georginaisland.com
Chief	Ted	Williams		Chippewas of Rama First Nation *	5884 Rama Road	Suite 200	Rama, ON	L3V 6H6	705 325-3611	tedw@ramafirstnation.ca
Ms.	Sharday	James	Community Consultation	Chippewas of Rama First Nation *	5884 Rama Road	Suite 200	Rama, ON	L3V 6H6		shardayj@ramafirstnation.ca
Ms.	Susan	Copegog	Consultation	Beausoleil First Nation*	11 O'Gemaa Miikaans		Christian Island, ON	L9M 0A9		consultations@chimnissing.ca;
***cc Karry Sandy-McKenzie on all corespondence sent to the above FN (Williams TreatyCommunities)**										
Ms.	Karry	Sandy- McKenzie	Barrister & Solicitor	Williams Treaties Communities	8 Creswick Court		Barrie, ON	L4M 2J7	705-792-5087	k.a.sandy-mckenzie@rogers.com
Ms.	Emily	Martin	Infrastructure and Resources Manager	Saugeen Ojibway Nation Environment Office	25 Maadookii Subdivision		Neyaashiinigmiing, ON	N0H 2T0		emily.martin@saugeenojibwaynation.ca juanita.meekins@saugeenojibwaynation.ca
Chief	Lester	Anoquot		Saugeen First Nation	6493 Highway 21	R.R. #1	Southampton, ON	N0H 2L0	(519) 797-2781	sfn@saugeen.org
Chief	Veronica	Smith		Chippewas of Nawash Unceded First Nation	135 Lakeshore Blvd.		Neyaashiinigmiing, ON	N0H 2T0		chief.veronica@nawash.ca
	Remy	Vincent	Grand Chief	Huron-Wendat Nation	255 Place Chef Michel Laveau		Wendake, QC	G0A 4V0		administration@cnhw.qc.ca
	Dave	Dusome	Regional Councillor, Region 7	Métis Nation of Ontario	66 Slater Street	Suite 1100, 11th Floor	Ottawa, ON	K1P 5H1		DavidD@metisnation.org
	Attn: Lands, Resources and Consultations Branch			Métis Nation of Ontario	66 Slater Street	Suite 1100, 11th Floor	Ottawa, ON	K1P 5H1		consultations@metisnation.org; JustinH@metisnation.org
Utilities										
Attn: General			Planning Department	Hydro One	16 Graham Street		Woodstock, ON	N4S 6J6	519-537-7122	
Ms.	Carol	O'Brien		Bell Canada	136 Bayfield Street	2nd Floor	Barrie, ON	L4M 3B1	705-722-2405	carol.obrien@bell.ca
Mr.	Tony	Dominguez		Rogers	1 Sperling Drive		Barrie, ON	L4N 6B8	705-737-4660 xt 6907	tony.dominguez@rci.rogers.com
Mr.	Tom	Jedemann		Enbridge Gas	101 Honda Blvd		Markham, ON	L6C 0M6	905-927-3184	tom.jedemann@enbridge.com

[redacted]
7743 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7883 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7757 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7783 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7901 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7631 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7969 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
125 BELLA VISTA TRAIL
ALLISTON ON L9R 2E2

[redacted]
7851 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7641 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7865 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7653 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
8063 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7765 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7801 5TH LINE
ANGUS ON L0M 1B1

[redacted]
125 BELLA VISTA TRAIL
ALLISTON ON L9R 2E2

[redacted]
7819 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7850 5TH LINE
ANGUS ON L0M 1B0

[redacted]
6219 25TH SIDEROAD
ANGUS ON L0M 1B1

[redacted]
7832 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7900 5TH LINE PO BOX 2079
ANGUS ON L0M 1B0

[redacted]
7740 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7804 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7780 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
8082 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7790 5TH LINE PO BOX 2053
THORNTON ON L0L 2N0

[redacted]
8066 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7616 5TH LINE
ANGUS ON L0M 1B1

[redacted]
8206 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7766 5TH LINE
ANGUS ON L0M 1B1

[redacted]
4108 FIELDGATE DR
MISSISSAUGA ON L4W 2C4

[redacted]
7634 5TH LINE
ANGUS ON L0M 1B1

[redacted]
6273 25TH SIDEROAD
ANGUS ON L0M 1B1

[redacted]
7654 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7831 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7692 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7839 5TH LINE
ANGUS ON L0M 1B1

Essa Township 5th Line Bridge Rehabilitation

Schedule ‘C’ Municipal Class Environmental Assessment

Public Information Centre No. 1

November 29, 2021

Introduction

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

- Project Manager
- Engineering Lead

Jody Marks
Environmental Planner

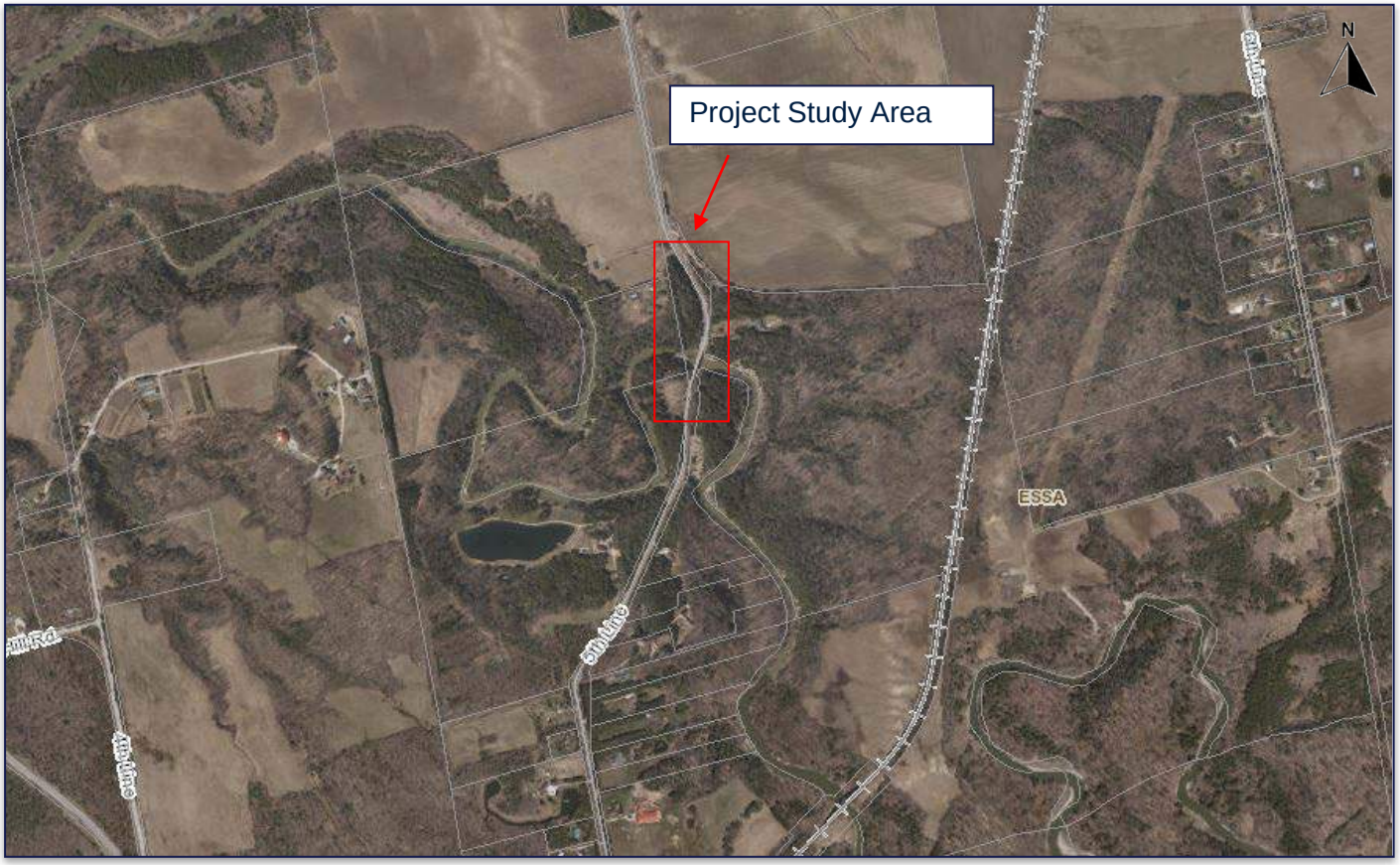
- Class Environmental Assessment Lead

Agenda

1. Project Background and Study Area
2. The Municipal Class Environmental Assessment Process
3. Existing Conditions
4. Alternative Solutions Considered
5. Comment Period 1
6. Evaluation of Alternative Solutions
7. Next Steps
8. Comment Period 2

Study Area

- Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25.



Project Background

- The Township of Essa has retained the services of the Ainley Group to undertake a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River.
- Bridge No. 9 and the 5th Line provide a key transportation link between the communities of Angus, Baxter, and Alliston. The existing structure is estimated to have been constructed circa 1950, making it approximately 70 years old at the present time. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit.
- In 2019 an inspection of Bridge No. 9 was completed following the Ontario Structure Inspection Manual (OSIM), and again in September 2021. The investigations identified the need for immediate maintenance items and long term recommendation to replace the structure.
- Ongoing erosion and sediment deposition is creating a restriction in the Nottawasaga River at the Bridge No. 9 location resulting in ice and debris jams causing flooding.

Municipal Class EA Process

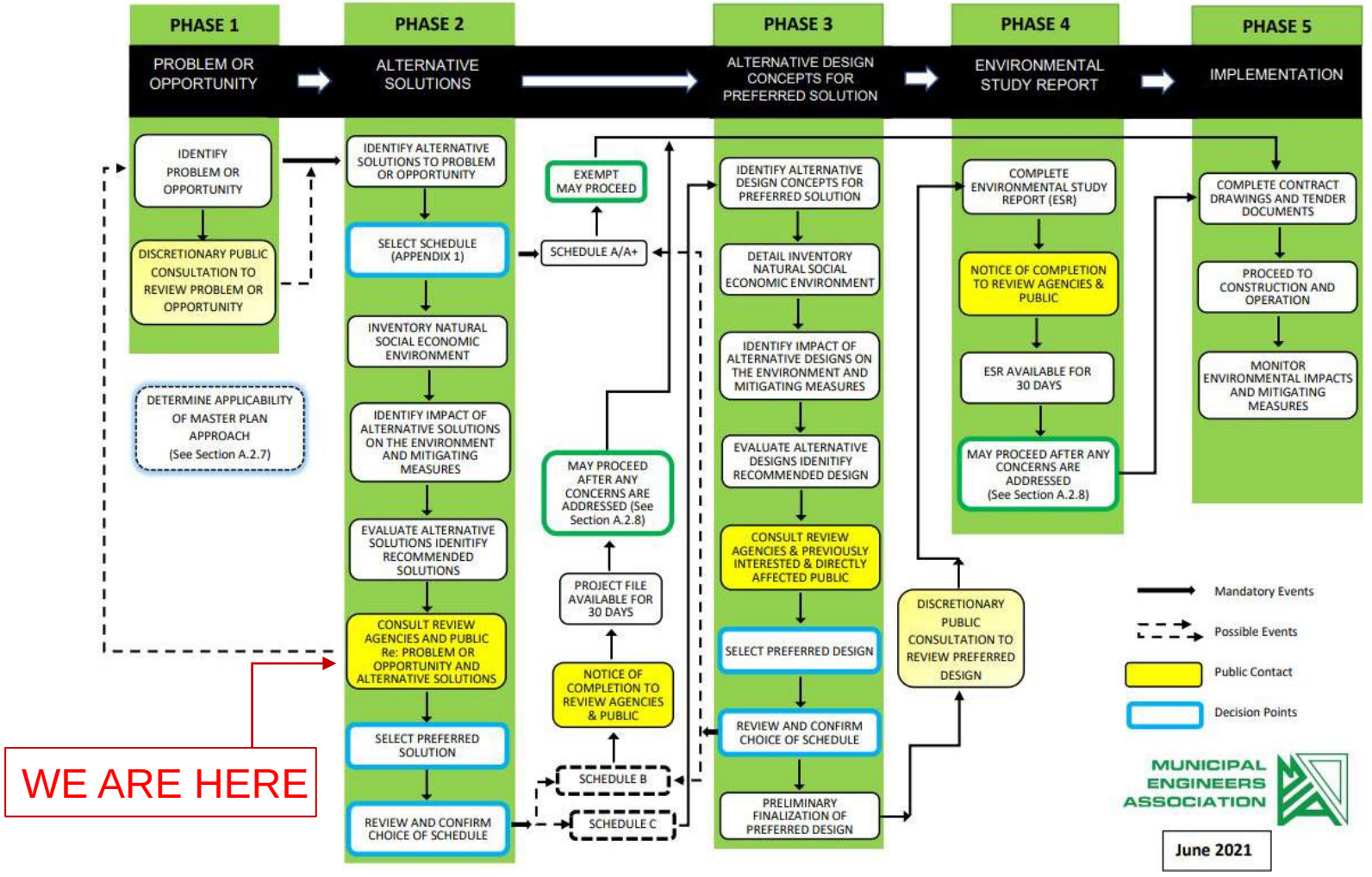
- A municipality is required to conduct a Municipal Class Environmental Assessment before this type of infrastructure improvement project can proceed to construction. A Municipal Class Environmental Assessment follows an approved planning process designed to protect the environment and to ensure compliance with the Environmental Assessment Act.

- The purpose of the Environmental Assessment Act (EA Act) is to provide for "…the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment." The term "environment" is broadly defined and includes the built, natural, socio-economic and cultural environments.

- The process requires the evaluation of potential solutions and design concepts so as to select a suitable approach that will address the problem/opportunity, but also keep impacts to a minimum.

- This project is classified as a Schedule 'C' in accordance with the Municipal Class Environmental Assessment (Oct. 2000, as amended 2007, 2011 & 2015) and requires completion of Phases 1 to 4 of the process.

Municipal Class EA Process



Existing Conditions

Various field studies have been completed to determine existing environmental conditions as well as to identify any potential impacts the alternative solutions pose to the environment.

- Physical Environment
  - The existing Bridge No. 9 is a two-span continuous concrete T-beam bridge with a concrete deck and a concrete wearing surface.
  - The deck is supported on three concrete beams cast integral with the deck. The beams are supported on concrete abutments and a central pier constructed normal to the road alignment.
  - The structure is 52m long, with only a 6.1m wide platform between barriers. As a result, it currently operates as a single-lane structure, rendering it functionally deficient for the volume of traffic it services.
  - The southbound roadway approach is quite steep and on a curve, so the sightlines do not meet the standard requirements for the posted speed limit.

Bridge No. 9 West Elevation View (2019)

5th Line Approach South of Bridge No. 9 (2019)

Existing Conditions

- Natural Environment
  - Habitat-based biological assessments indicate that the study area provides potential and confirmed habitat for a variety of wildlife including endangered and threatened species. The Nottawasaga River represents direct habitat for a diverse range of fish species.
  - The topography of the study area is generally steep, with the valley walls directly adjacent to the river being the steepest. One or more small drainage features within the study area drain run-off and groundwater seepage down these slopes toward the main river channel.
  - A portion of the study area is designated as an Area of Natural and Scientific Interest (ANSI) by the Ministry of Northern Development, Mines, Natural Resources and Forestry. The ANSI designation associated with the study area represents a composite of various other significant natural heritage features and functions. The ANSI is recognized due to the unique attributes of the Nottawasaga River valley, including its forested slopes, natural linkage functions, unique wildlife habitats, and prominent groundwater emergence zone.

Existing Conditions

- Natural Environment (continued)
  - The pier slows the velocity of the water on the downstream side of the pier creating an area of deposition. This deposition has continued to accumulate over time creating a sizeable formation in the river, as the island extends for more than 55 m downstream from the bridge pier.
  - The quantity of woody debris in the channel leads to the conclusion that the river is actively eroding the riverbanks. Erosion is occurring at the toe of this slope, particularly on the downstream side of the river. On the other side of the road an exposed, unvegetated slope is also a concern. The other location is just downstream of the bridge where the slope has partially failed already.
  - Logjams are common at this location and are an erosion concern while also increasing the potential for upstream flooding.

Downstream or Bridge, June 2021 Riverstone Environmental

Extent of large log-jam, June 2021 Riverstone Environmental

Existing Conditions

- Cultural Environment
  - The Nottawasaga River's main branch bisects the study area and therefore contributes to establishing archaeological potential.
  - However, it must be noted that post-1950 developments have artificially altered much of the area surrounding the 5th Line road alignment and river crossing.
  - Bridge No. 9 is typical of its construction time period and has some unique features such as a concrete open railing system. However, a cultural heritage assessment was completed and the structure was not deemed to have any cultural heritage value.
- Social and Economic Environment
  - Under the Township of Essa's Official Plan, the land use for much of the study area is officially categorized as "Environmental – Significant Areas," except for a small segment in the north end, which is "Agricultural" (Township of Essa, 2003).
  - Bridge No. 9 and the 5th Line provide a key transportation link between the communities of Angus, Baxter, and Alliston.
  - Portions of the Nottawasaga River are a navigable waterway and used for recreational purposes such as kayaking, canoeing, and angling.

Alternative Solutions

As part of Phase 2 of the Class EA process, several alternative solutions have been developed to address the deficiencies identified with Bridge No. 9.

- ***Option* 1 - "Do Nothing"**

The "Do-Nothing" option considers no improvements and/or modifications. This alternative does not address the problem/opportunity and is provided as a benchmark to gauge the potential impacts of the other options being considered.

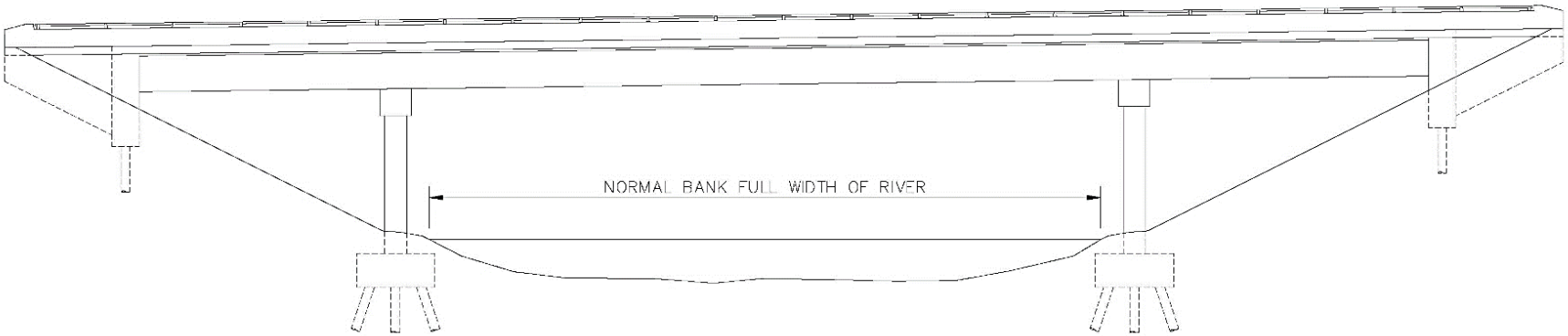
- ***Option 2 - Rehabilitate Existing Bridge***

This option involves rehabilitating the existing bridge structure in its current location. Some limited additional deck width could be achieved; however, due to the substructure design, it will not be possible to obtain two-lanes that meet current minimum design standards. As part of the rehabilitation, the existing barrier system and approach guiderail would be replaced to meet the requirements of the Roadside Design Manual (RDM). In addition, slope flattening and tree clearing within the road right-of way approaching the bridge (approximately 30m) in each direction would be completed to the extent possible in order to improve the sightlines.

Alternative Solutions

- ***Option 3 - Replace Bridge Structure in Current Location to Accommodate Two Lanes of Traffic***

This option involves replacing the bridge structure in its existing location. The new bridge would be of sufficient width to support two lanes of traffic and would meet all requirements of Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Canadian Highway Bridge Design Code (CHBDC) and RDM. The replacement would provide an opportunity to adjust the road profile and bridge elevation to improve the overall vertical alignment. The central pier would be eliminated and the new bridge would be three spans with piers set outside the bankful width. Erosion protection measures along the banks would also be reviewed along with removal of sediment deposition from the river to restore channel flow. In addition, slope flattening and vegetation removal would be considered to improve sightlines. (Drawing for illustration purposes only)



Alternative Solutions

- ***Option 4 - Replace Bridge on New Road Alignment to the West***
  - The existing bridge structure would be demolished and a new bridge constructed west of the existing location, remaining within the ROW. The new bridge would be of sufficient width to support two lanes of traffic and would meet all requirements of Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Canadian Highway Bridge Design Code (CHBDC) and RDM. As part of this option the road alignment on the 5th Line approaching the bridge from both directions (north and south) would be adjusted to 'straighten' the curves in the road.
  - Erosion protection measures along the banks would also be reviewed along with removal of sediment deposition from the river to restore channel flow.

Comment Period 1

Evaluation of Alternative Solutions

- Each of the alternatives were evaluated based on their potential impact to the study area environment (physical, natural, cultural, and socio-economic).
- The evaluation is presented in a table or matrix to provide a simplified, visual comparison.

Legend:

Positive	Positive Neutral	Neutral	Negative Neutral	Negative

- Green represents the most preferred option, as it will address the key concerns, but create the least amount of environmental impact.
- Red is indicative of a least preferred option as it has a higher potential to impact the environment.
- A blank space indicates that the impact is considered neutral

Evaluation of Alternative Solutions

EVALUATION CRITERIA	OPT 1	OPT 2	OPT 3	OPT 4	DESCRIPTION OF IMPACTS
PHYSICAL ENVIRONMENT					
Addresses Structural Deficiencies					The existing structure has numerous structural deficiencies and Option 1 would do nothing to address this. Options 2, 3, and 4 could address all structural deficiencies.
Addresses Functional Deficiencies					The existing structure is functionally deficient due to its limited width, vertical/horizontal alignment, and limited sightlines on each approach. Option 1 would do nothing to address this. Option 2 would provide minimal improvement. Options 3 and 4 would provide opportunity to address these functional deficiencies.
Impacts to Existing Utilities					There is existing aerial hydro and telecommunications along the corridor. There is also an existing sanitary forcemain on the bridge structure. Option 1 would have no impact on these utilities. Options 2 and 3 would only impact the sanitary forcemain during bridge construction works. Option 4 may require relocation of the hydro/telecommunications and would impact the sanitary forcemain.
NATURAL ENVIRONMENT					
Scientific Natural Heritage Features					Options 2 and 3 would not be expected to adversely impact features and functions associated with the ANSI, as the valley landform would not require alteration. Temporary impacts may include construction disturbance to various wildlife habitat functions associated with the ANSI. Option 4 would require substantial grading of valley slopes and removal of forested cover within the ANSI, resulting in both permanent and long-term impacts at a site level.
Terrestrial Vegetation/Wildlife (Including SAR)					Option 2 and 3 would not be expected to require substantial removals of trees within the ROW. Option 4 results in more substantial removal of forest cover. There is potential to impact SAR.
Fish Habitat (Including SAR)					Options 2-4 have the potential to adversely impact fish habitat by creating obstruction within the channel, removing important cover, or releasing sediment and or/pollutants into the river. From an aquatic habitat perspective the current log jam is beneficial fish habitat.
River System and Bank Stability					The existing bridge pier is causing the formation of the island, major logjams, and erosion along the upstream and downstream banks. Option 2 would not remove the central pier, however some bank protection measures could be explored. Option 3 and 4 design structure would eliminate the central pier and could include bank protection adjacent to the existing abutments to prevent scouring in the future.
Surface Water					Options 2 and 3 may result in temporary construction disturbance to a small drainage feature conveying runoff. Option 4 would likely require re-alignment of this feature within the ROW. Removal of tree cover would result in decreased shading, and potentially increase water temperature prior to the feature entering the main river channel.

Evaluation of Alternative Solutions

EVALUATION CRITERIA	OPT 1	OPT 2	OPT 3	OPT 4	DESCRIPTION OF EFFECTS
NATURAL ENVIRONMENT					
Ground Water					Multiple small seeps were identified within the northeastern portion of the study area. Option 2 and 3 would not be expected to alter any factors influencing the presence of seeps within the study area. Option 4 proposes the road re-alignment toward the west, away from the identified seepage zone. Provided that no grading is proposed east of the existing 5th Line alignment, no impacts to the seepage zone are expected under Options 2-4.
SOCIAL ENVIRONMENT					
Noise					Options 2, 3 and 4 would have temporary noise disturbances due to construction activity. There are 6 residential dwellings within the study area.
Archaeological					Parts of the study area have low or no longer retain archaeological potential due to steeply sloping terrain, permanently wet conditions or previous disturbance, portions in the north end will still require Stage 2 Investigation.
Cultural and Built Heritage					Bridge No. 9 was not determined to retain cultural heritage value following application of Regulation 9/06 of the Ontario Heritage Act.
Property Impacts					Option 2 and 3 may potentially result in minor property impacts due to vegetation clearing along the roadside. Option 4 would have property impacts associated with the new road alignment and property entrances.
Recreational Use					With Option 1 and 2 the formation of log jams will continue to occur, causing obstructions for recreational uses. The configuration of the new structures proposed under Option 3 and 4 would reduce the formation of log jams and provide open waterway for recreational uses.
ECONOMIC ENVIRONMENT					
Construction Costs					There is no construction cost associated with Option1. Construction costs under Option 2 and 3 could be considered comparable, whereas construction costs associated with Option 4 are estimated to be considerably higher.
Operating/Maintenance Costs					Maintenance of current structure will increase as the structure is over 70 years old. Option 1 has the highest cost due to the need for regular log jam removal and potential structure maintenance. Option 2 will similarly have ongoing maintenance for log jam removal. Options 3 and 4 should require less maintenance due to their revised configuration and new construction.

Preliminary Preferred Solution

- ***Option 3 - Replace Bridge Structure in Current Location to Accommodate Two Lanes of Traffic***

Given the results of the preliminary evaluation, it is recommended that Option 3 be selected as the Recommended Solution.

Next Steps

- All PIC material will be available on the Township of Essa's website at https://www.essatownship.on.ca/government/publicnotices
- The Project Team will receive comments for consideration until **December 13, 2021.** The project team will then select the Preferred Solution and the project will move into Phase 3 of the Class EA process.
- During Phase 3, alternative design concepts for the Preferred Solution will be identified and evaluated.
- A second Public Information Centre will be scheduled at a future date to present the alternative design concepts developed to implement the Preferred Solution.
- Advanced notification of the second Public Information Centre will be provided.

Comments

- We invite you to provide any comments in writing via email.
- All comments are to be submitted by **December 13, 2021** to one of the following members of the Project Team:

Michael Mikael
Project Manager
Township of Essa
5786 Simcoe County Road 21
Utopia, ON L0M 1T0
Tel: 705-424-9770
Email: mmikael@essatownship.on.ca

Brian Wickenheiser
Bridges and Structures Group Lead
Ainley Group
550 Welham Road
Barrie, ON L4N 8Z7
Tel: 705-726-3371
Email: wickenheiser@ainleygroup.com

Thank you for your attendance at this meeting!
We appreciate your participation.

Jody Marks

From: Jody Marks
Sent: Wednesday, December 22, 2021 10:55 AM
To: 'Dominic Ste-Marie'
Cc: Lori-Jeanne Bolduc; Mario Gros Louis; Brian Wickenheiser; 'Michael Mikael'
Subject: RE: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1
Attachments: 217031_Stage 1 Report_Feb 2021.pdf

Hi Dominic,

Thank you for your interest in the project. A Stage 1 Archaeological Assessment has been completed and the report is attached for your information. There is no field work planned at this time, we will continue to provide you with updated project information as we continue through the Class EA.

Thank you.

Regards,

Jody Marks
Environmental Planner

Tel: (705) 726-3371 Ext. 227

WWW.AINLEYGROUP.COM

From: Dominic Ste-Marie <Dominic.Sainte-Marie@wendake.ca>
Sent: Thursday, November 18, 2021 3:43 PM
To: Jody Marks <marks@ainleygroup.com>
Cc: Lori-Jeanne Bolduc <Lori-Jeanne.Bolduc@wendake.ca>; Mario Gros Louis <Mario.GrosLouis@wendake.ca>
Subject: RE: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1

Hi Jody,

Thank you for your email. Could you please let us know if any archaeological studies or fieldwork will be necessary as part of this project?

Tiawenhk chia' önenh
Dominic Ste-Marie

ATTENTION: Please note that Maxime Picard has a new position at the Huron-Wendat Nation Council and is no longer in charge of Ontario consultations. Any new consultation from Ontario must be sent to Mario Gros-Louis (mario.groslouis@wendake.ca), Lori-Jeanne Bolduc (lori-jeanne.bolduc@wendake.ca) and Dominic Ste-Marie (dominic.ste-marie@wendake.ca).

For inquiries relating specifically to archaeology (fieldwork planning, monitoring, reports review, etc.), please contact Marie-Sophie Gendron (marie-sophie.gendron@wendake.ca), Isabelle Lechasseur (isabelle.lechasseur@wendake.ca) and Jean-François Richard (jean-francois.richard@wendake.ca).

De : Administration <Administration@wendake.ca>
Envoyé : 18 novembre 2021 15:39
À : Mario Gros Louis <Mario.GrosLouis@wendake.ca>; Lori-Jeanne Bolduc <Lori-Jeanne.Bolduc@wendake.ca>
Cc : Dominic Ste-Marie <Dominic.Sainte-Marie@wendake.ca>; Jennifer O'bomsawin <Jennifer.Obomsawin@wendake.ca>
Objet : TR: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1

De : Jody Marks <marks@ainleygroup.com>
Envoyé : 18 novembre 2021 15:20
À : Administration <Administration@wendake.ca>
Cc : Michael Mikael <mmikael@essatownship.on.ca>; Brian Wickenheiser <wickenheiser@ainleygroup.com>
Objet : Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1

Dear Grand Chief Remy Vincent,

The Township of Essa has retained the services of Ainley Group to undertake a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25 and provide a key transportation link between the communities of Angus, Baxter, and Alliston. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit. This project will follow the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (Oct. 2000, as amended 2007, 2011 & 2015).*

A virtual Public Information Centre (PIC) will be held on **Monday, November 29, 2021 from 6:00pm to 7:00pm.** Please refer to the attached Notice of PIC No.1 for more details.

Thank you.

Regards,

Jody Marks
Environmental Planner
www.ainleygroup.com
Tel: (705) 726-3371 Ext. 227

Jody Marks

From: Jody Marks
Sent: Wednesday, December 22, 2021 11:38 AM
To: Barboza, Karla (MHSTCI)
Cc: Michael Mikael; Brian Wickenheiser; Minkin, Dan (MHSTCI)
Subject: RE: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1
Attachments: 17CH-129 5th Line Bridge CHER_UPDATEDDRAFT_4Mar2018.pdf; 217031_Stage 1 Report_Feb 2021.pdf

Hi Karla,

Thank you for your review and feedback. A Stage 1 Archeological Assessment has been completed for the project area in addition to the cultural heritage assessment for the Bridge No. 9. I have attached a copy of both reports for your review and file.

Our project contact list has been updated as directed. Thank you.

Happy Holidays!

Regards,

Jody Marks
Environmental Planner

Tel: (705) 726-3371 Ext. 227

WWW.AINLEYGROUP.COM

From: Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>
Sent: Thursday, December 2, 2021 5:17 PM
To: Jody Marks <marks@ainleygroup.com>
Cc: Michael Mikael <mmikael@essatownship.on.ca>; Brian Wickenheiser <wickenheiser@ainleygroup.com>; Minkin, Dan (MHSTCI) <Dan.Minkin@ontario.ca>
Subject: RE: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1

Hi Jody,

Thanks for sending the Notice of Public Information Centre to the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI).

I reviewed the PIC materials and have some observations and comments:

- Slide 11 states that the area has archaeological potential but it notes that post-1950 developments have artificially altered much of the are surrounding the road alignment. Please include documentation in the EA report to support the conclusion that all areas, to be impacted by ground disturbing activities, been subjected to recent extensive and intensive disturbances and to depths greater than the depths of the proposed activities – see Part D of the Municipal Heritage Bridges – Cultural, Heritage and Archaeological Resources Assessment Checklist (Revised April 11, 2014) and associated guidance.
- Slide 11 also states that a cultural heritage assessment was completed for Bridge No. 9. Could you please send an electronic copy of the report for our review?

In addition, please note that there has been some changes in our office. For this project (MHSTCI File number 0011204), could you please update your contact list as follows?
Include:

- Karla Barboza, Team Lead - Heritage (Acting) | Heritage Planning Unit (Heritage, Sport, Tourism and Culture Industries) | 416-660-1027 | karla.barboza@ontario.ca
- Dan Minkin, Heritage Planner | Heritage Planning Unit (Heritage, Sport, Tourism and Culture Industries) | 416-786-7553 | dan.minkin@ontario.ca

Let us know if you have any other question in the meantime.

Thanks in advance,
Karla

Karla Barboza MCIP, RPP, CAHP | (A) Team Lead, Heritage
Ministry of Heritage, Sport, Tourism and Culture Industries
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
T. 416. 660.1027 | Email: karla.barboza@ontario.ca

From: Jody Marks <marks@ainleygroup.com>
Sent: November-18-21 3:10 PM
Cc: Michael Mikael <mmikael@essatownship.on.ca>; Brian Wickenheiser <wickenheiser@ainleygroup.com>
Subject: Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 1

Hello,

The Township of Essa has retained the services of Ainley Group to undertake a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25 and provide a key transportation link between the communities of Angus, Baxter, and Alliston. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit. This project will follow the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (Oct. 2000, as amended 2007, 2011 & 2015).*

A virtual Public Information Centre (PIC) will be held on **Monday, November 29, 2021 from 6:00pm to 7:00pm.** Please refer to the attached Notice of PIC No.1 for more details.

Thank you.

Regards,

Jody Marks
Environmental Planner

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 227

Jody Marks

From: Jody Marks
Sent: Tuesday, November 30, 2021 11:14 AM
To: [redacted]
Cc: Michael Mikael; Brian Wickenheiser
Subject: Township of Essa PIC - 5th Line Bridge
Attachments: 217031 - Essa Township, PIC 1 Presentation Final.pdf

Hello [redacted],

I am responding on behalf of Mr. Mikael from the Township, who received your email regarding the Public Information Centre held yesterday evening. We are sorry that the audio of the presentation was not working for you. I have attached a copy of the presentation for you to review in hopes that the information is helpful and answers some of your questions. I have also included below a link to You Tube where you can watch a recording of the PIC presentation:

5th Line Bridge Rehabilitation - YouTube

Please connect with our team if you have any follow up questions and we would be happy to discuss them with you.

Thank you.

Regards,

Jody Marks
Environmental Planner
www.ainleygroup.com
Tel: (705) 726-3371 Ext. 227

Jody Marks

From: [redacted]
Sent: Wednesday, December 15, 2021 3:02 PM
To: Brian Wickenheiser
Cc: mmikael@essatownship.on.ca; Jody Marks
Subject: RE: 5th Line Bridge Project

Thanks Brian for your reply. I believe you've answered all my questions for now. I'll come back if I have any further questions.

Have a great day and all the best over this holiday season.

[redacted]

From: Brian Wickenheiser [mailto:wickenheiser@ainleygroup.com]
Sent: December 15, 2021 1:27 PM
To: [redacted]
Cc: mmikael@essatownship.on.ca; Jody Marks
Subject: RE: 5th Line Bridge Project

Hi [redacted],

My apologies for the delay in responding to you. Please see below for our responses (in red) to your questions.

1. If the construction of this bridge and any enhancements to the road leading to the bridge goes beyond the road allowance, will the township be compensating the landowners for the loss or damage to their land? If so, how is this determined? If the design results in any required disturbance, regrading or construction beyond the existing road allowance, the Township will approach the affected property owner to acquire the necessary property or to obtain a construction/grading easement. If property acquisition is required, the property owner will be compensated a fair market value for the property taking which will typically be determined through either a negotiation or expropriation process.
2. Will there be a new road allowance resulting in landowners losing a portion of their property and if so, how is this new road allowance determined? Again, how is the landowner compensated? As we are only currently in the Environmental Assessment (EA) phase we are unable to determine at this time whether the existing road allowance will be sufficient or if property acquisition will be required. Property requirements would be determined during the preliminary and possibly detailed design stage and will be based on the limits of disturbance or grading required which will be a function of the selected road alignment, profile and cross section as required to comply with current design regulations and standards.
3. I have a fence that runs along a portion of my property, if this fence is removed or taken down to assist with the construction of the bridge or turnaround, will the construction crew be repairing or reinstalling my fence? If any portion of the existing fence is required to be removed to facilitate construction, the Township's contractor will be required to reinstate the fence to its original condition or better. If property acquisition is required, all affected existing property line fences will be removed and reinstalled along the new property line at the Township's cost unless agreed otherwise in the property acquisition agreement.
4. If the construction results in the cutting of trees to allow for this project, is there a plan to restore or re-plant trees in and around the disturbed areas? If trees are required to be removed to facilitate construction or improve sight lines, they would not typically be replaced within the road allowance (as they become a maintenance issue). However, if any trees were required to be removed on private property for any reason, the Township would typically complete replanting to compensate for the removed trees or alternative provide financial compensation subject to agreement with the property owner. That being said, at this time we do

anticipate planting at least a few shrubs and trees on the river banks within the limits of grading for bank stabilization, shading and animal habitat purposes.

5. In the Zoom call on Nov 29th, I posed a question about snowplows and garbage trucks going beyond the road closures that would occur at the 20th & 25th sideroads. There was mention that a turnaround would be constructed for these vehicles along with school buses so that residents would not be impacted by the road closures. Has there been any thought of exactly where these turnarounds would be constructed? If so, can that be placed on the project map for further reference? As noted above, given that we are only currently within the EA phase of this project and have not yet confirmed the preferred solution or completed any detailed design, we have not yet determined locations or details of the temporary turn-arounds. That being said, we do anticipate the turn-arounds being constructed either at or slightly beyond the last driveway at each end of the bridge. In some cases we do use existing field entrances or driveways to create the turn-arounds, subject to agreement with the property owner, and upgrade them as required to handle the expected traffic, with all entrances restored to their preconstruction condition or better following construction.
6. If there is a decision to change from the plan of moving forward with option #3, will the public be notified? Will there be another Zoom call and/or question period? As the EA for this project is being completed in accordance with the Schedule C requirements of the Municipal Class EA process, the Township is required to have at least 2 points of public contact and consultation. Given that the virtual public information centre (PIC) on November 29th was the first public consultation, there will be at least one more PIC for this EA. At the next PIC we will present the selected option and provide some preliminary design details for public feedback.
7. Currently there is some room to park cars on the north side of the bridge for people using the river for recreational purposes such as canoeing. Will this space remain under the new reconstruction plans? Having said that, this area is a known dumping ground given vehicles can easily pull over and dump their garbage At the present time we do not anticipate being able to maintain the existing "parking area" along the side of the road at the north end of the bridge. In order to comply with current roadside safety requirements, a significant amount of steel beam guide rail will need to be installed on both bridge approaches, on both sides of the road, which will extend well beyond the current "parking area". With respect to the area being used as a dumping ground, unfortunately we cannot control the actions of ignorant people but with the elimination of the "parking area" hopefully there will be less dumping occurring in this location.
8. Given the road will be closed at the 20th & 25th sideroads and dead end roads are used by dumpers frequently, is there a plan to deal with potential excess garbage that may be dumped? At the present time there are no plans to deal with potential garbage dumping at the dead ends of the road closure. That being said, the contractor will be continually accessing the site from both ends of the bridge (road closure) throughout the bridge construction which should act as a deterrent during working hours but does not help at night. That being said, the contractor will be tasked with cleaning up any garbage that accumulates during the completion of the contract and during my past 25+ years of bridge construction we have never had any major problems with dumping at the road closure dead ends during construction.
9. Is there any more information on the proposed sewer/water lines that are to be run from Angus to the new subdivision in Baxter? If so, can it be included in the bridge project plans so that all know how it's going to be incorporated with the new bridge construction? As the water distribution network in Baxter has been determined to have sufficient capacity to support the currently proposed development, there is no need at this time to extend the watermain to Angus via Line 5. Likewise, based on the information currently available, there is no longer a need to extend the sanitary sewer network in Baxter to Angus.
10. In terms of the timing of the construction project, has there been any consideration given to the spawning runs of salmon and trout that occur in this river? The permissible in-water works timing window has not yet been confirmed for this reach of the Nottawasaga River, however this will be confirmed in consultation with our Environmental subconsultant, the Department of Fisheries and Oceans (DFO) and the Ministry of Natural Resources and Forestry (MNRF). Work within the wetted footprint of the river and in close proximity to the river bank will only typically be allowed during the permissible in-water work timing window which takes into account fish spawning and rearing timing. The bridge construction will be completed in accordance with all timing window requirements.
11. I know there are a number of stages before this project receives the necessary funding and approvals to move forward but is there a rough target date (year) that you are hoping to start this project? The timing of the bridge

construction will be subject to completion of the EA process followed by the preliminary and detailed design of the bridge improvement and any property acquisitions or utility relocations required. Further, as you noted, it will be subject to funding approval by the Township and possibly the Provincial and/or Federal governments. At this time, we expect that the bridge construction is at least 2 years out (possibly more).

We trust that the above response sufficiently address your concerns at this time; however, if you have any additional questions please do not hesitate to contact me.

Regards,

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

Tel: (705) 726-3371 Ext. 240
Cell: (705) 790-7365

WWW.AINLEYGROUP.COM

From: [redacted]
Sent: December 10, 2021 1:28 PM
To: mmikael@essatownship.on.ca; Brian Wickenheiser <wickenheiser@ainleygroup.com>
Subject: 5th Line Bridge Project

Hi Michael/Brian,

I have a number of questions concerning the proposed 5th line bridge project and I was hoping you could provide me with a little more information. I'm the landowner on the south east side of the bridge so this project directly impact myself and my property. These questions assume we are moving ahead with option #3 – the replacement of the existing bridge using the current roadway.

1. If the construction of this bridge and any enhancements to the road leading to the bridge goes beyond the road allowance, will the township be compensating the landowners for the loss or damage to their land? If so, how is this determined?
2. Will there be a new road allowance resulting in landowners losing a portion of their property and if so, how is this new road allowance determined? Again, how is the landowner compensated?
3. I have a fence that runs along a portion of my property, if this fence is removed or taken down to assist with the construction of the bridge or turnaround, will the construction crew be repairing or reinstalling my fence?
4. If the construction results in the cutting of trees to allow for this project, is there a plan to restore or re-plant trees in and around the disturbed areas?
5. In the Zoom call on Nov 29th, I posed a question about snowplows and garbage trucks going beyond the road closures that would occur at the 20th & 25th sideroads. There was mention that a turnaround would be constructed for these vehicles along with school buses so that residents would not be impacted by the road closures. Has there been any thought of exactly where these turnarounds would be constructed? If so, can that be placed on the project map for further reference?

6. If there is a decision to change from the plan of moving forward with option #3, will the public be notified? Will there be another Zoom call and/or question period?
7. Currently there is some room to park cars on the north side of the bridge for people using the river for recreational purposes such as canoeing. Will this space remain under the new reconstruction plans? Having said that, this area is a known dumping ground given vehicles can easily pull over and dump their garbage
8. Given the road will be closed at the 20th & 25th sideroads and dead end roads are used by dumpers frequently, is there a plan to deal with potential excess garbage that may be dumped?
9. Is there any more information on the proposed sewer/water lines that are to be run from Angus to the new subdivision in Baxter? If so, can it be included in the bridge project plans so that all know how it's going to be incorporated with the new bridge construction?
10. In terms of the timing of the construction project, has there been any consideration given to the spawning runs of salmon and trout that occur in this river?
11. I know there are a number of stages before this project receives the necessary funding and approvals to move forward but is there a rough target date (year) that you are hoping to start this project?

Option #3 does seem to be the best choice. I'm very opposed to option #4 which would have a much larger impact on the environment and landowners

Thank you,

[redacted]

Appendix I-3

Notice of PIC#2
Agency and Property Owner Contact Lists
PIC#2 Presentation Material
Comments and Responses

TOWNSHIP OF ESSA
5th Line Bridge (Bridge No. 09)
Schedule 'C' Municipal Class Environmental Assessment
Notice of Public Information Centre No. 2

The Project

The Township of Essa is undertaking a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25 and provides a key transportation link between the communities of Angus, Baxter, and Alliston. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit. This project is following the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (last amended in 2023).*

A Preferred Solution to "Replace the Bridge Structure in its Current Location to Accommodate Two Lanes of Traffic" was previously selected. Since then, the team has identified and evaluated various Design Options for the Preferred Solution.

Public Information Centre

A virtual Public Information Centre (PIC) will be held on **December 13, 2023 from 6:00pm to 7:00pm.** The purpose of the PIC will be to provide information on the Design Options and to allow interested parties an opportunity to ask questions and provide input into the process. You must register to attend the virtual PIC. You can register by visiting https://www.ainleygroup.com/essatownship-vpic/

Comments Invited

Public input is welcomed and encouraged throughout this process. Following the PIC, a recording of the presentation and copy of the presentation material will be available on the Township's website and can be accessed by visiting https://www.essatownship.on.ca/news-notices/. Questions, comments, and requests for additional information can be sent to either of the following members of the study team until December 31, 2023.

Michael Mikael, P. Eng.
Manager of Public Works/Deputy CAO
Township of Essa
5786 County Road 21 Utopia, ON L0M 1T0
Tel: 705-424-9917
Email: mmikael@essatownship.on.ca

Brian Wickenheiser
Bridges & Structures Group Lead
Ainley Group
550 Welham Road Barrie, Ontario L4N 8Z7
Tel: 705-726-3371
Email: brian.wickenheiser@ainleygroup.com

This notice first issued December 1, 2023.

Comments and information regarding this project are being collected for the purpose of meeting Environmental Assessment Act requirements, which includes the creation of a record that is available to the general public as described in the Municipal Freedom of Information and Protection of Privacy Act. Please note that all personal information included in a submission – such as name, address, telephone number and property location – will be collected, maintained, and may be disclosed for the purpose of transparency and consultation unless a request is made that personal information remain confidential.

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of PIC No. 2
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Provincial & Federal Agencies										
Ms.	Chunmei	Liu	Environmental Resource Planner & EA Coordinator - Air, Pesticides and	Central Region Ministry of Environment, Conservation and	5775 Yonge Street	8th Floor	North York, ON	M2M 4J1	416-326-4886	chunmei.liu@ontario.ca
Ms.	Cindy	Hood	District Manager	Barrie District Office Ministry of Environment, Conservation and	54 Cedar Point Drive	Unit 1201	Barrie, ON	L4N 5R7	705-739-6436	cindy.hood@ontario.ca
Mr.	Ken	Mott	District Planner	Midhurst District Ministry of Northern Development, Mines,	2284 Nursery Road		Midhurst, ON	L0L 1N8	705-725-7546	Ken.mott@ontario.ca
Ms.	Karla	Barboza	Team Lead, Heritage	Ministry of Heritage, Sport, Tourism and Cultural Industries	401 Bay Street	Suite 1700	Toronto, ON	M7A 0A7	416-660-1027	karla.barboza@ontario.ca
Mr.	Dan	Minkin	Heritage Planner	Ministry of Heritage, Sport, Tourism and Cultural Industries	401 Bay Street	Suite 1700	Toronto, ON	M7A 0A7	416-786-7553	dan.minkin@ontario.ca
Ms.	Kimberly	Livingstone	Heritage Planner (A)	Ministry of Tourisn, Culture and Sport						kimberly.livingstone@ontario.ca
Ms.	Nancy	Rutherford	Rural Planner	Ontario Ministry of Agriculture, Food and Rural Affairs	1 Stone Road Guelph	3rd Floor North	Guelph, ON	N1G 4Y2	1-877-424-1300 226-962-2139	omafra.eanotices@ontario.ca
Mr.	Teepu	Khawja	Regional Director	Ministry of Transportation, Central Region	1201 Wilson Avenue		Toronto, ON	M3M 1J8	416-235-5400	teepu.khawja@ontario.ca
Mr.	Michael	Lindsay	President and Chief Executive Officer	Infrastructure Ontario	777 Bay Street	6th Floor, Suite 602	Toronto, ON	M5G 2C8		michael.lindsay@infrastructureontario.ca
Mr.	Aldo	Ingraldi	Municipal Planning Advisor - Team Lead Central Ontario	Ministry of Municipal Affairs and Housing	777 Bay Street	13th Floor	Toronto, ON	M5G 2E5	416-585-6559	Aldo.Ingraldi@ontario.ca
Local Government, Adjacent Municipalities & Other Agencies										
Mr.	Christian	Meile	Director, Construction & Transportation Maintenance	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	christian.meile@simcoe.ca
Mr.	Dave	Parks	Director, Planning, Development & Tourism	County of Simcoe	1110 Highway 26 West		Midhurst, ON	L0L 1X0	705-726-9300	dave.parks@simcoe.ca
Mr.	Chris	Hibberd	Director, Watershed Management Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0	705-424-1479	c.hibberd@nvca.on.ca
Mr.	Brad	Krul	Manager, Planning Services	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre	8195 8th Line	Utopia, ON	L0M 1T0		bkrul@nvca.on.ca
Attn: General			Sr. Public Health Inspector, Safe Water Program		15 Sperling Drive		Barrie, ON	L9Y 4J5	705-721-7520	hc.phi@smdhu.org
Ms.	Colleen	Healey-Dowdall	CAO	Township of Essa	5786 County Road 12		Utopia, ON	L0M 1T0		chealey@essatownship.on.ca
Mr.	Blaine	Parkin	CAO	Town of New Tecumseth	10 Wellington Street East		Alliston, ON	L9R 1A1	705-435-3900	
Ms.	Michael	Prowse	CAO	City of Barrie	70 Collier Street	P.O. Box 400	Barrie, ON	L4M 4T5	705-739-4220	Ashley.Harrison@barrie.ca
Mr.	Allen	Morrison	Controller of Planning, Facilities and Student Transportation Services	Simcoe Muskoka Catholic District School Board	46 Alliance Blvd.		Barrie, ON	L4M 5K3	705-722-3555 ext. 351	info@smcdsb.on.ca
Mr.	Andrew	Keuken	Manager of Planning, Enrolment and Community Use	Simcoe County District School Board	1170 Highway 26		Midhurst, ON	L0L 1X0	705-728-7570 ext. 11513	akeuken@scdsb.on.ca
Mr.	Miguel	Ladouceur	Director of Building, Maintenance and Planning	Conseil Scolaire Viamonde	116 Cornelius Parkway		Toronto, ON	M6L 2K5	1-416-614-5917	ladouceurm@csviamonde.ca
Ms.	Nathalie	Huard	Transportation Technician, Service de Transport Francobus	Association Franco-Ontarienne Des Conseils Scolaires Catholiques	138 rue Main Est	Bureau 205	Welland, ON	L3B 3W6	1-800-749-0002	simcoe@francobus.ca
Attn: General			Transportation Coordinator	Simcoe County Student Transportation Consortium	64 Cedar Pointe Drive	Unit 1403	Barrie, ON	L4N 5R7	705-733-8965, ext. 107	transportation@scstc.ca
Mr.	Earl	Elliott	President	Simcoe County Historical Association		P.O. Box 144	Barrie, ON	L4M 4S9	705-796-7649	earl.elliott@rogers.com
Emergency Services										
Mr.	Andrew	Robert	Deputy Chief Operations	County of Simcoe Paramedic Services	1110 Highway 26		Midhurst, ON	L0L 1X0	705-726-9300	
Ms.	Donna	Danyluk	Communications Representative	Royal Victoria Regional Health Centre	201 Georgian Drive		Barrie, ON	L4M 6M2	705-728-9090 ext. 41610	danylukd@rvh.on.ca
Mr.	Doug	Burgin	Deputy Fire Chief	Essa Fire Department					705-424-5828	dburgin@essatownship.on.ca
Ms.	Lori	Dedora	Administration Assistant	Essa Fire Department					705-424-5828	ldedora@essatownship.on.ca
Ms.	Paula	Brown	Operational Policy & Strategic Planning	Ontario Provincial Police	777 Memorial Ave., 2nd Floor		Orillia, ON	L3V 7V3		
Attn: General			(Prefer to receive Fax)	Nottawasaga OPP Detachment Office	4601 Industrial Pkwy		Alliston, ON	L9R 1V2	705 434 1939	Fax: 705 434 9109
Special Interest Groups										
Attn: General				Angus and Area Chambers of Commerce	P.O Box 2003		Angus, ON	L0M 1B0	705 424 4878	info@anguschamber.com
Attn: General				Alliston & District Snowmobile Club Trail						markwhitehead@rogers.com
Attn: General				Essa Recreation Centre	8529 Simcoe County Road 10		Angus, ON	L0M 1B2	705 424 9303	

Township of Essa
5th Line Bridge Improvements Schedule 'C' Class EA
Notice of PIC No. 2
AGENCY CONTACT LIST

Title	First	Last	Title	Company	Address 1	Address 2	Town	PC	Telephone	Email
Attn: General				Essa Public Library	8505 County Road 10	Unit 1	Angus, ON	L0M 1B1	705 424 6531	
Mr.	Jeffrey	McGarvey	General Manager, Golf and Operations	CFB Borden Golf Club	31 Louisbourg Rd.	Box 1000	Borden, ON	L0M 1C0	705-424-1200	jeffrey.mcgarvey@forces.gc.ca
Consultants & Developers										
Ms.	Rayna	Thompson		Brookfield Residential					905 948 5003	Rayna.Thompson@brookfieldrp.com
Mr.	Phil	Sheridan		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2270	psheridan@scsconsultinggroup.com
Mr.	Malcolm	Catto		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8		mcatto@scsconsultinggroup.com
Mr.	Doug	Woo		SCS Consulting	30 Centurian Drive		Markham, ON	L3R 8B8	905 475 1900 ext. 2228	dwoo@scsconsultinggroup.com
Aboriginal Consultation										
Mr.	Greg	Garratt		Georgian Bay Metis Council						gbmccontact@gmail.com
	Francois	Lachance	Senior Advisor	Ministry of Indigenous Affairs, Indigenous Relations Branch	160 Bloor St. East, 9th Floor		Toronto, ON	M7A 2E6	416-326-4754	Jean-Francois.Lachance@canada.ca
Chief	Donna	Big Canoe		Chippewas of Georgina Island*	R.R. #2	P.O. Box N-13	Sutton West, ON	L0E 1R0	705-437-1337	donna.bigcanoe@georginaisland.com
Mr.	Ben	Benson	Community Consultation	Chippewas of Rama First Nation *	5884 Rama Road	Suite 200	Rama, ON	L3V 6H6	705-325-3611 ext. 1633	consultation@ramafirstnation.ca benb@ramafirstnation.ca
Ms.	Susan	Copegog	Consultation	Beausoleil First Nation*	11 O'Gemaa Miikaans		Christian Island, ON	L9M 0A9		consultations@chimnissing.ca.
***cc Karry Sandy-McKenzie on all corespondence sent to the above FN (Williams TreatyCommunities)**										
Ms.	Karry	Sandy- McKenzie	Barrister & Solicitor	Williams Treaties Communities	8 Creswick Court		Barrie, ON	L4M 2J7	705-792-5087	k.a.sandy-mckenzie@rogers.com
Ms.	Charlene	Leonard	Infrastructure and Resources Manager	Saugeen Ojibway Nation Environment Office	25 Maadookii Subdivision		Neyaashiinigmiing, ON	N0H 2T0	519-534-5507	manager.ri@saugeenojibwaynation.ca execassist.ri@saugeenojibwaynation.ca
Chief	Lester	Anoquot		Saugeen First Nation	6493 Highway 21	R.R. #1	Southampton, ON	N0H 2L0	(519) 797-2781	sfn@saugeen.org
Chief	Gimaa Greg	Nadjiwon		Chippewas of Nawash Unceded First Nation	135 Lakeshore Blvd.		Neyaashiinigmiing, ON	N0H 2T0	519-534-1689	chief@nawash.ca
	Remy	Vincent	Grand Chief	Huron-Wendat Nation	255 Place Chef Michel Laveau		Wendake, QC	G0A 4V0		administration@cnhw.qc.ca
	Mario	Gros-Louis		Huron-Wendat Nation						mario.groslouis@wendake.ca
	Lori-Jeanne	Bolduc		Huron-Wendat Nation						lori-jeanne.bolduc@wendake.ca
	Dominic	Ste-Marie		Huron-Wendat Nation						dominic.ste-marie@wendake.ca
	Dave	Dusome	Regional Councillor, Region 7	Métis Nation of Ontario	66 Slater Street	Suite 1100, 11th Floor	Ottawa, ON	K1P 5H1		DavidD@metisnation.org
	Attn: Lands, Resources and Consultations Branch			Métis Nation of Ontario	66 Slater Street	Suite 1100, 11th Floor	Ottawa, ON	K1P 5H1		consultations@metisnation.org
Utilities										
Attn: General			Planning Department	Hydro One	45 Sarjeant Drive		Barrie, ON	L4N 4V9	888-664-9376	customercommunications@hydroone.com
Ms.	Carol	O'Brien		Bell Canada	136 Bayfield Street	2nd Floor	Barrie, ON	L4M 3B1	705-722-2405	carol.obrien@bell.ca
Mr.	Tony	Dominguez		Rogers	1 Sperling Drive		Barrie, ON	L4N 6B8	705-737-4660 xt 6907	tony.dominguez@rci.rogers.com
Mr.	Tom	Jedemann		Enbridge Gas	101 Honda Blvd		Markham, ON	L6C 0M6	905-927-3184	tom.jedemann@enbridge.com

[redacted]
7743 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7883 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7757 5TH LINE
ANGUS ON L0M 1B1

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ANGUS ON L0M 1B1

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7901 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7631 5TH LINE RR 1
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[redacted]
7969 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7615 5TH LINE
ANGUS ON L0M 1B1

[redacted]
125 BELLA VISTA TRAIL
ALLISTON ON L9R 2E2

[redacted]
7851 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7641 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7865 5TH LINE RR 1
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[redacted]
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ANGUS ON L0M 1B0

[redacted]
6219 25TH SIDEROAD
ANGUS ON L0M 1B1

[redacted]
7832 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7900 5TH LINE PO BOX 2079
ANGUS ON L0M 1B0

[redacted]
7740 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7804 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7780 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
8082 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7790 5TH LINE PO BOX 2053
THORNTON ON L0L 2N0

[redacted]
8066 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7616 5TH LINE
ANGUS ON L0M 1B1

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8206 5TH LINE
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[redacted]
7766 5TH LINE
ANGUS ON L0M 1B1

[redacted]
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7692 5TH LINE RR 1
ANGUS ON L0M 1B1

[redacted]
7839 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7765 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7677 5TH LINE
ANGUS ON L0M 1B1

[redacted]
7665 5TH LINE
ANGUS ON L0M 1B1

[redacted]
8529 SIMCOE COUNTY ROAD 10
ANGUS ON L0M 1B2

[redacted]
8505 COUNTY ROAD 10
UNIT 1
ANGUS ON L0M 1B1

[redacted]
10 WELLINGTON STREET EAST
ALLISTON ON L9R 1A1

[redacted]
1110 HIGHWAY 26
MIDHURST ON L0L 1X0

[redacted]
OPERATIONAL POLICY & STRATEGIC PLANNING
777 MEMORIAL AVE., 2ND FLOOR
ORILLIA ON L3V 7V3

Township of Essa | 5th Line Bridge (No. 9) Improvements

Schedule 'C' Municipal Class Environmental Assessment

Public Information Centre No. 2

December 13, 2023

Ainley GROUP

Introductions

Tammy Kalimootoo, P. Eng., PMP
Vice-President & Branch Manager

- Presenter
- Consultation Lead
- 21+ years of Experience

Brian Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

- Project Manager
- Technical Lead
- 28+ years of Experience

Township of Essa staff and members of Council are also in attendance.

Welcome

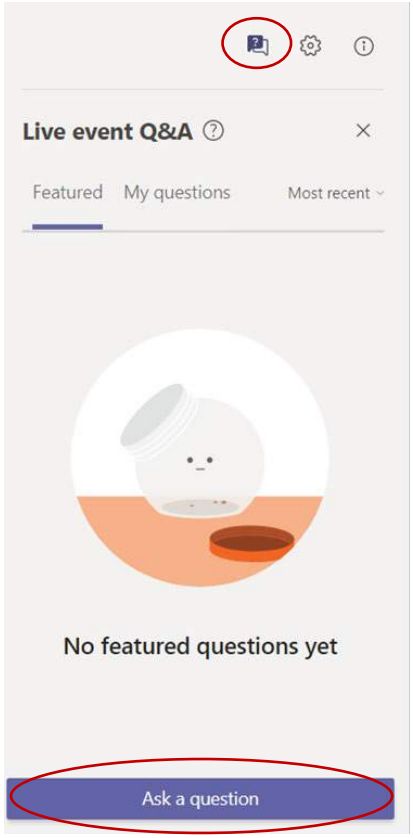
Thank you for your attendance and interest in this Municipal Class Environmental Assessment!

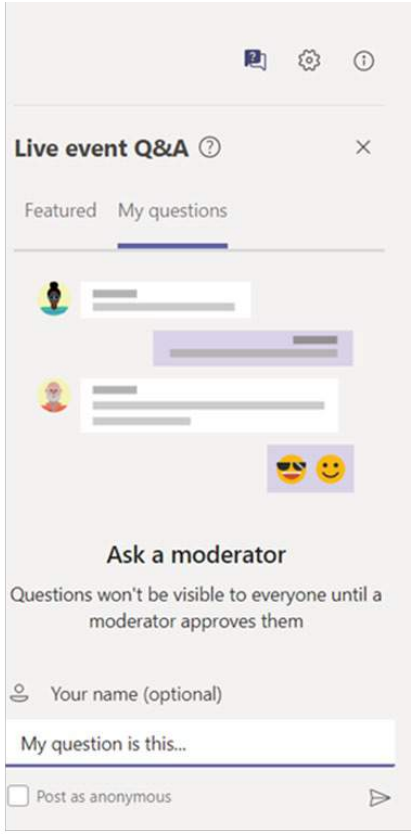
A few items to note:

- This presentation is being recorded.
- The presentation material, including the recording, will be made available after this event on the Township's website.
- There may be a 20-30 second video delay, so please be patient.

Your Input is Appreciated

- Cameras and microphones are deactivated, so the Presenter(s) cannot see or hear you.
- We invite you to provide questions or comments during the presentation.
- Look for the “?” icon.
- Select “Ask a Question”.
- Type your name and question and hit send.
- The team will gather questions and will respond at the end of the presentation.





MUNICIPAL FREEDOM OF INFORMATION & PROTECTION OF PRIVACY ACT

Comments and information regarding this project are being collected for the purpose of meeting Environmental Assessment Act requirements, which includes the creation of a record that is available to the general public as described in the Municipal Freedom of Information and Protection of Privacy Act. Please note that all personal information included in a submission – such as name, address, telephone number and property location – will be collected, maintained, and may be disclosed for the purpose of transparency and consultation unless a request is made that personal information remain confidential.

Agenda

1. Study Area and Project Background
2. The Municipal Class Environmental Assessment Process
3. Preferred Solution
4. Alternative Design Concepts Considered
5. Evaluation of Alternative Design Concepts
6. Next Steps
7. Question & Comment Period

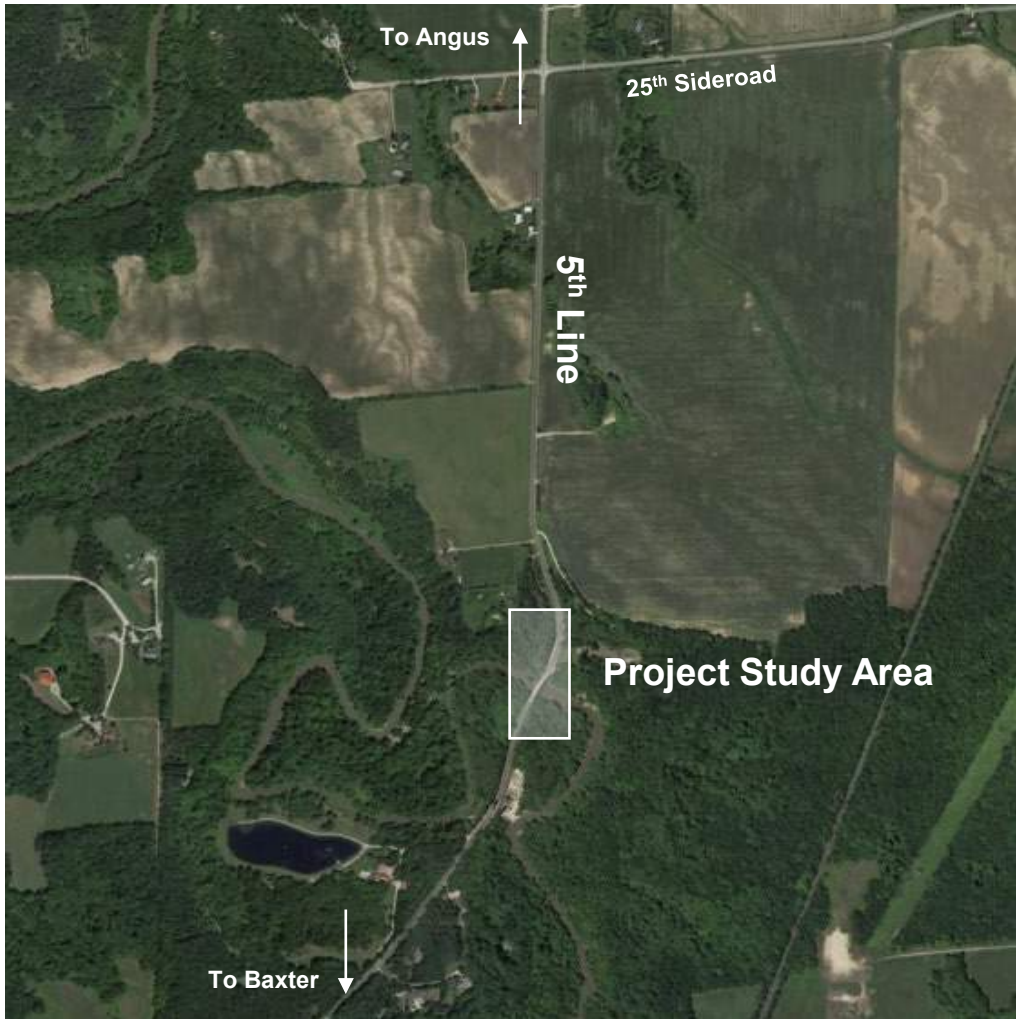
Study Area

- Bridge No. 9 is located in the Township of Essa, on the 5th Line, between the communities of Angus and Baxter.
- The 5th Line is a two-lane collector road with an AADT of approximately 1,150 (2017).
- The bridge spans the Nottawasaga River, between 20th Sideroad and 25th Sideroad.

*Source: Google Maps

Study Area

- The bridge is located in a large meander of the river and within a deep valley.
- A large portion of the surrounding lands are considered to be an Area of Natural and Scientific Interest (ANSI).
- The study area, including the woodlands, valleylands, and the river provide potential habitat for a variety of wildlife and fish species, including endangered and threatened species.



*Source: Google Maps

Project Background

- The existing structure is a two-span continuous concrete parabolic T-beam bridge with a concrete deck and a concrete wearing surface. It is estimated to have been constructed around 1950, making it over 70 years old.

Bridge No. 9 West Elevation View

Project Background

- The travelled portion of the bridge is only 6.1 m wide, so it currently operates as a single-lane structure, with substandard sightlines on the approaches.

Project Background

- Ongoing erosion and sediment deposition is creating a restriction in the Nottawasaga River at the bridge location resulting in ice and debris jams causing flooding.

Large log-jam

- Recent inspections of Bridge No. 9 were completed, following the Ontario Structure Inspection Manual (OSIM), and identified maintenance needs as well as the need to replace the structure in the 6-10 year timeframe.
- The Township initiated a Municipal Class Environmental Assessment (Class EA) to examine potential improvements.

Municipal Class EA Process

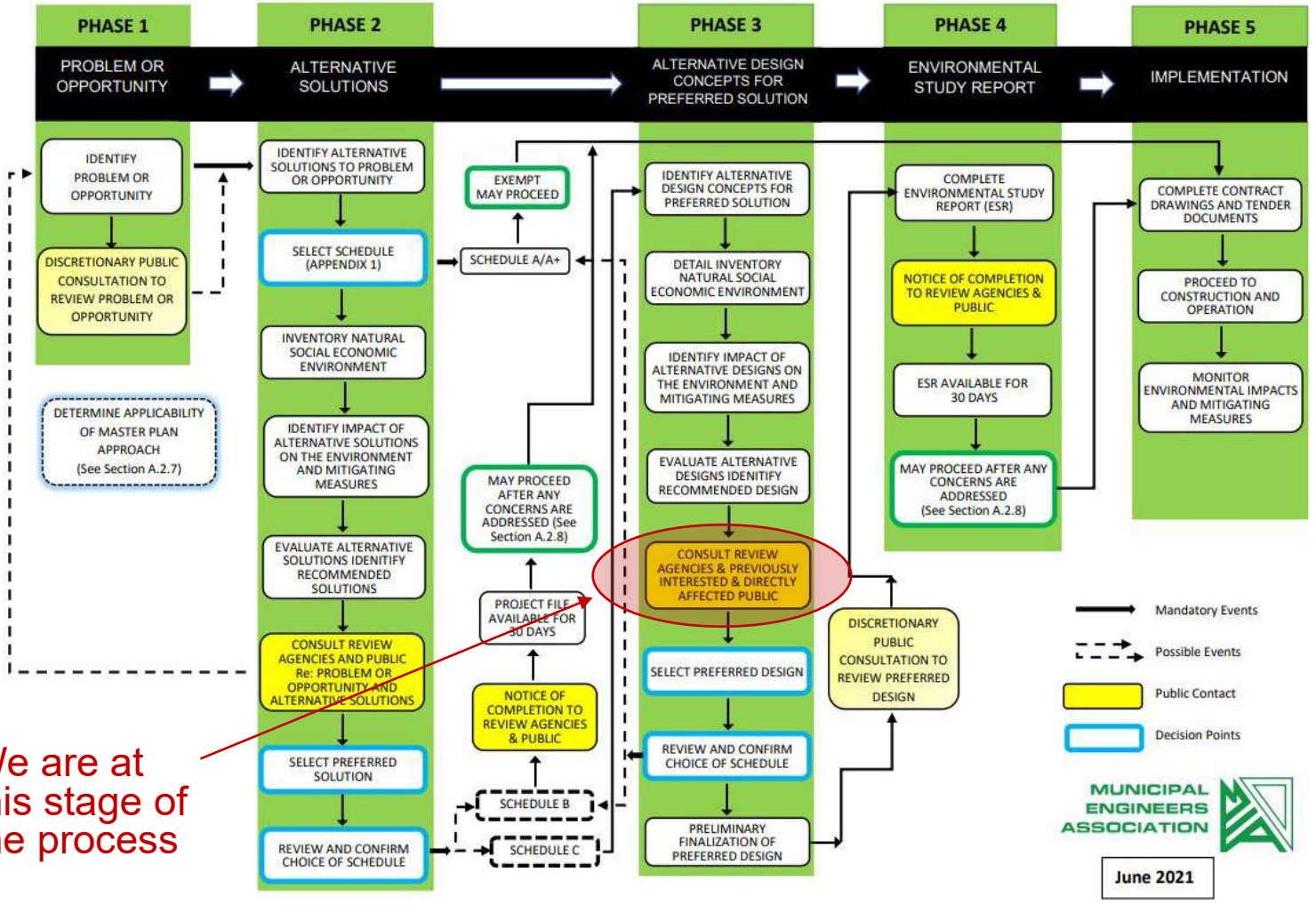
- A municipality is required to conduct a Municipal Class EA before this type of infrastructure improvement project can proceed to construction. A Municipal Class EA follows an approved planning process designed to protect the environment and to ensure compliance with the Environmental Assessment Act.

- The purpose of the Environmental Assessment Act (EA Act) is to provide for "…the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment." The term "environment" is broadly defined and includes the physical/built, natural, socio-economic and cultural environments.

- The process requires the identification and evaluation of potential solutions and design concepts in order to arrive at a suitable option that will address the problem/opportunity, but also keep environmental impacts to a minimum.

- This project is classified as a Schedule 'C' in accordance with the Municipal Class Environmental Assessment (last amended in 2023) and requires completion of Phases 1 to 4 of the process.

Municipal Class EA Process



★ We are at this stage of the process

Preferred Solution

- A Public Information Centre (PIC) was previously held during Phase 2 of the process in November of 2021.
- The alternative solutions considered included:
  - ***Option 1 - Do Nothing***
  - ***Option 2 - Rehabilitate Existing Bridge***
  - ***Option 3 - Replace Bridge Structure in Current Location to Accommodate Two Lanes of Traffic***
  - ***Option 4 - Replace Bridge on New Road Alignment to the West***
- After evaluation and consultation with various stakeholders and the public, Option 3 was selected as the Preferred Solution.

Alternative Design Concepts

- With the Preferred Solution established, a number of alternative design concepts have now been developed. The design concepts focus on addressing two critical factors: the vertical alignment of the road and the configuration of the bridge structure.

- Alternative Designs for Vertical Road Alignment:

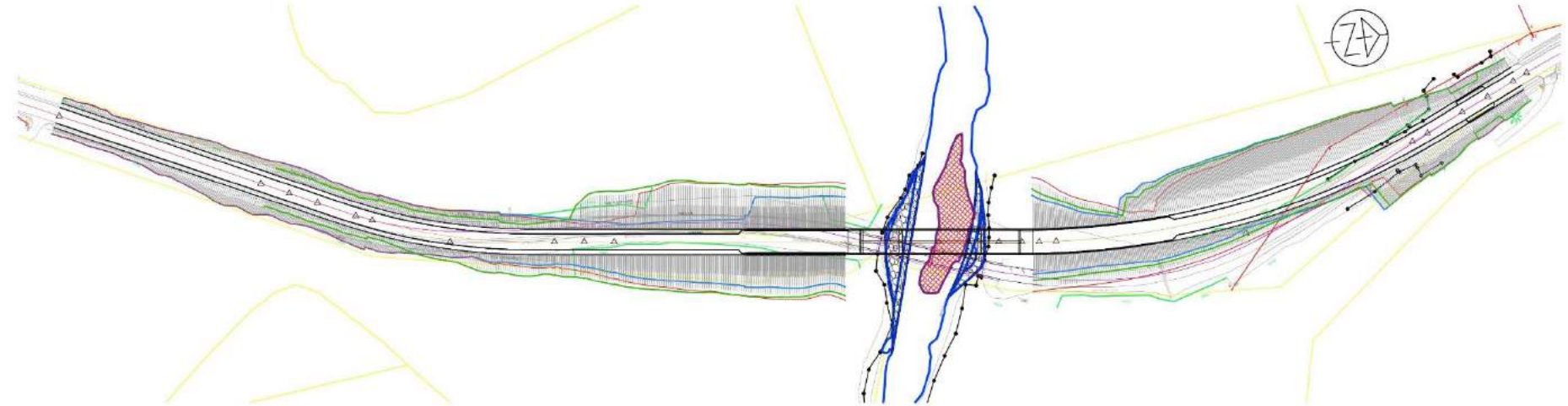
  - ***Option 1 - Lowest Vertical Alignment***
    (Increase of +/- 2.2 m)

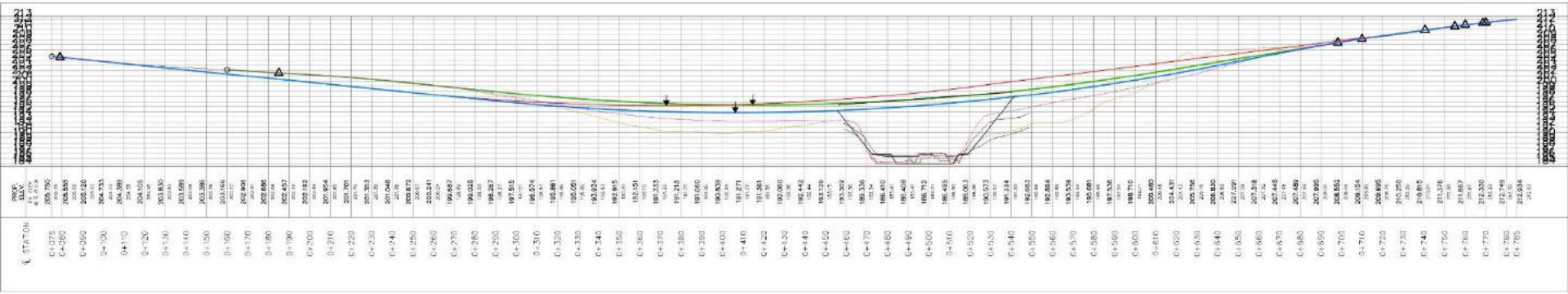
  - ***Option 2 - Highest Vertical Alignment***
    (Increase of +/- 4.7 m)

  - ***Option 3 - Mid-Height Vertical Alignment***
    (Increase of +/- 3.4 m)

*It should be noted that all options have a consistent horizontal road alignment and meet the minimum k value to provide the required sight distance.

Vertical Alignment Options





Vertical Alignment | Evaluation

- Each of the alternatives were evaluated based on their potential impact to the study area environment (physical, natural, social, and economic).
- The evaluation is presented in a table or matrix to provide a simplified, visual comparison.
- Colours were used to depict the impacts
  - Green represents the most preferred option as it will create the least amount or positive impact.
  - Red is indicative of a least preferred option as it has a higher potential to have a negative impact.
  - A blank space indicates that the impact is considered neutral.

Least Preferred	Negative Neutral	Neutral	Positive Neutral	Most Preferred
LP	**NN**	**N**	**PN**	**MP**

Vertical Alignment | Evaluation

Evaluation Criteria	Option 1	Option 2	Option 3	Description of Impacts
Physical Environment				
Horizontal & Vertical Alignment Design Criteria	MP	MP	MP	Horizontal alignment is consistent for all options. All three options satisfy design and safety requirements.
Impacts to Existing Utilities and Infrastructure	NN	NN	NN	All three options will require relocation of both Bell and Hydro. The relocation of the utilities may provide an opportunity to implement upgrades to these systems, which may also benefit the general public in the area.
Design & Constructability	NN	LP	NN	▪ Option 1 requires slightly more road work (710 m) than Options 2 & 3 (625 m). It would require the least amount of imported fill as it has the lowest raise in grade at the location of the bridge and the least limits of disturbance. ▪ Option 2 requires the most amount of imported fill material and raises the elevation of the bridge a considerable amount (approximately 2.5 m more than Option 1), requiring taller pier construction and the potential for more down drag, impacting the bridge foundation design. It has the greatest limits of disturbance and it also moves the low point in the road further from the bridge requiring more curb and gutter for stormwater control. ▪ Option 3 follows the existing road profile as closely as possible south of the bridge and ties into existing sooner than the other options to the north. As a result, it require the least amount of excavation. However, it does raise the elevation of the bridge (approximately 1.2 m more than Option 1). It moves the low point in the road closer to the bridge requiring less curb and gutter construction for stormwater control.

Vertical Alignment | Evaluation

Evaluation Criteria	Option 1	Option 2	Option 3	Description of Impacts
Natural Environment				
Areas of Natural and Scientific Interest	NN	LP	NN	All options will require tree clearing and grubbing north and south of the bridge, which will impact the feature. Minimizing the impact as well as mitigating the impact through restoration and naturalization will be needed. Option 1 provides the least impact in that it has the least area of disturbance whereas Option 2 has the largest area of disturbance and the most impact on tree clearing.
Terrestrial Vegetation/Wildlife (Including SAR)	NN	LP	NN	Similar to the ANSI, all options will require tree clearing and grubbing north and south of the bridge; however, trees and shrubs will be planted as part of the restoration. Option 1 provides the least impact as it has the least disturbance and the least amount of imported fill. Option 2 has the largest limit of disturbance and the most impact on tree clearing. A single butternut tree was found to the south of the bridge. All options may impact this tree and further analysis and mitigation will be required during detailed design.
Fish Habitat (Including SAR)	N	N	N	All options will require in-water work to remove the existing "island" of sediment that has formed south of the existing pier, which will cause a temporary, short-term impact. However, removal of the sediment also provides an opportunity for reconstruction of the channel bed and to provide improved habitat that will be to the ultimate benefit of fish and the watercourse in general. Removal of trees will reduce shading temporarily until restoration and naturalization is achieved.
River System and Bank Stability	NN	LP	NN	All options will require slope stabilization near the proposed abutments as well as armouring to minimize future erosion and scour. However, the more the road elevation is increased, the more slope stabilization and limits of disturbance will be required. Therefore, Option 1 has the least amount of impact with Option 2 having the most impact.
Surface Water	N	N	N	All of the options will be directing surface water from the road. All options will result in temporary construction disturbance to a small drainage feature conveying runoff. However, surface water will be controlled during construction operations and proper sediment control measures will be in place to ensure no foreign materials or contamination will enter the watercourse.
Ground Water	N	N	N	Multiple small seeps were identified within the northeastern portion of the study area. No grading is proposed east of the existing 5th Line alignment (north of the existing bridge) and therefore no impacts to the seepage zone are expected under any of the options.
Climate Change	N	N	N	All three options provide an alignment that allows for the smooth flow of traffic without the need for stopping to allow other users to pass (i.e. in the current single-lane configuration); thereby, nominally reducing emissions. All options will require tree clearing and grubbing north and south of the bridge; however, trees and shrubs will be planted as part of the restoration works. Although Option 1 requires a slightly longer length of road construction, it offers a better cut/fill balance with the least amount of imported fill for construction.

Vertical Alignment | Evaluation

Evaluation Criteria	Option 1	Option 2	Option 3	Description of Impacts
Cultural And Social Environment				
Noise	NN	NN	NN	All options will have similar temporary noise impacts from construction operations.
Archaeological	N	N	N	Based on the previous findings, parts of the study area have low or no longer retain archaeological potential due to steeply sloping terrain, permanently wet conditions or previous disturbance. Only small portions in the north end will require Stage 2 Archaeological Assessment. Each of the alignment options do not interfere with the previously indicated areas that would require a stage 2 archaeological assessment; therefore, there are no archaeological concerns.
Cultural and Built Heritage	N	N	N	There are no previously identified cultural and built heritage resources located within the vicinity of the work.
Property Impacts	NN	LP	NN	Each option will require property acquisition and may impact existing driveways. Option 1 will require the least amount of property acquisition and Option 2 requires the most property acquisition, with Option 3 being in the middle.
Recreational Use	PN	PN	PN	Each option will allow for a bridge to be constructed to meet the minimum navigational opening requirements for the Nottawasaga River. Removal of the existing "island" of sediment will improve the recreational use of the Nottawasaga River at this location. There may be temporary impacts to navigation during construction.
Construction Timing/Travel Delays/Detours	N	LP	NN	All three alignment options will require lengthy construction period and some road closures/detours. The lower the road elevation, the less time and materials required to complete the bridge construction; therefore, decreasing the overall time required to close the road and provide a detour, making Option 1 more attractive. Option 1 also has the least requirement for importing material as the cut and fill to the south of the bridge is nearly balanced and would only require moving material from one spot to another on site.

Evaluation Criteria	Option 1	Option 2	Option 3	Description of Impacts
Economic Environment				
Construction Costs	N	LP	NN	Each of the options will require considerable construction costs, with Option 1 being the least costly, Option 3 being the next, and Option 2 being the most expensive.
Operating/Maintenance Costs	N	LP	NN	Operation and maintenance costs will be reduced with all options. Option 1, having the lowest road elevation, may be less prone to side slope maintenance. Further, Option 1 has the least surface area, so the potential future maintenance and replacement costs may be lower.
Property Acquisition Costs	N	LP	NN	Option 2 requires the most amount of property, making it the most expensive. Option 1 requires the least amount of property and Option 3 is in the middle.

Vertical Alignment | Preferred

Based on the evaluation completed, Option 1 (lowest vertical road alignment) was selected as the Preferred Design Option as it:

- Meets the TAC, MTO, and CHDBC requirements;
- Has the smallest limit of disturbance, thereby reducing the required tree clearing and property impacts; and
- Has the lowest road construction costs.

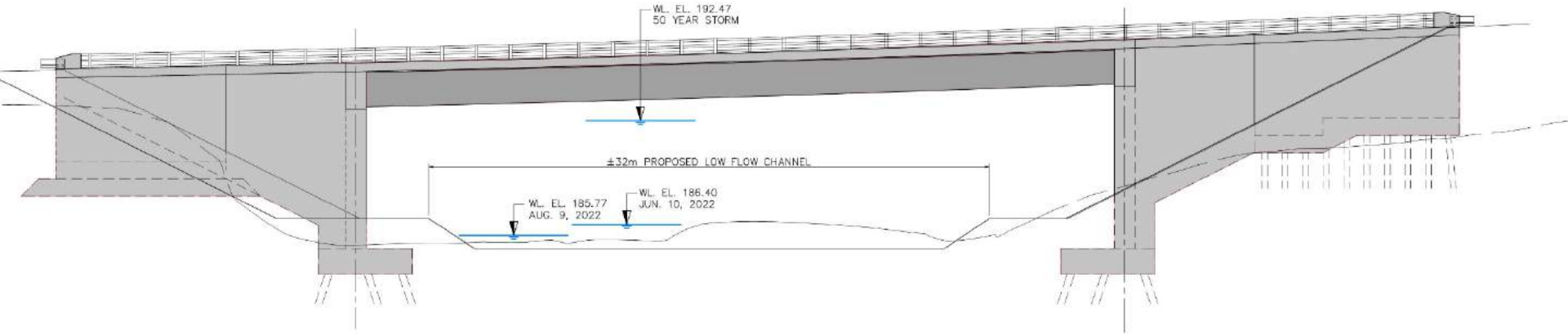
Alternative Design Concepts

Alternative Designs for Structure Configuration:

- ***Option A - Single Span Structure***
- ***Option B - Two-Span Structure***
- ***Option C - Three-Span Structure***

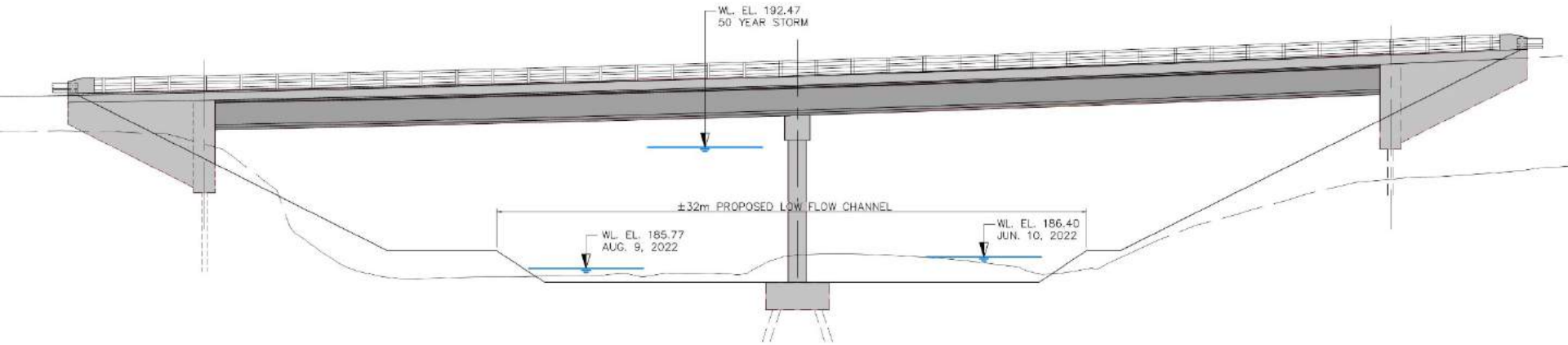
Structure Configuration | Option A

Single Span Structure



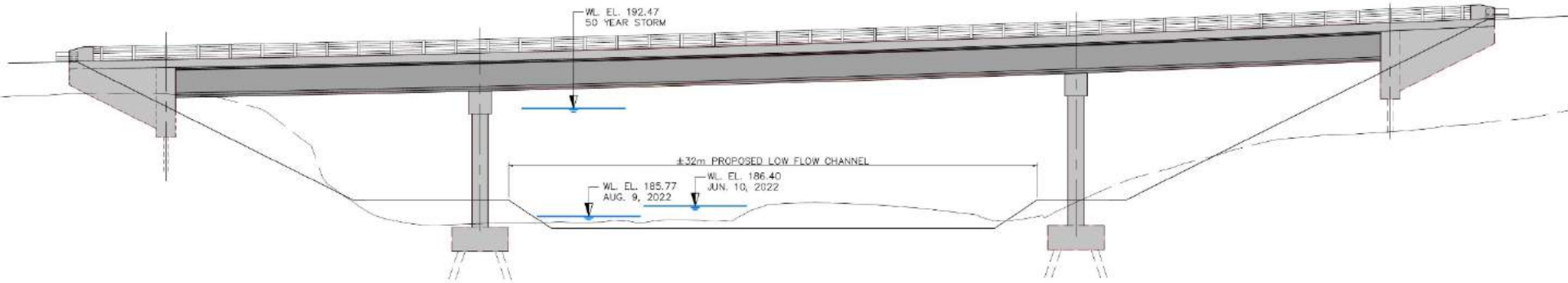
Structure Configuration | Option B

Two-Span Structure



Structure Configuration | Option C

Three-Span Structure



Evaluation Criteria

- Once again, each alternative was evaluated based on their potential impact to the study area environment (physical, natural, cultural, and socio-economic).
- Colours were again used to depict the impacts
  - Green represents the most preferred option as it will create the least amount or positive impact.
  - Red is indicative of a least preferred option as it has a higher potential to have a negative impact.
  - A blank space indicates that the impact is considered neutral.

Least Preferred	Negative Neutral	Neutral	Positive Neutral	Most Preferred
LP	**NN**	**N**	**PN**	**MP**

- Any criteria not applicable to the alternatives was generally considered neutral or not considered at all.

Structure Configuration Evaluation

Evaluation Criteria	Option A	Option B	Option C	Description of Impacts
Physical Environment				
Design & Constructability	LP	NN	NN	Option A: with the longest single span, will require the largest girders and largest equipment for installation. The total number of piles under the abutments and retaining wall is the highest of all options. All options will require cofferdams and each have their own unique complexities with comparable levels of difficulty.
Hydraulic Analysis	MP	MP	MP	All three options are able to convey the 50-year design storm while providing the required freeboard.
Natural Environment				
Fish Habitat (Including SAR)	N	LP	N	Option B will have the pier built in the middle of the river, which will result in disturbance in the riverbed. This option also leads to the possibility of a sediment island and ice/log jams forming in the future as it is the same configuration as the existing structure. Option A & C will have the abutments and piers built on the riverbank, outside the bankful width rather than in the water, which will minimize impacts.
River System and Bank Stability	PN	NN	MP	Option A & C, having the central pier eliminated and the new bridge abutments and piers set outside the bankful width as well as added scour and erosion protection measures along with removal of sediment deposition from the river to restore channel flow will increase the stability of the river system and riverbank. Option C, with additional spans on each end will provide larger flow area for the flood season. Additional mitigation features can also be added to the piers to assist with breakup of ice and logs. Option B, the same configuration as the existing bridge with the pier in the river, slows the velocity of the water on the downstream side of the pier creating an area of deposition. This deposition will continue to accumulate over time, leading to sediment island and log jams.
Climate Change	NN	NN	PN	Options B & C will provide a larger flow area for major flooding events and will better allow for passing of more intense storms as a result of climate change. Option B, having the same configuration as existing poses a challenge for future sediment deposition and ice/log jams. Additional mitigation features can be added to the piers to assist with breakup of ice and logs. However, with Option C, having the piers set back from the normal water level is preferred.

Structure Configuration Evaluation

Evaluation Criteria	Option A	Option B	Option C	Description of Impacts
Cultural And Social Environment				
Noise	LP	NN	NN	Noise impacts will be temporary during construction. It is anticipated that the major source of construction noise will be from pile driving. Option A has the highest number of piles and will require the longest pile driving time. Option B has the least number of piles, with Option C in the middle.
Recreational Use	MP	NN	MP	With Option B, there would be a pier in the middle of the channel and the potential for formation of sediment islands and log jams over time, causing obstructions and reduced water depths for recreational uses. Option A and C would provide an open waterway for recreational use.
Economic Environment				
Construction Costs	LP	NN	NN	Construction costs under Option B are considered to be the lowest, with Option C being approx. $0.6M more. Whereas construction costs associated with Option A are estimated to be considerably higher (+/-$1.5 to 2M more).
Operating/Maintenance Costs	PN	NN	PN	All options will reduce the operations and maintenance costs to the Township as the bridge will be new. Option C is anticipated to have the least operations and maintenance costs due to the integral abutment configuration. Over time, Option B is anticipated to have ongoing operations and maintenance cost for sediment and ice/log jam removal.

Structure Configuration

Based on the evaluation completed, Option C (three-span structure) was selected as the Preferred Design Option as it:

- Eliminates the central pier and the potential for future issues with sediment deposition as well as ice/log jams;
- Provides a more open waterway for recreational use;
- Provides a larger flow area for major flooding events such as the regional event as well as future climate change impacts;
- Provides for smaller girders, making installation easier; and
- Has a lower construction cost compared to Option A.

Preliminary Preferred Design

- After evaluation, the selected Preferred Design Option is 1C, comprised of the lowest vertical road alignment and a three-span structure configuration.
- This is considered to be the *Preliminary* Preferred Design Option. The choice will be reviewed again following the receipt and consideration of comments and input from the agencies, First Nations, interested stakeholders, and the public.

Potential Impacts & Mitigation

Environment	Potential Impact or Concern	Mitigation or Future Commitment
General	Engagement and Consultation	▪ Continued coordination and engagement during design and construction with: ▪ Adjacent property owners regarding project schedule, property acquisition/grading easements, restoration. ▪ Indigenous communities, particularly in conjunction with the completion of any further archaeological assessments and field work. ▪ Utility service providers regarding relocation requirements. ▪ County of Simcoe, emergency services, and school boards.
	Permits and Approvals	▪ Consultation and securing of permits and approvals with the following agencies, as required, during detailed design and construction: ▪ Transport Canada (Navigation), DFO, MNRF, MECP, NVCA, Township of Essa (Road Occupancy)
	Monitoring	▪ Monitoring during construction and post-construction to ensure the project is constructed in accordance with the approved design and permits/approvals and that the environmental mitigation and effects are as anticipated.
Physical	Final Alignments and Grading	▪ The horizontal and vertical alignments will be fine tuned, as necessary, during detailed design. ▪ The extent of grading and limits of disturbance (and associated property acquisition) should be minimized during detailed design as much as possible.
	Hydraulics	▪ The final design must convey the 50-year storm event as a minimum. ▪ The hydraulic analysis will be updated to reflect the final design and for the purposes of obtaining permitting/approvals.
	Construction Staging and Traffic Management	▪ Construction staging and traffic management plans will be prepared during design and construction to ensure efficient operations and the safety of road users.
	Geotechnical Investigation and Management of Excess Soils	▪ A geotechnical investigation will be completed to assess existing soil conditions and support the foundation design for the replacement structure. ▪ 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 will be completed in accordance with O. Reg. 406/19 and the MECP's document entitled "Rules for Soil Management and Excess Soil Quality Standards". All required investigations, analysis, planning, and reporting to meet the regulations will be completed.
	Utilities	▪ Coordination with Hydro and telecommunications will be completed during detailed design to ensure relocation of existing utilities to a location suitable for the proposed bridge replacement work.

Potential Impacts & Mitigation

Environment	Potential Impact or Concern	Mitigation or Future Commitment
Natural	Vegetation and Terrestrial Wildlife	▪ Limits of disturbance will be minimized to the extent possible, which will also minimize tree cutting. Tree preservation fencing may be incorporated into the design to ensure limits are adhered to. ▪ Tree cutting will be completed outside of the migratory birds and bat roosting windows. ▪ Netting of the existing bridge will be reviewed the ensure that nests are not developed on the bridge prior to demolition. ▪ Restoration/naturalization plans will be prepared and included as part of the design and construction of the project. ▪ Additional investigation will be completed to confirm that no significant bat roosting habitat is present. If found, mitigation such as bat roosting boxes may be incorporated into the design.
	Fish and Fish Habitat	▪ In-water works will only be completed during the permissible timing windows. ▪ Restoration plans will be prepared and implemented to improve fish habitat in consultation with DFO.
	Species at Risk	▪ Potential impacts to the single butternut tree will be reviewed as detailed design progresses. Additional investigations including a genetic assessment and/or a Butternut Health Assessment may be required. Pending the outcome, further mitigation, compensation, and authorizations may be required.
	Groundwater, Surface Water, and Source Water Protection	▪ Environmental protection plans will be prepared during design and construction to minimize risk from activities such as spills, bridge demolition, etc. ▪ Activities, including the maintenance of construction machinery, will be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the natural environment. ▪ To minimize the potential for erosion and off-site transport of sediment into surface water features and the natural environment, the ESC design will be completed to meet NVCA guidelines and standards. At a minimum, ESC fencing will be installed along the limits of the construction area prior to the commencement of construction.

Potential Impacts & Mitigation

Environment	Potential Impact or Concern	Mitigation or Future Commitment
Cultural and Social	Air Quality	▪ Impacts of construction activities on air quality are expected to be temporary in nature and will be mitigated through best practices.
	Climate Change	▪ Ensure hydraulic design is completed with consideration for increase in storm intensity, duration, and frequency related to climate change, as per Township standards. ▪ Ensure removal of the sediment island to prevent future ice and log jams. ▪ Incorporate vegetation into the restoration works to the extent possible to assist with stabilization, carbon sequestration, and provision of shade.
	Archaeological Resources	▪ The Stage 2 archaeological assessment will be completed by test pit and pedestrian survey in the locations identified in the Stage 1 report. ▪ Should it be determined during detailed design that the proposed work extends beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands. ▪ Should previously undocumented archaeological resources be discovered, the proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the Ontario Heritage Act.
	Noise and Vibration	▪ Construction will be limited to the time periods allowed by the Township's Noise bylaw. If construction activities are required outside of these hours, the Contractor will seek exemptions directly from the municipality in advance. ▪ All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. ▪ Preconstruction condition surveys as well as vibration monitoring will be included in the detailed design and construction plans, where necessary.
	Illegal Dumping and Site Conditions	▪ The contractor will be responsible for ensuring a secure project site to prevent illegal dumping as well as clean up of any garbage and debris.
Economic	Costs	▪ Continued effort will be required during detailed design and construction to minimize the economic impact of the project while ensuring all requirements are met.

Next Steps

- This PIC material will be available by visiting the Township of Essa's website at https://www.essatownship.on.ca/news-notices/.
- The Project Team will receive comments for consideration until **December 31, 2023.**
- Following the review and consideration of all comments received, the Project Team will finalize the Preferred Design selection. The Environment Study Report (ESR) will be updated to document the selection process and a Notice of Completion will be issued. The ESR will be made available for a 30-day public review and further commenting period.
- Once the 30-day public review period ends and assuming there are no objections, the Class EA process will be considered complete.

Comment Period

We invite you to provide any further comments in writing via email by **December 31, 2023** to one of the following members of the Project Team:

Michael Mikael
Manager of Public Works/Deputy CAO
Township of Essa
5786 Simcoe County Road 21
Utopia, ON L0M 1T0
Tel: 705-424-9917 Ext. 135
Email: mmikael@essatownship.on.ca

Brian Wickenheiser
Bridges and Structures Group Lead
Ainley Group
550 Welham Road
Barrie, ON L4N 8Z7
Tel: 705-726-3371
Email: brian.wickenheiser@ainleygroup.com

Thank you for your attendance at this meeting!
We appreciate your input and participation.

MUNICIPAL FREEDOM OF INFORMATION & PROTECTION OF PRIVACY ACT

Comments and information regarding this project are being collected for the purpose of meeting Environmental Assessment Act requirements, which includes the creation of a record that is available to the general public as described in the Municipal Freedom of Information and Protection of Privacy Act. Please note that all personal information included in a submission – such as name, address, telephone number and property location – is collected, maintained, and may be disclosed for the purpose of transparency and consultation unless a request is made that personal information remain confidential.

From:	Brian Wickenheiser
To:	consultation@ramafirstnation.ca
Cc:	Alex O"Donnell; Tammy Kalimootoo; James Baldwin
Subject:	Re: 217031 - Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 2
Date:	December 15, 2023 9:00:51 AM
Attachments:	Outlook-cu2htqhi.png

Hi Ben,

Thank you for your question regarding the deck drainage of the 5th Line Bridge in Essa Township over the Nottawasaga River. While the existing bridge currently has deck drains that outlet directly over the river, it is our intention to eliminate the deck drains on the proposed bridge and instead install gutter outlets or catch basins on the bridge approaches (beyond both ends of the bridge) which will capture the road surface water and direct it into either a ditch or a grassy area such that the salt laden runoff has to travel overland before reaching the river in an effort to filter out much of the salt and sediment before it reaches the river. In some cases we also install check dams with filter cloth to slow the passage of water thus giving more contact time for settlement and filtration.

Keeping your concerns in mind, this will be further explored and considered during the detailed design stage of the bridge.

Regards,

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 240
Cell: (705) 790-7365

From: Alex O'Donnell <alex.odonnell@ainleygroup.com>
Sent: Friday, December 15, 2023 8:37 AM
To: Brian Wickenheiser <brian.wickenheiser@ainleygroup.com>; James Baldwin <james.baldwin@ainleygroup.com>
Cc: Tammy Kalimootoo <tammy.kalimootoo@ainleygroup.com>
Subject: FW: 217031 - Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 2

Brian / James,

See question received below from Rama.

Sincerely,

Alex O'Donnell, EIT (she/her/hers)
Engineering Intern

Tel: (705) 445-3451, Ext. 413
Cell: (705) 606-0224
Email: alex.odonnell@ainleygroup.com

WWW.AINLEYGROUP.COM

From: Community Consultation <consultation@ramafirstnation.ca>
Sent: Thursday, December 14, 2023 4:00 PM
To: Alex O'Donnell <alex.odonnell@ainleygroup.com>
Subject: RE: 217031 - Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 2

Aaniin Alex,

I am fully aware of the state of that bridge as I use it often when going out trout fishing. I think the only concern Rama would have is the drainage system observed on other bridges in that area, specifically how the runoff pipes lead right to the river. In the winter, when salt is on the road it will naturally wash into the river and affect the water's health, is there any possibility of having the drainage pipes lead to the earth instead of directly into the water? If you could pass on my suggestion to the appropriate parties that would be very helpful.

Miigwech,

-BB

Ben Benson
Community Consultation Worker, Legal
Chippewas of Rama First Nation
(ph) 705-325-3611, 1633
(cell) 705-238-7111
(fax)
(url) www.ramafirstnation.ca

From: Alex O'Donnell <alex.odonnell@ainleygroup.com>
Sent: December 7, 2023 10:21 AM
To: Ben Benson <benb@ramafirstnation.ca>
Cc: Community Consultation <consultation@ramafirstnation.ca>
Subject: 217031 - Township of Essa, 5th Line Bridge Rehabilitation Class EA, Notice of Public Information Centre No. 2

Dear Mr. Benson,

The Township of Essa is undertaking a Municipal Class Environmental Assessment (Class EA) to evaluate options that would address deficiencies associated with Bridge No. 9 on the 5th Line over the Nottawasaga River. Bridge No. 9 is located on the 5th Line, north of 20th Sideroad and south of Sideroad 25 and provides a key transportation link between the communities of Angus, Baxter, and Alliston. The bridge currently operates as a single-lane structure, with sightlines on the southbound approach being below standard requirements for the posted speed limit. This project is following the Schedule 'C' planning and design process in accordance with the *Municipal Class Environmental Assessment (last amended in 2023).*

A virtual Public Information Centre (PIC) will be held on **Wednesday, December 13, 2023 from 6:00pm to 7:00pm.** Please refer to the attached Notice of PIC No. 2 for more details.

This PIC serves to update the public on the progress of the Class EA, and present the design options and evaluation process to the public.

Please note, you must register to attend the virtual PIC. You can register by visiting:
https://www.ainleygroup.com/essatownship-vpic/

Sincerely,

Alex O'Donnell, EIT (she/her/hers)
Engineering Intern

Tel: (705) 445-3451, Ext. 413
Cell: (705) 606-0224
Email: alex.odonnell@ainleygroup.com

WWW.AINLEYGROUP.COM

Group, is strictly prohibited. The recipient is responsible for confirming the accuracy and completeness of the information with the originator. Please advise the sender if you believe this message has been received by you in error.

Ainley Group is committed to providing accessible customer service. Please inform us if you require this information in an alternative format or require communication supports.

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
Tel.: 416-301-4797

Ministère des Affaires civiques et du Multiculturalisme

Unité de la planification relative au patrimoine
Direction du patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
Tél.: 416-301-4797

Ontario

January 11, 2024 EMAIL ONLY

Jody Marks, Environmental Planner
Ainley Group
6299 Airport Road, #205
Mississauga, ON L4V 1N3
marks@ainleygroup.com

MCM File	**:**	**0011204**
Proponent	**:**	**Township of Essa**
Subject	**:**	**Cultural Heritage Evaluation Report**
Project	**:**	**5th Line Bridge Rehabilitation Class Environmental Assessment**
Location	**:**	**5th Line, Township of Essa, Simcoe County**

Dear Jody Marks:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Cultural Heritage Evaluation Report for Township of Essa Bridge No. 9 (5th Line Bridge).

MCM's interest in the 5th Line Bridge Rehabilitation Class Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary
A Cultural Heritage Evaluation Report (CHER) was completed for Township of Essa Bridge No. 9, also known as 5th Line Bridge. The CHER was completed by Archaeological Services Inc. (ASI) in November 2017, and updated in March 2018. This CHER was undertaken as part of the Municipal Class Environmental Assessment (MCEA) for rehabilitation of the existing 5th Line Bridge. The existing bridge is a two-span, reinforced concrete T-beam bridge. It was constructed in 1950 and carries vehicular traffic on 5th Line over the Nottawasaga River.

Comments
MCM finds that due diligence has been undertaken in preparing this CHER by:

- Describing the provincial and municipal legislation and policy context for the evaluation of built heritage resources and cultural heritage landscapes
- Undertaking consultation with municipal planning staff at the Township of Essa
- Developing an historical overview of the study area, including the Township of Essa, a history of bridge building in Ontario, and the construction of the 5th Line Bridge
- Undertaking a field review to complete photo documentation of the existing conditions of the bridge
- Providing a comparative analysis and historic context of Concrete T-beam bridges
- Undertaking an evaluation of the 5th Line Bridge using the criteria of Ontario Regulation 9/06

The CHER concluded that the 5th Line Bridge does not have cultural heritage value or interest, and therefore no additional technical cultural heritage studies were recommended. The CHER recommended that the report should also be sent to heritage planning staff at the Township of Essa for review.

We have reviewed the above referenced CHER and find that the report is consistent overall with the requirements, guidance and standards of the MCEA and with best practice guidance prepared by MCM.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Liam Smythe, Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) | 613. 242. 3743 | Liam.Smythe2@ontario.ca

Thank you for the opportunity to review this CHER. If you have any questions or require clarification, please do not hesitate to contact me.

Regards,

Sincerely,

Liam Smythe
Heritage Planner
Liam.Smythe2@ontario.ca

Copied to: Michael Mikael, Township of Essa
Brian Wickenheiser, Ainley Group
Karla Barboza, MCM

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

AINLEY & ASSOCIATES LIMITED
550 Welham Road, Barrie, ON L4N 8Z7
Tel: (705) 726-3371 • www.ainleygroup.com

Memorandum

To: File

Copies To:

From: Brian Wickenheiser

Date: December 12, 2023

Reference: Line 5 - Bridge No. 9
Class EA PIC #2
Telephone Call from [redacted]
Ainley File No. 217031

Received at telephone call from [redacted], who lives 8063 Line 5, at approx. 12:00 pm. He advised that he does not have strong enough internet service and as such would not be able to attend the PIC schedule for the follow evening but had a couple of questions as follows:

- Q: How many lanes are proposed for the road and bridge?
  A: We are proposing 2 lanes for the road, one northbound and one southbound

- Q: Will there be any impacts to the adjacent properties as a result of the proposed work?
  A: The preferred design includes changes to both the horizontal and vertical alignments. Due to the horizontal alignment shift and/or the increased embankment width resulting from the proposed grade increase, property impacts are anticipated on the southwest, southeast and northeast quadrants of the bridge to complete the new road construction. It was also noted that the road is not currently contained entirely within the existing road allowance, particularly to the southwest, and some of the recommended property acquisition will be to bring the road back within the road allowance.

\\ag-barrie\ns1\Engineering\Barrie\217031\Class EA\04. Consultation\05. Notice of PIC No. 2\Comments Rec'd\Telephone Call - Konewka - 2023-12-12.docx

From: Brian Wickenheiser
To: [redacted]
Subject: Re: 5th L bridge
Date: December 14, 2023 12:01:47 PM
Attachments: Outlook-ka0i51u5.png

Hi Mr. [redacted],

With respect to construction duration, all three of the bridge options would be comparable. With the 3 span option, both piers could be constructed at the same time, so it would not result in any significant increase in duration over the 2 span option. While the single span option does not have any piers, it would have large retaining walls beyond the abutments at both ends of the bridge which would add to the construction duration. As such, we don't believe that there is any significant difference in the construction duration for the three bridge options.

Regards,

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 240
Cell: (705) 790-7365

From: [redacted]
Sent: Wednesday, December 13, 2023 6:33 PM
To: Brian Wickenheiser <brian.wickenheiser@ainleygroup.com>
Subject: 5th L bridge

I wasn't clear on which design would be the quickest to completion, to minimize inconvenience to commuters.

[redacted]
Baxter

Sent from my iPhone

From: Brian Wickenheiser
To: [redacted]
Cc: [redacted] Michael Mikael; Tammy Kalimootoo
Subject: RE: 5th Line Bridge proposal
Date: May 15, 2024 9:23:09 AM
Attachments: 217031-5th Line BR_9-DWG_2024-04-17-PAQ1.pdf
feb016ab-bfe8-4989-9dd9-323b2ee85dc0.png

Dear [redacted],

My apologies for the delay in responding to you. We have reviewed the comments you provided in response to the PIC and understand your concerns with potential impacts to your property. We wish to reiterate that this is a Municipal Class EA planning process and not detailed design. The purpose of the Class EA process is to identify potential solutions and evaluate them based on a number of criteria. Once a preferred solution is selected and the Class EA process has closed, it is up to the Township to determine if and when they wish to move forward with implementation, which would include undertaking the detailed design. It is during this detailed design process that more accurate details will be developed for the road and bridge, including existing property limits, utility relocations, grading, and property requirements. That being said, we have prepared the attached very preliminary sketch showing the potential limits of grading and property requirements. We note that the property requirements have been conservatively estimated and a buffer provided. During detailed design, the engineering team would make a concerted effort to reduce these limits and would engage you in further discussion including exploring options for a grading easement versus property acquistion.

Please note that the Class EA process has not yet concluded, although we hope to be in a position to issue a Notice of Completion in the near future, which will initiate a final public review period. We thank you again for your interest in this process.

Regards,

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 240
Cell: (705) 790-7365

From: [redacted]
Sent: May 10, 2024 9:51 AM
To: Brian Wickenheiser <brian.wickenheiser@ainleygroup.com>; Michael Mikael <mmikael@essatownship.on.ca>
Cc: [redacted] Tammy Kalimootoo <tammy.kalimootoo@ainleygroup.com>
Subject: RE: 5th Line Bridge proposal

Hi Brian/Michael,

Has there been any more developments on the 5th line bridge project? I have very little land that I can give up for the straightening of the road before I lose my tax credit. To be exact, I cannot lose more than 0.11 acres. I do not and will not agree to the reduction of anything more than 0.11 acres and will seek ILA. I've heard nothing from anyone on this project and I'm one of the only major landowners that will be impacted. Funny how you guys can take land away from me, my land that I bought and paid for and I have no say but give me a hard time and make me pay up for permits to expand my garage by a lousy 10 feet!

Not sure how this project is moving forward without consulting the residents and if some clarity is not provided soon, I will look to escalate.

[redacted]

From: [redacted]
Sent: December 22, 2023 7:58 AM
To: 'Brian Wickenheiser'; 'Michael Mikael'
Cc: [redacted] 'Tammy Kalimootoo'
Subject: RE: 5th Line Bridge proposal

Hi Brian,

Thank you for your reply.

I still disagree with the road straightening and do not see it as necessary. I do not see why the bridge can't be replaced in the exact same spot as it currently sits which would be cost beneficial. If it wasn't for this bridge replacement, the township would never consider the straightening of the road.

I hope the township and Ainley can find a compromise between this construction and landowners, like myself, that are directly impacted. I would like to have further dialogue with the township and Ainley on other potential options or solutions to limit the property loss on my side. I would also need to know the exact acreage that will be impacted. The property to the west, 7900, has 100 acres whereas I have much less in 11.66 acres and as mentioned, I could lose my CLTIP tax credit. It would be great to see a scale drawing with the exact measurements of the project and the land impacted. The slide in the presentation is not all that clear and doesn't have any measurements.

[redacted]

From: Brian Wickenheiser [mailto:brian.wickenheiser@ainleygroup.com]
Sent: December 21, 2023 11:56 AM
To: [redacted]; Michael Mikael

Cc: [redacted] Tammy Kalimootoo
Subject: RE: 5th Line Bridge proposal

Hi [redacted],

Thank you for your email. While we always attempt to minimize the impact of our designs on the public and private properties, unfortunately due to changes in design standards and roads needs over time, some impacts are unavoidable.

In response to your questions, please see your original email below in which I have appended my responses (in red) directly to each question. Unfortunately I am unable to provide responses to all questions and have deferred to the Township (Michael) to provide further response as required. Hopefully the responses I have provided fully address and appease your concerns for the most part; however, if you have further questions, please do not hesitate to submit them.

Regards,

Brian R. Wickenheiser, P.Eng., P.E.
Bridges and Structures Group Lead

www.ainleygroup.com
Tel: (705) 726-3371 Ext. 240
Cell: (705) 790-7365

From: [redacted]
Sent: December 20, 2023 4:05 PM
To: Michael Mikael <mmikael@essatownship.on.ca>; Brian Wickenheiser <brian.wickenheiser@ainleygroup.com>
Cc: [redacted]
Subject: 5th Line Bridge proposal

Hi Michael/Brian,

I am the landowner of the portion of land south east of the bridge and I have a number of questions. Unfortunately I wasn't able to attend the call as I was working.

1. First, I'd like to understand why a straightening of the road is needed since the posted speed limit has been dropped to 60km? The sight lines are not an issue travelling at that speed and I believe a less invasive road straightening can be accomplished. Also it didn't seem to be an issue when the posted speed limit was 80km.
   Upon review of the existing road alignment, it was determined that the existing alignment (both horizontal and vertical) is extremely deficient with respect to current design standards for not only the previous 80 km/h posted speed (100 km/h design speed) but also the current 60 km/h posted

speed (80 km/h design speed). These deficiencies include sight line issues (with respect to required stopping distances), curvature issues and road side safety issues. As such, these issues need to be addressed in the interest of public safety and in fact we are legally obligated to meet all current design standards when we design any retrofit or reconstruction of existing transportation facilities. For this reason, the road alignment needs to be revised.

2. The unnecessary straightening of the road is going to wipe out a stand of willow trees that is an important winter food source to porcupines. These are beautiful willow trees that I often see porcupines occupying especially during the winter. Can we just not leave the road as is? Would this not cut down on the overall cost if the road was left as is?

   As noted above, we cannot leave the road "as is" due to the public safety issues and legal requirements. A number of different road alignments were explored during the Class EA process and the currently proposed horizontal alignment was determined to be the least impactful in terms of deviation from the existing alignment as well as impacts to adjacent properties and the natural environment. Unfortunately, we were unable to find an alignment that fully eliminated property and natural environment impacts. Given the geometry issues and road width deficiencies associated with the current road, even if we were able to reconstruct the road in its current alignment, property and natural environment impacts would still be unavoidable. As noted in the EA presentation, the road alignment to the south of the bridge is expected to shift to the east which will result in some property impacts and tree clearing to the east. However, the actual tree clearing limits has not been fully determined at this time and as such we cannot comment on whether the stand of willow trees you are referring to will be impacted. I will say that in both my engineering experience and my previous fish and wildlife experience, that most wildlife are quite resilient and adaptable to changes or losses in habitat. It should also be noted that the existing road alignment to the south of the bridge is not currently contained within the existing road allowance and in fact encroaches upon Property #7900 on the west side of the road allowance. The proposed change to the road alignment will reduce the encroachment upon this property and will better place the road within the existing road allowance with only minor property acquisition expected on both sides of the road beyond the current road allowance.

3. I have a fence that borders my property that I paid to have installed. If this fence is removed or damaged, will it be replaced by the contractor?

   Whenever existing fences that are properly located on property lines (or on private property) are impacted by proposed property acquisition, they are typically removed and relocated/replaced by the municipality, at the municipality's cost. However, this is typically negotiated as part of the property acquisition with the terms of the resulting agreement in included within the property acquisition agreement.

4. What is the process to determine the price for property acquisition?

   This question is beyond my level of expertise and experience and as such I will defer this question to Michael/Essa Township.

5. How much land, in acres, is being considered for the south east portion of this project? I would like this to me minimized as much as possible.

   At the present time we have only completed the preliminary design for the identified options as part of the Class EA process and are not able to comment on the extent of the required property acquisition at this time. The actual property acquisition limits will be review and confirmed during the detailed design of the selected design option, at which time the municipality will commence property acquisition negotiations with the affected property owners. That being said, as noted above, very effort will be made to minimized property impacts.

6. I currently receive and participate in the Conservation Land Tax Incentive Program (CLTIP) and could lose this benefit depending on how much land is taken. I definitely need to know this

number. Will I be compensated for losing this benefit which equates to approx. $2k/yr? I have participated in this program since owning the property for over 20 yrs and would like to continue to do so. I would expect to be compensated for a minimum of 20 years.

As we are not familiar with this program and the actual property acquisition limits have not yet been fully determined, we are unable to comment as to whether the required property taking will impact your CLTIP benefit. That being said, the property acquisition is expected to be quite small in comparison the size of you property, including the forested area of your property, and as such I would not think that the acquisition should impact your CLTIP benefit. However, this will need to be confirmed following the determination of the property taking limits and if it does impact your benefit can be considered as part of the property acquisition negotiations.

7. Will I receive a new property survey at your cost to outline the new boundaries?

Whenever property acquisition is required, a legal survey must be undertaken to prepare and register the new "R-Plan(s)", with the cost of this survey typically bore by the party that is acquiring the property (in this case the municipality). I'm pretty sure that you would receive a copy of the updated "R-Plan(s)", or at the very least would be entitled to a copy. As part of the legal survey that is undertaken as part of the "R-Plan" preparation, new property bars will be installed by the legal surveyor.

Overall, I'm really not happy with the proposed straightening of the road and believe the project could save on costs by looking at a less invasive proposal. If the lower portion of the road was considered for straightening say approx. 200-250' from the start of the bridge on the south side, the majority of the land and trees on the south east side would remain intact along with my fence. I would like to see further discussion and solutions on the potential road straightening.

Thanks,

[redacted]

From: Tammy Kalimootoo
To: [redacted]; Brian Wickenheiser
Subject: RE: Township of Essa, 5th Line Bridge (Bridge No. 09) Improvements - Steel Bridge Options
Date: May 23, 2024 12:43:00 PM
Attachments: image004.png
image005.png
image006.png
image007.png

Good Afternoon,

Thank you for providing your comments on the Municipal Class EA for the 5th Line Bridge in the Township of Essa. The Study Team has reviewed all comments received. We would like to highlight that this is a planning process. As noted during the PIC presentation, the bridge configurations developed for this study assumed the use of prestressed concrete girders; however, the ultimate bridge design will be at the discretion of the design team who may examine alternative options at that time.

We would like to thank you for your interest in this Class EA process. We anticipate that the Environmental Study Report will be finalized and a Notice of Completion will be released in the coming weeks.

Regards,

Tammy Kalimootoo, P. Eng., PMP (she/her/hers)
Vice-President & Branch Manager

Ainley Group
Tel: (705) 726-3371 Ext. 233
Cell: (705) 790-1276
Email: tammy.kalimootoo@ainleygroup.com

WWW.AINLEYGROUP.COM

From: [redacted]>
Sent: Wednesday, January 10, 2024 11:33 AM
To: Tammy Kalimootoo <tammy.kalimootoo@ainleygroup.com>
Cc: [redacted]
Subject: Township of Essa, 5th Line Bridge (Bridge No. 09) Improvements - Steel Bridge Options

Good Morning, Tammy.

I listened in on your presentation in December. Great job; it was very informative! From what I understand, the next steps include investigating bridge design options and costs, and Acrow is interested in participating in both. My colleague, Amanda Mann (copied herein) lives minutes from this bridge in the Township of Essa and has a vested interest in the ultimate decision as she is a local taxpayer.

We've worked with Ainley before on a few Acrow 700XS bridges (most recently, the Bolingbroke Bridge for Tay Valley Township and St.Mary's Road Bridge for the City of Kawartha Lakes). I have not had the opportunity to work with you, personally, and am uncertain about your knowledge and experience with steel panel bridges. Are you familiar with panel bridges?

We can easily and cost-effectively supply a 200ft **single**-span permanent 700XS panel bridge to replace the existing bridge, and the fabrication of the bridge parts would take no more than 8-10 weeks, while the installation (by others) would be a matter of a few weeks (as compared to the 2-year construction period you had mentioned for a conventional concrete girder bridge). You had mentioned that a 3-span bridge is optimal as it eliminates a mid-span pier, where the water flow would direct branches and other debris and have it accumulate at the mid-pier. A single span would also eliminate this concern, and I believe it was the cost of a single-span girder bridge that originally precluded the single-span option. Avoiding pier work in the water is always a plus, and the cost of a single-span panel bridge is certainly worth considering and presenting to your client. We can incorporate cantilevered pedestrian footwalks on one or both sides of the bridge as well.

Alternatively, we now have another bridge system, manufactured in our UK plant, called the "Delta Bridge". It is also a modular steel bridge but has bolted trusses and a single truss line throughout for better sightlines. It's an attractive bridge and has a lead time of 4-6 months, and can typically be installed in about 4-6 weeks. We recently supplied a Delta bridge for an MTO project in Rydal Bank, ON, including a cantilevered pedestrian footwalk. The Contractor installed the bridge in an accelerated timeline of only 15 days from start of bridge assembly to "open for service" ! See photo below:

I'm happy to discuss either of these bridge options and help you with budgetary pricing, photos and example drawings to present to the Owner.

I look forward to hearing your thoughts.

Thanks and Kind Regards,

[redacted]

[redacted] Tammy Kalimootoo <tammy.kalimootoo@ainleygroup.com>
Sent: Wednesday, December 13, 2023 10:58 AM
To: Tammy Kalimootoo <tammy.kalimootoo@ainleygroup.com>
Subject: Township of Essa, 5th Line Bridge (Bridge No. 09) Improvements, Municipal Class EA - PIC#2

Good morning,

Thank you for registering to attend this evening's virtual PIC for the Township of Essa, 5th Line Bridge (Bridge No. 09) Improvements Municipal Class Environmental Assessment. Your interest and participation is appreciated!

The Live Event will start at 6 pm. Please use the link below to access the Live Event.

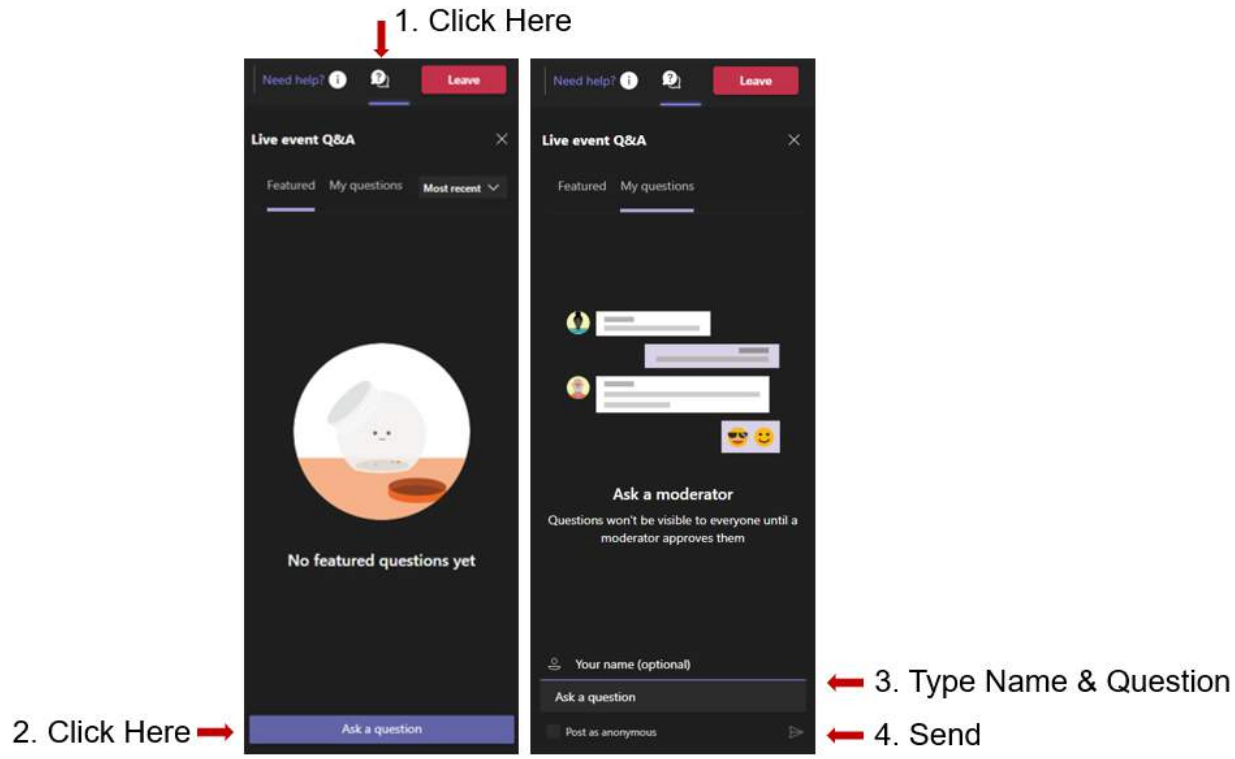
https://teams.microsoft.com/l/meetup-join/19%3ameeting_Zjg1ZTY5YmMtZDc2Zi00Y2M2LWFkNWItMjI5MzA3NzgwY2Iz%40thread.v2/0?context=%7B%22Tid%22%3A%2235a867e4-bbab-417d-ac8b-5827b0dab5de%22%2C%22Oid%22%3A%22c80aff37-8b00-4582-bed9-ed855a2dc3c0%22%2C%22IsBroadcastMeeting%22%3Atrue%2C%22role%22%3A%22a%22%7D&btype=a&role=a

When you click on the link, you may be asked if you want to download the Windows app or Watch on the web instead. We suggest that you select the option to watch on the web.

Please note that the presenters will not be able to see or hear you as your camera and microphone will be deactivated. However, you are welcome to submit questions and feedback using the Live Event Q&A option. Simply click on the chat icon with the question mark in the top right corner of the screen; then click on Ask a question; type your name and question; and click on send. See the example below. The team will gather all questions during the presentation and will respond at the end of the presentation.

If you are unable to attend the full presentation or if you have technical difficulties, do not worry. A recording of the presentation will be available for viewing on the

Township's website within 24-48 hours.



Thank you,

Tammy Kalimootoo, P. Eng., PMP (she/her/hers)
Vice-President & Branch Manager

Tel: (705) 726-3371 Ext. 233
Cell: (705) 790-1276
Email: tammy.kalimootoo@ainleygroup.com

WWW.AINLEYGROUP.COM

Appendix J
Cost Estimates

ESSA TOWNSHIP
MUNICIPAL CLASS EA
LINE 5 BRIDGE (NO. 9) IMPROVEMENTS

Cost Estimate	OPTION 1A (LOWEST VERTICAL ALIGNMENT WITH 1 SPAN BRIDGE)					November 1, 2023
Item No.	OPSS Reference	Spec. No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Total Price
Subtotal - A - GENERAL WORKS							$ 505,000.00
Subtotal - B - TEMPORARY WORKS							$ 600,000.00
Subtotal - C - REMOVAL WORKS							$ 498,000.00
Subtotal - D - ROAD WORKS							$ 1,533,000.00
Subtotal - E - BRIDGE WORK							$ 5,138,000.00
Subtotal - F - RESTORATION WORKS							$ 337,000.00
Subtotal - G - CONTINGENCY							$ 1,300,000.00
SUBTOTAL TENDER PRICE (EXCL. HST)							$ 9,911,000.00
HST 13%							$ 1,288,430.00
TOTAL TENDER PRICE (INCL. HST)							$ 11,199,430.00

ESSA TOWNSHIP
MUNICIPAL CLASS EA
LINE 5 BRIDGE (NO. 9) IMPROVEMENTS

Cost Estimate	OPTION 1B (LOWEST VERTICAL ALIGNMENT WITH 2 SPAN BRIDGE)	November 1, 2023

Item No.	OPSS Reference	Spec. No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Total Price
Subtotal - A - GENERAL WORKS							$ 470,000.00
Subtotal - B - TEMPORARY WORKS							$ 400,000.00
Subtotal - C - REMOVAL WORKS							$ 498,000.00
Subtotal - D - ROAD WORKS							$ 1,533,000.00
Subtotal - E - BRIDGE WORK							$ 3,716,000.00
Subtotal - F - RESTORATION WORKS							$ 337,000.00
Subtotal - G - CONTINGENCY							$ 1,050,000.00
SUBTOTAL TENDER PRICE (EXCL. HST)							$ 8,004,000.00
HST 13%							$ 1,040,520.00
TOTAL TENDER PRICE (INCL. HST)							$ 9,044,520.00

ESSA TOWNSHIP
MUNICIPAL CLASS EA
LINE 5 BRIDGE (NO. 9) IMPROVEMENTS

Cost Estimate	OPTION 1C (LOWEST VERTICAL ALIGNMENT WITH 3 SPAN BRIDGE)						November 1, 2023
Item No.	OPSS Reference	Spec. No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Total Price
Subtotal - A - GENERAL WORKS							$ 470,000.00
Subtotal - B - TEMPORARY WORKS							$ 450,000.00
Subtotal - C - REMOVAL WORKS							$ 498,000.00
Subtotal - D - ROAD WORKS							$ 1,533,000.00
Subtotal - E - BRIDGE WORK							$ 4,226,000.00
Subtotal - F - RESTORATION WORKS							$ 337,000.00
Subtotal - G - CONTINGENCY							$ 1,150,000.00
SUBTOTAL TENDER PRICE (EXCL. HST)							$ 8,664,000.00
HST 13%							$ 1,126,320.00
TOTAL TENDER PRICE (INCL. HST)							$ 9,790,320.00