Town of Caledon Bridges and Culverts Class Environmental Assessment, Schedule B

Project File Report

Town of Caledon
6311 Old Church Road
Caledon ON L7C 1J6

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R.J. Burnside & Associates Limited
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December 2025
300051839.0000

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
0	Y	Y	Town of Caledon (Town)
0	Y	Y	Ministry of the Environment, Conservation and Parks (MECP)

Record of Revisions

Rev.	Date	Description
0	February 22, 2024	DRAFT Submission Project File Report
1	April 25, 2024	1st Submission Project File Report
2	December 12, 2025	2nd Submission Project File Report

R.J. Burnside & Associates Limited

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In Association With

ASI Heritage

Peto MacCallum Ltd.

Van Harten Surveying Inc.

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by the Town of Caledon (Town) to complete a Municipal Class Environmental Assessment (MCEA) to consider improvements to bridges and culverts along Patterson Side Road because of increased wear and tear on existing infrastructure through increased traffic use.

The Town initiated a Schedule B MCEA to consider options for improvements to the following three bridges.

Patterson Side Road Bridge 1 (Bridge 1) was identified as requiring improvements to the existing two-lane, T-beam reinforced cast-in-place structure constructed in 1950. The bridge is located approximately 0.1 km west of Duffy's Lane over the Humber River.

Patterson Side Road Bridge 2 (Bridge 2) was identified as requiring improvements to the existing two-lane, rigid frame, vertical leg reinforced cast-in-place structure constructed in 1950. The bridge is located approximately 0.03 km east of Duffy's Lane over the Humber River.

Duffy's Lane Bridge was identified as requiring a feasibility investigation to determine future management of the existing two-lane structure. The structure is located approximately 0.03 km south of Patterson Side Road over the Humber River.

The planning of improvements was carried out in accordance with the Schedule B requirements (Phases 1 to 2) of the Municipal Engineers Association Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011 and 2015), which is approved under the *Ontario Environmental Assessment Act*.

Alternative Solutions considered for Bridge 1 and Bridge 2 included:

1) Do nothing

2) Rehabilitate structure

3) Rehabilitate and widen structure

4) Replace the structure

Alternative Solutions considered for Duffy's Lane Bridge included:

1) Do Nothing
2) Abandon / Remove Structure and Close the Road
3) Rehabilitate Structure
4) Replace Structure.
    a) Vehicular Bridge – Two-Lane
    b) Vehicular Bridge – Single-Lane, Modular
    c) Pedestrian Bridge

The Alternative Solutions were evaluated against the natural, social-cultural, financial, and technical environments.

Alternative Solution 4, replace the structure, was the Preferred Solution for both Patterson Side Road Bridges. The preferred solution for Bridge 1 involves replacement of the full structure with a 16.25 m span bridge. This solution includes the ability to improve alignment with the watercourse and widen the structure to meet desired road platform width. The Preferred Solution for Bridge 2 involves replacement of the full structure with a 14 m span bridge. The new structure can be constructed to the desired platform width and can allow for improved sight distance to meet 60 km/h design speed.

The evaluation determined that the preferred solution for Duffy's Lane Bridge was alternative solution 4B – replace structure-vehicular bridge (single-lane, modular). The preferred solution 4B includes a one-lane, two-way structure with a 4.15 m (+/-) wide driving platform as a prefabricated girder-type structure. The new structure would allow for a larger span and new bridge abutments and would allow for road profile improvements.

A key component of the study included engagement with interested Indigenous communities and consultation with stakeholders, considered broadly to include government and non-government agencies, property owners, and the general public. Consultation and engagement included a Notice of Commencement and Notice of Completion. In addition, a Public Information Centre was held to present the project and obtain input from interested stakeholders. A Notice of Completion will be published in the local newspapers and mailed to stakeholders and Indigenous communities that have interest in the project. As per the requirements of the MCEA, this Project File Report (PFR) is available for public review and comment for a period of 30 calendar days following the publication of the Notice of Completion.

The Notice of Completion will provide a link to an electronic copy of the PFR **[and the dates, times, and locations where the PFR can be reviewed]**, and names and addresses of people to whom comments can be sent.

Written comments can be provided to the project team within the 30-day comment period. If there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights resulting from this project, a request for an order requiring a higher level of study or conditions on those matters should be addressed in writing to the Minister of the Environment, Conservation and Parks, the Director of the Environmental Assessment Branch, and the project team. Requests on other grounds will not be considered. Requests must be received by the Minister within 30 calendar days of the publication of the Notice of Completion and should include the requester's contact information and full name for the ministry.

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Disclaimer

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Town of Caledon (Town) to complete a Municipal Class Environmental Assessment (MCEA) to consider options for the improvement of the Patterson Side Road Bridge 1 (Bridge 1), Patterson Side Road Bridge 2 (Bridge 2), and Duffy's Lane Bridge. The study area map is provided as Figure 1.

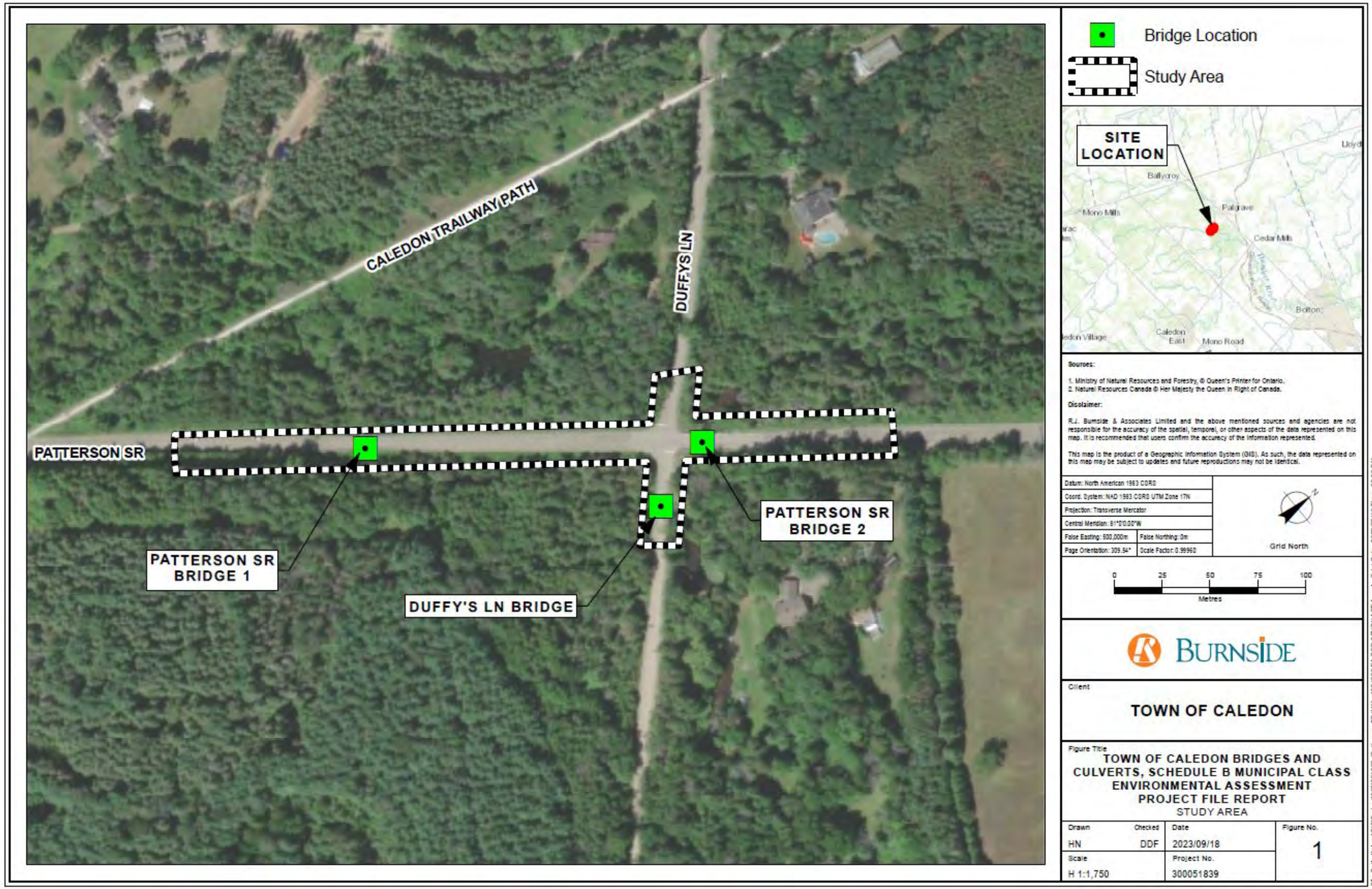
The Town of Caledon's Asset Management Strategy identified the need for improvements to the above-mentioned bridges and culverts because of increased wear and tear on existing infrastructure through increased traffic use.

The existing Bridge 1 consists of a 7.3 m span and is a T-beam reinforced cast-in-place structure. This bridge is located over the Humber River, on Patterson Side Road, approximately 0.1 km west of Duffy's Lane. The age of the structure is unknown; however, it is estimated to be circa 1950s.

Bridge 2 consists of a 13.7 m (+/-) span and has a cast-in-place concrete rigid frame structure. This bridge is located over the Humber River, on Patterson Side Road, approximately 20 m northeast of Duffy's Lane. Bridge 2 was constructed in 1957.

The Duffy's Lane Bridge consists of a 9.3 m (+/-) span and has a cast-in-place concrete rigid frame, arch soffit structure. The bridge is located over a tributary of the Humber River, on Duffy Lane, approximately 30 m southeast of Patterson Side Road, and was also constructed in 1957.

Figure 1: Study Area Location



2.0 Municipal Class Environmental Assessment Process

The planning of public sector projects or activities that have the potential for environmental effect is subject to an MCEA as required by *Ontario's Environmental Assessment Act*, R.S.O. 1990.

The MCEA process was developed by the Municipal Engineers Association (MEA), in consultation with the Ministry of the Environment, Conservation and Parks (previously known as MOE), as an alternative method to Individual Environmental Assessments for recurring municipal projects that were similar in nature, usually limited in scale and with a predictable range of environmental impacts, which were responsive to mitigating measures.

The MCEA solicits input from regulatory agencies, the municipality, Indigenous communities, and the public at the local level. This process leads to an evaluation of the alternatives in view of the significance of the environmental effects, including the technical, natural, social / cultural, and economic impact of a project, and the choice of effective mitigation measures.

The Town has completed a Schedule B MCEA to consider options for improvements to Bridge 1 and Bridge 2 on Patterson Side Road and Duffy's Lane Bridge.

Based on the description provided in the Municipal Engineering Association (MEA) Guide for MCEAs (2000, as amended in 2004, 2007, 2011, and 2015) for municipal road and infrastructure project activities, the Alternative Solutions being considered and the estimated cost limit for the project, it was determined that a Schedule B MCEA with a Project File Report (PFR) was appropriate for the undertaking of this investigation.

As a Schedule B project, the project planning proceeds under the planning and documentation procedures of Phases 1 and 2 of the MCEA process. Through this process, reasonable Alternative Solutions identified are evaluated with input from agencies, Indigenous communities, and stakeholders toward a recommendation for a Preferred Solution. As a minimum, public consultation is required at two stages under a Schedule B project. At the conclusion of Phase 2, the appropriate MCEA planning schedule is confirmed and, if there are no outstanding concerns, the proponent may proceed to design and implementation.

The phases of the MCEA process are illustrated in Figure 2 and summarized as follows:

- Phase 1 – Identify the problem (deficiency) or opportunity.
- Phase 2 – Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment and establish the preferred solution taking into account the public and review agency input. At this point, determine the appropriate schedule for the undertaking and document decisions in a project file for Schedule B projects.

or

Proceed through the following phases for Schedule C projects.

- Phase 3 – Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.
- Phase 4 – Document, in an Environment Study Report (ESR), a summary of the rationale and the planning, design, and consultation process of the project as established through the above phases and make such documentation available for scrutiny by review agencies and the public.
- Phase 5 – Complete contract drawings and documents, proceed to construction and operation, and monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

2.1 MCEA Updates: March 2023

In March 2023, an update to the MCEA process included revised descriptions of the class of undertakings carried out by municipalities and subject to the MCEA process. Given the timing of the update to the MCEA process and the progress of the project, the Town will complete the project under the transition provisions set out in the 2023 update that allow for a proponent to continue with the MCEA process that was started for the project prior to the 2023 update.

2.2 Class Environmental Assessment Section 16(6) Order (Formerly Part II Order)

The Ministry of the Environment, Conservation and Parks (MECP) has the authority and discretion to make an Order under Section 16 of the *Environmental Assessment Act*. Section 16 Order requests were previously known as Part II Order requests. A Section 16 Order may require that the proponent of a project going through an MCEA process:

1. Submit an application for approval of the project before they proceed. This is generally referred to as an Individual Environmental Assessment.

2. Meet further conditions in addition to the conditions in the MCEA. This could include conditions for:

    a) Further study

    b) Monitoring

    c) Consultation

The minister can also refer a matter in relation to a Section 16(6) Order request to mediation.

A Section 16(6) Order can be requested if:

- You have outstanding concerns that a project going through an MCEA process may have a potential adverse impact on constitutionally protected Aboriginal and treaty rights.
- You believe that an Order may prevent, mitigate, or remedy this impact.

In accordance with the requirements of the MCEA, this PFR is available for public review and comment for a period of 30 calendar days following the publication of the Notice of Completion.

Interested persons may provide written comments to our project team within the 30-day comment period. All comments and concerns should be sent directly to the project team at:

George Golding, P.Eng. Project Manager, Engineering Services Town of Caledon 6311 Old Church Road Caledon ON L7C 1J6 T: 905-584-2272 x 4523 E: George.Golding@caledon.ca	**Andrew Dawson, P.Eng.** Project Engineer R.J. Burnside & Associates Limited 15 Townline Orangeville ON L9W 3R4 T: 705-797-4310 E: Andrew.Dawson@rjburnside.com

In addition, a request may be made to the MECP for an order requiring a higher level of study (i.e., requiring an individual / comprehensive MCEA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the MECP.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual / comprehensive environmental assessment), how an order may prevent, mitigate, or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the MECP is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to:

Minister of the Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
Minister.MECP@ontario.ca

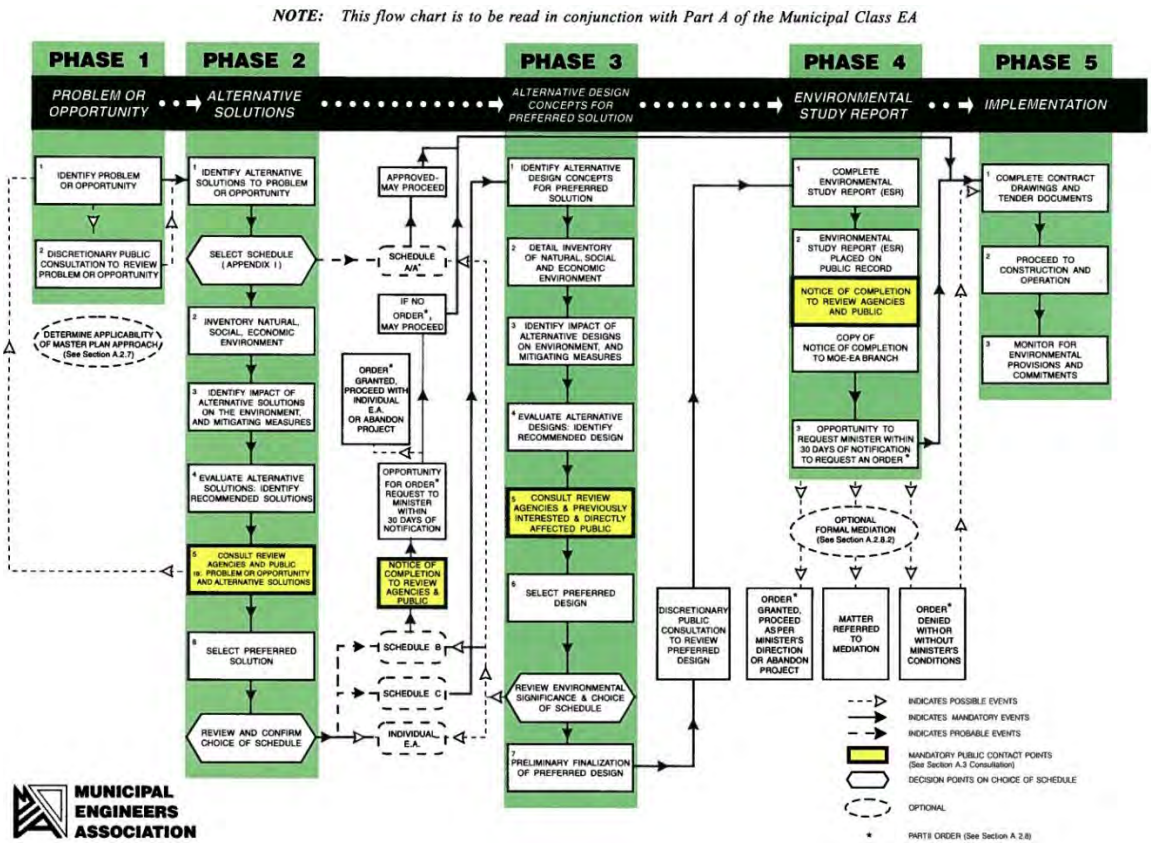
and

Director, Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto ON M4V 1P5
EABDirector@ontario.ca

Requests must also be sent to the project team.

If the Minister does not receive a request for a Section 16 Order within 30 calendar days, then the project will move forward to detailed design, approvals process, and subsequent implementation of the Preferred Design Concept.

Figure 2: MCEA Process Flow Chart (Municipal Engineers Association, October 2000, as Amended in 2007, 2011, and 2015)



3.0 Problem Identification

The Problem / Opportunity Statement has been defined as follows:

> *"As part of the Town of Caledon's Asset Management Strategy, improvements are being considered for bridge and culverts due to the wear and tear on existing infrastructure as a result of increased traffic use."*

4.0 Study Area

The study area includes Bridge 1 (B22162016) and Bridge 2 (B22164017) on Patterson Side Road, located approximately 150 m southwest and 20 m northeast of Duffy's Lane, respectively. Also included in the study area is the Duffy's Lane Bridge (B22072010), which is located on the no-exit portion of Duffy's Lane, approximately 30 m southeast of Patterson Side Road. Properties in the vicinity of the bridges are a mix of wooded areas and rural residential land use.

The study area map is provided as Figure 1.

5.0 Socio-Economic Environment

A review of existing planning and policy information was conducted to obtain secondary source information relating to the natural and social environment within the study area and to provide an overview of the existing policy framework in the study area.

5.1 Federal Planning Context

5.1.1 Fisheries Act

The federal *Fisheries Act* prohibits causing the "death of fish by means other than fishing", and the "harmful alteration, disruption, or destruction (HADD) of fish habitat". If construction activities have the potential to cause the death of fish, or HADD of fish habitat, then the project must be submitted to the Department of Fisheries and Oceans Canada (DFO) as a Request for Review. The proponent responsible for the activities is required to obtain an Authorization from DFO as per Paragraph 34.4(2) and 35(2)(b) of the *Fisheries Act*.

Fish habitat is present within the study area. Should project activities occur below the highwater mark of any identified watercourses or headwater drainage features, an assessment of potential impacts to fish and fish habitat is required. DFO has provided standardized Codes of Practice and Measures to Protect Fish and Fish Habitat to mitigate contraventions of the *Fisheries Act*.

Proponents are required to ensure that activities meet the criteria outlined on the Fish and Fish Habitat Protection Program website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) and are responsible for the implementation of best management practices (i.e., Codes of Practice) into the project design.

If it is determined that impacts of the proposed works can be avoided and a HADD is unlikely to occur, then the project does not require a review by the DFO. If HADD is anticipated because of the project, even following the application of feasible avoidance and mitigation strategies, then DFO review is recommended, and authorization may be required.

5.1.2 Migratory Birds Convention Act and Migratory Birds Regulations

The *Migratory Birds Convention Act, 1994* (MBCA) and the Migratory Bird Regulations, 2022 (MBR) are federal legislative requirements that are binding on members of the public and all levels of government, including federal and provincial governments. The legislation protects certain species, controls the harvest of others, and prohibits commercial sale of all species.

One key responsibility under the MBCA is described in Section 6 of the associated MBR:

> *"Subject to subsection 5(9), no person shall disturb, destroy or take a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or have in his possession a live migratory bird, or a carcass, skin, nest, or egg of a migratory bird except under authority of a permit therefor."*

The "incidental take" of migratory bird nests or the disturbance, destruction or taking of the nest of a migratory bird are prohibited under Section 6 of the MBR under the authority of the MBCA. Nests' contents (eggs and young) are protected by virtue of the MBCA which has implications on development and construction activities that might occur during the breeding season (Canadian Wildlife Service, July 2012).

The nests of all migratory bird species are protected when they contain a live bird or a viable egg. The nests of 18 species (listed in Schedule 1 of the regulations), whose nests are reused by migratory birds, continue to have year-round nest protection, unless they have been shown to be abandoned.

The MBCA has recently updated and modernized the MBR. The new MBR came into force on July 30, 2022. Further regulatory amendments are planned.

5.2 Provincial Planning Context

5.2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) provides a vision for land use planning in Ontario that encourages the efficient use of land, resources, and public investment in infrastructure. The 2020 PPS is the complimentary policy document to the Planning Act, 1990, issued under Section 3 of the Planning Act. Provincial policies are implemented through municipal official plans and planning decisions. Land use planning decisions made by municipalities must be consistent with the PPS.

On August 20, 2024, the Province issued the Provincial Planning Statement, 2024 (the "PPS, 2024"). On the same day, the Province issued Ontario Regulations 328/24 and 329/24, which revoked the designation of A Place to Grow and associated transition provisions under Ontario Regulation 311/06, as of October 20, 2024. Overall, there are few key changes, such as changes to municipal comprehensive reviews, growth forecasts, housing, settlement areas and settlement area boundary expansions, strategic growth areas and MTSAs, employment areas and employment area conversions, and large and fast-growing municipalities.

Applicable sections of the PPS include Section 2.9 (Energy Conservation, Air Quality and Climate Change), Section 3 (Infrastructure and Facilities, which includes transportation systems and infrastructure corridors), Section 4.1 (Natural Heritage), and Section 4.6 (Cultural Heritage and Archaeology) of the PPS.

Section 2.9 Energy Conservation, Air Quality and Climate Change identifies opportunities for planning authorities to develop plans to prepare for and reduce the impacts of climate change.

Subsection 2.9.1 states that planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions (GHGs), preparing for the impacts of a changing climate through land use and development patterns, and building community resilience to the impacts of a changing climate.

This includes land use and development patterns which promote design, and orientations that maximize energy efficiency and conservation, while considering the mitigating effects of vegetation and green infrastructure; and maximizing vegetation within settlement areas where feasible.

Section 3 Infrastructure and Facilities are to be provided in an efficient manner that prepares for the impacts of a changing climate, while accommodating projected needs. Subsection 3.1.2 states that the use of existing infrastructure and public service facilities should be optimized, and opportunities for adaptive re-use should be considered, wherever feasible.

Section 4.1 Natural Heritage identifies two types of natural heritage features where development and site alteration are not permitted:

- Significant wetlands in Ecoregions 5E, 6E, and 7E[1]
- Significant coastal wetlands

And six types of natural heritage features where development and site alteration are not permitted unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions:

- Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E, and 7E1
- Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
- Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
- Significant wildlife habitat
- Significant areas of natural and scientific interest
- Coastal wetlands in Ecoregions 5E, 6E, and 7E1 that are not subject to policy 4.1.4 b)

Sections 4.1.6, 4.1.7, and 4.1.8 identify three additional development and site alteration prohibitions and exemptions, as follows:

- 2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.
- 2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.
- 2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 4.1.4, 4.1.5, and 4.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Section 4.6 identifies three types of cultural heritage and archaeology to be conserved. As follows:

- 4.6.1 Protected heritage property, which may contain built heritage resources or cultural heritage landscapes, shall be conserved.
- 4.6.2 Planning authorities shall not permit development and site alteration on lands containing archaeological resources or areas of archaeological potential unless the significant archaeological resources have been conserved.
- 4.6.3 Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property unless the heritage attributes of the protected heritage property will be conserved.

In order to conserve cultural heritage and archaeology, Subsection 4.6.4 states that planning authorities are encouraged to develop and implement archaeological management plans for conserving archaeological resources, and proactive strategies for conserving significant built heritage resources and cultural heritage landscapes. Additionally, Subsection 4.6.5 states that planning authorities shall engage early with Indigenous communities and ensure their interests are considered when identifying, protecting and managing archaeological resources, built heritage resources and cultural heritage landscapes.

The presence, or potential presence of these features, as well as the policy and planning implications of these features for development are discussed in detail in this report.

5.2.2 Greenbelt Plan

The Greenbelt Plan (Government of Ontario, 2017) includes agriculturally and environmentally protected lands within the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP) as well as lands established as the Protected Countryside designation of the Greenbelt Plan, while enhancing the linkages between these areas and the surrounding major lake systems and watersheds.

Along with NEP and ORMCP lands, the Greenbelt Plan sets out three geographic specific policies that apply within the Protected Countryside designation: the Agricultural System, the Natural System and Settlement Areas, as well as general policies that apply throughout the Protected Countryside.

The entirety of the subject lands is within the Greenbelt, subject to the ORMCP area.

5.2.3 Oak Ridges Moraine Conservation Plan

The Oak Ridges Moraine Conservation Plan (ORMCP) is set out in *Ontario Regulation (O. Reg.) 140/02* under the *Oak Ridges Moraine Conservation Act, 2001*. The Oak Ridges Moraine is an irregular ridge that runs 160 km from the Trent River to the Niagara Escarpment and is one of Ontario's most significant landforms in the west. The Oak Ridges Moraine has a unique concentration of environmental, geological, and hydrological features that make its ecosystem vital to South Central Ontario. The ORMCP provides land use and resource management planning direction to provincial ministers, ministries, and agencies, municipalities, landowners, and other stakeholders on how to protect the Moraine's ecological and hydrological features and functions.

The study area is located within the Natural Core Area land use designation of the Oak Ridges Moraine. Infrastructure use is permitted in these areas.

5.2.4 Endangered Species Act

The *Endangered Species Act, 2007* (ESA) provides protection for Species At Risk (SAR) and their habitat. The ESA is administered by the MECP and provides policies for the protection of Extirpated, Endangered, and Threatened species. Species listed as provincially rare or special concern do not receive legal protection under the provincial ESA; however, they may receive protection from some agencies, such as provincial and national parks, or other Acts, such as the *Ontario Fish and Wildlife Conservation Act*, which prohibits the killing, capturing, injuring, harassment, and trapping of specially protected species.

The ESA helps protect species (Section 9) and their habitat (Section 10). Section 9(1)(a) of the ESA states:

> *"…no person shall kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species".*

Section 10(1)(a) of the ESA states:

> *"…no person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario List as an endangered or threatened species".*

The ESA includes general habitat regulations, as well as species-specific habitat regulations. Species uplisted to Endangered or Threatened automatically receive general habitat protection under the ESA. The province is then required to prepare a species recovery strategy and establish a habitat regulation according to requirements of the ESA.

Regulatory amendments under the ESA were issued by the province in 2022 which streamlines ESA Authorizations for activities that have "*predictable effects and common and routine mitigation actions with well understood requirements to minimize adverse impacts*". Proponents are still required to avoid and minimize impacts on SAR and their habitats.

The use of a SAR Conservation Fund was enabled for five designated conservation fund species when they seek permits and agreements related to these species (Eastern whip-poor-will (*Antrostomus vociferus*), Blanding's turtle (*Emydoidea blandingii*), or register for conditional exemptions (Eastern meadowlark (*Sturnella magna*), Bobolink (*Dolichonyx oryzivorus*), Butternut (*Juglans cinerea*)).

In 2024, the Province of Ontario repealed the Endangered Species Act and replaced it with the new Species Conservation Act. The Species Conservation Act (SCA) will eventually come into force when new regulations are developed and public consultation

is complete. While the new Species Conservation Act is not fully enacted, several changes to the existing ESA have been made, including, but not limited to:

1. ESA authorizations for aquatic and migratory birds that are protected under the federal Species at Risk Act (SARA) continue to be required until the new SCA is enacted.

2. A new “habitat” definition replaced the definition of “habitat” that was in the ESA, and “harass” has been removed from the prohibitions regarding harm to species.

3. The requirement for the government to develop recovery strategies for species has been removed.

4. The Species Conservation Program has been created.

5. The Species at Risk Conservation Fund will no longer accept funds, and there is no longer an option for proponents to pay a charge.

6. New permits and amendments to existing permits are available; however, agreements are no longer available.

7. There are no longer specific permit types or specific preconditions to the issuance of a permit.

The Species at Risk in Ontario (SARO) list is updated from time to time; therefore, it is the proponent’s responsibility to practice due diligence to ensure that the ESA and its regulations are not violated. It is also the proponent’s responsibility to be apprised of any amendments to *The Act* that may come into force for the duration of this project.

5.2.5 Clean Water Act – Source Water Protection

As a result of the *Clean Water Act*, (O. Reg. 287/07) communities in Ontario are required to develop Source Protection Plans to protect their municipal sources of drinking water. These plans identify risks to local drinking water sources and develop strategies to reduce or eliminate these risks.

Ontario’s Source Water Protection initiative is focused on protecting municipal drinking water sources. Key areas include wellhead protection areas (areas that drain down toward municipal wells), highly vulnerable aquifers (where groundwater lies close to ground surface), and significant groundwater recharge areas (areas that feed aquifers).

Three municipal well sites and associated wellhead protection areas for the Town of Caledon are illustrated on the atlas to the west of the study area. The size of a wellhead protection area is determined by how quickly water travels underground to the well, measured in years. The study area is not located within a wellhead protection area.

The study area is located outside of a significant groundwater recharge area. A recharge area is considered significant in areas where the highest volumes of groundwater infiltrate to help maintain the water level in an aquifer that supplies a drinking water system, including private wells (Toronto and Region Source Protection Area).

The study area is located within the boundary of a highly vulnerable aquifer. The vulnerability of an aquifer is dependent on the overlying geological materials. The vulnerability increases as the amount of protection provided by the overlying geological materials decreases.

The Clean Water Act defines a "prescribed threat" as "*an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water and includes an activity or condition that is prescribed by source protection regulation as a drinking water threat*". The province has identified 21 activities that could pose a threat if they are present in vulnerable areas, (listed in Section 1.1 of *The Clean Water Act*). Project activities are not prescribed drinking water threats and are not anticipated to pose a risk to drinking water.

5.3 Regional Planning Context

5.3.1 Region of Peel Official Plan

The Region of Peel Official Plan (OP) provides a holistic approach to planning through an overarching sustainable development framework that integrates environmental, social, economic, and cultural imperatives. It provides Regional Council with the long-term regional strategic policy framework for guiding growth and development while having regard for protecting the environment, managing the renewable and non-renewable resources, and outlining a regional structure that manages this growth in the most effective and efficient manner. The Region of Peel OP was adopted by Regional Council on April 28, 2022, through By-law 20-2022. This By-law repealed and replaced the former July 11, 1996, Region of Peel OP adopted by By-law 54-96, as amended. The Plan was subsequently approved with modifications by the Minister of Municipal Affairs and Housing, through the Minister's Notice of Decision on the Plan dated November 4, 2022.

On May 18, 2023, the province announced its intention to dissolve the Region of Peel. The Town of Caledon and Cities of Brampton and Mississauga are to become independent, single-tier municipalities on January 1, 2025. At that time, the Region of Peel OP, as it applies to Caledon, will become the Town's responsibility to implement.

5.3.2 Town of Caledon Official Plan

The Town of Caledon Official Plan Consolidated in April 2018 is a statement of principles, goals, objectives, and policies intended to guide future land use, physical development and change, and the effects on the social, economic, and natural environment within the Town of Caledon. The first major review of the Official Plan was initiated in 1989. This review resulted in Official Plan Amendment (OPA) 114, which was approved by the Ontario Municipal Board in September 1997. OPA 114 established an overall growth management framework for the Town within a 2021 planning horizon. The Plan has undergone multiple amendments and Official Plan Reviews in the years since (1999, 2000, 2003, 2005, 2006, 2007, 2009, 2010, 2016, 2017, 2018) in response to multiple major provincial policy and legislative changes to bring the plan into conformity with the changes and address local growth issues.

As of June 29, 2023, the draft Future Caledon Official Plan was prepared to conform with the 2020 Provincial Policy Statement and 2019 Growth Plan for the Greater Golden Horseshoe, as amended. A revised plan is anticipated in late 2023 or early 2024.

Land use within the study area is identified on draft Schedule B1 Town Structure, and draft Schedule B4 Land Use Designations as part of the Natural Environment System, Natural Features and Areas. Schedule B2 Growth Management identifies the study area as agricultural and rural lands.

The study area is identified as located within the natural core area (draft Schedule B3c), and Landform Conservation Area Category 1 (draft Schedule D4) of the ORMCP. The valley and stream corridor associated with the Humber River is identified in the study area on draft Schedule D2. Other identified natural features in the study area include lands to the south of Patterson Side Road, beyond the study area, which are identified as an earth and life science ANSI and significant woodland.

Municipal roads have been divided into categories based on the function of the road. The categories are *Highways, Arterial Roads, Collector Roads, Local Roads*. Improvement standards for the roads are based on the function of the road. Patterson Side Road and Duffy's Lane are identified as Collector Roads with a 26 m wide right-of-way (ROW) as illustrated on draft Schedule C1 and draft Schedule C2.

5.3.3 TRCA Ontario Regulation 166/06 Regulated Area

The study area is located within the regulated area of the Toronto Region Conservation Authority (TRCA). Ontario Regulation 166/06, Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses of the TRCA. The regulation prohibits development or alterations within the jurisdiction of the TRCA in regulated areas without the permission of the conservation authority.

5.4 Cultural Heritage Resources

Built Heritage Resources and Cultural Heritage Landscape

A Cultural Heritage Evaluation Report (CHER) was completed for the bridge in January 2021. The CHER identified that Bridge 1 and Bridge 2 do not have cultural heritage value as determined by the criteria outlined in O. Reg. 9/06. Duffy's Lane Bridge is considered a cultural heritage resource, eligible for designation under the *Ontario Heritage Act* based on its context and physical attributes (e.g., existing barrier). The subject bridges are not listed on the Town of Caledon's Heritage Register, designated under Part IV of the *Ontario Heritage Act,* or identified on the Ontario Heritage Bridge List.

Archaeological Resources

A Stage 1 archaeological study was completed in January 2021. Stage 1 determined that parts of the study area have archaeological potential. Stage 2 archaeological assessment (test pit survey) is required prior to any construction activities if areas of archaeological potential are impacted. This should be reviewed during the detailed design stage of the project.

The CHER and Archaeological Assessment are presented in Appendix A.

6.0 Technical Environment

Below is a review and summary of the technical environment for the Patterson Side Road Bridge 1 (B22162016) and Bridge 2 (B22164017) and the Duffy's Lane Bridge (B22072010), with regards to physical condition, geometry (width and profile), hydraulic capacity, and geotechnical conditions. All supporting reports are provided in Appendix A.

6.1 Physical Condition

In the fall of 2020, a field investigation was conducted to review the physical conditions of Duffy's Lane Bridge and Bridges 1 and 2. Additionally, Burnside staff reviewed the previous 2019 OSIM inspections (completed by GHD Limited) and the Detailed Deck Condition Surveys (DDCS), completed by EXP Services Inc. (Duffy's Lane Bridge, 2015) (Bridge Check Canada (Patterson Bridges 1 and 2, 2019)). Each of these reports were considered in the analyses of the condition of the structures.

The Bridge 1 (B22162016) structure was noted to be in fair condition overall with light scaling and hairline to narrow cracking throughout, and localized moderate to severe defects on the abutments, wingwalls, and soffit. The DDCS also identified probable active corrosion of the deck top, the east and west abutment, and the wingwalls. Further

details can be found in the Technical Memorandum Physical Condition – Patterson Side Road Bridges 1 and 2, found in Appendix A.

Currently, Bridge 1 is not well aligned with the watercourse which has caused scour on the northwest embankment, presumably requiring the previous installation of the additional steel sheet piles to retain the fill slope. It has also caused scouring along the east abutment, reducing the cover over the footings.

Bridge 2 (B22164017), similar to Bridge 1, was noted to be in fair condition overall, with minor surface defects throughout, and localized moderate to severe defects. There exists a medium to wide crack with efflorescence on the soffit near the centerline, indicating moisture penetration through the concrete deck. Areas of delamination and spalling were also noted on the soffit. Previous patching of the concrete was observed, but the bonding of these patches to the original concrete is failing in some locations.

The DDCS confirmed the presence of a waterproofing membrane which is generally in good condition but also indicated probable corrosion of the deck top area. Given that there is 8.6% of the deck area with high corrosion potential (<-0.45V), and delamination planes were found in 75% of the deck cores, the removal limits are estimated to be above 10% of the deck area, and a concrete overlay would be the recommendation for deck top repairs. The DDCS also indicated probable active corrosion in most of the west abutment, the east abutment, and the wingwalls. With the extent of probable corrosion occurring, the degradation rate of the structure will likely accelerate in the future if no action is taken. The watercourse at Bridge 2 flows predominantly along the west abutment, which has caused some erosion along the toe of embankments adjacent to the intersection. Further details can be found in the Technical Memorandum Physical Condition – Patterson Side Road Bridges 1 and 2, found in Appendix A.

A review of the Duffy's Lane Bridge (B22072010) indicated that the existing abutments are generally in good condition overall, with hairline to medium cracking with efflorescence, light scaling, small spalls, and areas of localized delamination. The existing wingwalls are also generally in good condition, with areas of severe scaling noted on the west walls and localized delamination.

The 2020 site inspection identified that most of the soffit is severely delaminated and in poor condition overall and in comparison, to the 2015 study, the degree of poor areas has significantly increased. This illustrates that the corrosion of the bottom layer of steel may be accelerating, resulting in more delaminated areas.

Several efflorescence-stained medium to wide cracks also indicate moisture penetration through the deck slab which may be leading to increased rates of corrosion. Medium to wide cracking and severe scaling were also noted along the exterior soffit and fascia.

Overall, the corrosion potential survey indicates that just under half of the deck surface has a greater than 90% probability that reinforcing steel corrosion was occurring at the

time of the measurements (2015). It is reasonable to assume that this number may have increased since the time of the survey.

6.2 Geometry – Width

Patterson Side Road currently carries two lanes of traffic, with a paved width of approximately 7 to 7.5 m and gravel shoulder widths ranging from 0.5 m to 1 m, with an overall driving platform width of approximately 9 m. The widths of Bridges 1 and 2 are 6.4 m and 7.67 m, respectively, indicating the roadway currently narrows at each of the bridge crossings.

It should be noted that a road reconstruction design is currently in the final stages for the portion of Patterson Side Road where Bridges 1 and 2 are located. The design, which is being completed by Morrison Hershfield, consists of a 9 m wide paved platform on the approach to the bridge, with 3 m lanes and 1.5 m paved shoulders.

The existing Duffy's Lane roadway has a paved driving platform width of approximately 7.25 m to 7.5 m up to the south limits of the structure. South of the structure, the roadway becomes a gravel roadway with a 5.75 m to 6 m travelled platform width and 1.25 m to 1.5 m shoulders. As previously mentioned, the width of the driving platform between raised curbs on the structure is approximately 7.3 m.

6.3 Geometry – Profile

Patterson Side Road is considered a rural collector road and has a posted speed limit of 60 km/h at the site. The structures are on a vertical curve portion of the roadway profile. The proposed road reconstruction (as designed by Morrison Hershfield) reduces the speed limit of the roadway to the northeast and southwest of the structure to 40 km/h; however, the posted speed limit at the bridge locations is noted to remain as 60 km/h based on Morrison Hershfield's '100% Submission' drawings, dated August 28, 2020.

As per the MTO Design Supplement for TAC – April 2020:

> *"Design speed should be greater than or equal to the legal posted speed. Generally, the desirable practice of selecting the design speed for new construction and reconstruction is 20 km/h greater than the posted legal speed, unless circumstances warrant a reduction.*
>
> *A design speed equal to the maximum posted speed is accepted where warranted by such factors as low traffic volumes, rugged terrain and economic considerations. This practice would be more appropriate for minor collector and local roads. A design speed equal to the legal posted speed is the normal practice for Secondary highways".*

In order to achieve the desirable 80 km/h design speed (20 km/h greater than currently posted), significant adjustments to the road profile would be required.

Therefore, it is recommended that the road profiles be designed for a 60 km/h design speed, to match the current maximum posted speed limit, as per normal practice for secondary highways.

To meet the minimum required design speed equal to the legal posted speed (60 km/h), the minimum K-factors for crest and sag curves in accordance with TAC Geometric Design Guides are 11 and 18, respectively. Given that the Patterson Side Road reconstruction profiles (completed by Morrison Hershfield) have more abrupt curvature rates than these standards, adjustments to the road profile should be considered as part of the bridge improvement works.

To rectify the profile / sight distance deficiencies at the site to meet the 60 km/h design speed criteria, increases to the road profiles of approximately 0.65 m and 0.45 m would be required for Bridges 1 and 2, respectively. To achieve these profile increases on the existing structures, significant structural overlays would be needed, which would likely require strengthening and imposing a load posting on the existing structures, and are therefore not considered feasible for rehabilitation options. Replacement of the structures would allow for the 60 km/h design speed profiles to be achieved without load postings. Duffy's Lane current profile has grade changes comparable to a design speed of approximately 20 km/h and is considered sub-standard for the anticipated operating speed of the road.

The intersection at Patterson Side Road is anticipated to be raised as part of the profile improvement works along Patterson Side Road between the bridges east and west of the intersection. To tie into this raised profile, adjustments to the profile of Duffy's Lane Road will also be required. Based on preliminary design profiles, a 30 km/h design speed vertical curve can be obtained to tie the raised intersection into the north end of the existing Duffy's Lane bridge. If the Duffy's Lane bridge is to be replaced, road profile adjustments of 40 km/h or higher are achievable. The final road profile under the replacement scenario will depend on the geometry of the proposed replacement structure.

6.4 Hydraulic Capacity

With regards to hydraulics, the Patterson Side Road Bridge 1 and 2 pass the 50-year design storm flows with clearances greater than the minimum requirements for a collector road and are considered sufficiently sized. The existing structures provide minimum 1 m recommended clearance to the soffit during a 50-year flood event.

Bridge 1 – Tributary of Humber River at the bridge location:

- Flows from west to east and is not well-aligned with the structure
- Depth of 0.2 m to 0.5 m
- The natural channel is 5 m to 7 m wide
- Classified as ‘collector’ road

Bridge 2 – Humber River at the bridge location:

- The mainstem of Humber River flows from north to south
- Depth of 0.2 m to 0.4 m
- The natural channel is 9 m to 11 m wide and is aligned along the western abutment
- Classified as ‘collector’ road

Duffy’s Lane Bridge – Tributary of Humber River at the bridge location:

- Flows west to east
- Depth of 0.25 m to 0.35 m
- The natural channel is 3 m to 4 m wide. Predominantly flows against the northern abutment
- Classified as ‘local’ road

As such, any increase to the spans of the bridges would be a result of site geometry / channel alignment and not a result of hydraulic requirements.

6.5 Utilities

Hydro Provider: Hydro One Networks Inc.

There are overhead hydro lines located along the east side of Patterson Side Road, inside the ROW. The overhead hydro is noted to cross to the west side of the road at the intersection with Duffy’s Lane.

Potential relocation of the utility may be required based on the potential increase in road profile and grading limits and construction approach. This will be explored further during the preliminary design options.

Communications Provider: Bell Communication

There are buried bell lines located along the east side of the roadway inside the ROW. The lines are attached to the east side of Patterson Side Road Bridges 1 and 2; however, it is noted that the line attached to the side of Bridge 1 has come loose from its attachment and was hanging from the bridge.

Potential relocation (temporary or permanent) of the utility may be required based on the bridge works and grading limits. This will be explored further during the preliminary design options.

Gas

The proposed site is clear of Enbridge Gas Distribution-Owned Utilities.

The presence of utilities will be further confirmed during the preliminary design stage.

7.0 Natural Environment

A review of existing terrestrial conditions and secondary source information was conducted to characterize vegetation and aquatic communities and assess the potential for habitat of Species at Risk (SAR), including breeding bird, bat, and reptile habitat, and incidental wildlife observations.

A summary of findings is provided in the sections below. The Terrestrial Conditions Technical Memorandum and Aquatic Assessment Technical Memorandum are provided in Appendix A.

7.1 Physiography and Topography

A review of available mapping by the Ontario Geological Survey was undertaken to characterize the general topography, and surficial and bedrock geology of the study area.

The study area is relatively flat with an elevation of approximately 268 m to 272 m above sea level.

The study area is located within the kame moraines of the Oak Ridges Moraine physiographic region of Southern Ontario (Chapman and Putnam, 1984).

Surficial geology mapping illustrates the study area is primarily located within ice contact stratified deposits consisting of sand and gravel with minor silt, clay, and till deposits as well as modern alluvial deposits in the vicinity of the watercourse, consisting of clay, silt, sand, and gravel and possible organic remains (Ontario Geological Survey, 2003).

7.2 Climate

Local climate conditions were obtained from Canada’s Environment and Climate Change Toronto Lester B. Pearson International Ontario meteorological station (ID 5097) (43.40.38.000" N, 79.37.50.000" W). The Toronto Lester B. Pearson International climate station is located approximately 145 m south of the study area.

According to the Canadian Climate Normals (calendar years 1971 to 2000) for this station, the daily average annual temperature is 7.5°C. The warmest month of the year is July with an average temperature of 20.8°C and the coldest month is January with an average temperature of -6.3°C.

The meteorological station recorded a total annual precipitation (snow and rain) of 792.7 mm, 684.6 mm of which was rain. The maximum mean monthly precipitation is 79.6 mm and occurs in August.

7.3 Terrestrial Environment

The study area includes the Humber River and its tributary along with riparian and treed vegetation communities. Adjacent lands include rural residential properties, forest, and wetland communities. The Caledon Trail known as the K-Tea Cup Single Track Bike trail is located to the west of the study area. The Albion Hills Conservation Area is to the southwest of the study area.

Vegetation communities in the study area were assessed and described according to the Ecological Land Classification (ELC) System for Southern Ontario, First Approximation (Lee et al., 1998), updated[1] to the 2008 Southern Ontario ELC Vegetation Type List, where available (Lee et al., 1998). TRCA ELC community mapping was referenced and verified in the field. The field assessment included the assessment of the potential for habitat of SAR, including breeding bird, bat, and reptile habitat, and incidental wildlife observations. Further details can be found in the Terrestrial Conditions Technical Memorandum found in Appendix A.

A total of eight vegetation communities were identified within the study area. All of the communities identified are considered to be relatively common in Ontario. Sensitive vegetation communities or provincially significant plant species were not observed within the study area during the field assessment. The vegetation communities within the study area are as follows:

- Fresh-Moist Deciduous Woodland (WODM5)
- White Cedar Hardwood Organic Mixed Swamp (SWMO1)
- Fresh Moist White Cedar Hardwood Mixed Forest (FOMM7-2)
- White Cedar Conifer Organic Coniferous Swamp (SWCM1-2)
- Dry Fresh White Cedar Poplar Mixed Forest (FOMM4-2)
- White Cedar Mineral Coniferous Swamp (SWCM1)
- Fresh-Moist White Cedar Coniferous Forest (FOCM4-1)
- Open Aquatic (OAO)

[1] Lee, H.T., et al. (1998). Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer branch. SCSS Field Guide FG-02.

7.4 Aquatic Habitat

The historical and existing aquatic and fish habitat condition of the study area was assessed through background database review and field assessment. The Humber River flows under Patterson Side Road Bridge 2. A tributary of the Humber River flows under Patterson Side Road Bridge 1 and Duffy's Lane Bridge and discharges downstream of Bridge 2.

Upstream of Patterson Bridge 1

The watercourse flows through densely forested lands in a northwest to southeast direction. The reach is comprised primarily of runs with sections of flats present. The bank vegetation is comprised primarily of White cedars (*Thuja occidentalis*) with grasses and forbs observed as well. Moderate erosion was observed with some scalloped / undercut conditions and tree roots exposed.

Large woody debris, both in-stream and overhanging, is present and provides cover and habitat for aquatic life in the watercourse. The vegetation on the banks, as well as the woody debris, shades a significant portion of the reach upstream of Bridge 1, and through the bridge, the streambed has scoured and is slightly deeper. Further details can be found in the Technical Memorandum Aquatics Conditions – Patterson-Duffy's Lane Bridges Aquatics Memo, found in Appendix A.

Downstream of Patterson Road Bridge 1

The watercourse flows through a section of forested lands. The watercourse flows in a west to east direction in a meandering channel. The vegetation is mostly comprised of White cedars through this section, with grasses and forbs present as well. The watercourse flows primarily in a flats-type of morphology with runs present. A debris jam was observed approximately 10 m downstream of Bridge 1, representing a potential barrier to fish movement during periods of low-flow.

Sections of bank material have sloughed, and minor undercutting was observed as well. Woody debris is abundant in the reach downstream of Bridge 1. Organic materials in the form of fallen leaves were observed throughout the downstream reach as well. Veronica (*Veronica anagallis aquatica*) was observed downstream of the bridge.

Fish were not observed upstream or downstream of Bridge 1, although it is considered fish habitat under the *Fisheries Act*.

Upstream of Patterson Road Bridge 2

The watercourse flows in a wide, gentle meandering channel, from north to south, through forested lands of White cedars. Upstream, the banks are stable, with limited erosion observed. The morphology of the upstream reach is composed primarily of runs and flats.

Approximately 10 m upstream of Bridge 2, a section of higher-density of cedars are present and overhang, shading close to the entire surface area of the watercourse. Some trace boulders are present downstream of the cedars. The area where the cedars are located lacks diversity in substrate and wetted depth. Through the bridge, there is an exposed bank against the east abutment. Large boulders are present against the other abutment.

Downstream of Patterson Road Bridge 2

The watercourse flows in a gently meandering pattern from north to south. Roadside ditches enter the watercourse from both banks. The right upstream (east) bank is densely vegetated with White cedars and grasses. The left upstream bank is vegetated with cedars as well, although with more grasses and shrubs. A single riffle is present at the outlet of the bridge and downstream flows in a combination of runs and flats. The vegetation does not overhang a significant amount of the downstream reach, and it shaded approximately 50% of the surface area of the watercourse.

Minor undercutting of the banks was observed, and they are slightly eroded. Watercress (*Nasturtium officinale*) was observed near the outlet of the watercourse that flows through Bridge 1 and Duffy's Lane Bridge.

Fish were not observed upstream or downstream of Bridge 2, although a dead Brown trout (*Salmo trutta*) was observed at the outlet of the channel from Duffy's Lane Bridge.

Upstream of Duffy's Lane Bridge

The watercourse flows from Bridge 1 to Duffy's Lane Bridge. The upstream reach flows from west to east through lands that are densely forested with cedars. There is an abundance of large woody debris overhanging and in-stream, upstream of Duffy's Lane Bridge. The vegetation on the bank's shades most of the watercourse and the overhanging and in-stream woody debris provides overhead cover for aquatic life (fish, crayfish, etc.).

The watercourse flows in a runs type of morphology upstream of the bridge. The banks are more eroded closer to Duffy's Lane Bridge than they are downstream of Bridge 1 and slightly undercut.

Within Duffy's Lane Bridge, there are broken vertical wooden supports and a trace amount of boulders in the bridge. Against the south abutment, the sediment is exposed, and the flow of the watercourse is closer to the northern abutment.

Downstream of Duffy's Lane Bridge

The watercourse flows for approximately 4.5 m prior to discharging to the Humber River that is conveyed through Bridge 2. The short length of the channel flows in a flats-type of morphology prior to discharging to the section of Humber River.

Fish were not observed upstream or downstream of Duffy's Lane Bridge.

Fish and Habitat

Fish were not observed during the October 30, 2020, site visit, although will be present in and around all structures. *The Fisheries Act* defines fish habitat as water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply, and migration areas. The watercourses in the vicinity of all bridges would be capable of providing habitat for species of fish to carry out these life processes. As such, HADD and the Death of Fish must be mitigated in the design and construction of any proposed design alternative.

The open watercourse features of the study area appear to provide potentially suitable habitat for Midland painted turtles (*Chrysemys picta*). Midland painted turtles generally inhabit shallow, slow-moving creek watercourses with the opportunity for basking areas associated with open areas on shorelines and in-stream boulders and rocks protruding from the water.

7.5 Species at Risk (SAR)

Several SAR were identified through background review to have the potential to be present in the study area.

Based on field observations, potential marginal habitat exists in the study area for the following provincial Special Concern species:

- Wood thrush (*Hylocichla mustelina*)
- Eastern wood-pewee (*Contopus virens*)
- Common nighthawk (*Chordeiles minor*)
- Barn swallow (*Hirundo rustica*)
- Snapping turtle (*Chelydra serpentina*)
- Monarch butterfly (*Danaus plexippus*)

Special Concern species were not observed within the study area during the field assessment completed in 2020.

Based on field observations, potential habitat exists in the study area for the following Endangered Species protected under the Provincial ESA (2007):

- Little brown myotis (*Myotis lucifugus*)
- Northern myotis (*Myotis septentrionalis*)
- Tri-colored bat (*Pipistrellus subflavus*)

Within the study area there were trees observed which may be suitable for roosting bats, including trees with >25 cm diameter at breast height (DBH) with potential for cavities / snags. Potential bat roosting habitat may also be present in the deciduous forested vegetation communities SWMO1, SWCM1, SWCM1-2, FOMM4-2 and FOMM7-2. These communities have some potential for large diameter trees with cavities / loose bark. Suitable foraging habitat for bats may be associated with the open watercourse features of Humber River as well as its tributary within the study area and an open aquatic feature located beyond the study area within the SWMO1 community north of Patterson Side Road in between Bridge 1 and Bridge 2.

Endangered or threatened species were not observed within the study area during the field assessment completed in 2020; however, species-specific surveys were not completed as part of the scope of work.

7.5.1 Wildlife Observations

Wildlife species observed during the field assessment included a foraging female Eastern downy woodpecker (*Picoides pubescens*) and Eastern grey squirrels (*Sciurus carolinensis*) in FOCM4-1. Evidence of other wildlife observed in the study area included excavated holes in trees in SWCM1-2, Canadian beaver (*Castor canadensis*) chewed tree trunks on banks of OAO south of Duffy's Lane Bridge, Raccoon (*Procyon lotor*) tracks under Bridge 2, North American porcupine (*Erethizon dorsatum*) stripped tree bark in SWMO1, Organ pipe mud dauber (*Trypoxylon politum*) nests on Bridge 2, holes from a Sapsucker (*Sphyrapicus sp*.) avian species in SWMO1.

The majority of these species are considered widespread and common in Ontario (i.e., provincial ranking of S5).

8.0 Identification of Alternative Solutions

Alternative Solutions considered for Patterson Side Road Bridge 1 and Bridge 2 include:

1) Do Nothing

2) Rehabilitate Structure

3) Rehabilitate and Widen Structure

4) Replace the Structure

Alternative Solutions considered for Duffy's Lane Bridge include:

1) Do Nothing
2) Abandon / Remove Structure and Close the Road
3) Rehabilitate Structure
4) Replace Structure
    a) Vehicular Bridge – Two-Lane
    b) Vehicular Bridge – Single-Lane, Modular
    c) Pedestrian Bridge

The Alternative Solutions are discussed below.

The Alternative Solution of Do Nothing is a mandatory consideration within the MCEA process. For this option, the existing system would be left in place and no improvements to the bridge would be completed. This option allows for the structure to live out remaining service life. For Duffy's Lane Bridge, the structure would be removed at the end of service life and the roadway would dead-end at the structure.

8.1 Alternative Solutions for Patterson Side Road Bridge 1 and Bridge 2

8.1.1 Alternative 2 – Rehabilitate Structure

The Alternative Solution to rehabilitate the structure varies for each bridge in the study area as follows:

Bridge 1 – Removal of existing curb and barrier, partial concrete depth repairs, removal of existing asphalt and replace with new asphalt and waterproofing, and removal of existing granular fill on deck and install reinforced concrete slab on existing deck.

Bridge 2 – Partial depth concrete repairs on soffit and on deck top, removal of existing barrier and installation of TL-4 parapet with railing, partial depth concrete repairs on substructure, scarify existing deck, and place concrete overlay, asphalt, and waterproofing.

8.1.2 Alternative 3 – Rehabilitate and Widen Structure

This Alternative Solution consists of rehabilitating and widening the structure for both Bridges 1 and 2. Included in this alternative are the rehabilitation efforts described in Alternative Solution 2, in addition to the widening of the deck and abutment, and the widening of the footing with steel piles on footing extensions.

8.1.3 Alternative 4 – Replace the Structure

The Alternative Solution 4 removes the existing structure and replaces it with a new full two-lane structure, considered for both Bridge 1 and Bridge 2. The span for Bridge 1 would be 16.5 m and Bridge 2's span would be 14 m. With the replacement of Bridge 1, there will be the ability to improve the alignment with the watercourse and widen the structure to meet the desired road platform width. A new structure for Bridge 2 can be constructed to the desired platform width and can allow for improved sight distance to meet the 60 km/h design speed.

8.2 Alternative Solutions for Duffy's Lane Bridge

The purpose of the evaluation of alternatives for Duffy's Lane Bridge was to assess the feasibility of future management options for the existing two-lane structure.

8.2.1 Alternative 2 – Abandon / Remove Structure and Close the Road

The Alternative Solution to abandon / remove the structure and close the road for Duffy's Lane Bridge in the study area would include removal of the structure before its end of service life and close the roadway at the structure.

8.2.2 Alternative 3 – Rehabilitate Structure

The Alternative Solution to rehabilitate the structure varies for each bridge in the study area. For Duffy's Lane bridge, rehabilitation includes partial depth concrete repairs on soffit, deck top, and substructure, removal and replacement of barrier system, full-depth curb removal and reconstruction of outer deck edges and wingwall tops, removal of asphalt wearing surface, installation of erosion, and scour protection.

8.2.3 4A – Replace Structure Vehicular Bridge – Two-Lane

Alternative Solution 4A consists of the replacement of the existing structure with a two-lane vehicular bridge that has a slightly larger span and width to meet the Town standard driving platform, designed to full vehicular load requirements and road profile improvements.

8.2.4 4B – Replace Structure Vehicular Bridge – Single-Lane, Modular

Alternative Solution 4B is a one-lane, two-way structure that would provide a 4.2 m (+/-) wide driving platform as a prefabricated girder-type structure. The new structure would allow for a larger span and new bridge abutments and would allow for road profile improvements.

8.2.5 4C – Replace Structure Pedestrian Bridge

Alternative Solution 4C would eliminate vehicular access and limit the capacity to pedestrian and bicycle crossings only. A 2.4 m platform and 15 m long span would be considered.

9.0 Evaluation of Alternative Solutions

The evaluation of alternatives is a step-by-step process that compares alternatives that are feasible within the project environment and meet the project objectives outlined in the Problem / Opportunity Statement.

The impacts of the alternatives are evaluated relative to each other, against a set of equally weighted criteria, including possible mitigating measures. The criteria are developed based on the inventory of the natural, social / cultural, financial, and technical environment of the study area, and identification of key considerations, including:

- Potential impact to existing natural features
- Minimizing encroachment onto private property and the potential for land acquisition
- Maintaining property access
- Consideration of active transportation along the corridor
- Working within existing planning policy and regulations
- Maintaining traffic flow and connection in the Town as well as providing capacity for future growth and traffic
- Maintaining effective storm drainage
- Financial costs
- Potential impact to utilities
- Consideration of community and agency input

A table showing the Evaluation of Alternative Solutions for each of the criteria is presented in Appendix B. An estimate of life-cycle costs for each alternative is provided in Appendix B. The results of the evaluation are discussed in the following sections.

9.1 Patterson Side Road Bridge 1

When compared to the other alternatives, the Do Nothing alternative is anticipated to have the most impact on the natural environment due to continued erosion and scouring around the abutment and ongoing impacts to water quality from road salt / sediment run-off from the bridge. The Do Nothing alternative will not be able to provide a road network that is efficient and accommodates a future level of service. While there are no upfront capital costs associated with the ‘Do Nothing’ alternative, this option will impose operating and maintenance costs for continued safety at the bridge which will increase over time as it continues to deteriorate. Additionally, the capital expenditure for replacement of the structure will still be required in approximately ten years. Although

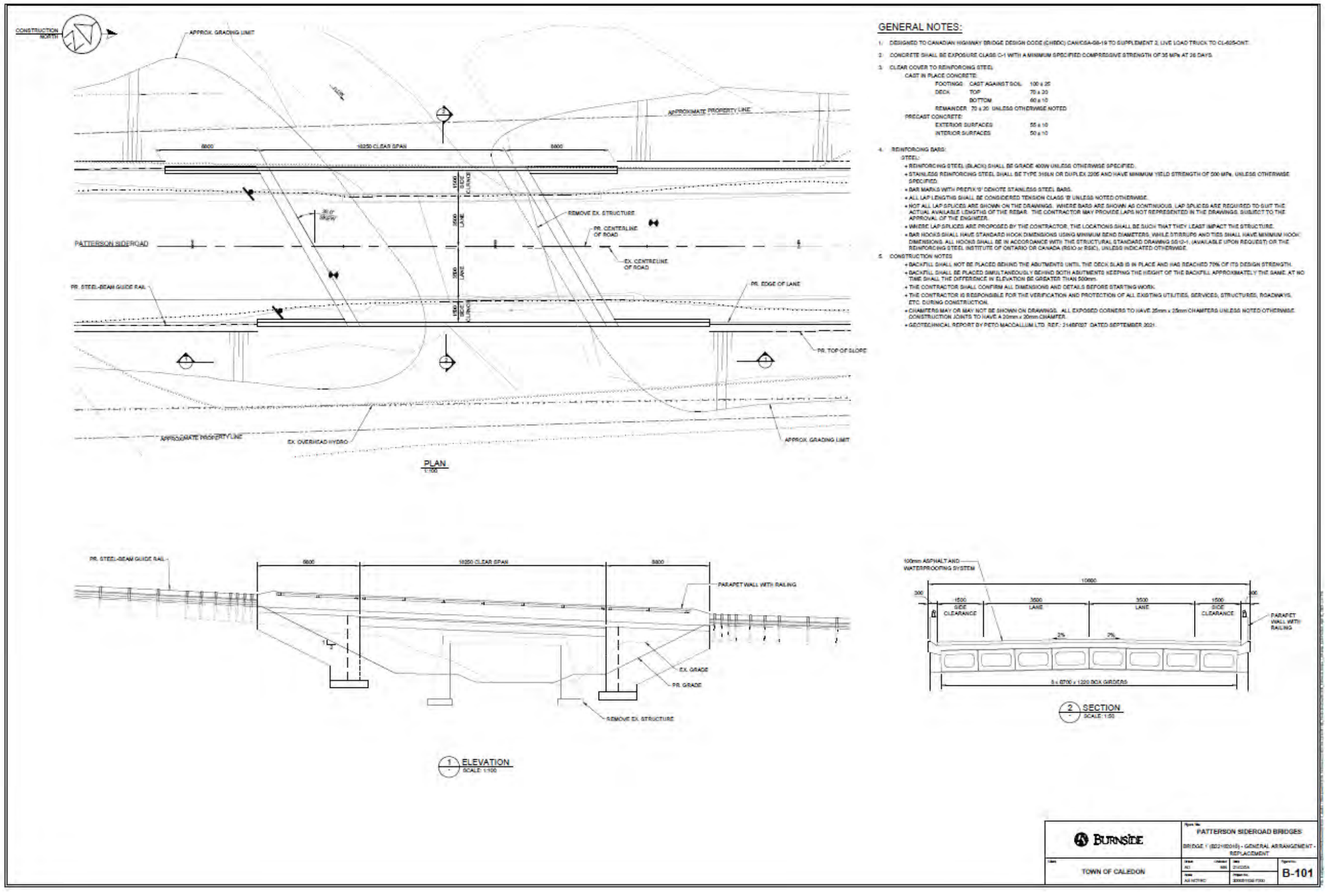
deferring the replacement results in lower net present value costs, the Do Nothing option does not address the Problem or Opportunity Statement and therefore is not preferred.

Alternative 2, Rehabilitate the Structure, is the least expensive option with a similar overall impact to the socio-cultural environment as the other Alternatives. The total upfront capital cost of this alternative is estimated to be **$385,000.00**. This alternative would result in some improvement to erosion protection, limited in-water work and would have a smaller footprint of construction; however, would have a similar overall impact to the natural environment as Alternatives 3 and 4 due to ongoing impacts to water quality from road run-off and vulnerability of the structure to potential flood conditions. From a technical standpoint, it will not provide improvement to the driving platform width compared to the Alternatives 3 and 4.

Alternative 3, Rehabilitate and Widen the Structure, will provide the opportunity for a widened platform width but only minor improvement to the profile and sight lines. This alternative has a similar level of impact under the natural and socio-cultural environments as Alternatives 2 and 4. The upfront capital costs associated with this option are estimated to be **$1,200,000.00**. Although the immediate capital costs of this option are lower than replacement, the net present value is comparable to Alternative 4 at approximately **$2,100,00.00**.

Alternative 4, Replace Structure, includes a full structure replacement with a 16.25 m clear-span bridge. This option has a moderate impact on the natural environment and socio-cultural environment, comparable to Alternatives 2 and 3. This alternative has the highest upfront cost, estimated at **$1,900,000.00**, but comparable net present value to Alternative 3 at approximately **$2,100,000.00**. From a technical standpoint, Alternative 4 includes the ability to improve the alignment with the watercourse and widen structure to meet desired road platform width.

Figure 3: Patterson Bridge 1 GA Replacement



9.2 Patterson Side Road Bridge 2

The Do Nothing alternative is anticipated to have a lesser impact on the natural environment, as compared with the other alternatives, with no anticipated impacts to terrestrial and aquatic habitat. However, ongoing impacts to water quality from road salt / sediment run-off from the bridge are possible. The Do Nothing alternative does not require any capital costs but operating and maintenance costs will increase over time as the structure continues to deteriorate and the capital costs associated with replacement will be required in approximately ten years. Although deferring the replacement results in lower net present value costs, the Do Nothing alternative does not provide any improvement to driving platform width or profile and sight lines, and therefore, does not provide a road network that is efficient and accommodating to levels of service. The Do Nothing option does not address the Problem or Opportunity Statement and therefore is not preferred.

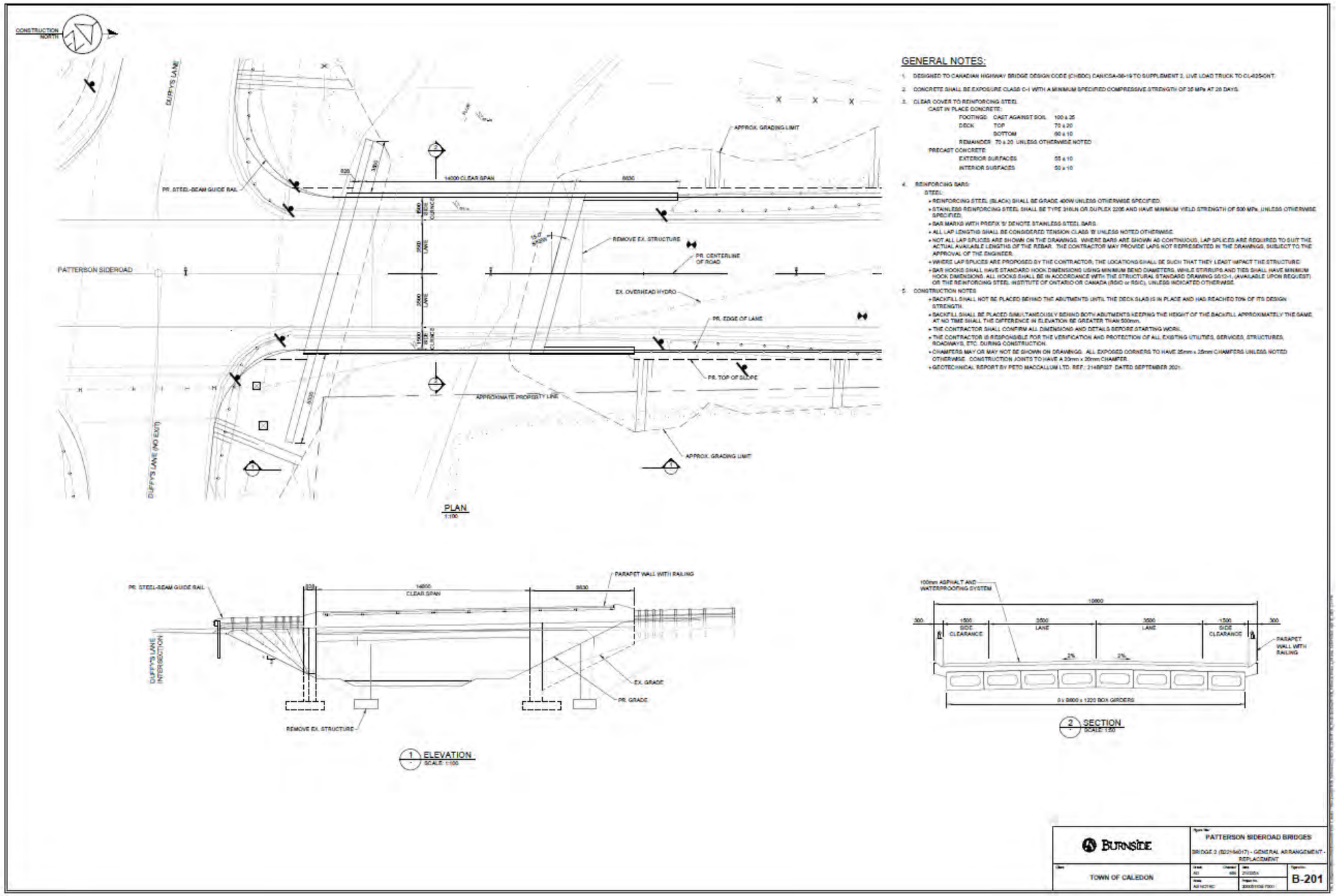
Alternative 2, Rehabilitate the Structure, is the option that limits the impacts to the aquatic, terrestrial, archaeological environments and species at risk and can be delivered at a lower upfront capital cost. However, this alternative does not provide the opportunity to meet desired driving platform widths or the Transportation Master Plan recommendations for shared on-road cycling. This alternative would require moderate upfront capital costs estimated at **$675,000.00** but would defer the larger capital investment for replacement to approximately 25 years from now, resulting in net present value costs of approximately **$1,850,000.00** over a 75-year time frame, when also considering the moderate level of maintenance required until replacement.

Alternative 3, Rehabilitate and Widen the Structure, would repair the structure in a similar manner to Alternative 2, but also include widening to allow for the desired road platform width and side clearances to be met as required to meet the shared on-road cycling routes desired. This option would result in some improvement to erosion protection, with limited in-water work anticipated; however, may result in impact to vegetation and wildlife habitat adjacent to the ROW because of construction and grading activities. As a result of the widening, this option may result in property acquisition or easement to accommodate grading, with a potential impact to archaeological resources at the limit of the ROW. Alternative 3 has higher upfront capital costs estimated at **$1,095,000.00** and would defer replacement of the structure by 25 years, resulting in net present value costs of approximately **$2,150,000.00** over the 75-year timeframe considered.

Alternative 4, Replace the Structure, includes the replacement of the full structure with a 14 m span bridge. The replacement of the existing structure with one of a larger span and increased vertical profile as outlined in Alternative 4 would allow for improved water conveyance capacity below Patterson Side Road during periods of high flow, providing resilience under changing climatic conditions. Additionally, from a technical standpoint,

Alternative 4 provides the opportunity for full improvement to the road profile, sight lines and sight distance, improving the roadway to meet a 60 km/h design speed. This option also meets the desired platform widths for shared on-road cycling as recommended in the Town's Transportation Master Plan. When compared with the other alternatives, this alternative has the highest upfront capital cost of approximately **$2,175,000.00** and a net present value cost of approximately **$2,450,000.00** over the 75-year term considered.

Figure 4: Patterson Bridge 2 GA Replacement



GENERAL NOTES:

1. DESIGNED TO CANADIAN HIGHWAY BRIDGE DESIGN CODE (CHBDC) CAN/CSA-S6-19 TO SUPPLEMENT 2. LIVE LOAD TRUCK TO CL-625-ONT.
2. CONCRETE SHALL BE EXPOSURE CLASS C-1 WITH A MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
3. CLEAR COVER TO REINFORCING STEEL
   CAST IN PLACE CONCRETE:
   FOOTINGS: CAST AGAINST SOIL 100 ± 25
   DECK TOP 70 ± 20
   BOTTOM 60 ± 10
   REMAINDER 70 ± 20 UNLESS OTHERWISE NOTED
   PRECAST CONCRETE:
   EXTERIOR SURFACES 55 ± 10
   INTERIOR SURFACES 50 ± 10
4. REINFORCING BARS:
   STEEL:
   - REINFORCING STEEL (BLACK) SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED.
   - STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS OTHERWISE SPECIFIED.
   - BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS.
   - ALL LAP LENGTHS SHALL BE CONSIDERED TENSION CLASS 'B' UNLESS NOTED OTHERWISE.
   - NOT ALL LAP SPLICES ARE SHOWN ON THE DRAWINGS. WHERE BARS ARE SHOWN AS CONTINUOUS, LAP SPLICES ARE REQUIRED TO SUIT THE ACTUAL AVAILABLE LENGTHS OF THE REBAR. THE CONTRACTOR MAY PROVIDE LAPS NOT REPRESENTED IN THE DRAWINGS, SUBJECT TO THE APPROVAL OF THE ENGINEER.
   - WHERE LAP SPLICES ARE PROPOSED BY THE CONTRACTOR, THE LOCATIONS SHALL BE SUCH THAT THEY LEAST IMPACT THE STRUCTURE.
   - BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWING S512-1, (AVAILABLE UPON REQUEST) OR THE REINFORCING STEEL INSTITUTE OF ONTARIO OR CANADA (RSIO or RSIC), UNLESS INDICATED OTHERWISE.
5. CONSTRUCTION NOTES
   - BACKFILL SHALL NOT BE PLACED BEHIND THE ABUTMENTS UNTIL THE DECK SLAB IS IN PLACE AND HAS REACHED 70% OF ITS DESIGN STRENGTH.
   - BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500mm.
   - THE CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS BEFORE STARTING WORK.
   - THE CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION AND PROTECTION OF ALL EXISTING UTILITIES, SERVICES, STRUCTURES, ROADWAYS, ETC. DURING CONSTRUCTION.
   - CHAMFERS MAY OR MAY NOT BE SHOWN ON DRAWINGS. ALL EXPOSED CORNERS TO HAVE 25mm x 25mm CHAMFERS UNLESS NOTED OTHERWISE. CONSTRUCTION JOINTS TO HAVE A 20mm x 20mm CHAMFER.
   - GEOTECHNICAL REPORT BY PETO MACCALLUM LTD. REF.: 21469/S07 DATED SEPTEMBER 2021.

BURNSIDE

PATTERSON SIDEROAD BRIDGES

BRIDGE 2 (B021/4017) - GENERAL ARRANGEMENT - REPLACEMENT

TOWN OF CALEDON

B-201

9.3 Duffy's Lane Bridge

The Do Nothing alternative is anticipated to have a lesser impact on the natural environment, with no near-term impact to terrestrial and aquatic habitat. The Do Nothing alternative maintains the existing vertical profile of the bridge, which is vulnerable to potential flood conditions during periods of very high flow and climate extremes. Although Do Nothing does not require any capital costs, operating and maintenance costs will increase over time and future removal costs (estimated at $100,000.00) or replacement costs would be required in approximately five to ten years. Additionally, the Do Nothing alternative does not provide any improvements to platform and side clearance. Load posting would need to be considered due to corrosion of reinforcing steel.

Alternative 2, Abandon / Remove the Structure and Close the Road, is one of the less expensive options overall with moderate costs for structure removal and minimal maintenance cost. The total cost of Alternative 2 is estimated to be **$100,000.00**. This option is anticipated to have some impact to the natural environment with potential for impact to wildlife habitat associated with activities to remove the bridge, and reduced water quality impacts from road salt and sediment and improved conveyance capacity during periods of high flow. The removal of the bridge would eliminate the risks associated with structure collapse; however, the portion of Duffy's Lane beyond the structure would be cut off from vehicular access (with exception of access through TRCA's Conservation Area, which is controlled). From a cultural standpoint, the bridge was determined to have cultural heritage value for physical and contextual reasons. The removal of the structure will be considered a substantial impact to the heritage value.

Alternative 3, Rehabilitation of the Structure, is anticipated to be relatively expensive with a total cost of approximately **$485,000.00**. This option is anticipated to have some impact on the natural environment with potential for impact to wildlife habitat associated with activities to rehabilitate the bridge. Minor impacts due to sediment mobilization during in-stream work are to be mitigated. Conveyance capacity during periods of high flow is limited by the profile of the existing bridge. This alternative would provide an opportunity to address defects and extend the service life of the bridge; however, load posting may be required. Existing sightlines and profile would be maintained. From a cultural standpoint, the bridge was determined to have cultural heritage value for physical and contextual reasons. The rehabilitation of the bridge may be considered value added for the heritage structure. Minimal impacts to potential archaeological resources are anticipated as the improvements would be made within the existing ROW.

Alternative 4, Replace the Structure. Replacement of the structure is anticipated to have limited impact on archaeological resources as the improvements would be completed within the existing ROW. This option would have a high negative impact on the bridge as a cultural heritage structure. This option is anticipated to have some impact on the

natural environment with potential for impact to wildlife habitat associated with activities to replace the bridge. Some potential for impacts due to sediment mobilization during limited in-stream work are to be mitigated. Alternative 4A, the Replacement of the Structure with a two-lane bridge, and Alternative 4B, the Replacement of the Structure with a single-lane bridge, would provide an opportunity to improve both the profile and sight lines of the bridge. Alternative 4A could also be designed to meet the desirable two-lane platform width. Alternatives 4A and 4B, are more costly compared to the other alternatives, with a total cost estimated to be **$1,400,000.00** and **$650,000.00**, respectively. Alternative 4C, Pedestrian Bridge, requires a complete bridge replacement with a pedestrian only crossing, not capable of carrying vehicular loads at an estimated cost of **$440,000.00**. All replacement options would have a substantial impact on the heritage value of the structure. Without a vehicular bridge, Duffy's Lane would no longer act as a local road. Alternative access to property fronting Duffy's Lane would be required.

10.0 Consultation Summary

Consultation is an important part of the MCEA process to ensure that anyone with an interest in the project has an opportunity to provide input into the Town's decision-making process before a project is implemented. Comments received throughout the MCEA process are incorporated into the evaluation of the Alternatives. Copies of correspondence are provided in Appendix C.

The Schedule B MCEA requirements include two mandatory public points of contact during the MCEA process. The mandatory points of contact for this project included a Notice of Commencement and a Notice of Completion. A Public Information Centre (PIC) and notice were completed as an additional point of contact to obtain input on the project.

Project information was made available on the Town's website at https://www.caledon.ca/en/news/public-notice-patterson-duffy-s-lane-bridge-environmental-assessment.aspx. Opportunity to provide input into the planning and design of the project included an online PIC and the opportunity to contact the project team members directly with questions or comments.

A Project Contact List was developed as a mailing list to distribute project notices. The Project Contact List consisted of technical and provincial agencies, utilities, and Indigenous communities that may have an interest in the project as well as residents within the study area. Throughout the MCEA process, the Project Contact List was used to maintain contact information for those interested in the project, as well as to summarize comments received about the project and responses from the study team. A copy of the Project Contact List is provided in Appendix C. Copies of correspondence received during the MCEA are provided in Appendix C.

Project Notices were published in the Caledon Citizen and the Caledon Enterprise and posted on the Town's website. Project Notices were emailed or mailed to those on the Project Contact List. Copies of Notices are provided in Appendix C.

The Notice of Commencement, inviting public input on the project, was published in the Caledon Citizen and the Caledon Enterprise in two issues; April 12 and April 19, 2018, and posted on the Town's website.

The Notice of the PIC, including details of the date, time, location, and purpose of the PIC were published in the Caledon Enterprise on March 16 and March 23, 2023. Notification of the PIC was also posted on the Town of Caledon website. The PIC was held online on March 29, 2023.

A Notice of Completion will be published in **[the Caledon Enterprise]** at the conclusion of the MCEA process for the project and mailed / emailed to all on the Project Contact List. The Notice of Completion will provide members of the public with the dates and location where the Project File Report can be reviewed as well as names and addresses of people to whom they can send their comments.

10.1 Indigenous Communities

A summary of comments received from Indigenous communities throughout the project is provided in the Project Contact List in Appendix C and summarized in the Table below. As a result of the government stay-at-home order in place at that time of the Notice of Commencement, due to COVID-19, most community contacts were not available to reach by phone to confirm receipt of the Notice of Commencement and interest in the project.

Table 1: Summary of Comments Received from Indigenous Communities

Community	Notices	Comments Received	Responses Provided
Haudenosaunee Confederacy	210223 Emailed Notice of Commencement 230424 Email Notice of PIC	No comments received	
Six Nations of the Grand River	210223 Emailed Notice of Commencement 230424 Email Notice of PIC	221011_Email noting that contact has changed. 230430_Email noting SNGREC has interest in the project. Inquiring if archaeology has been completed. 230503_Email confirming interest in reviewing the Stage 1 report. 230526_Email confirmed receipt of Stage 1 report and inquired about timeframe or review. 240410_Email responded to request to review draft stage 1AA included in draft PRF report. At the time upon review SNGREC doesn't have comments but looking forward to conversations in the design phase.	230503_Email from Burnside indicating a Stage 1 Archaeological assessment has been completed and inquiring if SNGREC would like to review the report. 230525_Email Burnside forwarded a copy of the Stage 1 report for review as well as a link to the PIC information on the Town's website. 230526_Email from Burnside noting request for review comments by June 14, 2023. 230616_Email from Burnside inquiring if comments on Stage 1 would be provided. 240226_Phone call. Burnside spoke with Tanya Hill-Montour to confirm whether Six Nations was still interested in reviewing the Stage 1 Archaeological Assessment (AA) completed for the project. Neither Town staff nor Burnside staff received any input from Six Nations by the previously proposed review deadline of June 2023. Six Nations expressed they would still like the opportunity to review the assessment. 240228_Email. Town followed up phone call (with Tanya Hill-Montour) with email to circulate the draft PFR and PIC slides. 240312_Email. Town sent follow up email inquiring if Six Nations has had a chance to review the draft PRF, requested if Six Nations could provide input by March 20. If Six Nations would like to discuss the project, please contact Township or Burnside – contact details included. 240408_Email. Town sent a follow up email requesting the review of the Stage 1 AA that was included in the draft EA link that was provided. Original email and shared links included in email.

Community	Notices	Comments Received	Responses Provided
Nation Huron-Wendat	210223 Emailed Notice of Commencement 2100408_Email copy from Burnside with correspondence which was previously sent to M. Picard, as Burnside understands M. Gros-Louis is now the contact for this project. 230424 Email Notice of PIC	210223_Email from M. Picard acknowledging receipt of NOC. Huron-Wendat Nation is requesting to participate in all archaeological field work for this project as well as receiving copy of the draft reports for review and comments.	210331_Email from Burnside, with attached completed Stage 1 AA. Burnside noted a Stage 2 AA will be completed as part of the project if the preliminary preferred solution has the potential to impact identified areas of archaeological potential due to construction activities. Burnside will keep the community informed of any upcoming Stage 2 archaeological field work completed as part of the EA and to receive future notices about the EA.
Mississaugas of the Credit First Nation	210223 Emailed Notice of Commencement 230424 Email Notice of PIC	220117_Email from F. Sault to Region. F. Sault has moved to a new role for MCFN Council and will not be checking or receiving any Emails at this address. 210401_Email from Adrian Blake, MCFN-DOCA has reviewed Stage 1 AA. At this time, MCFN had no additional comments for inclusions and is in agreement with the recommendations made within the report. 220424_Bounceback Email, no longer in role. Contact Megan DeVries for archaeology. As of October 20, 2021, Megan DeVries no longer the Archaeological Operations Supervisor. 230428_Email from A. Lee, DOCA would like to review and comment on Stage 1 AA. DOCA expects to have field involvement for Stage 2.	210202_Email from Burnside with attached signed MCFN FLR Participation Agreement and the Archaeological Review Agreement, for review and signatures, and the Stage 1 AA, for review and reference.

The Mississaugas of the Credit First Nation and Huron-Wendat Nation expressed an interest in receiving copies of Draft Archaeological Reports for review as well as participating in archaeological field work. A copy of the Stage 1 Archaeological Assessment (AA) was provided to each community for review.

The Mississaugas of the Credit reviewed Stage 1 AA and agrees with the recommendations made within the report. At this time, the Mississaugas of the Credit First Nation have no additional comments for inclusion. The Mississaugas of the Credit First Nation have requested to participate in any Stage 2 AA field work completed for the project.

Six Nations of the Grand River reviewed the Stage 1 AA included in the draft Project File Report. At the time of review, Six Nations of the Grand River had no comments but look forward to conversations in the design phase.

At the time of this report, review comments have not been received from the Huron-Wendat Nation.

The Mississaugas of the Credit First Nation and the Huron-Wendat Nation must be contacted to coordinate participation in the Stage 2 AA fieldwork prior to any field work planned for later stages of the project. Six Nations of the Grand River should also be engaged at the initiation of the design phase to confirm interest in the project.

10.2 Public Information Centre (PIC)

The PIC was hosted in a virtual environment. The virtual PIC included a presentation of information materials hosted on the Town's website for the public to attend and discuss the project with the Town. Following the virtual PIC, project information materials were posted to the Town's webpage for the project for the public to view or download anytime during the PIC comment period until May 31, 2023. Opportunity for public feedback was made available through an online digital comment form or by contacting the project team with written comments.

Presentation material described the project, the Proposed Alternative Solutions, the Preferred Alternatives, and identified next steps in the process.

The virtual PIC was attended by Town staff and one municipal councilor. No members of the public attended the PIC. No comments were received during the PIC comment period.

11.0 Preferred Solution

Based on the evaluation of the alternatives, the comments received from stakeholders, agencies, and interested parties, the Preferred Solutions identified for each of the bridges are as follows:

Patterson Side Road Bridges 1 and 2: Alternative 4 – Replace Structure received the most favourable overall ranking when compared to the other alternatives and is the preferred solution. For each of the Patterson Side Road bridges, Alternative 4 will have the most impact in terms of project costs; however, it will provide the best solution for all technical factors including sight distance and platform width, and socio-economic factors including pedestrian and cyclist access, with some impacts to the natural environment while meeting the objectives as outlined in the Problem / Opportunity Statement.

For Bridge 1, Alternative 4 consists of a full structure replacement of a two-lane, two-way structure with a 16.25 m span bridge. This alternative provides the ability to improve alignment with the watercourse and widen the structure to meet the desired road platform width. The replaced structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

For Bridge 2, Alternative 4 consists of a full structure replacement of a two-lane, two-way structure with a 14 m span bridge. The new bridge structure can be constructed to the desired platform width and can allow for improved sight distance to meet the 60 km/h design speed. The replaced structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

Duffy's Lane Bridge: The purpose of the evaluation of alternatives for Duffy's Lane Bridge was to assess the feasibility of future management options for the existing two-lane structure.

Overall, Alternative 4B – Vehicular Single-Lane Bridge, received the most favourable ranking when compared to the other alternatives and is the preferred solution. Alternative 4B will have the most impact in terms of project costs, it will provide the best solution for all technical factors including sight distance and platform width, and socio-economic factors including pedestrian and cyclist access, with minimal impacts to the natural environment while meeting the objectives as outlined in the Problem / Opportunity Statement.

This alternative includes a one-lane, two-way structure with a 4.15 m (+/-) wide driving platform which would allow for a larger span, new bridge abutments and road profile improvements. ROW signs to notify users of the single-lane structure would be required. It is anticipated that a structure designed to meet the MTO exceptions to the Canadian

Highway Bridge Design Code for Low Volume Roads would be utilized for this alternative. The replaced structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

A larger span (15 m +/-) prefabricated structure could be installed on cast-in-place abutments supported on deep foundations placed behind the existing abutments. This allows for the construction of the bridge to occur without impeding the watercourse, reducing the construction costs, and environmental impacts associated with waterway control. Upon installation of the new abutments, the existing abutments could be removed to or above the existing grade level and help aid in scour prevention.

12.0 Impacts

Project activities associated with the Preferred Solution for each of the bridges include the removal and replacement of the existing bridges and abutments including excavation, grading, and asphalt application, with the possibility of limited vegetation removal in select areas, located primarily within the existing ROW.

12.1 Technical Environment

From a technical perspective, the Preferred Solutions will provide a bridge that is safe and efficient and provides a high level of service.

Replacement of Bridge Structures 1 and 2 would allow for the 60 km/h design speed profiles to be achieved without load postings. Replacement of the Duffy's Lane bridge would allow for road profile adjustments of 40 km/h or higher. The final road profile under the replacement scenario will depend on the geometry of the proposed replacement structure. Potential relocation (temporary or permanent) of utilities may be required based on the bridge works and grading limits.

12.2 Natural Environment

The replacement of each of the existing structures with one of a wider span and increased vertical profile would allow for water to pass more easily during periods of high flow, providing resilience under changing climatic conditions. The consumption of energy to operate motorized construction equipment to implement the preferred solutions is anticipated to result in some greenhouse gas emissions and some minor impact to carbon storage because of vegetation removal.

The preferred solutions for the bridges do not include additional vehicle travel lanes. As such, predicted traffic growth is not anticipated to increase because of improvements, and improvements are not anticipated to significantly change air quality in the study

area. Potential air quality effects associated with the construction stage are expected to be temporary and localized to the immediate surrounding area.

The increased span of the structure is anticipated to benefit the fish habitat, watercourse morphology, and the condition of the structure. The deep sections noted beneath and downstream of the bridge should be maintained throughout the design as it provides valuable over-wintering habitat for fish and wildlife (hibernating frogs and turtles).

The watercourses in the vicinity of all bridges would be capable of providing habitat for species of fish to carry out life processes. As such, HADD and the Death of Fish must be mitigated in the design and construction of bridge replacements. If HADD is anticipated because of the project, even following the application of feasible avoidance and mitigation strategies, then DFO review is recommended, and authorization may be required. At the detailed design phase of the project, the timing window for in-water works should be confirmed with the MNRF.

Some loss of vegetation is anticipated within grading limits and natural vegetation communities located within the existing ROW in the vicinity of the bridges. All the communities identified are considered to be relatively common in Ontario.

Temporary displacement of and disturbance to migratory breeding birds, wildlife, and wildlife habitat is anticipated during the construction phase (i.e., vegetation removals, noise disturbance), including SAR.

Potential marginal habitat exists in the study area for the following provincial special concern species:

- Wood thrush (*Hylocichla mustelina*)
- Eastern wood-pewee (*Contopus virens*)
- Common nighthawk (*Chordeiles minor*)
- Barn swallow (*Hirundo rustica*)
- Snapping turtle (*Chelydra serpentina*)
- Monarch butterfly (*Danaus plexippus*)

The open watercourse features of the study area appear to provide potentially suitable habitat for the Midland painted turtle, listed as Special Concern under the federal *Species at Risk Act*.

Although species provincially listed as rare or Special Concern do not receive legal protection under the provincial *Endangered Species Act, 2007* or the federal *Species at Risk Act*, they may receive protection from some agencies, such as provincial and national parks, or other Acts, such as the *Ontario Fish and Wildlife Conservation Act*, which prohibits the killing, capturing, injuring, harassment, and trapping of specially protected species.

Potential habitat exists in the deciduous forested vegetation communities of the study area for the following endangered species protected under the Provincial ESA (2007):

- Little brown myotis (*Myotis lucifugus*)
- Northern myotis (*Myotis septentrionalis*)
- Tri-colored bat (*Pipistrellus subflavus*)

Vegetation clearing within the ROW, adjacent to the wooded area, may impact selected trees within potential roosting habitat for SAR bats. Limited vegetation removal is not expected to have a significant impact on the available overall potential habitat for these species within the greater area. Direct impact to species is expected to be avoided with appropriate timing of vegetation removal to be completed outside of the active season for bats.

The Preferred Solution is not anticipated to directly impact breeding birds, generalist mammal species, and Species at Risk wildlife with the implementation of avoidance measures, including minimizing the footprint of construction and timing of construction for the removal of vegetation.

The Species at Risk in Ontario (SARO) List is updated from time to time; therefore, it is the proponent's responsibility to practice due diligence to ensure that the ESA and its regulations are not violated. It is also the proponent's responsibility to be apprised of any amendments to *the Act* that may come into force for the duration of this project.

12.3 Socio-Economic / Cultural Environment

The construction of the preferred solution will occur within the regulated area of the TRCA. Development or alterations within the jurisdiction of the TRCA in Regulated Areas will require a Permit from TRCA under Ontario Regulation 166/06 (Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).

Replacement of the structures may impact potential archaeological resources because of grading within previously undisturbed areas within the existing Patterson Side Road and Duffy's Lane ROW. Stage 2 Archaeological Assessment is required prior to any construction activities if areas of identified archaeological potential are impacted. To be confirmed during detailed design once grading limits are established.

The loss of the existing Bridge Structures 1 and 2 will not result in the loss of cultural heritage value, as identified in the CHER. The loss of the existing Duffy's Lane Bridge will result in the loss of a valued cultural heritage structure.

12.4 Financial

The preferred solutions, i.e., replacement of the bridge structures, will result in high capital cost. More accurate cost estimates are expected to be developed during the detailed design stage.

13.0 Mitigation Measures

The following mitigation measures and design approach should be implemented to mitigate negative impacts of the proposed project on the environment of the study area for the Patterson Side Road bridges and considered for future improvements to the Duffy's Lane Bridge. It is also recommended that the following mitigation and monitoring measures be included within the detailed design process and reporting, and within the Special Provisions Section of the Tender Documents, as applicable.

All Design and Construction Reports and Plans will be based on a best management approach that centers on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of the impacted areas.

13.1 Surface Water / Hydrology and Sedimentation

Potential Effect

1. Potential for sediments to enter the watercourse as a result of the following project activities:
   a) Stockpiling
   b) Excavation
   c) Construction
2. Potential for localized water quality impacts as a result of spills.
3. Potential for invasive species to enter the environment.

Mitigation Measures

1. The footprint of disturbed areas should be minimized as much as possible, for example, vegetated buffers / setbacks should remain untouched adjacent to the watercourse, wherever possible.
   a) An Erosion and Sediment Control Plan should be developed during detailed design, prior to construction. Implementation of the erosion and sediment control measures shall conform to recognized standard specifications, such as Ontario Provincial Standards Specification (OPSS), and the requirements of the TRCA.

b) In-water operation of heavy equipment should be prevented, as well as minimizing the operation of any equipment on the banks of the watercourse. Stockpiled material should be stored and stabilized at least 30 m from the watercourse. All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water.

c) Sediment and erosion control measures (silt curtains, silt fence, rock check dams, etc.) should be installed and maintained during the work phase, until the site has been stabilized. Control measures should be inspected daily to ensure they are functioning and maintained as required. If control measures are not functioning properly, no further work should occur until the problem is resolved.

d) Temporary mitigation measures should be installed prior to the commencement of any clearing, grubbing, excavation, filling, or grading works and must be maintained on a regular basis, prior to, and after precipitation events.

e) Water quality impacts related to surface water run-off should be mitigated to avoid downstream impacts by controlling surface water run-off within the boundaries of the site.

f) All disturbed areas of the work site should be stabilized immediately, and re-vegetated as soon as conditions allow.

2. All equipment fueling and maintenance should be done at least 30 m from the watercourse to ensure that no deleterious substances enter the waterway.

   a) The contractor will be required to develop Spill Prevention and Contingency Plans for construction and operational phases of the project. Personnel will be trained in how to apply the Plans, and the Plans will be reviewed to strengthen their effectiveness and ensure continuous improvement. Spills will be immediately contained and cleaned up in accordance with provincial regulatory requirements and the contingency plan. A hydrocarbon spill response kit will be on-site at all times during the work. Spills will be reported to the Ontario Spills Action Center at 1-800-268-6060.

3. All equipment and personal protective equipment must arrive on-site clean to prevent the potential transfer of invasive species (i.e., phragmites) to the local environment.

13.2 Soil and Groundwater

Effect

1. There is potential for localized groundwater quality impacts as a result of spills.

2. Potential dewatering of the work area may be required.

3. Potential for excess soil as a result of bridge replacement.

Mitigation Measures

1. Refueling of equipment and fuel storage should be conducted in designated areas, at least 30 m away from the watercourses and any existing wells, with spill protection provided.

    a) If applicable, the work area should be dewatered as per recognized provincial standards and pumped into acceptable dewatering traps. These dewatering traps should be placed away from the watercourse to allow for infiltration prior to discharging to the watercourse. It is recommended the work be scheduled following periods of prolonged dry weather, and when the ground water table and creek flow are usually at their lowest, in order to minimize the quantity of water to be handled.

    b) Activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during construction must be disposed of in accordance with ministry requirements.

13.3 Trees and Vegetation

Effect

1. Loss of vegetation.
    a) Grading impacts. Trees adjacent to the ROW may be subject to impacts within the rootzone as a result of proposed grading and other construction activities.

Mitigation

1. Minimize disturbance to existing vegetation. Adjust grading prior to construction to reduce impacts to trees by increasing the steepness of slopes in isolated locations, where feasible.
    a) Disturbed areas will be stabilized and re-vegetated upon project completion and restored to a pre-disturbed state where practical. An appropriate seed mix will be selected based on consultation with the TRCA.

2. Impacts to individual trees adjacent to the ROW should be evaluated for impacts on a case-by-case basis during detailed design. Protection measures (e.g., tree protection, erosion, and sediment control) are recommended where construction is proposed to protect trees from grading impacts and when adjacent construction is occurring to prevent access, stockpile, and storage within the adjacent sensitive watercourse communities.

3. Erosion and Sediment Control (ESC) measures must be installed prior to commencement of any grading or vegetation disturbance.

4. An environmental inspector shall be engaged during the construction phase to review ESC measures that will also act as tree protection measures for deficiencies. Deficiencies will be resolved immediately.

5. No access, storage, or stockpile of materials or equipment can occur within the area protected by the ESC measures.

6. A certified arborist should carry out or oversee the mitigation of any impacts to trees, including broken branches.

13.4 Wildlife / Habitat

Effect

1. Temporary displacement of and disturbance to wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance), including SAR. Works associated with the bridge replacements may also temporarily limit wildlife movement and reduce useable habitat during the construction phase.

2. Vegetation clearing in the wooded area (SWM01, SWCM1-2, and SWCM1, FOMM4 2, FOMM7 2) within and adjacent to the ROW may impact selected trees within potential roosting habitat for SAR bats.

Mitigation

1. The footprint of the proposed disturbed area should be minimized as much as possible.
   a) Avoid vegetation clearing during sensitive times of the year for local wildlife, such as spring and early summer (when many animals bear their young or migrate between winter and summer habitats).
   b) To reduce the risk of potential impact to wildlife, including SAR, vegetation clearing should not be completed between April 1 to October 31 to avoid the active period for the following:
      1) Breeding birds – Broadly from April 1 to August 31 for most species (regardless of the calendar year).
      2) Reptile species – Special Concern – Generally considered to be from April to October (Environment Canada, 2014).
      3) Bat species – Considered to be between April 1 to October 31, of any calendar year.
      4) Monarch species – End of May through end of August. Removals of individual host plants (milkweed species) and their supporting habitat should be avoided during the active egg-laying and larval stages of monarch species.
   c) Temporary silt fence barriers are recommended to exclude wildlife (i.e., amphibians and reptiles) from the earthwork and construction activities in areas adjacent to low-lying areas. Temporary exclusion fencing shall be installed to allow wildlife to leave the fenced area during vegetation clearing. Once the work area has been cleared, it can be securely fenced to prevent wildlife from returning. The excluded area shall be searched immediately following fencing

installation for any wildlife (including SAR) that may have become trapped. Any wildlife shall be permitted to escape to a suitable habitat.

d) Active nests (nests with eggs or young birds) of protected migratory birds, including SAR protected under the ESA, cannot be destroyed at any time of the year.

e) If a nesting migratory bird or SAR protected under ESA is identified within or adjacent to the construction site and the activities are such that continuing works in that area would result in a contravention of the MBCA or ESA, all activities shall stop and the contract administrator (with assistance from an avian biologist) shall discuss mitigation measures with the County.

f) Should SAR be identified, all activities shall stop and MECP, responsible for administering SAR under the ESA, shall be contacted immediately to ensure compliance with the ESA. The contract administrator shall instruct the contractor on how to proceed based on the mitigation measures established through discussions with the County, the MECP and/or Environment Canada.

g) An environmental inspector shall be engaged during the construction phase to review ESC measures that protect adjacent natural features and prevent certain wildlife such as reptiles and amphibians from entering the work zone. The environmental inspector shall ensure that all deficiencies are resolved immediately.

h) Consideration should be given during detailed design to facilitate wildlife passage through sizing and design of bridge structures to reduce road mortality for reptiles, amphibians, and small mammals. Design details should be coordinated with MECP and TRCA during detailed design.

13.5 Fish and Fish Habitat

Effect

1. In-water works may be required, and the proposed works could potentially pose a harmful alteration, destruction, or disruption (HADD) of fish and/or fish habitat, as described in the *Fisheries Act*.

Mitigation Measures

1. The proposed works will be reviewed by a qualified professional aquatic ecologist to determine whether a HADD can be avoided or adequately mitigated. If a HADD cannot be avoided, the DFO will be consulted through a Request for Project Review to determine appropriate next steps.

   a) During detailed design, correspondence should be maintained with a qualified professional aquatic ecologist to determine appropriate mitigation measures and

whether the proposal has potential to pose an unavoidable HADD. Preferred mitigation measures include work zone isolation while maintaining flow downstream and fish salvage. Efforts will be made in consultation with the DFO to mitigate, should a HADD be unavoidable.

b) Near-water work and work below the annual high-water mark will adhere to the appropriate in-water work timing window to avoid potential impacts to resident and migratory fish species.

c) A permit from the TRCA under the Development, Interference, with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 166/06) will be required prior to conducting the proposed works as work is proposed within a flood regulated area.

13.6 Noise / Vibration / Air Quality / Greenhouse Gas Emissions

Effect

1. Temporary nuisance noise during construction activities. Effects could also include increased dust in the air and carbon emissions from construction activities.

Mitigation

1. Noise control measures, such as restricted hours of operation and the use of appropriate machinery / mufflers will be implemented where required. Vehicles / machinery and equipment should be in good repair, equipped with emission controls, as applicable, and operated within regulatory requirements. If required, dust control measures may include the wetting of surfaces using a non-chloride-based compound to protect water quality.

13.7 Cultural Heritage

Effect

1. Potential impact to archaeological resources beyond the limits of the ROW. The property inspection determined that parts of the study area exhibit archaeological potential and will require Stage 2 assessment, prior to any proposed construction activities.

2. Potential impact to build cultural heritage resources beyond the limits of the ROW.

Mitigation

1. The following mitigation is excerpted from the Stage 2 Archaeological Assessment Report completed by Archaeological Services Inc. (January 2021), and provided in Appendix A.

a) For areas within the study area that exhibit archaeological potential, these lands require Stage 2 Archaeological Assessment by test pit survey at 5 m intervals prior to any proposed impacts to the property.

b) The remainder of the study area does not retain archaeological potential on account of deep and extensive land disturbance, watercourses, or slopes more than 20 degrees. These lands do not require further archaeological assessment.

c) Should the proposed work extend beyond the current study area, further Stage 1 Archaeological Assessment should be conducted to determine the archaeological potential of the surrounding lands.

2. The following recommendations are excerpted from the Draft Cultural Heritage Evaluation Report (January 2021, revised March 2021).

   a) A Cultural Heritage Impact Statement / Heritage Impact Assessment should be completed for the Duffy's Lane Bridge prior to construction, as early as possible during detailed design. This assessment should be completed by a qualified person who has relevant and recent experience in the conservation of road bridges (see Section 3.0 of the Standards and Guidelines for Conservation of Provincial Heritage Properties (MHSTCI 2014) as a guide for best practice) and submitted to heritage staff at the Town of Caledon for review and approval.

14.0 Climate Change Considerations

Climate change is defined as any significant change in long-term weather patterns. The term can apply to any major variation in temperature, wind patterns or precipitation that occurs over time. Global warming describes the recent rise in the average global temperature caused by increased concentrations of greenhouse gases (GHGs) trapped in the atmosphere.

Scientists have concluded that human activity is largely responsible for recently observed changes to our climate since GHGs are mainly caused by burning fossil fuels to produce energy.

The MECP finalized a document entitled "Considering Climate Change in the Environmental Assessment Process" in 2017 that provides guidance relating to the ministry's expectations for considering climate change during the MCEA process. It is suggested that this guide be consulted if an approved MCEA has no climate consideration method.

There are two types of climate change effects that can be considered. The first is the effect that a project can have on climate change. In this case, the degree to which the project can provide some climate change mitigation measures is to be assessed. The second is the effect climate change has on the project. In this case, the degree to which

the project can demonstrate adaptation to climate change impacts is assessed. Climate change was considered during this MCEA and is discussed in this section.

14.1 Effects of the Project on Climate Change

There is potential for the works proposed to impact the atmosphere through the emission of GHGs on an ongoing basis.

An increase in traffic over time may result in an increase in associated GHG emissions. Bridge improvements are anticipated to reduce traffic congestion. Other carbon sources and emissions associated with this project would relate to construction vehicle emissions during the construction period. Emissions can be decreased by increasing efficiency and through regular maintenance of equipment.

Landscape changes associated with a project can also impact climate change. A carbon sink is described as a land or ocean mass that can take in carbon, in particular carbon dioxide, from the atmosphere. Vegetation can assist in removing carbon dioxide from the atmosphere.

The proposed undertaking will result in some vegetation removal during grading activities. Vegetation loss (and related carbon sink removal) is anticipated to be minimized as much as possible by reducing the footprint of grading activities where feasible.

14.2 Effects of Climate Change on the Project

The pavement and bridge deck infrastructure are susceptible to deterioration from freeze-thaw events. Roadside drainage and watercourse features may be impacted by increased precipitation events that are becoming more prevalent in Southern Ontario due to climate change effects which can result in potential flooding and erosion of bridge abutments.

The detailed design of the bridge improvements and associated infrastructure will consider peak flows and capacity.

15.0 Conclusions

During detailed design and construction of the project, the following commitments are required:

- Mitigation measures as detailed in Section 13.0, including updating the Draft Cultural Heritage Report for the Duffy's Lane Bridge to confirm potential impacts of the undertaking on the cultural heritage resources in the study area, as early as possible during detailed design and prior to construction.

- Evaluate options of road closure during replacement versus staged construction. Confirm staging requirements during construction.
- The Town will be required to secure all necessary Permits and/or Authorizations required for the Project, including:
  - Consultation with the TRCA with respect to working within a regulated area
  - Six Nations of the Grand River should also be engaged at the initiation of the design phase to confirm their interest in the project
  - The Mississaugas of the Credit First Nation and the Huron-Wendat Nation must be contacted to coordinate participation in the Stage 2 Archaeological Assessment fieldwork prior to any field work planned for later stages of the project

As per the requirements of the MCEA, this Project File Report is available for public review and comment for a period of 30 calendar days following the publication of the Notice of Completion.

16.0 References

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Appendix A

Existing Conditions

Technical Memorandum Physical Conditions - Patterson Sideroad Bridges 1 and 2	A1
Technical Memorandum Physical Conditions – Duffy's Lane	A2
Geotechnical Investigation –Geotechnical Report – 20BF041 2021-03-05	A3
Technical Memorandum Aquatics Conditions – Patterson Sideroad Duffy's Lane Bridges Aquatics Memo	A4
Technical Memorandum Terrestrial Assessment Conditions – Natural Heritage Memo	A5
Technical Memorandum Hydraulic Conditions – Patterson Sideroad Duffy's Lane Bridges Hydraulic Report	A6
Cultural Heritage Evaluation Report – 20CH-115 Patterson Sideroad Duffy's Lane Bridges	A7
Stage 1 Archaeological Assessment – Stage 1 Report	A8

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Technical Memorandum
Physical Condition - Patterson Side Road Bridges 1 and 2

Date: January 30, 2023 **Project No.:** 300051839.0000

Project Name: Patterson Side Road Bridges 1 (B22162016) and 2 (B22164017)

Client Name: Town of Caledon

Submitted To: Project File Report

Submitted By: Andrew Dawson, P.Eng.

Reviewed By: Matthew Brooks, P.Eng.

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As part of the Schedule B Environmental Assessment (MCEA) for the Patterson Side Road and Duffy's Lane Bridges, R.J. Burnside & Associates Limited (Burnside) has completed a visual inspection of the Patterson Side Road structures and reviewed all available background information for the bridges to evaluate the various options as part of the MCEA, considering the physical environment. The Patterson Side Road Bridges are located on Patterson Side Road, with Bridges 1 (B22162016) and 2 (B22164017) located approximately 300 m southwest and 20 m northeast of Duffy's Lane, respectively.

Structure Background Information

Patterson Side Road Bridge 1 (B22162016)

The existing structure consists of a 7.0 m (+/-) span (7.4 m +/- parallel to road) cast-in-place concrete T Beam structure, with an overall structure width of approximately 7.4 m (+/-) and a driving platform width of approximately 6.4 m between barriers. The structure is skewed at an angle of approximately 18.4° to perpendicular. Portions of the original drawings were obtained during background review, but no date was present on the available drawings. It is estimated that the structure was constructed in the 1950s.

By comparison of the current structure to the original drawings, a rehabilitation has occurred previously, at an unknown date. This rehabilitation consisted of removal of the existing barrier and increasing the height of the curb, with a new curb mounted guide rail barrier. This rehabilitation increased the amount of fill over the bridge from approximately 200 to

500-700 mm. It is unknown whether the structure was evaluated at the time of rehabilitation to confirm if it could carry the increased dead loads. As such, it is recommended that a structure evaluation be considered if the original structure is to remain to confirm it can carry the additional dead load without limiting the live (truck) loads. Background review also indicated that a rehabilitation design for the widening and repair of the bridge was completed in 2001; however, based on the site review the designed rehabilitation was never completed.

Patterson Side Road Bridge 2 (B22164017)

Patterson Bridge 2 consists of a 13.7 m (+/-) span, cast-in-place concrete rigid frame with an overall structure width of approximately 8.7 m (+/-) and a driving platform width of approximately 7.67 m between barriers. The structure was originally constructed in 1957 and later rehabilitated in 2001.

Preliminary consideration regarding repair or replacement alternatives has been evaluated previously by GHD Limited (GHD). The options of a concrete overlay rehabilitation versus full structure replacement were analyzed. GHD's recommendation was to proceed with rehabilitation of the structure. However, this analysis considered cost and physical condition of the structure only but did not take into consideration aspects such as provisions to increase driving platforms and adjust vertical alignments to meet current Town standards. These considerations will be further evaluated within the MCEA.

Physical Condition

On October 27, 2020, Andrew Dawson, P.Eng., and Devin Soeting, C.E.T., from Burnside conducted a Field Investigation to review the physical conditions of Patterson Side Road Bridges 1 and 2. The previous 2019 OSIM inspections (completed by GHD Limited) and Detailed Deck Condition Surveys (DDCS) (completed by Bridge Check Canada) were also reviewed in consideration of analyzing the condition of the structures. A summary of the findings for each structure are below:

Patterson Side Road Bridge 1 (B22162016)

Overall, the structure was noted to be in fair condition overall with light scaling and hairline to narrow cracking throughout, localized moderate to severe defects (wet areas, delaminations, spalls, etc.) on the abutments wingwalls and soffit. The DDCS also identified probable active corrosion in 29% of the deck top, 14% of the east abutment, 26% of the west abutment and 56% of the wingwalls. The noted physical defects at the structure could be repaired as part of a major rehabilitation of the bridge by completing conventional concrete patch repairs.

Bridge 1 is not well aligned with the watercourse in its current condition. The watercourse currently flows into the northwest wingwall and abutment corner and flows through the bridge are concentrated along the west abutment. This poor alignment has caused scour on the northwest embankment, requiring additional steel sheet piles to be installed to retain the fill

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slope. It has also caused scouring along the east abutment, reducing the cover over the footings.

Patterson Side Road Bridge 2 (B22164017)

Overall, Patterson Bridge 2 was noted to be in fair condition overall, with minor surface defects (scaling, narrow cracks) throughout, and localized moderate to severe defects. A medium to wide crack with efflorescence was noted on the soffit near the centerline, indicating moisture penetration through the concrete deck. Delaminations and spalling were also noted on the soffit. Previous patching of the concrete was observed, but the bonding of these patches to the original concrete are failing in some locations. All of the noted defects at the structure could be repaired as part of a major rehabilitation of the bridge, which would likely require a concrete overlay on the deck, and significantly large patch repair areas.

The DDCS confirmed the presence of a waterproofing membrane which is generally in good condition, but also indicated probable corrosion in 36.6% of the deck top area. Given that there is 8.6% of the deck area with high corrosion potential (<-0.45V), and delamination planes were found in 75% of the deck cores, the removal limits are estimated to be above 10% of the deck area, and a concrete overlay would be the recommendation for deck top repairs. The DDCS also indicated probable active corrosion in 100% of the west abutment, 78% of the east abutment and 98% of the wingwalls. With this extent of probable corrosion occurring, the degradation rate of the structure will likely accelerate in the future if no action is taken.

The watercourse at Bridge 2 flows predominantly along the west abutment, which has caused some erosion along the toe of embankments adjacent to the intersection.

Geometry – Width

Patterson Side Road currently carries two lanes of traffic, with a paved width of approximately 7 - 7.5 m and gravel shoulder widths ranging from 0.5 m to 1.0 m, with an overall platform width of approximately 9.0 m. As previously noted, the widths of Bridge 1 and 2 are 6.4 m and 7.67 m, respectively. As such the roadway currently narrows at each of the bridge crossings.

A road reconstruction design is currently in the final stages for the portion of Patterson Side Road where Bridge 1 and 2 are located. The design, which is being completed by Morrison Hershfield, consists of a 9.0 m wide paved platform on the approaches to the bridge, with 3.0 m lanes and 1.5 m paved shoulders. However, the road width will transition current driving platform width between barriers over the existing bridges. It should be noted however that this proposed road platform configuration does not meet the Town's current standards as outlined in the Transportation Master Plan.

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The Town's October 2017 Transportation Master Plan (TMP) recommends that the segment of Patterson Side Road accommodate a 'Shared On-Road Cycling Route'. The total driving platform required for a rural road with the desired 1.5 m wide Signed Bikeway (per Table 4.5 of the TMP) would be 10.0 m, as illustrated in Figure 1 (excerpt of Figure 4.1 of Caledon's TMP).

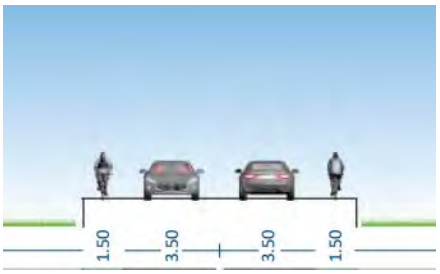


Figure 1 - Rural Road Cross-Section

Review of the TAC Geometric Design Guide for Canadian Roads[1] and MTO Design Supplement (April 2020) were also reviewed for comparison to the Town's 2017 TMP standards. The 10.0 m wide Town standard platform would meet the minimum requirements, provided that the design speed of the roadway is 70 km/hour or less. If the desired design speed were to be 80 km/hour, the required shoulder and side clearance (distance between edge of lane and bridge barrier) widths would be 2.0 m, for a total platform width of 11.0 m.

Given the narrow platform width of the existing bridges, the structures are deficient with respect to platform width and cannot accommodate the shared on-road bicycle lanes or provide the recommended side clearances. To rectify the geometric deficiencies, the structures could be widened as part of a major rehabilitation or replaced with a new two lane structure.

Geometry – Profile

Patterson Side Road in the Town of Caledon is considered a rural collector road and has a posted speed limit of 60 km/hour at the site. The structures are on a vertical curve portion of the roadway profile. As previously mentioned, Morrison Hershfield is currently in the stage of finalizing the design for a reconstruction of Patterson Side Road, which includes the subject area of the structures. The proposed road reconstruction reduces the speed limit of the roadway to the northeast and southwest of the structure to 40 km/hour; however, the posted speed limit at the bridge locations is noted to remain as 60 km/hour based on Morrison Hershfield's '100% Submission' drawings, dated August 28, 2020.

As per the MTO Design Supplement for TAC – April 2020:

> *"Design speed should be greater than or equal to the legal posted speed. Generally, the desirable practice of selecting the design speed for new construction and reconstruction is 20 km/h greater than the posted legal speed, unless circumstances warrant a reduction.*
>
> *A design speed equal to the maximum posted speed is accepted where warranted by such factors as low traffic volumes, rugged terrain and economic considerations. This practice would be more appropriate for minor collector*

[1] Chiu, M., Clayton, C., Millen, G. et al. 2017. *Geometric Design Guide for Canadian Roads*. Ottawa, ON: Transportation Association of Canada

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and local roads. A design speed equal to the legal posted speed is the normal practice for Secondary highways"

In order to achieve the *desirable* 80 km/hour design speed (20 km/hour greater than currently posted), significant adjustments to the road profile would be required. Preliminary profile options indicate 3-4 m of fill would be required in areas of the existing bridges and the intersection with Duffy's Lane. Such increases would only be feasible with full structure replacements. This magnitude of increase would also result in grading conflicts to the adjacent watercourse, significant property acquisitions or retaining walls and significant reconstruction of the Duffy's Lane intersection and adjacent bridge structure. Additionally, the substantial increase in the profile would have negative hydraulic impacts during larger storm events and would require a significantly larger span structure to attempt to offset these impacts.

Therefore, given the above constraints of the site, it is recommended that the road profiles be designed for a 60 km/hour design speed, to match the current maximum posted speed limit, as per normal practice for Secondary highways.

To meet the minimum required design speed equal to the legal posted speed (60 km/hour), the minimum K-factors for crest and sag curves in accordance with TAC Geometric Design Guides are 11 and 18, respectively. Given that the Patterson Side Road reconstruction profiles (completed by Morrison Hershfield) have more abrupt curvature rates than these standards, adjustments to the road profile should be considered as part of the bridge improvement works. If the Town desires to meet the *desirable* design speed of 20 km/hour above the posted speed limit, consideration should be given to reducing the speed limit to 40 km/h in the vicinity of the bridges, which would match the speed limit of the roadway approaching the bridges.

To rectify the profile / sight distance deficiencies at the site to meet the 60km/hour design speed criteria, increases to the road profiles at the bridge locations up to approximately 0.65 m and 0.45 m would be required for Bridges 1 and 2, respectively. To achieve these profile increases on the existing structures, significant structural overlays would be required, which would likely require strengthening and load posting of the existing structures and therefore are not considered feasible for rehabilitation options. Replacement of the structures would allow for the 60 km/hour design speed profiles to be achieved without load postings.

With regard to hydraulics, the existing structures pass the 50-year design storm flows with clearances greater than the minimum requirements for a Collector Road. As such, the consideration for increasing the road profile is to improve sight lines only. For further information regarding hydraulic performance of the existing and proposed structures, please refer to the Hydraulic Report.

A Preliminary Plan and Profile Drawing for a 60 km/hour design speed and 10.0 m paved platform width is available in Appendix A.

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Load Capacity

Both Patterson Bridges 1 and 2 do not have load limit postings on the structures. However, Heavy Truck traffic is currently restricted on Patterson Side Road by Town By-Law, as identified by the Rb-62 signage at intersections. The By-Law restricts *commercial* vehicles over 12 tonnes from using the structures unless use of the roadway is required for delivery or collection purposes with no alternative route. The by-law excludes emergency response vehicles, Town/Region/Province and utility vehicles from these restrictions.

As previously noted, Patterson Side Road Bridge 1 has had additional deadload added to the structure, with the amount of fill over the structure increased from 200 mm in the original design to 600-700 mm under current conditions. This addition of dead loads can affect the structure's capacity for carrying traffic loading.

Additionally, the required live load capacities have increased since the time of the original design of the structure. As such, if the current structures are to remain, a structure evaluation is recommended to be completed on both structures to determine if a more restrictive load posting would be required.

If it is determined that a load posting is applicable at either structure, there is a potential that strengthening of the existing bridges during a major rehabilitation may help increase the allowable loading.

Evaluation of Alternatives

The MCEA for the Patterson Side Road Bridges has identified the following four options for each of the structures:

1. Do Nothing
2. Rehabilitation
3. Rehabilitation with Widening; or
4. Replacement.

Cross-sections outlining the general scopes of work for each of the proposed options above (excluding the Do Nothing option) are provided in Appendix B.

Each alternative is to be evaluated based on its ability to improve the physical environment at the site, which is the intent of this Technical Memo. Table 1 and Table 2 are a summary of the physical environments that were considered, the noted deficiencies and the effectiveness of each option to rectify the deficiency and identify a Preferred Solution.

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Table 1: Evaluation of Alternatives, Physical Environment - Patterson Bridge 1

	EA Options			
	Do Nothing	**Rehabilitation**	**Rehab. & Widen**	**Replacement**
Physical Condition	Defects not addressed; Structure generally in fair condition with limited (10 years +/-) service life remaining; Alignment with watercourse not improved	All defects can be addressed to extend the service life to 20-25 years. Alignment with watercourse not improved	All defects can be addressed to extend the service life to 20-25 years (limited by existing substructure); Alignment with watercourse not improved	A new structure will not have any defects and all issues will be addressed; Service life of 75 years expected; Alignment with watercourse improved.
Geometry – Width	No improvement to driving platform width.	No improvement to driving platform width.	Structure can be widened as part of a major rehabilitation to meet desired platform width.	A new structure can be constructed to the desired platform width.
Geometry – Profile	No opportunity to improve profile and sight lines. Design speed of less than 40 km/hour	Opportunity for minor improvement to profile and sight lines (40 km/hour design speed).	Opportunity for minor improvement to profile and sight lines (40 km/hour design speed).	Sight distance can be improved to meet 60 km/hour design speed.
Load Capacity	No opportunity to improve capacity of the structure. May require load posting	Reinforced concrete deck overlay to replace granular fill and improve capacity.	Reinforced concrete deck overlay to replace granular fill and improve capacity.	A new bridge will not have any load restrictions.
Cost	No immediate costs, service life of structure is > 10 years.	$385,000.00 (See Appendix C)	$1,150,000.00 (See Appendix C)	$1,895,000.00 (See Appendix C) Based on 16.25m span bridge
Preferred Option	Least Preferred	Less preferred	Somewhat Preferred	**Most Preferred**

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Table 2: Evaluation of Alternatives, Physical Environment - Patterson Bridge 2

	EA Options			
	Do Nothing	**Rehabilitation**	**Rehab. & Widen**	**Replacement**
Physical Condition	Defects not addressed; Structure generally in fair condition with limited (10-15 years) service life remaining; Alignment with watercourse not improved	All defects can be addressed to extend the service life to 20-25 years. Alignment with watercourse not improved	All defects can be addressed to extend the service life to 20-25 years (limited by existing substructure); Alignment with watercourse not improved	A new structure will not have any defects and all issues will be addressed; Service life of 75 years expected; Alignment with watercourse improved.
Geometry – Width	No improvement to driving platform width.	No improvement to driving platform width.	Structure can be widened as part of a major rehabilitation to meet desired platform width.	A new structure can be constructed to the desired platform width.
Geometry – Profile	No opportunity to improve profile and sight lines. Design speed of less than 40 km/hour	Opportunity for minor improvement to profile and sight lines (40 km/hour design speed).	Opportunity for minor improvement to profile and sight lines (40 km/hour design speed).	Sight distance can be improved to meet 60 km/hour design speed.
Load Capacity	No opportunity to improve capacity of the structure. May require load posting	Opportunity to strengthen structure & provide minor capacity improvement	Opportunity to strengthen structure & provide minor capacity improvement	A new bridge will not have any load restrictions.
Cost	No immediate costs, service life of structure is > 10 years.	$675,000 (See Appendix C)	$1,095,000.00 (See Appendix C)	$2,175,000.00 (See Appendix C) Based on a 14.0m span bridge.
Preferred Option	Least Preferred	Less preferred	Somewhat Preferred	**Most Preferred**

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For reference, Preliminary Cost Estimates have been provided and enclosed within the document.

Summary

The Preferred option to address the physical and geometric deficiencies for both Patterson Side Road Bridges 1 and 2 is to replace the structures with new, wider platform structure.

If you have any questions or comments do not hesitate to contact the undersigned.

R.J. Burnside & Associates Limited

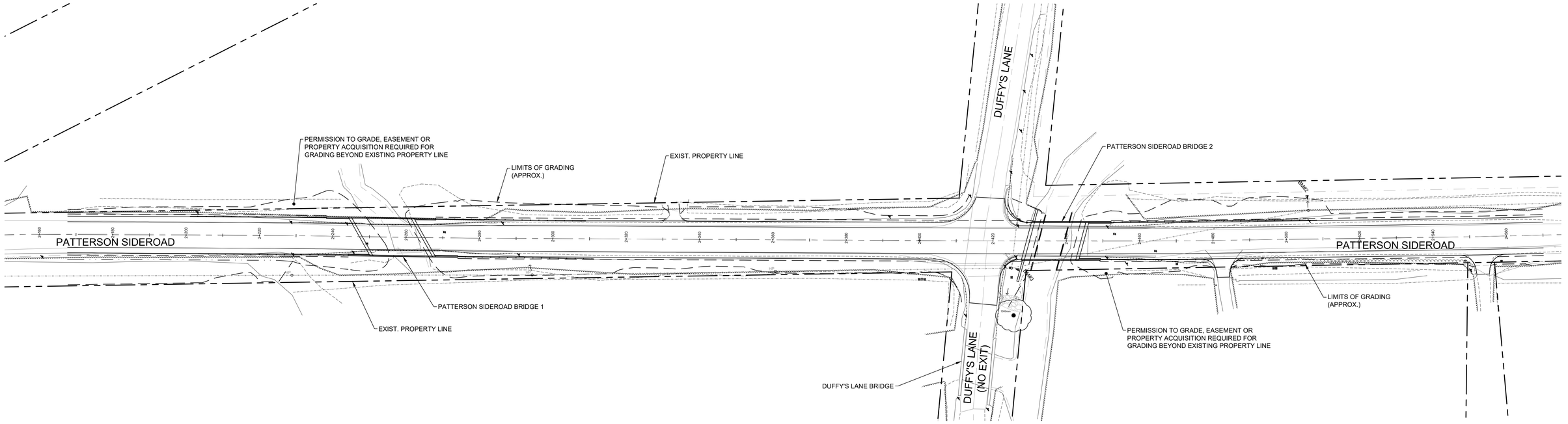
Andrew Dawson, P.Eng.
Project Engineer

AD:jm

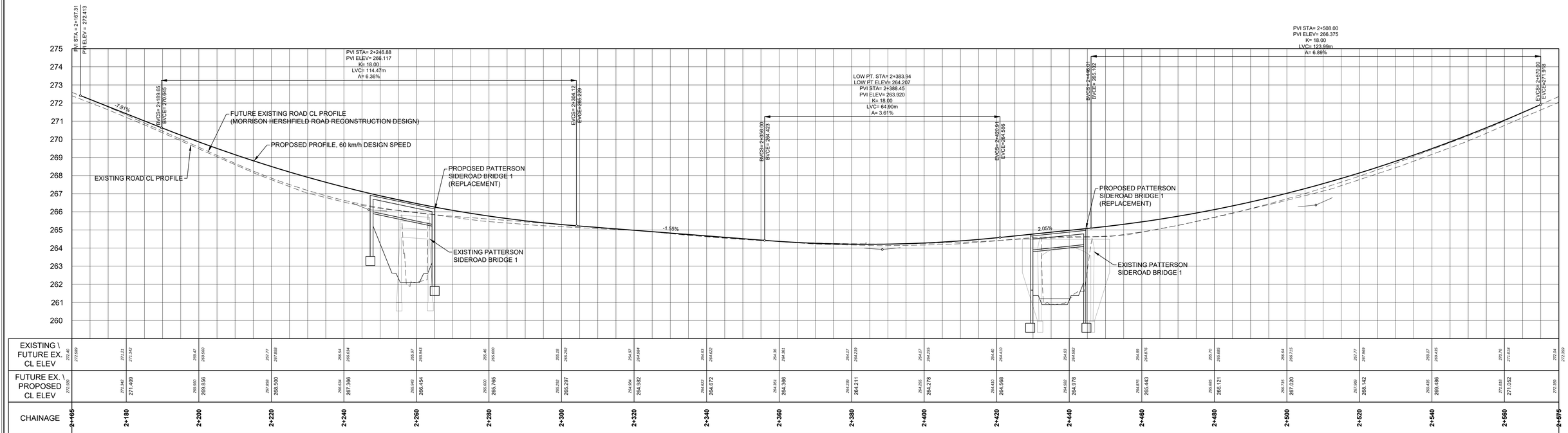
Enclosure(s) Appendix A – 051839 Patterson EA P&P
Appendix B – Patterson EA Bridge Cross Sections
Appendix C – Bridge 1 Cost Estimates
Bridge 2 Cost Estimates

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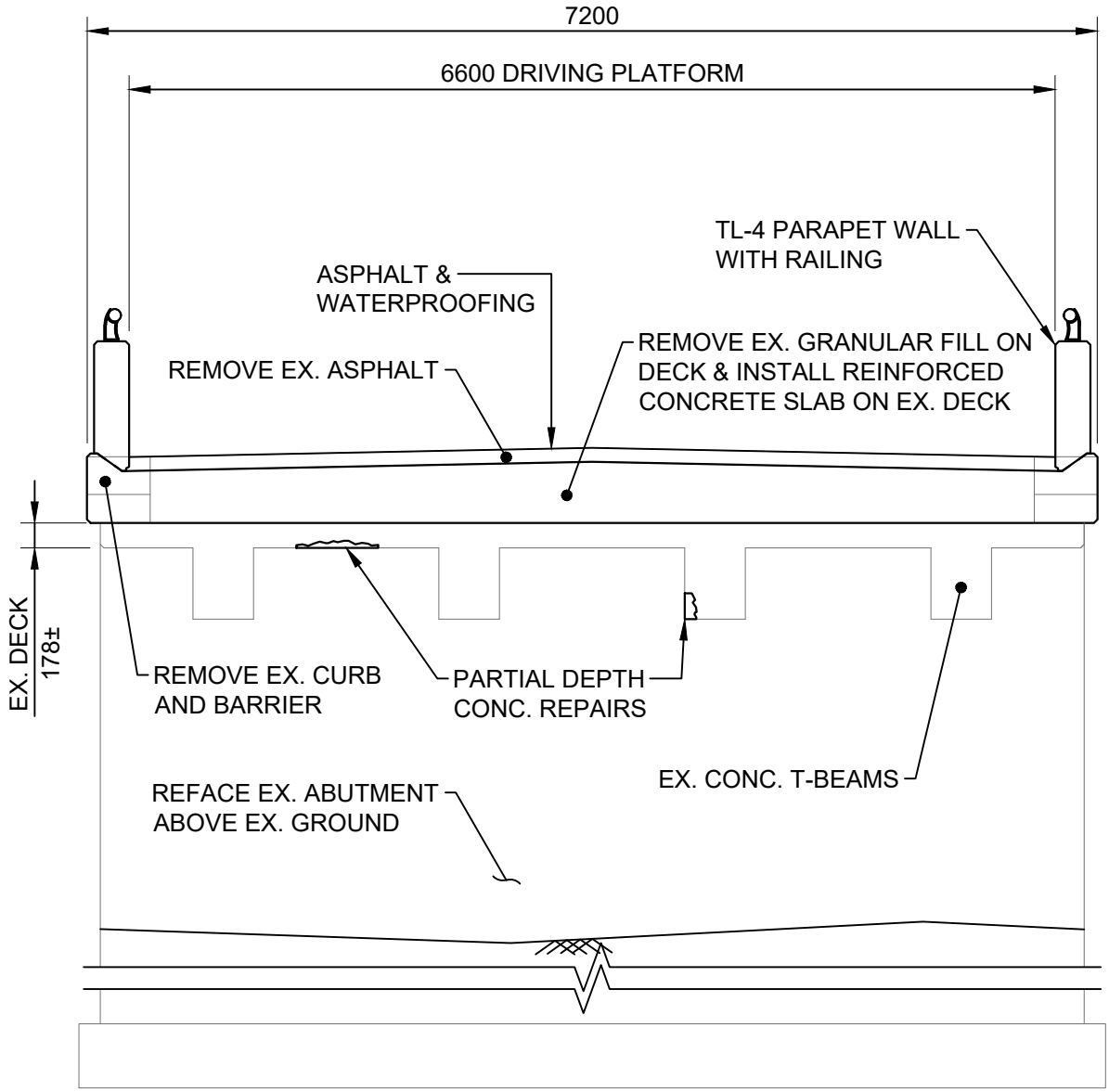
PLAN
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CHAINAGE	2+165	2+180	2+200	2+220	2+240	2+260	2+280	2+300	2+320	2+340	2+360	2+380	2+400	2+420	2+440	2+460	2+480	2+500	2+520	2+540	2+560	2+575
EXISTING \ FUTURE EX. CL ELEV	272.089	272.240	271.221 271.342	269.447 269.560	267.777 267.858	266.554 266.634	265.937 265.943	265.446 265.600	265.118 265.292	264.497 264.684	264.463 264.622	264.361 264.361	264.217 264.239	264.217 264.255	264.410 264.410	264.583 264.582	264.889 264.876	265.370 265.685	266.064 266.715	267.177 267.999	269.125 269.435	270.376 271.018	272.054 272.389
FUTURE EX. \ PROPOSED CL ELEV	272.089	271.342 271.469	269.560 269.856	267.858 268.500	266.634 267.366	265.943 266.454	265.600 265.765	265.292 265.297	264.684 264.982	264.622 264.672	264.361 264.386	264.239 264.211	264.255 264.278	264.410 264.588	264.582 264.978	264.876 265.443	265.685 266.121	266.715 267.020	267.999 268.142	269.435 269.486	271.018 271.052	272.389 272.389

BURNSIDE	Figure Title: PATTERSON SIDEROAD BRIDGES — PLAN AND PROFILE - 60 kmh	
Client: TOWN OF CALEDON	Drawn: AD; Checked: MB; Date: 21/02/08	Figure No.: 1
	Scale: AS NOTED	Project No.: 300051839.7000

M:\Projects\Client Work\300051839 Caledon 5 Year\300051839 - Caledon 5 Year Drawings\2015\01 Preliminary Design\2015-01-14 Patterson SR Bridges\Patterson SR Bridges.dwg, Data Added February 9, 2021 9:43:29



BRIDGE 1 - OPTION 2 - REHABILITATION

1:50

BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

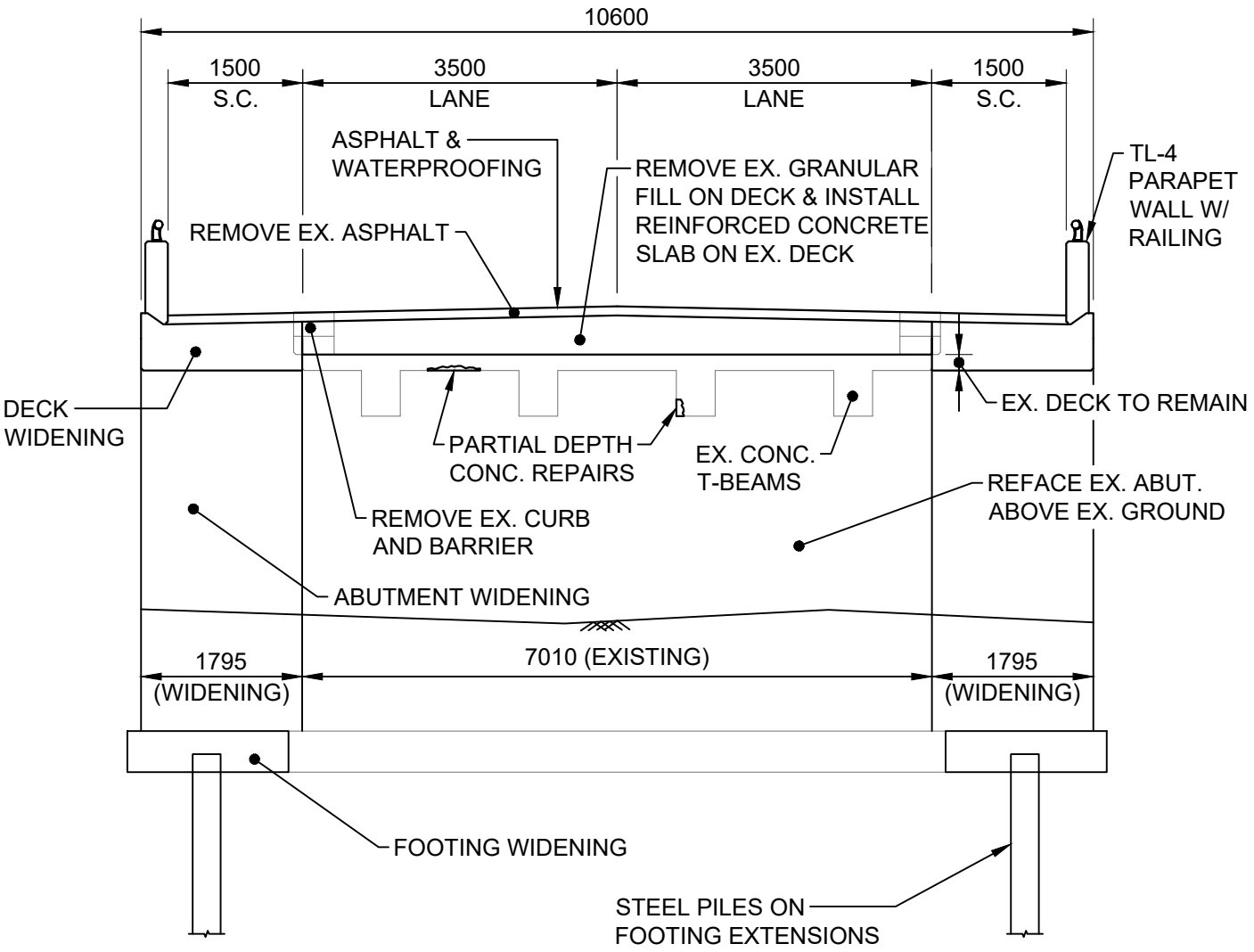
BRIDGE 1 - OPTION 2 - REHABILITATION

Client

TOWN OF CALEDON

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
AS NOTED		300051839.7000	

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BRIDGE 1 - OPTION 3 - REHABILITATION & WIDENING

1:75

BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

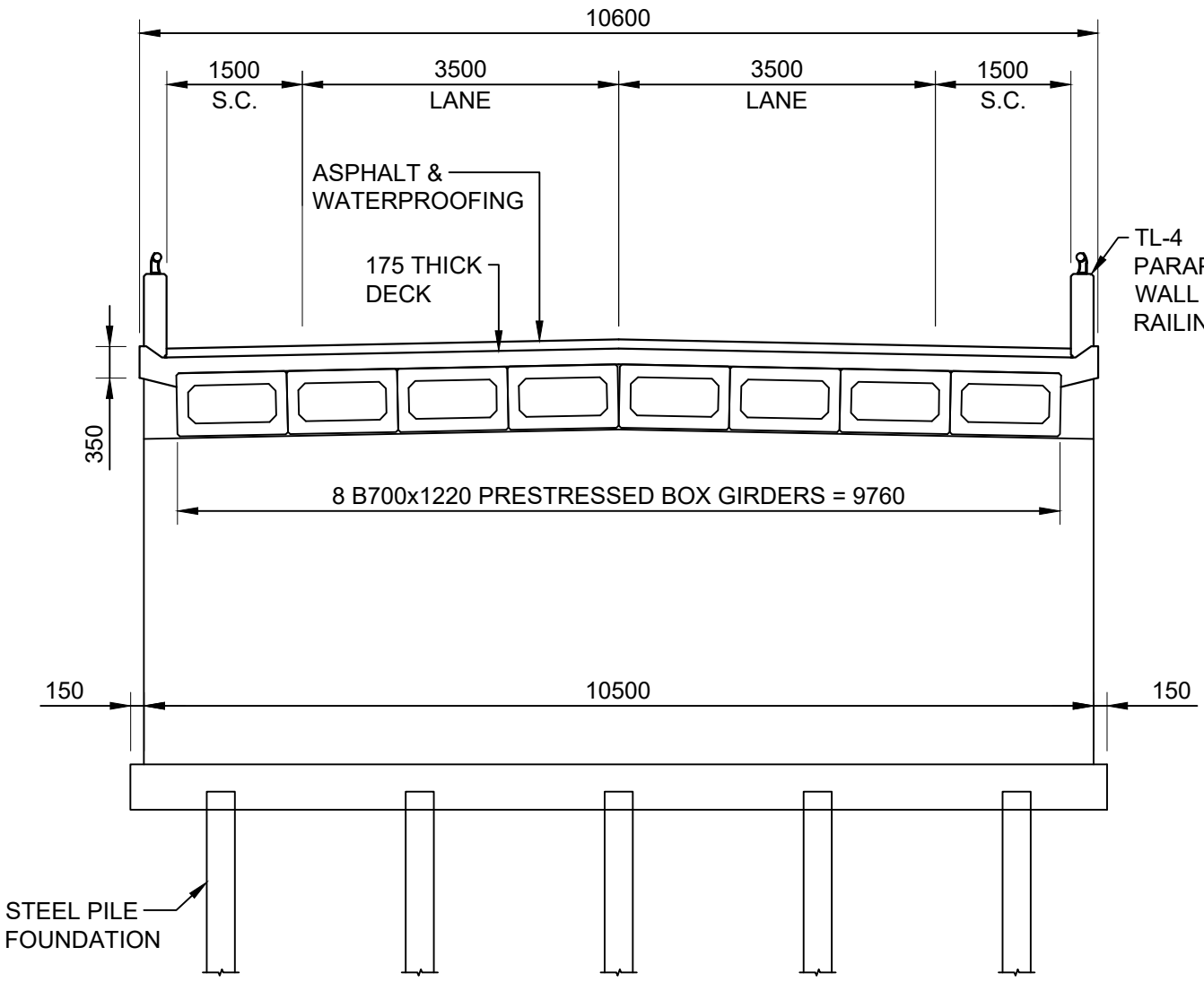
BRIDGE 1 - OPTION 3 - REHABILITATION & WIDENING

Client

TOWN OF CALEDON

Drawn	Checked	Date	Figure No.
AD	MB	21/02/08	**B1.3**
Scale		Project No.	
AS NOTED		300051839.7000	

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BRIDGE 1 - OPTION 4 - REPLACEMENT

1:75

BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

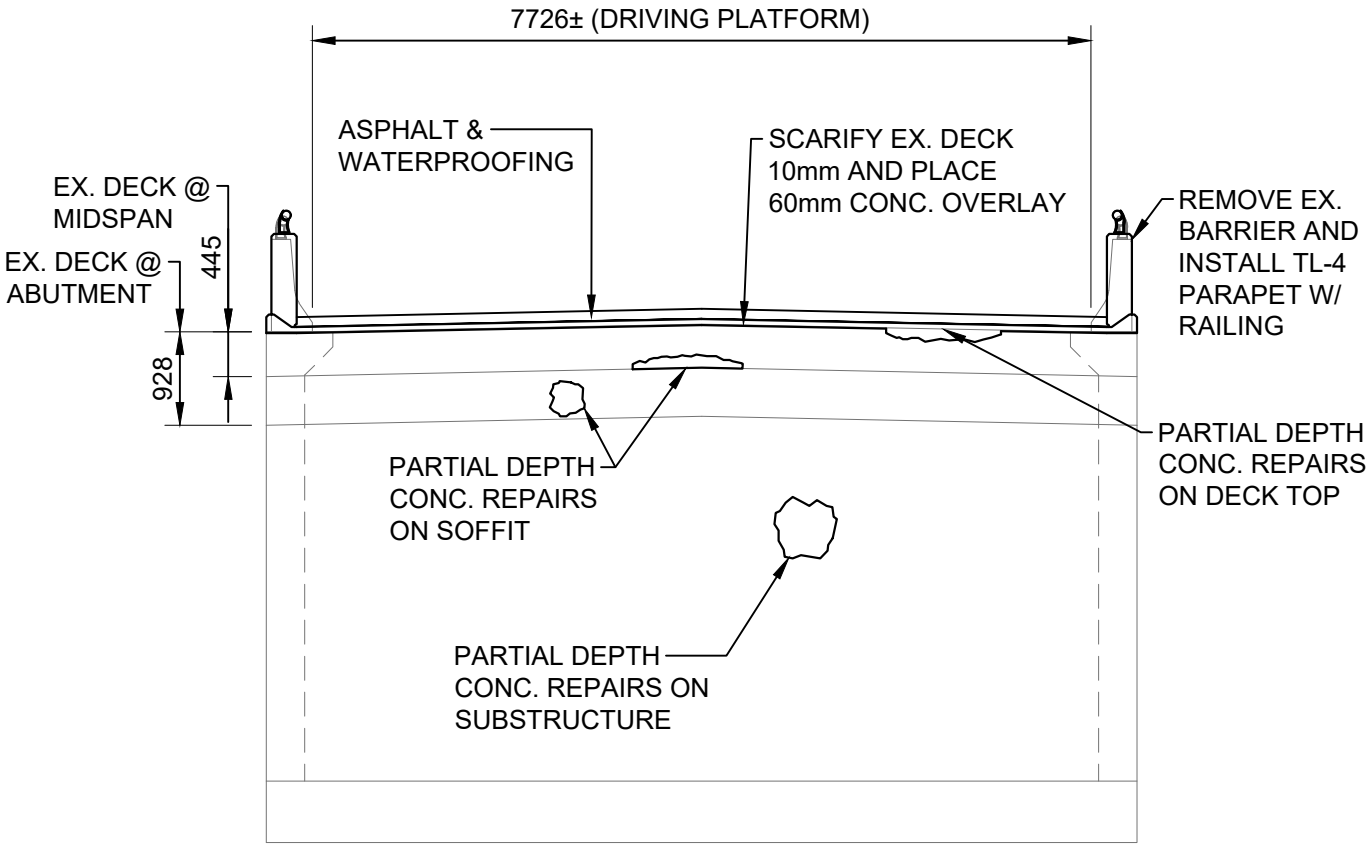
BRIDGE 1 - OPTION 4 - REPLACEMENT

Client

TOWN OF CALEDON

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
AS NOTED		300051839.7000	

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BRIDGE 2 - OPTION 2 - REHABILITATION

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BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

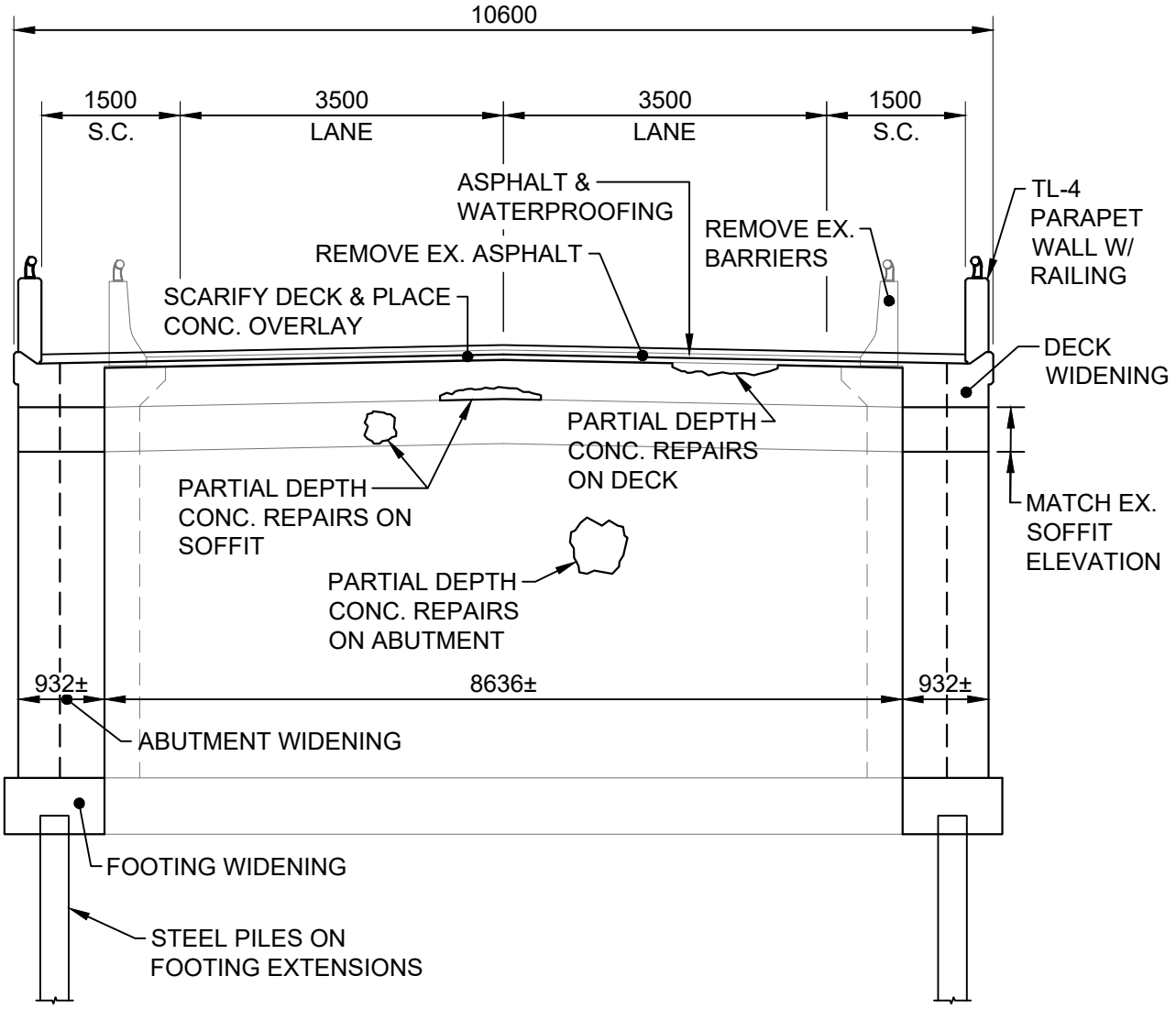
BRIDGE 2 - OPTION 2 - REHABILITATION

Client

TOWN OF CALEDON

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Scale		Project No.	
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BRIDGE 2 - OPTION 3 - REHABILITATION & WIDENING

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BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

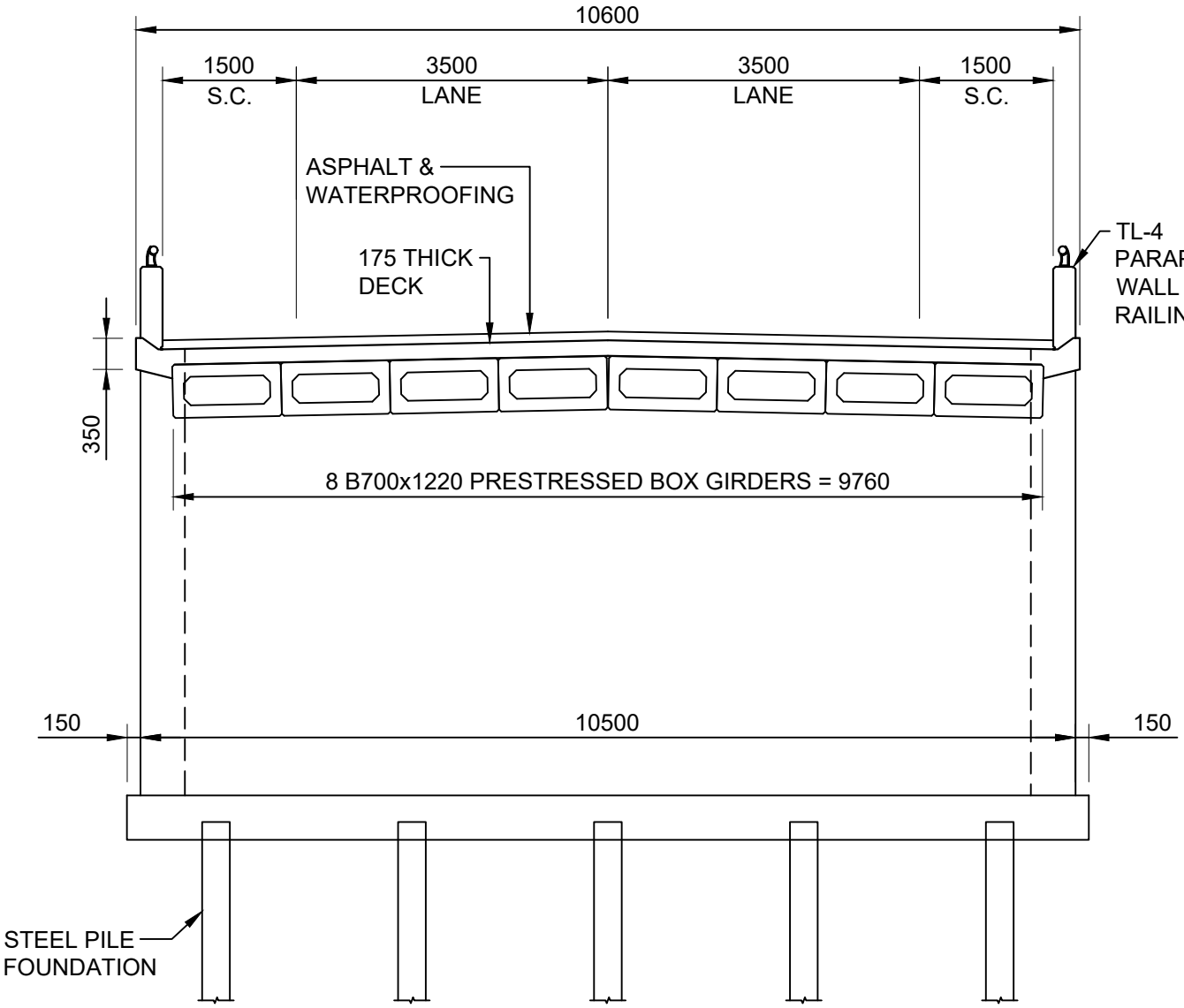
BRIDGE 2 - OPTION 3 - REHABILITATION & WIDENING

Client

TOWN OF CALEDON

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
AS NOTED		300051839.7000	

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BRIDGE 2 - OPTION 4 - REPLACEMENT

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BURNSIDE

Figure Title

PATTERSON SIDEROAD BRIDGES

BRIDGE 2 - OPTION 4 - REPLACEMENT

Client

TOWN OF CALEDON

Drawn	Checked	Date	Figure No.
AD	MB	21/02/24	**B2.4**
Scale		Project No.	
AS NOTED		300051839.7000	

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Client:	**Town of Caledon**
Project:	**Patterson Road Bridge 1**
Project No.:	**300051839.7**
Date:	**February 22, 2021**

REHABILITATE EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Asphalt Removal - Full Depth	255	sq.m	$12.50	$3,187.50
10	Removal of Ex. Fill from Deck	1	LS	$5,000.00	$5,000.00
11	Concrete Removals, Partial Depth - Type A	0.5	cu.m	$5,000.00	$2,500.00
12	Concrete Removals, Partial Depth - Type B	0.6	cu.m	$12,500.00	$7,500.00
13	Concrete Removals, Partial Depth - Type C	0.7	cu.m	$12,500.00	$8,750.00
14	Hot Mix HL-3	20	t	$200.00	$4,000.00
15	Hot Mix HL-8	40	t	$200.00	$8,000.00
16	Pavement Markings	120	m	$20.00	$2,400.00
17	Granular 'A'	150	t	$22.00	$3,300.00
18	Earth Excavation for Structure	1	LS	$5,000.00	$5,000.00
19	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
20	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
21	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
22	Concrete in Deck Overlay	1	LS	$37,500.00	$37,500.00
23	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
24	Concrete in Abutment Refacing	1	LS	$8,500.00	$8,500.00
25	Concrete Patches, Partial Depth, Form & Pump	0.6	cu.m	$7,000.00	$4,200.00
26	Dowels into Concrete	200	ea.	$20.00	$4,000.00
27	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
28	Steel Reinforcing	1	LS	$12,500.00	$12,500.00
29	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
30	Bridge Deck Waterproofing	59	sq.m	$75.00	$4,425.00
31	Joint Fillers, Seals and Compounds	1	LS	$2,500.00	$2,500.00
32	Rip-Rap	125	t	$65.00	$8,125.00
33	Topsoil, Imported	40	cu.m	$60.00	$2,400.00
34	Seed and Cover	400	sq.m	$5.00	$2,000.00
35	Heavy Duty Silt Fence Barriers	100	m	$20.00	$2,000.00
36	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
37	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
38	Smooth Run River Stone	100	t	$90.00	$9,000.00
			Estimated Construction Cost Subtotal		$336,862.50
			15% Contingency		$50,529.38
			Project Cost Subtotal		$387,391.88
			13% H.S.T.		$50,360.94
			TOTAL ESTIMATED PROJECT COST		$437,752.82

Note - Total estimated construction price does not include any cost for property

BURNSIDE	**Client:**	**Town of Caledon**
	Project:	**Patterson Road Bridge 1**
	Project No.:	**300051839.7**
	Date:	**February 22, 2021**

REHABILITATE & WIDEN BRIDGE (10.0m Wide Platform) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$15,000.00	$15,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$30,000.00	$30,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Asphalt Removal - Full Depth	720	sq.m	$12.50	$9,000.00
10	Removal of Ex. Fill from Deck	1	LS	$5,000.00	$5,000.00
11	Remove Ex. Concrete Curbs & Wingwall Tops	1	LS	$12,500.00	$12,500.00
12	Concrete Removals, Partial Depth - Type A	0.5	cu.m	$5,000.00	$2,500.00
13	Concrete Removals, Partial Depth - Type B	0.6	cu.m	$12,500.00	$7,500.00
14	Concrete Removals, Partial Depth - Type C	0.7	cu.m	$12,500.00	$8,750.00
15	Hot Mix HL-3	90	t	$150.00	$13,500.00
16	Hot Mix HL-8	190	t	$150.00	$28,500.00
17	Pavement Markings	320	m	$20.00	$6,400.00
18	Granular 'A'	150	t	$22.00	$3,300.00
19	Granular 'B' - Type 1 Roadway	350	t	$18.00	$6,300.00
20	Granular 'B' - Backfill to Structure	2400	t	$20.00	$48,000.00
21	Pipe Subdrain	52	m	$15.00	$780.00
22	Earth Excavation for Structure	1	LS	$40,000.00	$40,000.00
23	Unwatering Structure Excavation	1	LS	$40,000.00	$40,000.00
24	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
25	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
26	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
27	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
28	H Piles - HP 310 x 110	160	m	$500.00	$80,000.00
29	Driving Shoes	8	ea.	$450.00	$3,600.00
30	Concrete in Footings	1	LS	$9,000.00	$9,000.00
31	Concrete in Structure Widening	1	LS	$60,000.00	$60,000.00
32	Concrete in Wingwalls	1	LS	$65,000.00	$65,000.00
33	Concrete in Deck Overlay	1	LS	$37,500.00	$37,500.00
34	Concrete in Barrier Wall	1	LS	$22,000.00	$22,000.00
35	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
36	Concrete in Abutment Refacing	1	LS	$8,500.00	$8,500.00
37	Dowels into Concrete	650	ea.	$20.00	$13,000.00
38	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
39	Steel Reinforcing	1	LS	$55,000.00	$55,000.00
40	Stainless Reinforcing Steel	1	LS	$25,000.00	$25,000.00
41	Bridge Deck Waterproofing	89	sq.m	$75.00	$6,675.00
42	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
43	Rip-Rap	150	t	$65.00	$9,750.00
44	Topsoil, Imported	60	cu.m	$60.00	$3,600.00
45	Seed and Cover	600	sq.m	$5.00	$3,000.00
46	Heavy Duty Silt Fence Barriers	200	m	$20.00	$4,000.00
47	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
48	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
49	Smooth Run River Stone	120	t	$90.00	$10,800.00
				Estimated Construction Cost Subtotal	$1,001,030.00
				15% Contingency	$150,154.50
				Project Cost Subtotal	$1,151,184.50
				13% H.S.T.	$149,653.99
				TOTAL ESTIMATED PROJECT COST	$1,300,838.49

Note - Total estimated construction price does not include any cost for property

BURNSIDE	**Client:**	**Town of Caledon**
	Project:	**Patterson Sideroad Bridge 1**
	Project No.:	**300051839.7**
	Date:	**February 22, 2021**

REPLACE BRIDGE (10m Wide Platform, 16.25m Span) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$25,000.00	$25,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$75,000.00	$75,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Remove Existing Asphalt	1350	sq.m	$12.50	$16,875.00
10	Hot Mix HL-3	165	t	$150.00	$24,750.00
11	Hot Mix HL-8	375	t	$150.00	$56,250.00
12	Pavement Markings	580	m	$8.00	$4,640.00
13	Granular 'A'	700	t	$22.00	$15,400.00
14	Granular 'B' - Type 1 Roadway	1900	t	$18.00	$34,200.00
15	Granular 'B' - Backfill to Structure	1600	t	$20.00	$32,000.00
16	Earth Borrow	1600	t	$16.00	$25,600.00
17	Pipe Subdrain	400	m	$15.00	$6,000.00
18	Earth Excavation for Structure	1	LS	$50,000.00	$50,000.00
19	Unwatering Structure Excavation	1	LS	$50,000.00	$50,000.00
20	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
21	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
22	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
23	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
24	H Piles - HP 310 x 110	400	m	$500.00	$200,000.00
25	Driving Shoes	20	ea.	$450.00	$9,000.00
26	Concrete in Footings	1	LS	$30,000.00	$30,000.00
27	Concrete in Substructure	1	LS	$135,000.00	$135,000.00
28	Concrete in Deck	1	LS	$60,000.00	$60,000.00
29	Concrete in Barrier Wall	1	LS	$22,000.00	$22,000.00
30	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
31	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
32	Steel Reinforcing	1	LS	$80,000.00	$80,000.00
33	Stainless Reinforcing Steel	1	LS	$25,000.00	$25,000.00
34	Fabrication of Prestressed Girders	1	LS	$225,000.00	$225,000.00
35	Delivery of Prestressed Girders	1	LS	$30,000.00	$30,000.00
36	Erection of Prestressed Girders	1	LS	$50,000.00	$50,000.00
37	Bridge Deck Waterproofing	185	sq.m	$75.00	$13,875.00
38	Joint Fillers, Seals and Compounds	100%	LS	$7,500.00	$7,500.00
39	Rip-Rap	175	t	$65.00	$11,375.00
40	Topsoil, Imported	110	cu.m	$60.00	$6,600.00
41	Seed and Cover	1100	sq.m	$5.00	$5,500.00
42	Heavy Duty Silt Fence Barriers	350	m	$20.00	$7,000.00
47	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
43	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
44	Smooth Run River Stone	155	t	$90.00	$13,950.00
				Estimated Construction Cost Subtotal	$1,647,590.00
				15% Contingency	$247,138.50
				Project Cost Subtotal	$1,894,728.50
				13% H.S.T.	$246,314.71
				TOTAL ESTIMATED PROJECT COST	$2,141,043.21

Note - Total estimated construction price does not include any cost for property

BURNSIDE	**Client:**	**Town of Caledon**
	Project:	**Patterson Road Bridge 2**
	Project No.:	**300051839.8**
	Date:	**February 24, 2021**

REHABILITATE EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Access to Work Area, Work Platform & Scaffolding	1	LS	$40,000.00	$40,000.00
9	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
10	Remove Existing Barriers	48.1	m	$200.00	$9,620.00
11	Asphalt Removal - Full Depth	252	sq.m	$12.50	$3,150.00
12	Asphalt Removal - From Concrete Deck	206	sq.m	$17.50	$3,605.00
13	Deck & Approach Slab Scarification	206	sq.m	$35.00	$7,210.00
14	Concrete Removals, Partial Depth - Type A	5.1	cu.m	$4,000.00	$20,400.00
15	Concrete Removals, Partial Depth - Type B	4.5	cu.m	$7,500.00	$33,750.00
16	Concrete Removals, Partial Depth - Type C	5.0	cu.m	$6,000.00	$30,000.00
17	Hot Mix HL-3	60	t	$200.00	$12,000.00
18	Hot Mix HL-8	115	t	$200.00	$23,000.00
19	Pavement Markings	275	m	$20.00	$5,500.00
20	Granular 'A'	150	t	$22.00	$3,300.00
21	Earth Excavation for Structure	1	LS	$5,000.00	$5,000.00
22	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
23	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
24	Steel Beam Energy Attenuating System	2	ea.	$4,500.00	$9,000.00
25	Concrete in Deck & Approach Slab Overlay	1	LS	$40,000.00	$40,000.00
26	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
27	Concrete Patches, Form & Pump	9.5	cu.m	$7,000.00	$66,500.00
28	Galvanic Cathodic Protection System	70.0	sq.m	$500.00	$35,000.00
29	Dowels into Concrete	750	ea.	$20.00	$15,000.00
30	Replace Deck Drains	4	ea.	$1,500.00	$6,000.00
31	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
32	Steel Reinforcing	1	LS	$7,500.00	$7,500.00
33	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
34	Bridge Deck Waterproofing	123	sq.m	$75.00	$9,225.00
35	Joint Fillers, Seals and Compounds	1	LS	$5,000.00	$5,000.00
36	Rip-Rap	125	t	$65.00	$8,125.00
37	Topsoil, Imported	40	cu.m	$60.00	$2,400.00
38	Seed and Cover	400	sq.m	$5.00	$2,000.00
39	Heavy Duty Silt Fence Barriers	125	m	$20.00	$2,500.00
40	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
41	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
42	Smooth Run River Stone	100	t	$90.00	$9,000.00

Estimated Construction Cost Subtotal	$585,515.00
15% Contingency	$87,827.25
Project Cost Subtotal	$673,342.25
13% H.S.T.	$87,534.49
TOTAL ESTIMATED PROJECT COST	$760,876.74

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Road Bridge 2**
Project No.:	**300051839.8**
Date:	**February 24, 2021**

REHABILITATE & WIDEN EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Temporary Protection System	1	LS	$75,000.00	$75,000.00
9	Access to Work Area, Work Platform & Scaffolding	1	LS	$40,000.00	$40,000.00
10	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
11	Remove Existing Barriers	48.1	m	$200.00	$9,620.00
12	Asphalt Removal - Full Depth	252	sq.m	$12.50	$3,150.00
13	Asphalt Removal - From Concrete Deck	206	sq.m	$17.50	$3,605.00
14	Deck & Approach Slab Scarification	206	sq.m	$35.00	$7,210.00
15	Concrete Removals, Partial Depth - Type A	5.1	cu.m	$4,000.00	$20,400.00
16	Concrete Removals, Partial Depth - Type B	4.5	cu.m	$7,500.00	$33,750.00
17	Concrete Removals, Partial Depth - Type C	5.0	cu.m	$6,000.00	$30,000.00
18	Hot Mix HL-3	60	t	$200.00	$12,000.00
19	Hot Mix HL-8	115	t	$200.00	$23,000.00
20	Pavement Markings	275	m	$20.00	$5,500.00
21	Granular 'A'	150	t	$22.00	$3,300.00
22	Earth Excavation for Structure	1	LS	$25,000.00	$25,000.00
23	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
24	H Piles - HP 310 x 110	160	m	$500.00	$80,000.00
25	Driving Shoes	8	ea.	$450.00	$3,600.00
23	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
24	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
25	Steel Beam Energy Attenuating System	2	ea.	$4,500.00	$9,000.00
26	Concrete in Deck & Approach Slab Overlay	1	LS	$40,000.00	$40,000.00
27	Concrete in Deck Widening	1	LS	$35,000.00	$35,000.00
28	Concrete in Substructure Widening	1	LS	$75,000.00	$75,000.00
29	Concrete in Footings Widening	1	LS	$7,500.00	$7,500.00
30	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
31	Concrete Patches, Form & Pump	9.5	cu.m	$7,000.00	$66,500.00
32	Galvanic Cathodic Protection System	70.0	sq.m	$500.00	$35,000.00
33	Dowels into Concrete	100	ea.	$20.00	$2,000.00
34	Deck Drains	4	ea.	$1,500.00	$6,000.00
35	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
36	Steel Reinforcing	1	LS	$35,000.00	$35,000.00
37	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
38	Bridge Deck Waterproofing	152	sq.m	$75.00	$11,400.00
39	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
40	Rip-Rap	125	t	$65.00	$8,125.00
41	Topsoil, Imported	60	cu.m	$60.00	$3,600.00
42	Seed and Cover	600	sq.m	$5.00	$3,000.00
43	Heavy Duty Silt Fence Barriers	125	m	$20.00	$2,500.00
44	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
45	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
46	Smooth Run River Stone	100	t	$90.00	$9,000.00

Estimated Construction Cost Subtotal	$952,990.00
15% Contingency	$142,948.50
Project Cost Subtotal	$1,095,938.50
13% H.S.T.	$142,472.01
TOTAL ESTIMATED PROJECT COST	$1,238,410.51

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Sideroad Bridge 2**
Project No.:	**300051839.8**
Date:	**February 24, 2021**

REPLACE BRIDGE (10m Wide Platform, 14m Span) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$25,000.00	$25,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$75,000.00	$75,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Temporary Protection System	1	LS	$75,000.00	$75,000.00
9	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
10	Remove Existing Asphalt	2310	sq.m	$12.50	$28,875.00
11	Hot Mix HL-3	280	t	$150.00	$42,000.00
12	Hot Mix HL-8	680	t	$150.00	$102,000.00
13	Pavement Markings	1050	m	$8.00	$8,400.00
14	Granular 'A'	1320	t	$22.00	$29,040.00
15	Granular 'B' - Type 1 Roadway	3500	t	$18.00	$63,000.00
16	Granular 'B' - Backfill to Structure	2220	t	$20.00	$44,400.00
17	Earth Borrow	1175	t	$16.00	$18,800.00
18	Pipe Subdrain	150	m	$15.00	$2,250.00
19	Earth Excavation for Structure	1	LS	$60,000.00	$60,000.00
20	Unwatering Structure Excavation	1	LS	$50,000.00	$50,000.00
21	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
22	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
23	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
24	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
25	H Piles - HP 310 x 110	580	m	$500.00	$290,000.00
26	Driving Shoes	20	ea.	$450.00	$9,000.00
27	Concrete in Footings	1	LS	$40,000.00	$40,000.00
28	Concrete in Substructure	1	LS	$155,000.00	$155,000.00
29	Concrete in Deck	1	LS	$52,500.00	$52,500.00
30	Concrete in Barrier Wall	1	LS	$15,000.00	$15,000.00
31	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
32	Barrier Wall Railing	1	LS	$6,500.00	$6,500.00
33	Steel Reinforcing	1	LS	$90,000.00	$90,000.00
34	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
35	Fabrication of Prestressed Girders	1	LS	$150,000.00	$150,000.00
36	Delivery of Prestressed Girders	1	LS	$30,000.00	$30,000.00
37	Erection of Prestressed Girders	1	LS	$50,000.00	$50,000.00
38	Bridge Deck Waterproofing	162	sq.m	$75.00	$12,150.00
39	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
40	Rip-Rap	175	t	$65.00	$11,375.00
41	Topsoil, Imported	127	cu.m	$60.00	$7,620.00
42	Seed and Cover	1270	sq.m	$5.00	$6,350.00
43	Heavy Duty Silt Fence Barriers	500	m	$20.00	$10,000.00
44	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
45	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
46	Smooth Run River Stone	155	t	$90.00	$13,950.00
				Estimated Construction Cost Subtotal	$1,890,440.00
				15% Contingency	$283,566.00
				Project Cost Subtotal	$2,174,006.00
				13% H.S.T.	$282,620.78
				TOTAL ESTIMATED PROJECT COST	$2,456,626.78

Note - Total estimated construction price does not include any cost for property

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Technical Memorandum
Physical Condition – Duffy's Lane Bridge

Date: January 30, 2023 **Project No.:** 300051839.0000

Project Name: Duffy's Lane Bridge

Client Name: Town of Caledon

Submitted To: Project File Report

Submitted By: Andrew Dawson, P.Eng.

Reviewed By: Matthew Brooks, P.Eng.

As part of the Schedule B Environmental Assessment (MCEA) for the Patterson Side Road and Duffy's Lane Bridges, R.J. Burnside & Associates Limited (Burnside) has completed a visual inspection of the Duffy's Lane structure and reviewed all available background information for the bridge to evaluate the various options as part of the MCEA, considering the physical environment. The Duffy's Lane Bridge (B22072010) is located on the no-exit portion of Duffy's Lane, approximately 30 m southeast of Patterson Side Road.

Structure Background Information

The existing structure consists of a 9.1 m (+/-) span (9.35 m +/- parallel to road) cast-in-place concrete rigid frame, arch soffit structure with an overall structure width of approximately 8.8 m (+/-) and a driving platform width of approximately 7.3 m (+/-) between raised concrete curbs. The structure is skewed at an angle of approximately 12 ° to perpendicular. The structure is supported on a wooden pile foundation and was constructed in 1957.

The existing structure has undergone a previous minor rehabilitation in 2000. The rehabilitation consisted of localized concrete repairs to the deck top, soffit and abutments, as well as replacement of the existing barrier system. Migrating corrosion inhibitors and concrete sealer were also applied to exposed surfaces of concrete during the rehabilitation. Although not indicated on the design drawings, the detailed deck condition survey completed in 2015 identified presence of a concrete overlay which may have been installed during the 2000 rehabilitation.

More recently, The Town of Caledon has retained Greer Galloway Consulting Engineers to complete design services for an additional rehabilitation of the existing structure. This project is currently between the 60% and 90% design stage. The current scope of proposed rehabilitation work consists of full depth barrier and curb removal and replacement with a concrete parapet wall on curb, removal of asphalt, partial depth concrete repairs to the deck, soffit and exposed substructure, waterproofing and paving and deck drain replacement.

Structure Use and Access

The Town of Caledon considers Duffy's Lane to be a Rural Local Undivided road south of Patterson Side Road. The section of road is a no-exit, no-winter-maintenance road with low traffic volumes (ADT < 400). These low traffic volumes classify the subject portion of the road as a 'special road' in accordance with Chapter 11 of the March 2020 TAC Geometric Design Guide for Canadian Roads.

There are no residences with municipal addresses along Duffy's Lane south of the structure as the majority of the lands are part of the Albion Hills Conservation Park owned by the Toronto and Region Conservation Authority (TRCA). However, three properties (#8519, #8541 and #8575 Patterson Side Road) east of Duffy's Lane have corridors within their parcel fabric adjoining Duffy's Lane, south of the structure. Some of these parcel corridors are used as alternative access points to the above noted properties. The roadway south of the structure also provides an additional point of access to the Albion Hills Conservation Park; however, the public access point for the Park is located at 16500 Regional Road 50.

Heavy Truck traffic is currently limited on the structure due to the current By-Law restrictions on Patterson Side Road. The By-law generally restricts *commercial* vehicles over 12 tonnes from gaining access to the no-exit roadway and bridge. However, exemptions to the By-Law are made for Heavy Trucks completing delivery or collection with no alternative route, emergency response vehicles, Town/Region/Province vehicles and utility vehicles.

Given that there are no municipal addresses south of the structure, the roadway and bridge are generally used by passenger vehicles for alternative access to the Albion Hills Conservation Park and hiking trails, as well as alternate access for residents with adjoining properties. As such, traffic volumes are not anticipated to increase beyond 400 vehicles per day in the future.

It is noted that there are additional access points to the hiking trails via the Albion Hills Conservation Park main entrance (16500 Regional Road 50) or the nearby Caledon Trailway Path, located on Patterson Side Road, 350 m west of Duffy's Lane. As such, reduction of the structure's capacity, removal of the structure or conversion to a pedestrian only structure would only directly affect the three adjoining residential property owners and the Albion Hills Conservation Park.

Physical Condition

On October 27, 2020, Andrew Dawson, P.Eng., and Devin Soeting, C.E.T., from Burnside conducted a Field Investigation to review the physical conditions of the Duffy's Lane Bridge. The previous 2019 OSIM inspections completed by GHD Limited and 2015 Detailed Deck Condition Survey (DDCS) completed by Exp. were also reviewed in consideration of analyzing the condition of the structure. The previous OSIM inspection and Detailed Deck Condition Survey are enclosed with this document for reference. A summary of the condition of the structure is provided below:

Wearing Surface

The asphalt wearing surface was generally in good to fair condition overall, with localized fair to poor areas in locations of previous asphalt patches resulting from the deck condition survey. Minor settlement was observed at the approaches of the structure.

Barrier

The existing barrier system was noted to be in generally good condition overall, with light to moderate scaling and localized small spalls. The current barrier system does not meet current test level requirements for vehicle impact and as such, may not prevent errant vehicles from leaving the structure.

Curbs

The existing curbs are in fair to poor condition overall, with disintegration, spalling, severe scaling and narrow to wide cracks.

Deck

The concrete deck top was unable to be visually inspected due to the overlying asphalt wearing surface; however, the detailed deck condition survey completed in 2015 indicated that the deck top is in fair to good condition and confirmed the presence of a waterproofing system with generally good bond to the deck. The condition survey also identified the presence of a concrete overlay ranging from 50 to 120 mm. The overlay does not appear to have additional reinforcing steel, as no steel was encountered within this region by any of the deck cores.

The chloride content measured in the original concrete (below overlay) exceeded the threshold value necessary to activate corrosion in 2 of the 3 cores tested. Although the testing of chloride content was not conducted to the depth of reinforcing steel at all locations, it is anticipated that the value of chloride at the reinforcing steel level is exceeded in both of these tested areas. In the overlay, chloride content exceeded the corrosion threshold in the same two core locations, but only within the bottom portion of the overlay. This indicates that the chlorides in the original concrete below the overlay are potentially migrating upwards into the overlay.

Overall, the corrosion potential survey indicates that approximately 45% of the deck surface has a greater than 90% probability that reinforcing steel corrosion was occurring at the time of the measurements (2015). It is reasonable to assume that this number may have increased since the time of the survey.

Soffit

Sounding of the concrete during the 2020 site inspection identified that the majority of the soffit is severely delaminated and in poor condition overall. Based on comparison of the 2020 investigation to the extents of delamination noted during the 2015 study, it appears that the degree of poor areas has significantly increased. This illustrates that the corrosion of the bottom layer of steel may be accelerating, resulting in more delaminated areas. Several efflorescence stained medium to wide cracks also indicate moisture penetration through the deck slab which may be leading to increased rates of corrosion. Medium to wide cracking and severe scaling were also noted along the exterior soffit and fascia.

Substructure

The existing abutments are generally in good condition overall, with hairline to medium cracking with efflorescence, light scaling, small spalls and localized delaminations.

The existing wingwalls are generally in good condition, areas of severe scaling noted on the west walls and localized delaminations.

Geometry – Width

The existing roadway has a paved driving platform width of approximately 7.25 - 7.5 m up to the south limits of the structure. South of the structure, the roadway becomes a gravel roadway with a 5.75 - 6 m travelled platform width and 1.25 – 1.5 m shoulders. As previously mentioned, the width of the driving platform between raised curbs on the structure is approximately 7.3 m.

The subject roadway does not have a posted regulatory speed limit. Generally, for unposted rural roads, a speed limit of 80km/h is assumed. However, general overview of the roadway indicates the road has not been designed for such an operating speed and it is recommended that the Town consider posting a reduced regulatory speed. The Town's Transportation Master Plan identifies the desired operating speed for Local roads to be 30 to 40 km/hour, and it is recommended that the Town consider posting the road as such. Given the proximity of the structure to the intersection, operating speeds at the bridge location are anticipated to be approximately 30 km/hour at the bridge.

The Town's Transportation Master Plan requires 3.5 m through lanes with 1.5 m wide shoulders for typical rural and local road cross-sections. As such, in order to meet the Town's typical standard for a two-lane structure, a 10.0 m wide driving platform is required. However, it is recognized that due to the low-volume nature of this road, the Town may

accept a reduced driving platform, as the frequency of traffic conflicts on 'special roads' associated with stopped vehicles generally does not justify additional width for sheltering them.

Based on the 'special road' classification, traffic volumes (ADT < 100, ADTT < 15) and the Town's typical desired 40 km/hour operating speed for local roads, the TAC Geometric Design Guide for Canadian Roads[1] and 2020 MTO Design Supplements recommend a minimum approach Roadway Width of 6.0 m between side slopes, or 7.0 m wide where guiderail is present. Additionally, as shown in Figure 1, the MTO Structural Design Manual allows bridges on Low Volume Roads to have minimum lane and shoulder widths of 2.75 m and 0.25 m, respectively. As such, the minimum driving platform width required for a two-lane bridge on this Low Volume Road is 6.0 m. Given the presence of guiderail on the approaches, the overall recommended width of the approach roadway is 7.0 m, and it is recommended that this width be carried across the bridge when considering a two-lane structure, to avoid narrowing of the platform.

2020 03 10	EXCEPTIONS TO THE CANADIAN HIGHWAY BRIDGE DESIGN CODE, CSA S6-19	PAGE E1-4

TABLE 1: MINIMUM LANE, SHOULDER AND BRIDGE WIDTHS

AADT	Design Speed (km/h)	# Lanes	Min. Lane Width (m)	Min. Shoulder Width (m)	Min. Bridge Width (m)[1]
≤ 200	≤ 60	1	3.0	0.5	4.0[2,3,4] (4.9m max)[5]
		2[6]	2.75	0.25	6.0
	≥ 70	2	3.0	0.5	7.0
> 200 and ≤ 400[7]	≤ 40	1	3.0	0.5	4.0[2,3,4] (4.9m max)[5]
		2[6]	2.75	0.25	6.0
	50 to 60	2	3.0	0.5	7.0
	≥ 70	2	3.3[8]	0.6[8]	7.5[8]

Figure 1: Minimum Bridge Widths for Low Volume Roads (MTO Structural Manual)

Given the 7.3 m platform width of the existing structure, this structure would be considered to have meet the minimum requirements for a Low Volume Road bridge. To achieve additional side clearances, the raised curbs could be removed during a rehabilitation to maximize the platform width without widening the overall structure. Alternatively, to achieve the Town standard, structure replacement would be required.

It is further recognized that due to the low traffic volumes, the Town may consider a single -lane, two-way structure with a bridge width between 4.0 m and 4.9 m. Right-of-way control signage (such as 'narrow bridge', 'yield to oncoming traffic', 'stop if oncoming traffic',

[1] Chiu, M., Clayton, C., Millen, G. et al. 2017. *Geometric Design Guide for Canadian Roads*. Ottawa, ON: Transportation Association of Canada

etc.) should be placed at the structure to indicate to bridge users of the reduction to one-way traffic.

Geometry – Profile

The Duffy's Lane Bridge is located approximately 30 m from the intersection of Patterson Side Road. Based on this proximity to the intersection, vehicles travelling along Duffy's Lane in the vicinity of the bridge structure will be accelerating or decelerating. Based on passenger vehicle acceleration and deceleration rates[2] it is anticipated that vehicles north of the structure will be travelling at a speed of 30 km/hour or less, with speeds decreasing closer to the intersection.

The current road has a profile with rates of grade changes comparable to a design speed of approximately 20 km/hour and is considered sub-standard for the anticipated operating speed of the road.

The intersection at Patterson Side Road is anticipated to be raised as part of the profile improvement works along Patterson Side Road between the bridges east and west of the intersection. To tie into this raised profile, adjustments to Duffy's Lane road profile will also be required. Based on preliminary design profiles, a 30 km/hour design speed vertical curve can be obtained to tie the raised intersection into the north end of the existing Duffy's Lane bridge. If the Duffy's Lane bridge is to be replaced, road profile adjustments of 40 km/hour or higher are achievable. The final road profile under the replacement scenario will depend on the geometry of the proposed replacement structure. Preliminary drawings illustrating road profile adjustments have been enclosed for reference.

Load Capacity

It is noted that the required live load capacities have increased since the time of the original design of the structure. There are currently no visual signs of distress in the structure that would indicate it is being over-stressed as a result of current vehicular loading; however, this may be due to loading being generally limited to passenger vehicles. If the existing structure is to remain, a structural evaluation would be recommended to confirm if the structure has adequate capacity to carry current design vehicle loading, or if a load posting is required.

Design Alternatives

The EA for the Duffy's Lane Bridge has identified the following five options for consideration:

1. Do Nothing – Future Asset Disposal / Removal
2. Rehabilitation
3. Replacement – Vehicular Bridge – Two-lane
4. Replacement – Vehicular Bridge – Single Lane, Modular
5. Replacement – Pedestrian Bridge

[2] Exhibit 2-24 and 2-25, A Policy on Geometric Design of Highways and Streets, AASHTO, 2001

A brief description of each alternative is provided below. General arrangement drawings showing the general scopes of work for each of the proposed options (excluding the Do-Nothing option) are enclosed within this document.

Do Nothing – Future Asset Disposal / Removal

The Do Nothing alternative is to leave the existing system in place and not complete any improvements to the Bridge. The existing structure may carry out its remaining service life until the overall condition of the structure warrants it un-safe. Based on its current condition and evidence of accelerating corrosion of reinforcing steel since the 2015 inspection, it is anticipated that the remaining service life of the structure is 5-10 years. At the end of its service life, the structure would be required to be removed and barriers placed in front of the structure, closing the road at each end of the bridge. This option would result in no through vehicular or pedestrian traffic at the end of the existing structures service life. In the interim, load posting requirements for the structure should be evaluated as previously discussed and the value of the posting shall be re-evaluated as the structure continues to degrade.

Rehabilitation

This alternative consists of rehabilitating the existing structure to rectify the identified deficiencies outlined above. The required repairs/improvements include:

- Full depth curb removal and reconstruction of outer deck edges and wingwall tops;
- Removal of asphalt wearing surface;
- Partial depth concrete repairs to soffit, deck top and substructure;
- Removal and replacement of barrier system;
- Installation of erosion and scour protection;

This option allows for the driving platform width to be maximized within the constraints of the existing footprint of the bridge by removal of the raised curbs. This widened platform would exceed the minimum driving platform width for Low Volume Road bridges but would not meet the Town’s standard 10.0 m width.

Rehabilitation of the structure will address the physical deficiencies noted on the accessible surfaces. The condition of the bridge structure may be improved, and the overall service life of the structure can be increased with rehabilitation. It is anticipated that rehabilitating the structure would extend the service life to approximately 20 years.

If a structural evaluation identifies that load posting of the structure is required, standard rehabilitation outlined in the scope of work above would not increase the overall capacity. Although near surface strengthening is an option, it has not been considered as part of the scope of work for this alternative due to it being a considerable cost for a structure with very limited heavy truck traffic.

Replacement – Vehicular Bridge – Two Lane

This option considers removal of the existing structure and replacement with a new, two-lane vehicular bridge. The proposed structure in this alternative would consist of a 10.0 m wide driving platform to meet the Town's typical cross-section. The roadway width would taper to be reduced to the 7 m south of the bridge in the interim but can be widened in the future as required. Alternatively, the structure width could be reduced to as low as 7.0 m if the Town is willing to accept the recommended TAC/MTO minimums based on the low traffic volumes, which are lesser than the Town's standard 10.0 m platform width.

With a two-lane structure designed to full vehicular load requirements, this alternative allows for increased traffic utilization in the future if it were to be required.

It is anticipated that a pre-cast concrete rigid frame structure of slightly larger span would be utilized and supported on deep foundations. Based on preliminary structure geometry, the road could be designed to the desired 40 km/hour local road operating speed by reconstructing the road profile over a length of approximately 70 m from the intersection.

Replacement of the bridge addresses all deficiencies noted, including improvements to structure width, road profiles and load capacity. The proposed structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

Replacement – Vehicular Bridge – Single Lane, Modular

A single lane vehicular bridge is also considered to be a viable alternative, as it maintains vehicular access south of the structure at a lower cost, in consideration of the low traffic volumes.

The single-lane structure would be a one-lane, two-way structure and would require right-of-way signage as previously discussed to notify users of the structure of the reduction from a two-lane road to a single-lane structure. The one-lane structure would provide a 4.15 m (+/-) wide driving platform, which allows for adequate clearance for snow-plough vehicles.

It is anticipated that a structure designed to meet the MTO exceptions to the Canadian Highway Bridge Design Code for Low Volume Roads would be utilized for this alternative. Several modular bridges are available that provide a cost-effective solution for structures of these requirements, including typical Bailey Bridge structures, or pre-fabricated girder type structures such as Lessard Welding's Modular Type Municipal Bridges; the latter of which has been the assumed structure used for evaluation of this alternative.

A larger span (15 m +/-) prefabricated structure could be installed on cast-in-place abutments supported on deep foundations placed behind the existing abutments. This allows for the construction of the bridge to occur without impeding on the watercourse, reducing the construction costs and environmental impacts associated with waterway control. Upon

installation of the new abutments, the existing abutments could be removed to at or above the existing grades level and help aid in scour prevention.

Road profile adjustments over approximately 70 m would similarly be required to obtain a design speed of 40 km/hour under this alternative.

The replaced structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

Replacement – Pedestrian Bridge

This alternative involves replacement of the existing crossing with a pedestrian bridge. As such, this option limits the capacity of the crossing to pedestrians only and would eliminate vehicular access to the properties with alternate access south of the structure and to the Albion Hills Conservation Park alternative access point.

For preliminary design purposes, a prefabricated weathering steel (or galvanized) through-truss bridge with timber deck (Eagle Bridge, Algonquin Bridge, or similar) has been assumed. The structure would be founded on cast-in-place concrete abutments supported by helical pile foundations, installed beyond the existing structure abutments. Spanning beyond the existing abutments will allow for the existing structure to be cut off and utilized as scour protection retaining wall in front of the proposed foundation system.

The structure would provide a 2.4 m wide platform to allow for pedestrian and bicycle crossing of the watercourse. To span over the existing structure, a 15 m long structure is recommended.

The pedestrian structure is expected to have a service life of 75 years, provided that the Town completes typical maintenance and repairs as required over the lifespan.

Evaluation of Alternatives

Each alternative is to be evaluated based on its ability to improve the physical environment at the site, which is the intent of this Technical Memo. Table 1 overleaf is a summary of the physical environments that were considered, the noted deficiencies and the effectiveness of each option to rectify the deficiency and identify a preferred solution. For reference, Preliminary Cost Estimates have been provided and enclosed within the document.

Table 1: Evaluation of Alternatives, Physical Environment – Duffy's Lane Bridge

		EA Options				
		Do Nothing	**Rehabilitation**	**Replace – Vehicular – Two Lane**	**Replace – Vehicular – Single Lane**	**Replace - Pedestrian**
Physical Condition		Defects not addressed; Structure generally in fair to poor condition with limited (5-10 years) service life remaining;	Defects can be addressed to extend the service life to 20 years.	A new structure will not have any defects and all issues will be addressed; Service life of 75 years expected	A new structure will not have any defects and all issues will be addressed; Service life of 75 years expected	A new structure will not have any defects and all issues will be addressed; Service life of 75 years expected;
Geometry – Width		No improvement to driving platform width; Minimum width for 2-Lane Low Volume Road met; Town Standard width not met.	Opportunity to remove raised curbs to increase side clearances over structure. Minimum width for 2-Lane Low Volume Road met; Town Standard width not met.	Replacement structure can be designed to meet Town standard two-lane platform width (10.0 m).	Replacement structure designed for single-lane, two-way structure. Right-of-way control required on approaches.	Pedestrian width bridge; narrower than approach roadways.
Geometry – Profile		Existing sightlines and profile maintained. 30 km/hour design speed curves to tie into raised intersection.	Existing sightlines and profile maintained. 30 km/hour design speed curves to tie into raised intersection.	Opportunity for minor improvement to profile and sight lines (40 km/hour design speed).	Opportunity for improvements to profile and sight lines up to 50 km/hour design speed.	Not applicable
Load Capacity		Load posting to be considered due to corrosion of embedded reinforcing steel.	Load posting requirements to be evaluated based on current design loading.	A new bridge will not have any load restrictions.	A new bridge will not have any load restrictions.	Pedestrian loading only. Opportunity to design for maintenance vehicle loading, if desired.
Property Access		Alternate access for three residences and Conservation Park removed in future (5-10 years).	Vehicular and pedestrian access to alternative entrances for three residences and Conservation Park remains.	Vehicular and pedestrian access to alternative entrances for three residences and Conservation Park remains.	Vehicular and pedestrian access to alternative entrances for three residences and Conservation Park remains.	Vehicular access to alternative entrances of three residences and Conservation Park removed; Pedestrian access remains.
Cost (Excl. HST)		$100,000 to remove structure and install barricades when condition warrants removal (5-10 years)	$482,000.00 (See Appendix C)	$1,357,000.00 (See Appendix C)	$646,000.00 (See Appendix C)	$444,000.00 (See Appendix C)
Service Life		5 – 10 years	20 years	75 Years	75 Years	75 Years
Preference	**Vehicle access required**	Least Preferred	Less Preferred	Somewhat Preferred	**Most Preferred**	Least preferred
	Pedestrian only access required	Least Preferred	Somewhat Preferred	Less Preferred	Less Preferred	**Most Preferred**
	No access required	**Most Preferred**	Somewhat preferred	Least Preferred	Less Preferred	Less Preferred

Summary

The Preferred option to address the physical and geometric deficiencies for the Duffy's Lane Bridge is heavily dependent on the access requirements that will need to be maintained. Access requirements will be further investigated as part of the MCEA process to determine what the overall best suited alternative is. The Preferred option for each level of access requirement is as outlined in Table 1 above.

If you have any questions or comments do not hesitate to contact the undersigned.

R.J. Burnside & Associates Limited

Andrew Dawson, P.Eng.
Project Engineer

AD:jm

Enclosure(s) Structure B22072010 OSIM Inspection, dated October 2, 2019
Detail Bridge Condition Survey, Duffy Lane Structure (Dec. 18, 2015, by exp Services Inc.)
Drawings – Preliminary Plan and Profile Options
Preliminary Cost Estimates

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION
PROPOSED REPLACEMENT OF BRIDGES
PATTERSON SIDEROAD
TOWN OF CALEDON, ONTARIO

for

R.J. BURNSIDE & ASSOCIATES LIMITED



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PML Ref.: 20BF041
Report: 1
March 2021

Peto MacCallum Ltd.
CONSULTING ENGINEERS

March 5, 2021

PML Ref.: 20BF047
Report: 1

Mr. Matt Brooks, P.Eng
R.J. Burnside & Associates Limited
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L9Y 4J6

Dear Mr. Brooks

Geotechnical Investigation
Proposed Replacement of Bridges
Patterson Road
Town of Caledon, Ontario

Peto MacCallum Ltd (PML) is pleased to present the results of the geotechnical investigation recently completed at the above noted project site. Authorization for the work was provided by Mr. M. Brooks in the signed Subconsultant agreement dated September 8, 2020.

The Town of Caledon is planning to replace two bridges as follows:

- Patterson Side Road Bridge (B22162016) - Located 100 m west of Duffy's Lane;
- Patterson Side Road Bridge (B22162017) - Located 30 m east of Duffy's Lane.

A geotechnical investigation has been requested to assess the subsurface conditions at the bridge abutments for both bridges, and based on this information, provide geotechnical recommendations for bridge abutment foundations.

A total of four boreholes to 2.1 to 30.2 m depth were advanced for the project (two boreholes for each bridge). Pavement was overlying fill and peat over a major native silt unit.

A limited chemical testing program was carried out to check the geoenvironmental quality of a limited number of soil samples retrieved from the boreholes in order to provide comments regarding on-site re-use and/or off-site disposal/reuse of excess excavated soils.

We trust the information in this report is sufficient for your present purpose. If you have any questions, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

Geoffrey R. White, P.Eng.
Director
Manager, Geotechnical Services

DP/GRW:tc

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1. INTRODUCTION

Peto MacCallum Ltd (PML) is pleased to present the results of the geotechnical investigation recently completed at the above noted project site. Authorization for the work was provided by Mr. M. Brooks in the signed Subconsultant agreement dated September 8, 2020.

The Town of Caledon is planning to replace two bridges as follows:

- Patterson Sideroad Bridge (B22162016) - Located 100 m west of Duffy's Lane;
- Patterson Sideroad Bridge (B22162017) - Located 30 m east of Duffy's Lane;

A geotechnical investigation has been requested to assess the subsurface at the bridge abutments for both bridges, and based on this information, provide geotechnical recommendations for bridge abutment foundations.

A limited chemical testing program was carried out to check the geoenvironmental quality of a limited number of soil samples retrieved from the boreholes in order to provide comments regarding on-site re-use and/or off-site disposal/reuse of excess excavated soils.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation and are applicable only to the proposed works as addressed in the report. Any changes in the proposed plans will require review by PML to re-assess the validity of the report, and may require modified recommendations, additional investigation and/or analysis.

This report is subject to the Statement of Limitations that is included in Appendix A and must be read in conjunction with the report.

2. INVESTIGATION PROCEDURES

The geotechnical field work for this project consisted Boreholes 1 and 2 (Bridge – B22162017) both advanced to 15.7 m depth, extended by Dynamic Cone Penetration Tests (DCPT) to 25.0 m and 19.2 m depth, respectively. Boreholes 3 and 4 (Bridge – B22162016) extended to 2.1 and 30.2 m depth. The field work was carried out on October 8, 9, 14, and 15, 2020.

PML laid out the boreholes in the field. The ground surface elevation at the borehole locations was obtained with a Sokkia SHC5000 Global Navigation Satellite System (GNSS). Vertical and horizontal accuracy of this unit are 0.1 and 0.5 m, respectively. All elevations in this report are geodetic and expressed in metres.

Co-ordination for clearances of underground utilities was provided by PML. The boreholes were drilled cognizant of the underground utilities.

Traffic control was provided in accordance with Ontario Traffic Manual, Book 7.

The boreholes were advanced using continuous flight hollow stem augers, powered by truck mounted CME-75 and track mounted D-50 drill rigs, equipped with an automatic hammer, supplied and operated by a specialist drilling contractors, working under the full-time supervision of a member of PML's engineering staff.

The existing pavement component thicknesses were measured and samples of the granular material were collected.

Representative samples of the subgrade were recovered at frequent depth intervals for identification purposes using a conventional 51 mm OD split spoon sampler. The sampler excluded particles larger than 38 mm. Standard penetration tests were carried out simultaneously with the sampling operations to assess the strength characteristics of the subsoil. The ground water conditions in the boreholes were assessed during drilling by visual examination of the soil samples, the sampler, and drill rods as the samples were retrieved, and measurement of the

water level in the open boreholes, if any. Beyond the depth of the boreholes, DCPTs were utilized to assess soil density.

Monitoring wells, comprised of 50 mm diameter pipe, filter sand, bentonite seal, and flush-mounted protection casing, were installed in two boreholes. The details of the monitoring well installation are shown on the applicable Log of Borehole Sheets. It should be noted that the wells become the property of the Owner and will have to be decommissioned by the Owner when no longer required. PML would be pleased to assist, if requested.

All recovered samples were returned to our laboratory for detailed examination and moisture content determinations. Grain size analyses were carried out on four samples of the major soil unit. Atterberg Limits showed the samples to be non-plastic. The laboratory test results are provided on Figure 1-1, appended.

3. SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions, including pavement component thicknesses, soil classifications and inferred stratigraphy and thicknesses, Standard Penetration N values (N Values – blows per 300 mm of penetration of the split spoon sampler), monitoring well installation details and ground water levels, and the results of laboratory water content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth/elevation demarcations on the borehole logs must be viewed as “transitional” zones, and cannot be construed as exact geologic boundaries between layers. PML should be retained to assist in defining the geological boundaries in the field during construction, if required.

At both bridges, pavement was at the surface of the boreholes, over fill and peat, underlain by a native silt deposit.

3.1 Patterson Side Road Bridge B22162016 (Boreholes 1 and 2)

3.1.1 Soil

The existing pavement component thicknesses encountered in Boreholes 1 and 2 are summarized in the following table:

BOREHOLE	ASPHALT (mm)	GRANULAR BASE (mm)	GRANULAR SUBBASE (mm)	TOTAL THICKNESS (mm)
1	100	150	250	500
2	110	130	250	490

Fill was contacted below the pavement, extending to 2.6 and 3.1 m depth (elevation 262.5 and 263.5). The fill comprised silty sand to sandy silt with trace to some gravel. The N Values in the fill were 2 to 38, indicating a variable compactive effort was applied when the fill was placed. The fill was moist to wet, with moisture contents ranging from 4 to 18%.

An amorphic peat layer was encountered beneath the fill in both boreholes, extending to 3.7 m and 4.4 m depth (elevation 261.2 and 262.4). The unit was wet with moisture contents of 17% to 37%.

A major silt unit was encountered beneath the peat to the 15.7 m depth of exploration in both boreholes. Two samples of the material were submitted for grain size analysis, and the results are presented on Figure 1-1, attached. Atterberg Limits showed the samples to be non-plastic. The unit was loose to compact, with N Values of 8 to 26. The unit was very moist with moisture contents of 14 to 34%.

3.1.2 Dynamic Cone Penetration Test

DCPTs extended the boreholes to 25.0 to 19.7 m depth. In Borehole 1, the DCPT showed compact conditions to 22.0 m depth (about elevation 243.5), being dense between 22.0 m and 23.5 m depth and very dense below 23.5 m depth. In Borehole 2, the DCPT revealed dense to very dense conditions from 15.7 to 19.2 m depth.

3.1.3 Ground Water

The first water strike (ground water first encountered during drilling), the ground water/wet cave levels measured in the boreholes upon completion of augering, and ground water level measured in the well about two weeks after installation are summarized in the table below, on a borehole by borehole basis.

BOREHOLE	FIRST STRIKE DURING DRILLING DEPTH (m) / ELEVATION	UPON COMPLETION OF AUGERING DEPTH (m) / ELEVATION	WATER LEVEL IN WELL DEPTH (m) / ELEVATION 2020-10-28
1	4.0 / 261.6	3.0 / 262.6	2.7 / 262.9
2	3.0 / 263.1	3.2 / 262.9	--

The creek bed was about 4.2 to 4.9 m below the road surface, and was 0.5 m deep at the time of our investigation.

Ground water levels will fluctuate seasonally, and in response to variations in precipitation.

3.2 Patterson Side Road Bridge B22162017 (Boreholes 3 and 4)

3.2.1 Soil

The existing pavement component thicknesses in Boreholes 3 and 4 encountered are summarized in the following table:

BOREHOLE	ASPHALT (mm)	GRANULAR BASE (mm)	GRANULAR SUBBASE (mm)	TOTAL THICKNESS (mm)
3	100	150	250	500
4	130	130	170	430

Fill was contacted below the pavement, extending to the 2.1 m depth of Borehole 3 and 2.1 m depth (elevation 262.9) in Borehole 4. The fill comprised silty sand/sandy silt with trace gravel and clay varying to sand with some silt and trace gravel. The N Values in the fill were 5 to 23, indicating a variable compactive effort was applied when the fill was placed. The fill was moist, with moisture contents ranging from 5 to 20%.

An amorphic peat unit was encountered beneath the fill in Borehole 4, extending to 2.9 m depth (elevation 262.1). The unit was wet with a moisture content of 30%.

A major silt unit was encountered beneath the peat to the 30.2 m depth of exploration in Borehole 4. Two samples of the material were submitted for grain size analysis, and the results are presented on Figure 1-1, attached. Atterberg Limits showed both samples to be non-plastic. The unit was loose to compact, with N Values of 7 to 28. Moisture contents were 14 to 21% (very moist).

3.2.2 Auger Refusal

Refusal to auger was encountered in Borehole 3 at 2.1 m depth (elevation 262.3). Multiple attempts were made to advance the borehole further without success.

3.2.3 Ground Water

The first water strike (ground water first encountered during drilling), the ground water/wet cave levels measured in the boreholes upon completion of augering, and ground water level measured in the well about two weeks after installation are summarized in the table below, on a borehole by borehole basis.

BOREHOLE	FIRST STRIKE DURING DRILLING DEPTH (m) / ELEVATION	UPON COMPLETION OF AUGERING DEPTH (m) / ELEVATION	WATER LEVEL IN WELL DEPTH (m) / ELEVATION 2020-10-28
3	No Water	No Water	--
4	2.9 / 262.1	4.3 / 260.7	2.2 / 262.8

The creek bed was 4.7 m below the road surface, and was 0.5 m deep at the time of our investigation.

Ground water levels will fluctuate seasonally, and in response to variations in precipitation.

4. GEOTECHNICAL ENGINEERING CONSIDERATIONS

4.1 Foundations

It is understood that a deep foundation comprised of 25 ft. long timer piles is in place for the bridge, 30 m east of Duffy's Lane. Based on the low bearing capacity available at the typical footing level, a deep foundation comprising pipe piles is proposed for both bridges.

If the abutments are to be closer to the creek, it is envisioned that the base of the pile cap would be set at about elevation 259 for Bridge 22162016 and elevation 258 for Bridge 22162017 (minimum 2.0 m below the creek bed to provide scour and frost protection). Where the abutments are further from the creek (longer span bridge), such that scour protection is provided laterally, then the pile caps can be set at a higher elevation assumed 2.0 m below the road grade, allowing a minimum 1.2 m of earth cover for frost protection. The latter has been assumed for pile capacities below.

For Bridge 22162016, the pipe piles should be driven through the fill, upper loose to compact soil layers, to the very dense soil stratum, relying on friction and some end bearing. The following vertical axial resistances are recommended for pipe piles driven a minimum 1 to 2 m into the 50 to 100-blow stratum, approximately 24 m below the existing grade, corresponding to about 22 m below the base of the pile cap (elevation 241).

PILE SECTION	GEOTECHNCIAL RESISTANCE AT SLS (kN)	FACTORED BEARING RESISTANCE AT ULS (kN)
324 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	700	875
356 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	800	950

For Bridge 22162017, the piles will rely on friction only as no end bearing unit was revealed within the depth of exploration. The vertical axial resistances below are based on a pile driven at least 20 m below the pile cap or deeper.

PILE SECTION	GEOTECHNCIAL RESISTANCE AT SLS (kN)	FACTORED BEARING RESISTANCE AT ULS (kN)
324 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	450	550
356 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	500	625

Pipe piles should be driven closed ended and filled with 20 MPa concrete.

The required pile set should be established when the pile section is selected, and based on the pile hammer to be used by the piling contractor. For preliminary design and planning purposes only, the piles should be driven with a hammer transferring at least 40 kJ of energy to the pile. The required set will be dictated by the pile section selected, the design capacity /axial resistance as well as the transferred energy and impact force on the piles of the hammer selected to install the piles. The actual set should be reviewed when design details are established and the pile capacities should be verified in the field by Pile Dynamic Analysis (PDA). A geotechnical

resistance factor of 0.5 was utilized for the ULS values, in anticipation that values would be verified via PDA testing.

Prior to driving of piles, a Wave Equation Analysis (WEAP) should be performed by PML in order to confirm that appropriate pile driving equipment has been selected for the project and the pile will not be overstressed during driving. A WEAP analysis estimates the bearing capacities and stresses during driving based on the pile driving equipment, pile and the soil.

To evaluate the point of contraflexure, the coefficient of horizontal subgrade reaction, k_s (MN/m^3) should be computed using the following equation:

Cohesionless Soils –Silt (Terzaghi, 1955)

$k_s = n_h z/b$

Where n_h = coefficient related to soil density, (MN/m^3)
$= 4.4\ MN/m^3$
z = depth, (m)
b = pile width, (m)

Battered piles should be installed to resist lateral loads.

Lateral load testing is recommended to verify the horizontal pile resistance.

The piling installation operations should be reviewed on a full-time basis by qualified geotechnical personnel to check that the required set and capacity are achieved, and to document founding elevation, alignment and plumbness.

4.1.1 Seismic Considerations

Based on the stratigraphic conditions in the boreholes (N Values) and as per the Canadian Highway Bridge Design Code (CHBDC), December 2014, CSA-S6-14, Clause 4.4.3.2 – Table 4.1, Site Class D is applicable for both bridges.

Based on the type and relative density of the soil revealed in the boreholes, there is a moderate potential for liquefaction of the shallow soils to occur (CHBDC Clause 4.6.6).

4.2 Abutment Wall Design

Abutment walls must be designed to resist the unbalanced lateral earth pressure imposed by the backfill adjacent to the abutment. The lateral earth and water pressure, P (kPa), may be computed using the equivalent fluid pressure method presented in Section 6.12 of the CHBDC, or employing the following equation:

$$P = K(\gamma h + q) + C_p$$

Where
- P = total lateral pressure at depth h (m) below ground surface (kPa)
- K = lateral earth pressure coefficient of compacted backfill
- h = depth below grade (m) at which lateral pressure is calculated
- γ = unit weight of compacted sand and gravel backfill
- q = vertical stress at depth h due to surcharge loads (kPa)
- C_p = compaction pressure (refer to clause 6.12.3 of CHBDC)

In addition, there should be allowance for seismic events and appropriate safety factors.

Free draining granular material should be used as backfill behind the abutments comprising OPSS Granular A or Granular B, placed in thin lifts compacted to a minimum 95% Standard Proctor maximum dry density (SPmdd). Site soils are not suitable for use as free draining backfill. Over compaction close to the abutment wall should be avoided as this could generate excessive pressure on the abutment wall. The following parameters are recommended for design:

	Granular 'A'	Granular 'B'
Angle of Internal Friction (degrees)	35	32
Unit Weight (kN/m^3)	22.8	21.2
Rankin Active Earth Pressure Coefficient (K_a)	0.27	0.31
At Rest Earth Pressure Coefficient (K_o)	0.43	0.47
Rankin Passive Earth Pressure Coefficient (K_p)	3.70	3.23

A weeping tile system and/or weeping holes should be installed to minimize the build-up of hydrostatic pressure behind the abutments. The weeping tiles should be surrounded by a properly designed granular filter or geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free outlet.

4.3 Approach Fill

In general, approach fill embankments should be constructed in accordance with OPSS 206 and OPSD 200.01. The side slopes of the approach embankments should be inclined no steeper than three horizontal to one vertical (3H:1V) for earth fill. Backfill adjacent to the structure should be carried out in conformance with OPSS for granular backfill.

Excavated inorganic site soil is generally considered to be acceptable for reuse in constructing bridge approaches, subject to moisture content control and geotechnical field review and approval.

Side slopes should be protected from surface erosion by sodding or by seed and mulch as soon as possible following construction.

4.4 Excavation and Ground Water Control

Excavation for pile caps for the bridge abutments is expected to extend to about 2.0 m depth at both locations (based on discussion earlier, regarding pile caps set laterally away from the creek) and will encounter the pavement and fill.

Subject to ground water control as discussed below, site soils are considered as Type 3 Soil requiring excavation sidewalls to be constructed at no steeper than 1H:1V from the base of the excavation in accordance with the Occupational Health and Safety Act. Peat is considered Type 4 Soil and where encountered excavation side slopes shall be constructed no steeper than 3H:1V from the base of the excavation. Flatter side slopes may be required.

Excavation side slopes should be continuously examined and reviewed for evidence of instability, particularly following periods of heavy rain or thawing. When required, remediation action must be taken to ensure the continued stability of the excavation slope and the safety of the workers.

For shallow excavation to 2.0 m depth, sump pumping should suffice to control seepage and surface water runoff.

It envisioned that sheet piling will be employed to support the excavations where space does not permit open cut or deeper excavation is required. Sheet piling will aid with ground water control. For design of temporary sheet piling for excavations, in addition to hydrostatic pressure, the following parameters may be assumed (wall friction ignored):

PARAMETER	FILL	SILT
Angle of Internal Friction, ϕ, (degrees)	28	29
Shear Strength, c, (kPa)	--	--
Bulk Unit Weight (kN/m³)	19	19

Sheet piling should penetrate sufficiently below the lowest level of excavation to maintain basal stability. Sheet piling should be designed and installed by specialist in this field. Sump pumping from within the sheeted excavation is still anticipated.

Depending on the construction staging coffer dams and creek diversion will likely be required.

It is recommended the work be scheduled following periods of prolonged dry weather, and when the ground water table and creek flow are usually at their lowest, in order to minimize the quantity of water to be handled.

Water taking in Ontario is governed by the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation O.Reg. 387/040, Section 34 of the OWRA requires any one taking more than 50,000 L/d to notify the Ministry of Environment, Conservation and Parks (MECP). This requirement applies to all withdrawals, whether for consumption, temporary construction dewatering or permanent drainage improvements. Projects assessed to be taking more than 50,000 L/d but less than 400,000 L/d of ground water can obtain a permit/permission online via the Environmental Activity and Sector Registry (EASR) system. If it is assessed that more than 400,000 L/d is required, then a Category 3 Permit-to-Take-Water (PTTW) will be required.

Once design details, including creek diversion and excavation plans, are finalized, the project should be reviewed to confirm the MECP requirements. As minimum, registering on the EASR system may be required.

It is recommended that a test dig be undertaken to allow prospective contractors an opportunity to observe and evaluate the conditions likely to be encountered and assess preferred means of excavation and ground water control measures based on their own experience.

4.5 Pavement Design and Construction

Once the bridges are replaced, the pavement is to be restored. Based on the boreholes, it is anticipated that the pavement subgrade will comprise moderately to highly frost susceptible silty sand to sandy silt fill. Traffic volumes of approximately 1000 AADT with 1% commercial vehicles were provided at the time of this report by the Client. Considering the existing pavement appears to be performing adequately, the following pavement structure thicknesses are recommended:

MATERIAL	THICKNESS (mm)
Asphalt (two lifts)	110
Granular A Base Course	150
Granular B Subbase Course	350
Total Thickness	610

Rough grading will involve stripping of the asphalt and the existing granulars and cutting down to the design subgrade level. It is not intended to remove all of the existing fill from under the road structure. However, in order to minimize potential settlement issues, it is recommended that following rough grading to the proposed subgrade level, the exposed subgrade soil should be compacted to minimum 95% SPmdd, under geotechnical review by PML. Any unstable zones identified during this process should be sub-excavated and replaced with select site material placed in 200 mm thick lifts and compacted to a minimum 95 % SPmdd.

The pavement design considering that construction will be carried out during the dry time of the year and that the subgrade is relatively dry and is stable, as determined by proofrolling operations described above. If the pavement subgrade is wet, remediation may include increasing the thickness/depth of the subbase, the use of Granular B Type II and/or the use of geogrid reinforcement, subject to geotechnical review during construction.

Imported material for the granular base and subbase should conform to OPSS gradation specifications for Granular A and Granular B, and should be compacted to 100% SPmdd. Asphalt should be compacted in accordance with OPSS 310.

The new pavement structure thickness should be tapered 10H:1V to match the existing pavement structure thickness at tie-in locations. For transverse joints at the tie-in locations, key each lift of asphalt into the existing pavement (where existing asphalt thicknesses allow) to provide a 5 m overlap into the existing asphalt, in accordance with OPSS.PROV313 (item 313.07.07.03.03).

For the pavement to function properly, it is essential that provisions be made for water to drain out of and not collect in the base material. The granular material should daylight at the ditches with the ditches constructed as per OPSD 200.010.

4.6 Geotechnical Review and Construction Inspection and Testing

It is recommended that the final design drawings be submitted to PML for geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures and check the specified degree of compaction is achieved throughout.

The piling installation operations should be reviewed on a full-time basis by qualified geotechnical personnel to check that the required set and capacity are achieved, and to document founding elevation, alignment and plumbness.

The comments and recommendations provided in the report are based on information revealed in the boreholes. Conditions away from and between boreholes may vary. Geotechnical review during construction should be ongoing to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

5. GEOENVIRONMENTAL CONSIDERATIONS

5.1 General

A limited chemical testing program was carried out to check the geoenvironmental quality of the soil at selected sampling locations in order to provide comments regarding on site reuse or off-site disposal options for excess excavated soil.

A Phase One Environmental Site Assessment (ESA) was not within the scope of work for this assignment. Accordingly, soil impairment that has not been identified by the limited chemical testing program may exist at the site. The limited chemical testing program does not constitute an Environmental Site Assessment as defined under the Environmental Protection Act and O. Reg. 153/04, as amended.

5.2 Chemical Testing Protocols

As part of the geoenvironmental procedural protocol, all recovered soil samples were examined for visual and olfactory evidence of potential contamination. It is noted that none of the samples displayed visual or olfactory evidence of contamination.

After field examination, selected geoenvironmental soil samples were placed in laboratory air tight glass containers and stored in an insulated cooler for transportation to our laboratory for detailed visual examination.

Soil samples were submitted for chemical analysis to a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory. The chemical analyses conducted were in accordance with the O. Reg. 153/04, as amended Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act dated March 9, 2004, amended as of July 1, 2011.

For general environmental quality characterization, soil samples were tested for the following analyte groups:

- Metals and Inorganics;
- Petroleum Hydrocarbons (F1 to F4 fractions).

The following soil samples were submitted for testing:

Borehole 1 SS2 (fill – 0.8 to 1.4 m)
Borehole 2 SS3 (fill – 1.5 to 2.1 m)
Borehole 3 SS2 (fill – 0.8 to 1.4 m)
Borehole 4 SS3 (fill – 1.5 to 2.1 m)

5.3 Site Condition Standards

The Ontario MECP has developed a set of Soil, Ground water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011) and O. Reg. 153/04, as amended. The standards consist of nine tables (Table 1 through Table 9) that provide criteria for maximum concentrations of various contaminants. In general, the applicable O. Reg. 153/04, as amended, SCSs depend on the site location, land use, soil texture, bedrock depth and the applicable potable or non-potable ground water condition at the investigation site.

In order to determine the Site Sensitivity, Sections 41 and 43.1 of O. Reg. 153/04, as amended, were evaluated by PML as shown in the following table:

CRITERIA	RESULT
Current Property Use	Roadway
Potable vs. Non-Potable Ground Water	Potable [i]
Proximity of Areas of Natural Significance	> 30 m
Proximity to a Water Body	< 30 m[ii]
Shallow Soil Condition	No
Land Use	Industrial / Commercial / Community (ICC)
Applicable Site Condition Standard	Table 8: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition (Table 8 ICC)

Notes: i) MECP interactive Water Well Record (WWR) mapping indicates water supply wells within 100 m of the site.
ii) Creeks run through the site(s).

5.4 Analytical Findings and Conclusions

The Certificates of Analyses for Chemical Testing are included in Appendix B.

5.4.1 On-Site Reuse

In summary, the concentration of the tested parameters in the submitted soil samples from the boreholes were either not detected (below the method detection limit) or were within the Table 8 ICC SCSs except as follows:

- Electrical Conductivity (EC) of 3.08 mS/cm in Borehole 2 and 0.997 mS/cm in Borehole 3 (Guideline Value is 0.7 mS/cm);
- Sodium Adsorption Ratio (SAR) of 46 in Borehole 2, 8.24 in Borehole 3 and 5.26 in Borehole 4 (Guideline Value is 5).

The results show that the soil associated with Borehole 1 can remain on site, subject to geotechnical requirements. The results indicate that the soils associated with Boreholes 2, 3 and 4 can remain on site, subject to the discussion below and geotechnical requirements.

Non-conforming levels of EC and/or SAR were indicated in the samples. The elevated levels of EC/SAR in the samples are considered associated with winter de-icing operations. It is noted that EC and SAR are physical, non-health related parameters typically affecting vegetation and elevated levels of this parameters is relevant to soils that must support plant growth.

Under O. Reg. 153/04, as amended, where a site condition standard is exceeded solely because a substance has been used on a surface for purposes of keeping traffic safe under conditions of snow and ice, the applicable site condition standard is deemed not to be exceeded. In this regard, the tested soil samples exhibiting EC/SAR exceedances only can be reused on- or off-site at a road site where paved surfaces are to be constructed and continued de-icing salt application can be expected to occur for traffic safety. Reference is made to O. Reg. 153/04 (as amended), s. 48 (3) and O. Reg. 339 s. 2 for a full outline of the regulations regarding soils impacted by de-icing salt.

It should be noted that the soil conditions between and beyond the sampled locations may differ from those encountered during this assignment. PML should be contacted if impacted soil conditions become apparent during future development to further assess and appropriately handle the materials, if any, and evaluate whether modifications to the conclusions documented in this report are necessary.

This assessment is subject to the Statement of Limitations that is included with this report (Appendix A) which must be read in conjunction with the report.

5.4.2 Off-Site Reuse/Disposal

As of January 1, 2021, excess excavated soil at a site that is to be transported off site is governed by O.Reg. 406/19. Within the new regulation, for excess soil volumes leaving the site of less than 350 m³ the existing O.Reg. 153/04 tables apply (Tables 1, 2, 3, 4, 5, 6, 7, 8 and 9) and for volumes in excess of 350 m³ the recent O.Reg. 406/19 tables apply (Tables 1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.1, 8,1 and 9,1), for evaluating Environmental Soil Characteristics. Tables from both regulations are further divided based on land use. The chemical testing results from this project were compared to the various SCSs to evaluate where the excess soil can be transported. Our assessment was limited to Tables 1, 2 and 3 (O.Reg. 153/04) and Tables 1, 2.1 and 3.1

(O.Reg. 406/19), the most common SCSs. If a potential receiving site has SCSs other than the above noted tables, then PML should be consulted to ensure that the results meet the applicable SCSs of the proposed receiving site.

Based on the limited chemical testing results the on-site soil associated with Boreholes 1, 3 and 4, is in compliance with the following O. Reg. 153/04, as amended, and O.Reg. 406/19 SCS's;

- Table 2 RPI/ICC;
- Table 3 RPI/ICC;
- Table 2.1 RPI/ICC;
- Table 3.1 RPI/ICC.

The soil associated with Borehole 2 does not meet any SCS's used in this assessment. Due the road salt exemption noted earlier in the report, it is recommended that the soil associated with Borehole 2 stay on site, or alternatively be taken to a landfill. Excess excavated soil can be transported to a landfill site, however, additional testing for Toxicity Characteristic Leaching Procedure (TCLP) will be required, in accordance with Ontario Regulation 347, Schedule 4, as amended to Ontario Regulation 558/00, dated March 2001.

In accordance with O.Reg. 406/19, the following requirements must also be completed by a QP prior to movement of soil:

- Preparation of an assessment of past land uses for the source site;
- Preparation and implementation of a soil sampling and chemical testing plan;
- Preparation of a soil characterization report (chemical testing results);
- Preparation of an excess soil destination assessment report.

Since there are exceedances of salt related contaminants, the reuse and placement of soil from the site must also meet the following guidelines from O.Reg. 406:

1. Excess soil quality standards for chemicals (e.g., SAR and EC) in soil resulting solely from the use of a substance for the safety of vehicular or pedestrian traffic applied under conditions of snow or ice or both, are deemed to be met if the following criteria are met:

    a) The excess soil is final placed:

        i) Where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice; or

        ii) With an industrial or commercial property use and to which non-potable standards would be applicable; or

        iii) That is at least 1.5 m below the surface of the soil.

    b) Further, the excess soil is not to be finally placed:

        i) Within 30 m of a waterbody;

        ii) Within 100 m of a potable water well or area with an intended property use that may require a potable water well;

        iii) That will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 m or greater below the soil surface.

In general, when transporting excavated site soil to another site, O.Reg. 406/19 should be followed along with any local bylaws, with the following highlighted below:

- The soil characterization and excess soil destination assessment reports, including all applicable chemical testing results, should be provided to the receiving site authority for approval;
- A tracking system must be implemented by the source site QP such that transportation and placement of the surplus soil is monitored to check the material is appropriately placed at the pre-approved site;
- The receiving site(s) must be arranged and/or approved in advance of excavation such that a site-specific excess soil destination report assessment report is completed for each site prior to fill movement;
- Additional sampling and chemical testing shall be carried out during construction to verify the chemical quality of the excess soil to assess the appropriate management/disposal options for the actual soil to leave the site. The frequency of additional testing depends on the volume of soil to be transported and it is noted that additional leachate testing will be required to meet O.Reg. 406/19 requirements, where the volume of soil is to be transferred off site is greater than 350 m^3.

This assessment is subject to the Statement of Limitations that is included with this report (Appendix A) which must be read in conjunction with the report.

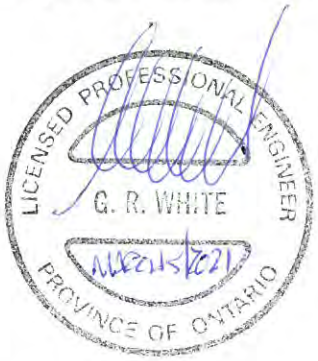
6. CLOSURE

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

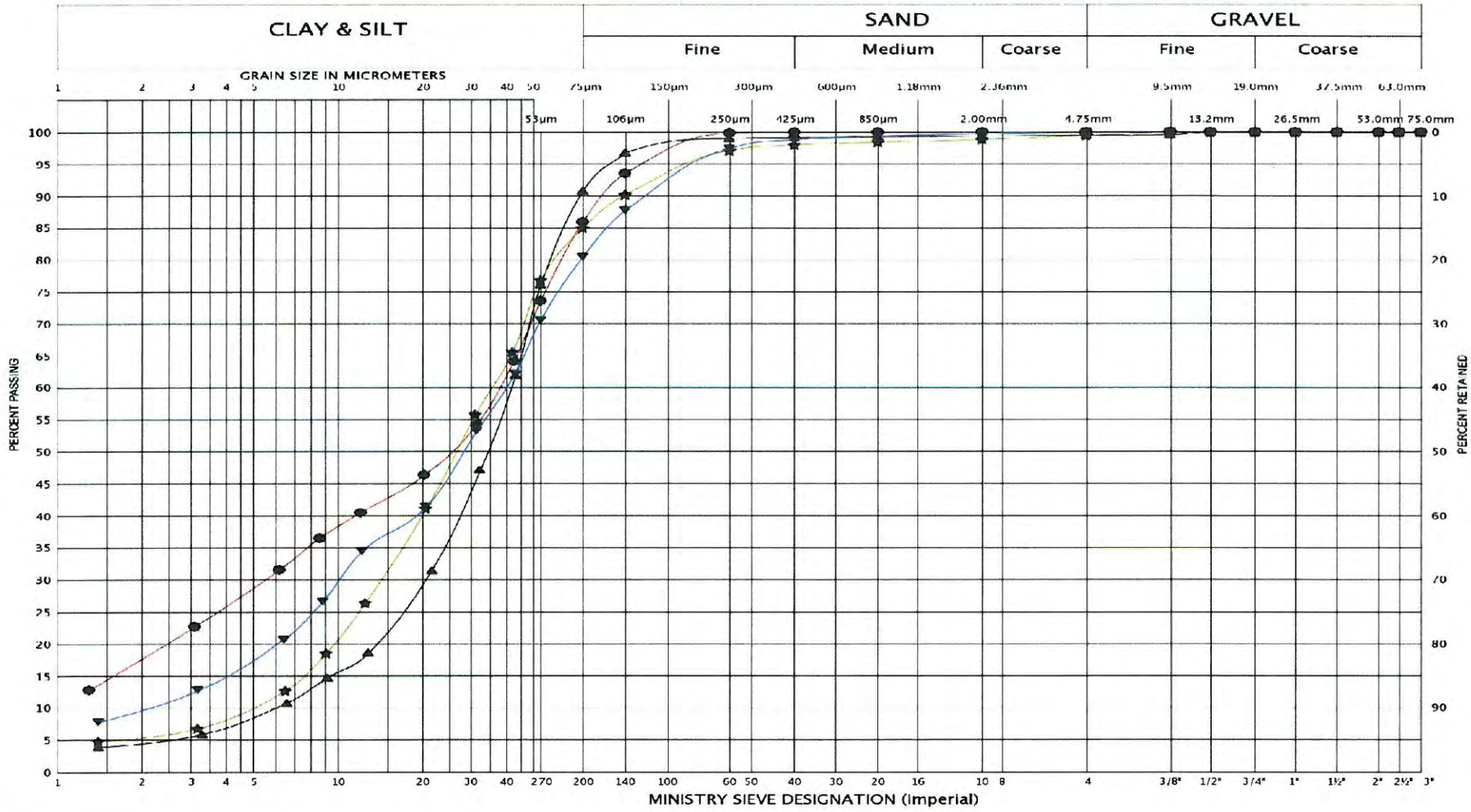
Davin Power, E.I.T.
Project Supervisor, Geotechnical Services



Geoffrey R. White, P.Eng.
Director
Manager, Geotechnical Services

DP/GRW:tc

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND	BH	1	1	4	4B
	SAMPLE	8	11	15	22
	SYMBOL	★	▼	●	▲

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GRAIN SIZE DISTRIBUTION

SILT, Trace to Some Sand, Trace to Some Clay

FIG No.: 1-1

Project No.: 20BF041

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTLL	Wetter Than Liquid Limit
WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	ST	Slotted Tube Sample
WS	Washed Sample	TW	Thinwall Open
SB	Scraper Bucket Sample	TP	Thinwall Piston
AS	Auger Sample	OS	Oesterberg Sample
CS	Chunk Sample	FS	Foil Sample
GS	Grab Sample	RC	Rock Core

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE/MONITORING WELL NO. 1

592948E 4865415N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 8/15, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 265.60				
0.0	265.60	PAVEMENT: 100 mm asphalt, over 150 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-
0.50	265.10	FILL: Brown, silty sand, trace to some gravel, moist to wet		2[1]	SS	12
1.0				3	SS	38
2.0				4	SS	3
3.0	262.5	PEAT: Black, peat, amorphic, wood pieces, wet		5	SS	5
3.1				6	SS	2
4.0	261.2	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		7	SS	21
4.4				8	SS	14
5.0				9	SS	8
6.0				10	SS	20
7.0				11	SS	13
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0		CONTINUED				

ELEVATION SCALE: 265, 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252, 251

SHEAR STRENGTH (kPa)
+FIELD VANE ΔTORVANE O Qu
▲POCKET PENETROMETER O Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Flushmount casing
Concrete
Bentonite seal
First water strike at 4.0 m
Approximate Creek Bed EL. 261.2
50 mm slotted pipe
Filter sand

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 1

592948E 4865415N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 8/15, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
15.0	CONTINUED FROM PREVIOUS PAGE				
250.6	SILT(Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		12	SS	14
15.7					
249.9	BOREHOLE TERMINATED AT 15.7 m BEGIN DYNAMIC CONE PENETRATION TEST				
25.0					
240.6	DYNAMIC CONE TEST TERMINATED AT 25.0 m				

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200

DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 250, 249, 248, 247, 246, 245, 244, 243, 242, 241

109×
135×

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Water at 3.0 m
No cave
Water Level Readings:

Date	Depth	Elev.
2020-10-28	2.7	262.9

NOTES 1. Sample submitted for chemical testing

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CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

592937E 4865397N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 8/15, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 266.10				
0.0	266.10	PAVEMENT: 110 mm asphalt, over 130 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-
0.49	265.61	FILL: Brown, sandy silt, trace gravel, moist to wet		2	SS	16
1.0				3[1]	SS	6
2.0				4	SS	2
2.6	263.5	PEAT: Black, peat, amorphic, wood pieces, wet		5	SS	2
3.0						
3.7	262.4	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		6	SS	8
4.0				7	SS	8
5.0						
6.0				8	SS	21
7.0						
8.0				9	SS	12
9.0						
10.0				10	SS	26
11.0						
12.0				11	SS	26
13.0						
14.0						
15.0		CONTINUED				

ELEVATION SCALE: 266, 265, 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ● Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

First water strike at 3.0 m

Approximate Creek Bed EL. 261.2

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

592937E 4865397N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 8/15, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
15.0	CONTINUED FROM PREVIOUS PAGE					251
251.1	SILT(Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		12	SS	23	
15.7						250
250.4	BOREHOLE TERMINATED AT 15.7 m BEGIN DYNAMIC CONE PENETRATION TEST					249
						248
19.2						247
246.9	DYNAMIC CONE PENETRATION TEST TERMINATED AT 19.2 m					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80
134

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Water at 3.2 m
Cave at 8.5 m

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

593044E 4965534N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 14, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) +FIELD VANE △TORVANE ○ Qu ▲POCKET PENETROMETER ○ Q / DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 264.35						50 100 150 200 / 20 40 60 80	10 20 30 40		
0.0	PAVEMENT: 100 mm asphalt, over 150 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-	264				
0.50 263.85	FILL: Brown to grey, sand, some silt, trace gravel, moist		2[1]	SS	23			○		
1.0						263				
2.0			3	SS	5			○		
2.1 262.3	BOREHOLE TERMINATED AT 2.1 m UPON REFUSAL TO AUGER									Upon completion of augering No water No cave Multiple attempts to advance past 2.1 m depth encountering refusal at same depth
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0										
12.0										
13.0										
14.0										
15.0										

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

593075E 4865563N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 9/14, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 265.00				
0.0	265.00	PAVEMENT: 130 mm asphalt, over 130 mm granular base, over 170 mm granular subbase, moist		1A 1B	GS	-
0.43	264.57	FILL: Brown, sandy silt/sandy silt, trace gravel, trace clay, moist		2	SS	11
1.0				3	SS	13
2.0	262.9	PEAT: Black, peat, amorphic, wood pieces, wet		4	SS	3
2.1	262.9					
2.9	262.1	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		5	SS	10
3.0				6	SS	17
4.0				7	SS	21
5.0				8	SS	20
6.0				9	SS	16
7.0				10	SS	21
8.0				11	SS	18
9.0				12	SS	27
10.0				13	SS	25
11.0						
12.0						
13.0						
14.0						
15.0		CONTINUED				

ELEVATION SCALE: 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252, 251

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL



NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

593075E 4865563N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 9/14, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE
15.0	CONTINUED FROM PREVIOUS PAGE					
	SILT (Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		14	SS	28	
			15	SS	28	
			16	SS	13	
			17	SS	9	
			18	SS	27	
			19	SS	7	
	CONTINUED					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

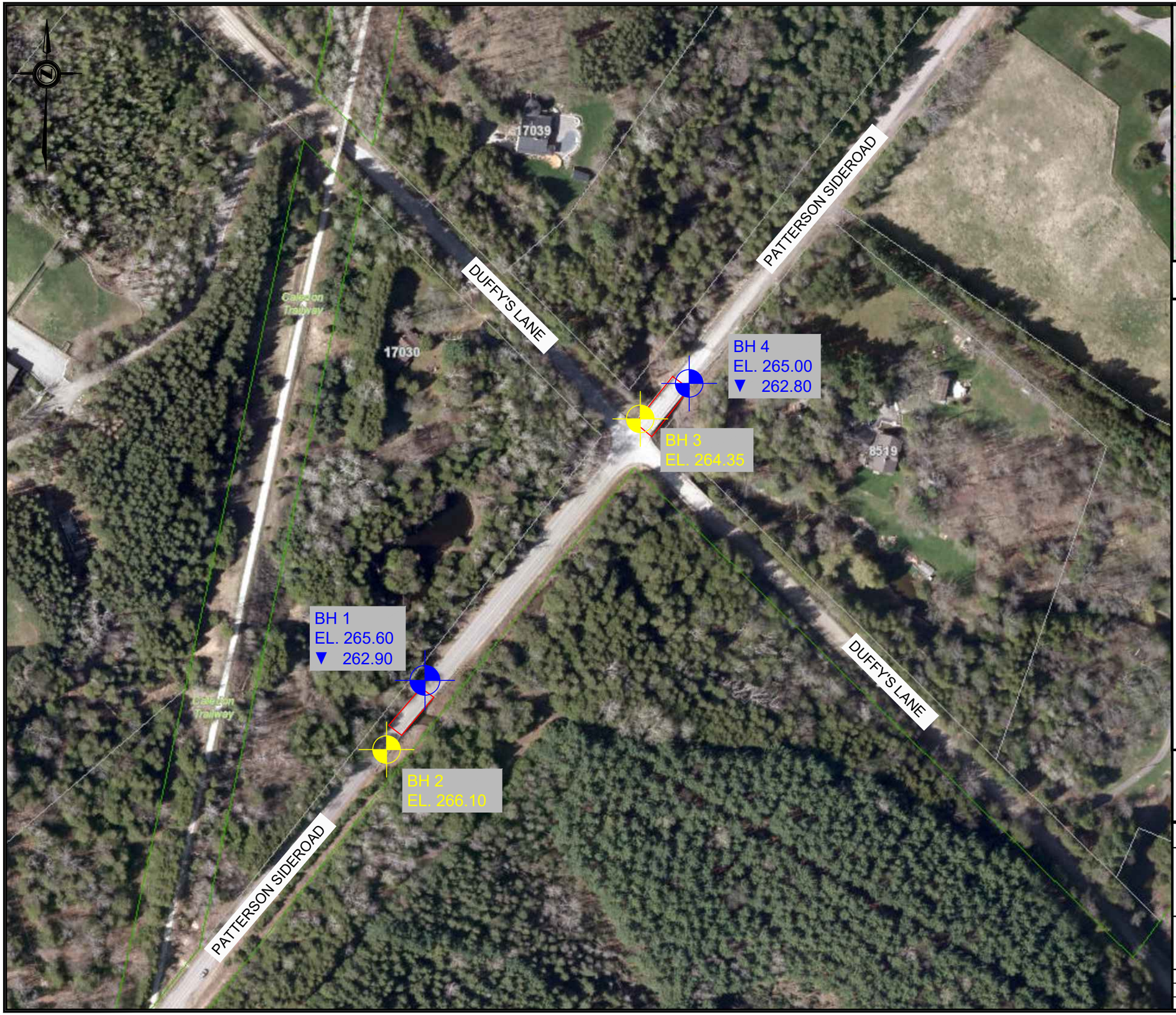
593075E 4865563N

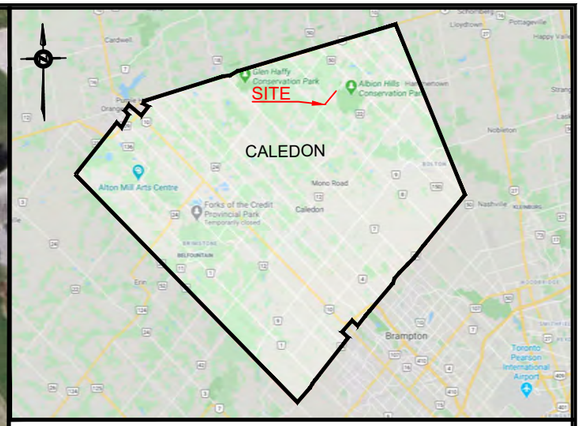
PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 9/14, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa): +FIELD VANE △TORVANE ○ Qu ▲POCKET PENETROMETER ○ Q (50 100 150 200); DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20 40 60 80)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%) (10 20 30 40)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
30.0	CONTINUED FROM PREVIOUS PAGE									
30.2 234.8	SILT (Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist BOREHOLE TERMINATED AT 30.2 m									Upon completion of augering Water at 4.3 m Cave at 5.5 m Water Level Readings: Date Depth Elev. 2020-10-28 2.2 262.8

30.0 31.0 32.0 33.0 34.0 35.0 36.0 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0 45.0

NOTES 1. Sample submitted for chemical testing





KEY PLAN
CALEDON, ONTARIO

LEGEND:

BH 1
EL. 265.60
▼ 262.90
BOREHOLE/MONITORING WELL 1
SURFACE ELEVATION
WATER ELEVATION

BH 2
EL. 266.10
BOREHOLE 2
SURFACE ELEVATION

APPROXIMATE BRIDGE LIMITS

REFERENCE:

BASE PLAN PRODUCED USING THE TOWN OF CALEDON MAPPING SERVICE, 2018

0m 20 40 60 80 100
SCALE

BOREHOLE LOCATION PLAN

PROPOSED BRIDGE AND CULVERT REPLACEMENT
PATTERSON SIDEROAD
CALEDON, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

		DATE	SCALE	PML REF.	DRAWING NO.
DRAWN	NG	JAN 2021	AS SHOWN	20BF041	1-1
CHECKED	GW				
APPROVED	GW				

APPENDIX A

Statement of Limitations

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

STATEMENT OF LIMITATIONS
(continued)

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may affect the validity of the findings and recommendations given in this report.

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence an action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

APPENDIX B

Certificates of Analysis of Chemical Testing

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0319 **REPORT No. B20-32199 (i)**

Report To:

Peto MacCallum Ltd
19 Churchill Drive,
Barrie ON L4N 8Z5
Attention: Alicia Kimberley

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:

P.O. NUMBER: 20BF041
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	12	Kingston	US	20-Oct-20	A-CN s K	in house
Conductivity	12	Holly Lane	ROD	21-Oct-20	A-COND-01 (o)	SM 2510B
pH	12	Richmond Hill	HAZ	19-Oct-20	A-pH-02 (rh)	MOEE3530
Chromium (VI)	12	Holly Lane	LMG	19-Oct-20	D-CRVI-02 (o)	EPA7196A
Mercury	12	Holly Lane	PBK	21-Oct-20	D-HG-01 (o)	EPA 7471A
Sodium Adsorption Ratio	12	Holly Lane	TPR	20-Oct-20	D-ICP-01 SAR (o)	SM 3120
Metals - ICP-OES	12	Holly Lane	TPR	20-Oct-20	D-ICP-02 (o)	EPA 6010
Metals - ICP-MS	12	Holly Lane	TPR	20-Oct-20	D-ICPMS-01 (o)	EPA 6020

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH1-SS2	BH2-SS3	BH4-SS3	BH5-SS2	O. Reg. 153	
	Sample I.D.		B20-32199-1	B20-32199-2	B20-32199-3	B20-32199-4	Tbl. 1 - All	
	Date Collected		08-Oct-20	08-Oct-20	09-Oct-20	08-Oct-20		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.25	8.23	7.97	8.22		
Conductivity @25°C	mS/cm	0.001	**0.63**	**3.08**	0.514	**0.823**	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		**3.36**	**46.0**	**5.26**	**9.40**	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	2.6	2.2	1.3	1.3	18	
Barium	µg/g	1	37	28	20	13	220	
Beryllium	µg/g	0.2	0.2	0.2	< 0.2	< 0.2	2.5	
Boron	µg/g	0.5	4.5	3.6	1.3	1.7	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	10	10	9	7	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	5	3	3	21	
Copper	µg/g	1	22	11	6	6	92	
Lead	µg/g	5	11	< 5	< 5	< 5	120	
Mercury	µg/g	0.005	0.008	0.008	0.012	< 0.005	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	9	8	4	4	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.5	0.4	0.3	0.3	2.5	
Vanadium	µg/g	1	17	18	21	23	86	
Zinc	µg/g	3	27	21	13	13	290	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun

Christine Burke
Lab Manager

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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D. / Sample I.D. / Date Collected		BH5-SS3 B20-32199-5 08-Oct-20	BH6 SS 2 B20-32199-6 06-Oct-20	BH6 SS 3 B20-32199-7 06-Oct-20	BH7 SS 2 B20-32199-8 06-Oct-20	O. Reg. 153 Tbl. 1 - All	
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.10	7.96	7.37	7.89		
Conductivity @25°C	mS/cm	0.001	**0.993**	0.359	0.404	0.404	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		**9.62**	0.409	0.417	1.19	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	1.8	2.8	2.9	2.3	18	
Barium	µg/g	1	33	48	62	32	220	
Beryllium	µg/g	0.2	0.2	0.2	0.3	0.2	2.5	
Boron	µg/g	0.5	2.5	4.3	3.6	2.8	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	10	11	11	10	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	5	5	5	21	
Copper	µg/g	1	11	27	21	13	92	
Lead	µg/g	5	7	9	11	6	120	
Mercury	µg/g	0.005	0.009	0.018	0.038	0.012	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	7	9	8	7	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.5	0.6	0.5	2.5	
Vanadium	µg/g	1	22	17	16	21	86	
Zinc	µg/g	3	22	70	62	24	290	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Fax: 705-252-5746

DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH7 SS 3	BH8 SS 2	BH 8 SS 3	BH 3 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-9	B20-32199-10	B20-32199-11	B20-32199-12	Tbl. 1 - All	
	Date Collected		06-Oct-20	07-Oct-20	07-Oct-20	14-Oct-20		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		7.84	7.80	7.88	8.19		
Conductivity @25°C	mS/cm	0.001	0.383	**1.04**	**0.848**	**0.997**	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		1.82	**7.69**	**3.90**	**8.24**	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	3.2	5.8	6.3	1.8	18	
Barium	µg/g	1	38	105	106	28	220	
Beryllium	µg/g	0.2	0.3	0.8	0.8	< 0.2	2.5	
Boron	µg/g	0.5	4.2	16.9	18.6	3.5	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	14	27	25	10	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	15	15	4	21	
Copper	µg/g	1	13	12	11	13	92	
Lead	µg/g	5	11	8	9	8	120	
Mercury	µg/g	0.005	0.023	< 0.005	< 0.005	0.009	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	9	34	32	6	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.6	0.6	0.4	2.5	
Vanadium	µg/g	1	23	29	29	18	86	
Zinc	µg/g	3	38	65	62	20	290	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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DATE RECEIVED: 15-Oct-20
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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Summary of Exceedances

Table 1 - Res/Park/Institutional/Indus/Com/Commun

BH1-SS2	Found Value	Limit
Sodium Adsorption Ratio (units)	3.36	2.4
Conductivity @25°C (mS/cm)	0.63	0.57
BH2-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	46.0	2.4
Conductivity @25°C (mS/cm)	3.08	0.57
BH4-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	5.26	2.4
BH5-SS2	Found Value	Limit
Sodium Adsorption Ratio (units)	9.40	2.4
Conductivity @25°C (mS/cm)	0.823	0.57
BH5-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	9.62	2.4
Conductivity @25°C (mS/cm)	0.993	0.57
BH8 SS 2	Found Value	Limit
Sodium Adsorption Ratio (units)	7.69	2.4
Conductivity @25°C (mS/cm)	1.04	0.57
BH 8 SS 3	Found Value	Limit

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0319 **REPORT No. B20-32199 (i)**

Report To:

Peto MacCallum Ltd
19 Churchill Drive,
Barrie ON L4N 8Z5
Attention: Alicia Kimberley

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Table 1 - Res/Park/Institutional/Indus/Com/Commun

BH 8 SS 3	Found Value	Limit
Sodium Adsorption Ratio (units)	3.90	2.4
Conductivity @25°C (mS/cm)	0.848	0.57
BH 3 SS 2	Found Value	Limit
Sodium Adsorption Ratio (units)	8.24	2.4
Conductivity @25°C (mS/cm)	0.997	0.57

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:

P.O. NUMBER: 20BF041
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
% Moisture	12	Richmond Hill	FAL	19-Oct-20	A-% moisture RH	
PHC(F2-F4)	12	Kingston	KPR	20-Oct-20	C-PHC-S-001 (k)	CWS Tier 1
PHC(F2-F4)	5	Kingston	NSC	21-Oct-20	C-PHC-S-001 (k)	CWS Tier 1
PHC(F1)	12	Richmond Hill	FAL	16-Oct-20	C-VPHS-01 (rh)	CWS Tier 1

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Lab Manager

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DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH1-SS2	BH2-SS3	BH4-SS3	BH5-SS2	O. Reg. 153	
	Sample I.D.		B20-32199-1	B20-32199-2	B20-32199-3	B20-32199-4	Tbl. 1 - All	
	Date Collected		08-Oct-20	08-Oct-20	09-Oct-20	08-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	6	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	46	24	27	< 10	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	27 [1]	< 10	< 10	120	
PHC F4 (Gravimetric)	µg/g	50		160 [2]			120	
% moisture	%		14.9	12.5	9.6	4.4		

1 . F4 Gravimetric analysis required as chromats did not return to baseline.

2 . Sample silica cleaned

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH5-SS3	BH6 SS 2	BH6 SS 3	BH7 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-5	B20-32199-6	B20-32199-7	B20-32199-8	Tbl. 1 - All	
	Date Collected		08-Oct-20	06-Oct-20	06-Oct-20	06-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 6	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	< 10	176	16	58	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	389 [1]	< 10	92 [1]	120	
PHC F4 (Gravimetric)	µg/g	50		380 [2]		330 [2]	120	
% moisture	%		8.2	11.1	28.1	7.4		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Sample silica cleaned

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
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JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH7 SS 3	BH8 SS 2	BH 8 SS 3	BH 3 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-9	B20-32199-10	B20-32199-11	B20-32199-12	Tbl. 1 - All	
	Date Collected		06-Oct-20	07-Oct-20	07-Oct-20	14-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	22	< 10	< 10	23	240	
PHC F4 (>C34-C50)	µg/g	10	26 [1]	< 10	< 10	38 [1]	120	
PHC F4 (Gravimetric)	µg/g	50	190 [2]			200 [2]	120	
% moisture	%		9.6	8.8	14.7	4.9		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Sample silica cleaned

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Summary of Exceedances

Table 1 - Res/Park/Institutional/Indus/Com/Commun

BH2-SS3	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	160	120
BH6 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	380	120
PHC F4 (>C34-C50) (µg/g)	389	120
BH7 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	330	120
BH7 SS 3	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	190	120
BH 3 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	200	120

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun

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TESTING REQUIREMENTS

X O.Reg 153 Table _1_ Medium/Fine Coarse MISA Guidelines
RPI ICC Agricultural (O.Reg 153) O.Reg 558 Leachate Analysis
Yes No Record of Site Condition (O.Reg 153) Disposal Site: _____
Provincial Water Quality Objectives Landfill Monitoring
Sewer Use By-Law: _____ Other: _____

REPORT NUMBER (Lab Use)

B20-32199

Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? Yes X No (If yes, submit all Drinking Water Samples on a Drinking Water Chain of Custody)

Indicate Laboratory Samples are submitted to: Kingston Ottawa Richmond Hill Windsor X Barrie London

Organization: Peto MacCallum Ltd.	Address and Invoicing Address (if different): 19 Churchill Drive, Barrie, ON L4N8Z5, barrie@petomaccallum.com
Contact: A. Kimberley	
Tel: 705-734-3900	
Fax: 705-734-9911	Quote No.:
Email: akimberley@petomaccallum.c	P.O. No.:
	Project Name: 20BF041
	Additional Info: sberg@petomaccallum.com

ANALYSES REQUESTED (Print Test in Boxes)

Metals and Inorganics; PHCs (F1 to F4 Fractions); Suspected Highly Contaminated

TURNAROUND SERVICE REQUESTED (see back page)

Platinum 200% Surcharge
Gold 100% Surcharge
Silver 50% Surcharge
Bronze 25% Surcharge
X Standard 5-7 days

Specific Date: _____

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Indicate Test For Each Sample By Using A Check Mark In The Box Provided	✓	Field pH	Field Temp.	# Bottles/ Sample	Field Filtered(Y/N)
1	BH1-SS2		S	2020-10-08		X X				4	
2	BH2-SS3		S	2020-10-08		X X				4	
3	BH4-SS3		S	2020-10-09		X X				4	
4	BH5-SS2		S	2020-10-08		X X				4	
5	BH5-SS3		S	2020-10-08		X X				4	
6	BH6 SS 2		S	2020-10-06		X X				4	
7	BH6 SS 3		S	2020-10-06		X X				4	
8	BH7 SS 2		S	2020-10-06		X X				4	
9	BH7 SS 3		S	2020-10-06		X X				4	
10	BH8 SS 2		S	2020-10-07		X X				4	

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	Niklas Gardlund	N. G
Sign:	N Gardlund	N Gardlund
	2020-10-07	2020-10-14
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

Client's Courier
Caduceon's Courier
Drop Off X
Caduceon (Pick-up)

Invoice
# of Pieces

REPORTING / INVOICING

Report by Fax
Report by Email X
Invoice by Email X
Invoice by Mail

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): Steel Signature: S
Date Received (yy-mm-dd): 20/10/15 Time Received: 16:40
Laboratory Prepared Bottles: (Yes) No
Sample Temperature °C: 13.5 Labeled by: SC

Comments: jar → O jar → K precip vials → PH.

Page _1_ of __2____
G 0319

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CofC, May 2019, Revision No: 22

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TESTING REQUIREMENTS

X O.Reg 153 Table _1_ Medium/Fine Coarse MISA Guidelines
RPI ICC Agricultural (O.Reg 153) O.Reg 558 Leachate Analysis
Yes No Record of Site Condition (O.Reg 153) Disposal Site: _____
Provincial Water Quality Objectives Landfill Monitoring
Sewer Use By-Law: _____ Other: _____

REPORT NUMBER (Lab Use)

B20-32199

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Indicate Laboratory Samples are submitted to: Kingston Ottawa Richmond Hill Windsor Barrie London

Organization: Peto MacCallum Ltd.	Address and Invoicing Address (if different): 19 Churchuill Drive, Barrie, ON L4N8Z5, barrie@petomaccallum.com
Contact: A. Kimberley	
Tel: 705-734-3900	
Fax: 705-734-9911	Quote No.: / Project Name: 20BF041
Email: akimberley@petomaccallum.c	P.O. No.: / Additional Info:

ANALYSES REQUESTED (Print Test in Boxes)

Metals and Inorganics; PHCs (F1 to F4 Fractions); Suspected Highly Contaminated

TURNAROUND SERVICE REQUESTED (see back page)

Platinum 200% Surcharge
Gold 100% Surcharge
Silver 50% Surcharge
Bronze 25% Surcharge
X Standard 5-7 days
Specific Date: _____

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Lab No:	Sample Identification		S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Indicate Test For Each Sample By Using A Check Mark In The Box Provided											✓	Field pH	Field Temp.	# Bottles Sample	Field Filtered(Y/N)
							Metals and Inorganics	PHCs (F1 to F4 Fractions)										Suspected Highly Contaminated					
11	BH 8 SS 3			S	2020-10-07		X	X													4	
12	BH 3 SS 2			S	2020-10-14		X	X													4	

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	N. Gardlund	N. Gardlund
Sign:	N Gardlund	N Gardlund
	2020-10-07	2020-10-14
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

Client's Courier
Caduceon's Courier
Drop Off X
Caduceon (Pick-up)
Invoice
# of Pieces

REPORTING / INVOICING

Report by Fax
Report by Email X
Invoice by Email X
Invoice by Mail

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): Steve Signature: SRO
Date Received (yy-mm-dd): 20/10/15 Time Received: 16:40
Laboratory Prepared Bottles: (Yes) No
Sample Temperature °C: 13.5 Labeled by: SF

Comments:

Page _2_ of _2_
G 0319

CofC, May 2019, Revision No: 22

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R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (519) 836-5477 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Technical Memorandum – Aquatic Habitat Assessment

Date: February 23, 2021 **Project No.:** 300051839.0000

Project Name: Patterson Side Road and Duffy's Lane Bridges

Client Name: Town of Caledon

Submitted To: File

Submitted By: Matthew Moote, H.B.Sc., C.Tech., CAN-CISEC-IT, Aquatic Ecologist

Reviewed By: Chris Pfohl, CET, EP, CAN-CISEC, Sr. Aquatic Ecologist

1.0 Project Background

R.J. Burnside & Associates Limited (herein, Burnside) has been retained by the Town of Caledon to provide engineering, design, consulting and permitting services required for the replacement of multiple bridges and culverts. Three of these structures, Patterson Side Road Bridge 1 and 2 (herein, PSR-1 and PSR-2) and the Duffy's Lane Bridge (DLB) are included as part of a Schedule B Environmental Assessment.

PSR-1 is located approximately 160m southwest of Duffy's Lane. PSR-2 is located approximately 15 m northeast of Duffy's Lane. The Duffy's Lane bridge is located approximately 45 m southeast of Patterson Side Road.

A component of the EA includes the characterization of the natural environment within the Study Area to evaluate the alternative solutions including 1) do nothing; 2) abandon the structure and close the road; 3) rehabilitate the structure; and 4) replace the structure. The characterization of the aquatic habitat to support the evaluation of alternatives is included herein.

The federal *Fisheries Act* prohibits causing Harmful Alteration, Disruption, and Destruction (HADD) of fish habitat, as well as the Death of Fish by means other than fishing. This memo describes the historical and existing fish habitat condition, and recommendations for mitigation

that should be employed in the construction of the preferred design alternative if in-water works are required.

2.0 Project Description

PSR-1 consists of a 7.0 m (+/-) span (7.4 m +/- parallel to road) cast-in-place concrete rigid frame with an overall structure width of approximately 7.4 m (+/-) and a driving platform width of approximately 6.4 m. The structure is skewed at an angle of approximately 18.4° to perpendicular.

PSR-2 consists of a 13.7 m (+/-) span cast-in-place concrete rigid frame with an overall structure width of approximately 8.7 m (+/-) and a driving platform width of approximately 7.67 m.

The Duffy's Lane Bridge is an 8.8m wide, 9.14 m span cast-in-place concrete rigid frame arched soffit.

3.0 Aquatic Habitat Assessment

3.1 Background Information Review

Burnside Aquatic Ecology staff reviewed the following sources of information to evaluate the historical background conditions:

- Aerial Imagery;
- Ministry of Natural Resources and Forestry (MNRF) Aquatic Resources Area (ARA) mapping (2017);
- Department of Fisheries and Oceans (DFO) Species at Risk (SAR) mapping (2020);
- Natural Heritage Information Centre (NHIC) mapping (2020); and

The MNRF ARA data does not display that the watercourses flow through structures PSR-1 or DLB, however based on field observations the watercourse flows from PSR-1 to DLB and discharges downstream of PSR-2. The watercourse that flows through PSR-2 is known as the Humber River. The watercourse that flows through PSR-1 and DLB is an unnamed tributary of the Humber River. The species of fish historically observed in the Humber River are listed below in Table 1. These fish could inhabit the Tributary of the Humber as well.

Table 1. Fish Species Historically Observed in the Humber River

Species Name	Scientific Name	Thermal Regime Preference
American brook lamprey	*Lethenteron appendix*	Cold
Blackchin shiner	*Notropis heterodon*	Cool
Blacknose dace	*Rhinichthys spp.*	Cool

Species Name	Scientific Name	Thermal Regime Preference
Bluntnose minnow	*Pimephales notatus*	Warm
Brassy minnow	*Hybognathus hankinsoni*	Cool
Brook trout	*Salvelinus fontinalis*	Cold
Brown bullhead	*Ameiurus nebulosus*	Warm
Brown trout	*Salmo trutta*	Cold
Common shiner	*Luxilus cornutus*	Cool
Creek chub	*Semotilus atromaculatus*	Cool
Fantail darter	*Etheostoma flabellare*	Cool
Fathead minnow	*Pimephales promelas*	Warm
Johnny darter	*Etheostoma nigrum*	Cool
Largemouth bass	*Micropterus salmoides*	Warm
Longnose dace	*Rhinichthys cataractae*	Cool
Mottled sculpin	*Cottus bairdii*	Cold
Northern hog sucker	*Hypentelium nigricans*	Warm
Northern redbelly dace	*Chrosomus eos*	Cool
Pumpkinseed	*Lepomis gibbosus*	Warm
Rainbow darter	*Etheostoma caeruleum*	Cool
Redside dace	*Clinostomus elongatus*	Cool
River chub	*Nocomis micropogon*	Cool
Rock bass	*Ambloplites rupestris*	Cool
Slimy sculpin	*Cottus cognatus*	Cold
Stonecat	*Noturus flavus*	Warm
White sucker	*Catostomus commersonii*	cool

The DFO SAR and NHIC mapping do not state that aquatic SAR inhabit the watercourse in the vicinity of the three structures discussed in this memo. While the ARA data states that Redside dace (listed as Endangered) inhabit the watercourse, the DFO and NHIC mapping does not illustrate this occurrence. The potential presence of Redside dace could be from data downstream of the Study Area.

3.2 Existing Conditions

Burnside's Aquatic Ecologist visited the sites on October 30, 2020 to observe conditions with respect to form, function and fish habitat. The weather conditions during the site visit were overcast and -1°C. the water clarity was very clear at the 3 structures as the substrate was visible.

Channel measurements and conditions are provided in Table 2 below. Additional information regarding the aquatic habitat conditions observed are presented in Sections 3.2.1 to 3.2.3 below.

Table 2. Channel Characteristic of the Watercourses that Flow through PSR-1 and 2 and DLB

Structure	Wetted Width / Depth (m)	Bankfull Width / Depth (m)	Substrate	Bank Stability
PSR-1 Upstream	5.0 / 0.2	7.0 / 1.8	Sand, gravel, cobble, trace boulders	Moderate erosion observed.
PSR-1 Downstream	5.0 / 0.3	6.5 / 1.2	Sand, gravel, cobble	Moderate erosion observed
PSR-2 Upstream	8.5 / 0.2	11 / 1.1	Sand, gravel cobble, trace boulders	Minor erosion observed
PSR-2 Downstream	8.8 / 0.4	9 / 1.2	Sand, gravel cobble, trace boulders	Minor erosion observed
DLB Upstream	3.5 / 0.25	3.8 / 0.75	Cobble, sand, gravel	Moderate erosion observed
DLB Downstream	3.4 / 0.35	3.4 / 0.8 m	Cobble, sand, gravel	Minor erosion observed

3.3 Patterson Side Road 1

3.3.1 Upstream

Upstream of PSR-1 the watercourse flows through densely forested lands in a northwest to southeast direction (Photo 1). The morphology of the upstream reach is comprised primarily of runs with sections of flats present as well. The vegetation on the banks is comprised primarily of White Cedars (*Thuja occidentalis*) with grasses and forbs observed as well. Moderate erosion was observed with some scalloped/undercut conditions (Photo 2) and tree roots exposed.

Large woody debris, both in-stream and overhanging, is present and provides cover and habitat for aquatic life in the watercourse. The vegetation on the banks, as well as the woody debris, shades a significant portion of the reach upstream of PSR-1. Through the bridge the streambed has scoured and is slightly deeper (0.75 m) (Photo 3).



Photo 1: Facing south, the watercourse reach upstream of PSR-1 (10-30-2020).



Photo 2: Facing north, an undercut section of the bank with large woody debris within it (10-30-2020).



Photo 3: Facing north, the watercourse and scoured steambed at the inlet of PSR-1 (10-30-2020)

3.3.2 Downstream

Downstream of PSR-1 the watercourse flows through another section of forested lands (Photo 1). The watercourse bends approximately 15 m downstream of PSR-1 to flow in a west to east direction in a meandering channel. The vegetation is mostly comprised of White cedars through this section, with grasses and forbs present as well. The watercourse flows primarily in a flats type of morphology with runs present as well. A debris jam formed from fallen trees and woody debris was observed approximately 10 m downstream of PSR-1 (Photo 5). This represents a potential barrier to fish movement during periods of low-flow.

Sections of bank material have sloughed and minor undercutting was observed as well. Woody debris is abundant in the reach downstream of PSR-1. Organic materials in the form of fallen leaves were observed throughout the downstream reach as well. Veronica (*Veronica anagallis-aquatica*) was observed downstream of the bridge.

Fish were not observed upstream or downstream of PSR-1, although it is considered fish habitat under the *Fisheries Act*.



Photo 4: Facing south, the watercourse downstream of PSR-1 (10-30-2020).



Photo 5: Facing south, a section of the debris jam downstream of PSR-1 (10-30-2020)

3.4 Patterson Side Road 2

3.4.1 Upstream

Upstream of PSR-2 the watercourse flows from north to south in a wide, gently meandering channel (Photos 6 and 7). It flows through forested lands, vegetated with White cedars. The

banks of the upstream reach are stable upstream of the bridge with limited erosion observed. The morphology of the upstream reach is composed primarily of runs and flats.

Approximately 10 m upstream of PSR-2 the cedars are present in a higher density than they are closer to the structure. In this section the cedars overhang and shade close to the entire surface area of the watercourse. Some trace boulders are present downstream of the cedars. The area where the cedars are located lacks diversity in substrate and wetted depth.

Through the bridge there is an exposed bank against the east abutment. Large boulders are present against the other abutment (Photo 8).



Photo 6: Facing north, the watercourse upstream of PSR-2 (10-30-2020).



Photo 7: Facing south, the watercourse flowing toward PSR-2 (10-30-2020).



Photo 8: Facing north, the watercourse flowing through the PSR-2 bridge (10-30-2020).

3.4.2 Downstream

Downstream of PSR-2 the watercourse flows in a gently meandering pattern from north to south (Photo 9). Roadside ditches enter the watercourse from both banks. The right upstream (east) bank is densely vegetated with White cedars and grasses. The left upstream bank is vegetated with cedars as well, although with more grasses and shrubs. A single riffle is present at the

outlet of the bridge and downstream flows in a combination of runs and flats. The vegetation does not overhang a significant amount of the downstream reach, and it shaded approximately 50% of the surface area of the watercourse.

Minor undercutting of the banks was observed, and they are slightly eroded. Watercress (*Nasturtium officinale*) was observed near the outlet of the watercourse that flows through the PSR-1 bridge and DLB (Photo 10).

Fish were not observed upstream or downstream of PSR-2, although a dead Brown trout was observed at the outlet of the channel from DLB.



Photo 9: Facing south, the watercourse downstream of PSR-2 (10-30-2020).



Photo 10: Facing north, watercress observed downstream of PSR-2 (10-30-2020).

3.5 Duffy's Lane Bridge

3.5.1 Upstream

The watercourse flows from PSR-1 to DLB. The upstream reach flows from west to east through lands that are densely forested with cedars. There is an abundance of large woody debris overhanging and in-stream upstream of DLB (Photo 11). The vegetation on the banks shades the majority of the watercourse and the overhanging and in-stream woody debris provides overhead cover for aquatic life (fish, crayfish etc.).

The watercourse flows in a runs type of morphology upstream of the bridge. The banks are more eroded closer to DLB than they are downstream of PSR-1, and slightly undercut.

Within DLB there are broken vertical wooden supports and a trace amount of boulders in the bridge (Photo 12). Against the south abutment the sediment is exposed, and the flow of the watercourse is closer to the northern abutment.



Photo 11: Facing west, the watercourse upstream of DLB (10-30-2020).



Photo 13: Facing north, the watercourse through DLB (10-30-2020).

3.5.2 Downstream

Downstream of DLB the watercourse flows for approximately 4.5m prior to discharging to the Humber River that is conveyed through PSR-2 (Photo 13). The short length of the channel flows in a flats type of morphology prior to discharging to the section of Humber River which is discussed above in Section 3.4.2 of this memo (Photo 14).

Fish were not observed upstream or downstream of DLB.



Photo 13: Facing east, the channel downstream of DLB prior to discharging to the Humber River (10-30-2020).



Photo 14: Facing south, the Humber River downstream of where the watercourse that flows through DLB discharges (10-30-2020).

3.6 Fish Habitat

Fish were not observed during the October 30th, 2020 site visit although will be present in and around all structures. The *Fisheries Act* defines fish habitat as water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas. The watercourses in the vicinity of all bridges would be capable of providing habitat for species of fish to carry out these life processes. As such, HADD and the Death of Fish must be mitigated in the design and construction of any proposed design alternative.

The MNRF ARA mapping states that Redside dace, a species classified at Endangered by the provincial Endangered Species Act and the federal Species at Risk Act, has historically been observed in the watercourse. The DFO SAR and the provincial NHIC mapping do not state that this species has been observed in the Study Area or in the vicinity of it. Suitable habitat for this species, including small streams and headwaters with overhanging grasses and vegetation, were not observed in the Study Area.

4.0 Impacts and Mitigation

Under the federal *Fisheries Act* it is prohibited to cause Harmful Alteration, Disruption or Destruction (HADD) of fish habitat as well as the Death of Fish by means other than fishing. At this stage the timing window for in-water works in the Study Area is July 15th to September 30th. At the detailed design phase of the project the timing window for in-water works should be confirmed with the MNRF.

Work zone isolation should be performed if in-water works (i.e. structure replacement) are required for the construction of the preferred design alternative. Cofferdams constructed of clean, non-erodible materials should be constructed upstream and downstream of the works area to isolate it. Flows should be maintained downstream through pumping or a by-pass culvert and the isolated work area should be dewatered. All pump intakes must be screened to prevent the entrainment or impingement of fish.

If repairs to the structure are the preferred design alternative, then a debris platform may need to be installed to ensure deleterious substances (i.e. concrete) do not enter the watercourse.

If in-water works and work zone isolation are required, then the Death of Fish must be mitigated by performing a fish salvage prior to the commencement of in-water works under a License to Collect Fish (LCF) obtained from the Guelph District MNRF. If any flow events result in overtopping of the cofferdams subsequent fish salvages will be performed to ensure fish are not killed.

Erosion and sediment controls (ESC) should be installed throughout the work areas to prevent sedimentation of the watercourse or other sensitive features present. Inspection of the ESC

measures is recommended during construction to ensure that they protect the watercourse and sensitive work areas.

Post-construction, the disturbed area of the watercourse should be restored with a mix of suitably sized round stone and native substrate place through the culvert and at the inlet and outlet. The embankments disturbed above the annual highwater mark should be restored with erosion control blankets, topsoil and seeding, and plantings where appropriate. The slopes and disturbed area adjacent to the watercourse should be restored with rip-rap above the annual high-water mark. Angular stone is not to be placed below the annual high-water mark.

5.0 Conclusion

The watercourses are considered fish habitat as defined under the Federal *Fisheries Act*. As such the mitigation measures described in Section 4.0 of this memo should be implemented if in-water works are required for the preferred design alternative to ensure that HADD and the Death of Fish does not occur.

R.J. Burnside & Associates Limited



Matthew Moote. H.B.Sc., C.Tech., CAN-CISEC-IT,
Aquatic Ecologist

MM:js

Enclosure(s) Figure 1. Aquatic Conditions

cc: Deanna De Forest, B.Sc. EP, Senior Environmental Coordinator, R.J. Burnside & Associates Limited

Matt Brooks, P.Eng., Bridge Group Leader, R.J. Burnside & Associates, R.J. burnside & Associates Limited

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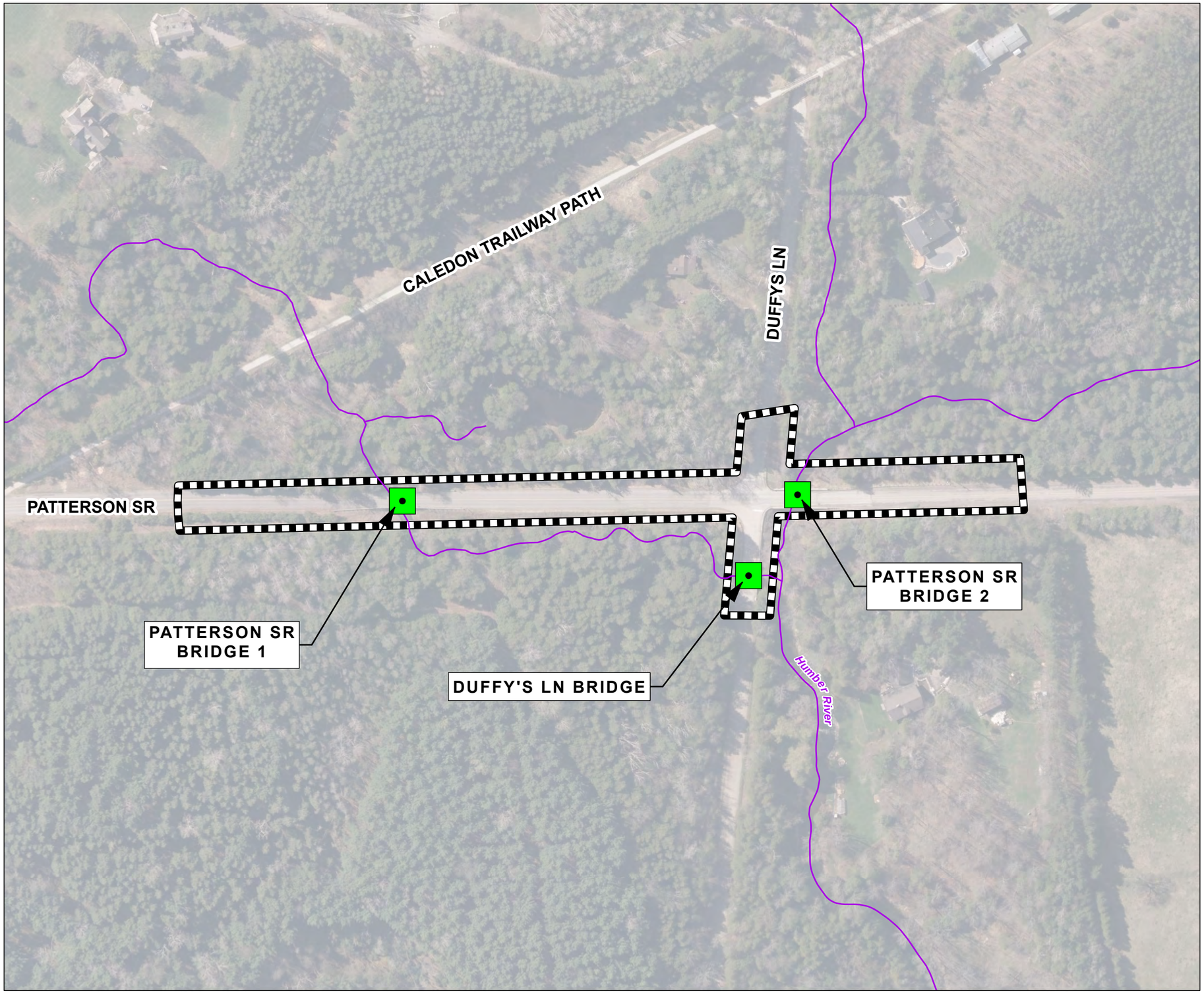
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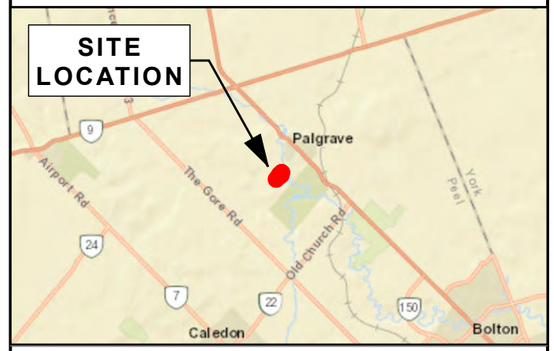
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2/23/2021 9:59 AM



Bridge Location

Watercourse (Cold)

Study Area



Sources:

1. Ministry of Natural Resources and Forestry, © Queen's Printer for Ontario.
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Coord. System: NAD 1983 CSRS UTM Zone 17N	
Projection: Transverse Mercator	
Central Meridian: 81°0'0.00"W	
False Easting: 500,000m	False Northing: 0m
Page Orientation: 309.54°	Scale Factor: 0.99960

Grid North

0 25 50 75 100

Metres

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TOWN OF CALEDON

Figure Title

PATTERSON SIDEROAD CALEDON BRIDGES

AQUATIC CONDITIONS

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Technical Memorandum - Terrestrial Assessment

Date: February 1, 2024 **Project No.:** 300051839.0000

Project Name: Natural Heritage Memo - Patterson Side Road Bridges 1 and 2, Duffy's Bridge

Client Name: Town of Caledon

Submitted To: File

Submitted By: Devin Soeting, C.E.T., EP, CAN-CISEC

Reviewed By: Deanna De Forest, B.Sc., E.P., and Kevin Butt, B.Sc. (Env)., Eco. Rest. Cert.

R.J. Burnside & Associates Limited (Burnside) was retained by the Town of Caledon (Town) to complete a Schedule B Municipal Class Environmental Assessment (MCEA) to consider improvements to Patterson Side Road Bridges 1 and 2, and Duffy's Lane Bridge, as a result of increased wear and tear on existing infrastructure through increased traffic use.

A component of the MCEA includes the characterization of the natural environment within the Study Area to evaluate alternative solutions, including 1) do nothing; 2) abandon the structure and close the road; 3) rehabilitate the structure; and 4) replace the structure. The characterization of the terrestrial natural environment is included herein.

Aquatic habitat within the Study Area is addressed in the Burnside Patterson Side Road Bridges 1 and 2 and Duffy's Lane Bridge Environmental Assessment – Aquatic Assessment Technical Memo.

1.0 Study Area

For the purposes of this technical memorandum, the Study Area is defined as the Patterson Side Road Bridges 1 and 2, Duffy's Lane Bridge, the associated road corridor between the bridges, and extending approximately 100 m beyond the bridges, as well as the vegetated riparian corridor located approximately 20 m upstream and downstream of the bridges (refer to enclosed Figure 1). Patterson Side Road Bridge 1 (B22162016) is located approximately 0.150 km west of Duffy's Lane over an unnamed tributary of the Humber River. Duffy's Lane Bridge (B22068009) is located approximately 0.03 km south of Patterson Side Road over the tributary of the Humber River. Patterson Side Road Bridge 2 (B22164017) is located approximately 0.02 km east of Duffy's Lane over the Humber River. In the greater area, beyond the study area, adjacent lands include rural residential properties and natural forest and wetland

communities. The Caledon Trail known as the K-Tea Cup Single Track Bike Trail is located to the west of the Study Area. The Albion Hills Conservation Area is to the southwest of the Study Area.

2.0 Methodology

A review of existing data was conducted to obtain secondary source information relating to the Study Area. Sources reviewed included:

- Aerial photography;
- Toronto Region Conservation Authority (TRCA) Ecological Land Classification (ELC) Mapping;
- Natural Heritage GIS Data Layers from Land Information Ontario (LIO);
- Ontario Breeding Bird Atlas (OBBA) (Square 17NJ96);
- Ontario Reptile and Amphibian Atlas (ORAA) (Square 17NJ96);
- Ministry of Natural Resources and Forestry (MNRF) Aquatic Resources Area mapping; and
- MNRF Natural Heritage Information Centre (NHIC) Online Map Viewer / Database (Square 17NJ9365).

Burnside completed a field assessment within the Study Area of Patterson Bridge 1 and 2 on September 30, 2020, and Duffy's Lane Bridge on October 23, 2020, from publicly accessible locations to characterize vegetation communities according to the Ecological Land Classification (ELC) System for Southern Ontario, First Approximations (Lee *et al*., 1998), updated0F0F[1]. TRCA ELC community mapping was referenced and verified in the field. The field assessment included the assessment of the potential for the habitat of Species at Risk (SAR), including breeding bird, bat, amphibian and reptile habitat, and incidental wildlife observations.

3.0 Vegetation Communities

Within the Study Area, lands are comprised of riparian vegetation associated with Humber River and its tributary, as well as open aquatic and treed vegetation communities. A total of eight vegetation communities were identified in the Study Area as follows:

- Fresh-Moist Deciduous Woodland (WODM5);
- White Cedar Hardwood Organic Mixed Swamp (SWMO1);
- Fresh Moist White Cedar Hardwood Mixed Forest (FOMM7-2);
- White Cedar Conifer Organic Coniferous Swamp (SWCM1-2);
- Dry Fresh White Cedar Poplar Mixed Forest (FOMM4-2);
- White Cedar Mineral Coniferous Swamp (SWCM1);
- Fresh-Moist White Cedar Coniferous Forest (FOCM4-1); and
- Open Aquatic (OAO).

[1] Lee, H.T., et al. (1998). Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

These communities are described below and are illustrated in Figure 1. All of the communities identified are considered to be relatively common in Ontario. Sensitive vegetation communities or provincially significant plant species were not observed within the Study Area during the field assessment.

3.1 Fresh Moist Deciduous Woodland (WODM5)

Photo 1: WODM5 Community - As viewed from Patterson Side Road looking northeast (September 20, 2020)



The community is a woodland community with tree cover of less than 60%. Deciduous tree cover comprises 75% of the canopy and is dominated by native deciduous trees, including Paper Birch (*Betula papyrifera*), Trembling Aspen (*Populus tremuloides)*, and some Red Maple (*Acer rubrum*) trees with a subcanopy including Virginia Chokecherry (*Prunus virginiana*), Black Walnut (*Juglans nigra*), and White Cedar (*Thuja occidentalis)*. Understorey was dominated by White Cedar and limited groundcover noted included Canada Goldenrod (Solidago canadensis), Queen Anne's Lace (*Daucus carota*) and Coltsfoot (*Tussilago farfara*).

3.2 White Cedar Hardwood Organic Mixed Swamp (SWMO1)

Photo 2: SWMO1 Community - As seen looking northwest from Patterson Side Road towards Duffy's Lane (September 30, 2020)



This community is dominated by both coniferous and deciduous trees, including White Cedar coniferous trees and Paper Birch deciduous trees. Trees that were occasional in the canopy, included Balsam Fir (*Abies balsamea*), Red Maple, and Trembling Aspen. Understorey trees, included Green Ash (*Fraxinus pennsylvanica*), Red-Osier Dogwood (*Cornus sericea*) and non-native vegetation including Manitoba Maple *(Acer negundo*), Common Buckthorn (*Rhamnus cathartica*) and River-bank Grape (*Vitis riparia*) were noted. Groundcover included water tolerant plants including Sensitive Fern (*Onoclea sensibilis*), Spotted Jewelweed (*Impatiens capensis*), Canada Anemone (*Anemone canadensis*), Spinulose Wood Fern (*Dryopteris carthusiana*), White Snakeroot (*Ageratina altissima*), Wood Nettle (*Laportea canadensis*), Canada Goldenrod (*Solidago canadensis*), Common Beggar-ticks (*Bidens frondosa*), Spotted Joe Pye Wweed (*Eutrochium maculatum*), Common Boneset (*Eupatorium perfoliatum*), Willow-Herb (*Epilobium ciliatum*), and Bull Thistle (*Cirsium vulgare*), Bittersweet Nightshade (*Solanum dulcamara*), Moss sp, and Common Milkweed (*Asclepias syriac*a). Snags were noted in this community.

3.3 Fresh Moist White Cedar Hardwood Mixed Forest (FOMM7-2)

Photo 3: FOMM7-2 Community - As seen looking northeast from Patterson Side Road towards Duffy's Lane (September 30, 2020)



This community is co-dominated by coniferous and deciduous trees including White Cedar coniferous trees and Trembling Aspen deciduous trees. Trees that were occasional in the canopy included White Pine (*Pinus strobus*). Understory included Green Ash trees with non-native River-bank Grape and Tartarian Honeysuckle (*Lonicera tatarica*). Groundcover included water tolerant plants including Spinuolose Woodfern, New England Aster (*Symphotrichium novae-angliae*), and Canada Goldenrod. Snags were noted in this community.

3.4 White Cedar Conifer Organic Coniferous Swamp (SWCM1-2)

Photo 4: SWCM1-2 Community - As viewed from Patterson Side Road and Duffy's Lane Intersection looking northeast (September 30, 2020)



This community is dominated by White Cedar coniferous trees from canopy to understorey. Groundcover included water tolerant plants including Spinulose Wood Fern, New England Aster, and Canada Goldenrod. Snags were noted in this community.

3.5 Fresh White Cedar Poplar Mixed Forest (FOMM4-2)

Photo 5: FOMM4-2 - As viewed from Duffy's Lane Bridge looking southeast (September 30, 2020)



The community is comprised of both coniferous and deciduous trees. White Cedar trees dominate the canopy of this community type. Trembling Aspen trees dominate the deciduous portion of the canopy with American Basswood (*Tilia americana*), Manitoba Maple, and Black Walnut trees noted. The understorey layer consisted of vegetation typically found in disturbed areas such as Tartarian Honeysuckle, River-bank Grape and Virginia Chokecherry. Groundcover included, Calico Aster *(Symphyotrichum lateriflorum*), Grass-leaved Goldenrod (*Euthamia graminifolia*), and Common Milkweed.

3.6 White Cedar Mineral Coniferous Swamp (SWCM1)

Photo 6: SWCM1 - As viewed from Duffy's Lane Bridge looking southwest (October 23, 2020)



This community is dominated by White Cedar coniferous trees with some Yellow Birch (*Betula alleghaniensis*) and White Pine trees in the canopy. The subcanopy included Black Walnut and Manitoba Maple. The understorey and groundcover included both water tolerant species and introduced species indicative of disturbance. The understorey included water tolerant Red-Osier Dogwood, and Speckled Alder (*Alnus incana*) with non-native and invasive Common Buckthorn. Groundcover included water tolerant potted Joe Pye Wweed, Cat-tails (*Typha x glauca*), Bittersweet Nightshade, Sensitive Fern, Bottlebrush Sedge (*Carex hystercina*), and Spotted Jewelweed, with species typical of disturbed sites Common Horsetail (*Equisetum arvense*), Yarrow (*Achillea millefolium*) and non-native species Common Soapwort (*Saponaria officinalis*).

3.7 Fresh-Moist White Cedar Coniferous Forest (FOCM4-1)

Photo 7: FOCM4-1 - As viewed looking east from the north side of Patterson Side Road Bridge 1 looking toward Duffy's Lane / Bridge 2 (September 30, 2020)



Photo 8: FOCM4-1 - As viewed looking west along the south side of Patterson Side Road looking towards Bridge 1 (September 30, 2020)



The community is dominated by White Cedar trees in the canopy with some White Pine trees. The understorey layer consists of Red-Osier Dogwood and vegetation typically found in disturbed areas such as American Basswood, Common Buckthorn, and Manitoba Maple. Also, found in the understorey were some Autumn Olive (*Elaeagnus umbellata*), highly invasive shrub species. Partial vegetation clearing for hydro lines was observed on the south side of Patterson Side Road, parallel to the tributary of Humber River.

Disturbed groundcover included patches of Canada Yew (*Taxus canadensis*), spreading Virginia Clematis (*Clematis virginiana*) and introduced vegetation including European Lily-of-the-Valley (*Convallaria majalis*). Watercourse flooding related groundcover included Calico Aster, Purple Stemmed Aster (*Symphyotrichum puniceum*), White Heath Aster (*Symphyotrichum ericoides*), New England Aster, Ostrich Fern (*Matteuccia struthiopteris*), Tall Goldenrod (*Solidago altissima*), Heart-leaved Willow (*Salix cordata*), Canada Anemone (*Anemonastrum canadense*), and Spotted Joe Pye weed.

3.8 Open Aquatic (OAO)

Photo 9: OAO as seen looking south downstream in Coldwater Creek, south of Patterson Bridge 2 and east of Duffy's Lane Bridge (September 30, 2020)



Photo 10: As viewed from Duffy's Lane Bridge looking southeast (September 30, 2020)



Photo 11: OAO as seen looking south downstream in Coldwater Creek, north of Patterson Bridge 2 (September 30, 2020)



Photo 12: OAO as seen looking southeast from Patterson Bridge 1 (September 30, 2020)



The OAO areas are generally abundant in overhanging vegetation. They are all shallow with sandy bottoms, occasional boulders were noted with some emergent vegetation consisting of Watercress (*Nasturtium officinale*). Water tolerant plant species associated with the presence of watercourses were observed adjacent to the watercourses and described in their respective communities.

4.0 Wildlife and Habitat Observations

Wildlife species observed during the field assessment included a foraging female Eastern Downy Woodpecker (*Picoides pubescens*) and Eastern Grey Squirrels (*Sciurus carolinensis*) in FOCM4-1. Evidence of other wildlife observed in the Study Area included excavated holes in trees in SWCM1-2, Canadian Beaver (*Castor canadensis*) chewed tree trunks on banks of OAO south of Duffy's Lane Bridge, Raccoon (*Procyon lotor*) tracks under Patterson Bridge 2, North American Porcupine (*Erethizon dorsatum*) stripped tree bark in SWMO1, Organ Pipe Mud Dauber (*Trypoxylon politum*) nests on Patterson Bridge 2, holes from a sapsucker (*Sphyrapicus sp.*) avian species in SWMO1.

The majority of these species are considered widespread and common in Ontario (i.e., provincial ranking of S5).

Photo 13: Downy Woodpecker in FOCM4 1 (October 23, 2020)



Photo 14: Eastern Grey Squirrel in FOCM4 1 (October 23, 2020)



4.1 Species at Risk (SAR)

The Species at Risk in Ontario (SARO) List is Ontario Regulation 230/08 issued under the *Endangered Species Act, 2007* (ESA 2007). The ESA 2007 provides both species protection (Section 9) and habitat protection (Section 10) to species listed as "Endangered" or "Threatened" on the SARO List. If an activity or project will result in adverse effects to Endangered or Threatened species and / or their habitat, additional action would need to be taken by a proponent to remain in compliance with the ESA 2007. Species listed as "Special Concern" are not afforded legal protection under the ESA, however, they may receive protection by some agencies, such as provincial and national parks, or other acts, such as the *Ontario Fish and Wildlife Conservation Act*, and the *Migratory Birds Convention Act* (MBCA), which prohibits the killing, capturing, injuring, harassment, and trapping of specially protected species.

4.1.1 Birds

A review of the OBBA (17NJ9265 & 17NJ9365) indicated the potential for the following provincial SAR bird species in the general vicinity of the Study Area:

- Bank Swallow (*Riparia riparia*) – Threatened;
- Bobolink (*Dolichonyx oryzivorus*) – Threatened;
- Chimney Swift (*Chaetura pelagica)* – Threatened;
- Barn Swallow (*Hirundo rustica*) – Special Concern;
- Common Nighthawk (*Chordeiles minor*) – Special Concern;
- Eastern Meadowlark (*Sturnella magna)* – Threatened;
- Eastern Whip-poor-will (*Antrostomus vociferous)* – Threatened;
- Eastern Wood-pewee (*Contopus virens*) – Special Concern;
- Least Bittern (*Ixobrychus exilis)* Threatened;
- Red-Headed Woodpecker (*Melanerpes erythrocephalus)* – Special Concern; and
- Wood Thrush (*Hylocichla mustelina*) – Special concern.

Potential for SAR and SAR habitat in the Study Area is evaluated in the SAR Screening Table attached.

The Study Area represents suitable habitat for Barn Swallows on all three bridge structures. No evidence of nesting was observed on any of the three structures and no Barn Swallows were observed during the site assessment.

FOMM4-2 and FOMM7-2 forests in the Study Area may represent potential habitat for Eastern Wood-pewee and Wood Thrush, however suitable habitat in the Study Area is considered marginal in the absence of preferred intermediate to mature forests. Although a thicker understorey is present for Wood Thrush, the preferred Sugar Maple and American Beech species are not present in these forest communities.

Common Nighthawk prefer open and flat areas of dune, beach or recently harvested forest, grassland pastures or marsh breeding habitat. The mixed and coniferous forest that they may inhabit for roosting are present, however, suitable habitat is considered marginal based on the limited availability of open vegetation free habitat in these communities that have thick understoreys.

Potential habitat for the remaining SAR birds listed above was not observed in the Study Area.

Bank Swallows were not observed during the field assessment. The creek banks did not possess the vertical slopes required by Bank Swallows.

Bobolink and Eastern Meadowlark, prefer large areas (minimum of 10 ha) of grassland habitat, which is not present in the Study Area which consists of forest and swamp communities.

Chimney Swift habitat was not present as no chimneys or suitable hollow trees were observed in the Study Area.

Least Bittern habitat was not present as no suitable marsh wetland habitat is present on-site. Swamp wetland communities present are White Cedar dominant with closed canopy and not the characteristic large marsh community dominated by cattails or other robust emergent vegetation.

Red-headed Woodpecker habitat is not present as the preferred open deciduous forests and grasslands are not present. Roadsides are bordered by dense coniferous dominated swamps (SWM01, SWCM1-2, SWCM1) and forest edges are also dense and coniferous dominated (FOCM4-1; FOMM4-2; FOMM7-2).

4.1.2 Candidate Bat Maternity Roosting Habitat

Since 2013, four bat species have been listed as endangered under the *Endangered Species Act 2007* due to rapid declining population sizes caused by White-nose Syndrome (WNS).

Among the four listed species, three are known to roost in forested habitats; Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Pipistrellus subflavus*). While Little Brown Bat typically choose maternity roosts in anthropogenic structures, according to MNRF and Environment Canada (2015), key features of significant bat maternity roosting habitat sites for Northern myotis and Tri-colored bat species, and to a lesser extent Little brown myotis, include:

- Deciduous Forest (FOD), Mixedwood Forest (FOM), Coniferous Forest (FOC), Deciduous Swamp (SWD), Mixedwood Swamp (SWM) and Coniferous Swamp (SWC) communities;
- Older forest stands that typically feature increased snag availability for roosting and foraging under a relatively closed canopy and mature large-diameter trees with >25 cm DBH;
- Cavities with small entrances/crevices or loose bark; and
- Cavities in tall tree snags of live trees that exhibit early to mid-stages of decay.

Trees which may be suitable for roosting bats, including trees with > 25 cm DBH with potential for cavities / snags, were observed within the Study Area.

Snag trees >25 cm DBH, with dying limbs and preferred tree cavities / snags or peeling bark were observed within the Study Area in the FOMM7-2, SWCM1-2, and SWMO1.

Based on site observations and a review of aerial photographs, six of the 8 ELC vegetation community types present in the Study Area are considered to be key features preferred by bats for roosting, consisting of open areas and preferred treed communities of SWMO1, SWCM1, SWCM1-2, FOCM4-1, FOMM4-2 and FOMM7-2. These communities have some potential for large diameter trees with cavities / loose bark. Suitable foraging habitat for bats may be associated with the open watercourse features of Humber River as well as its tributary within the Study Area and an open aquatic feature beyond the Study Area within the SWMO1 community north of Patterson Side Road in between Bridge 1 and Bridge 2.

4.1.3 Amphibians and Reptiles

A review of the ORAA Square 17NJ96 identified the following provincial Special Concern or Specially Protected amphibian and reptile species were identified as having potential to be located within the Study Area:

- Snapping Turtle (*Chelydra serpentina)* (ORAA – 2019); and
- Midland Painted Turtle (*Graptemys geographica)* (ORAA – 2019).

Snapping Turtle is provincially listed as a Special Concern species on the SARO list and has been designated as a Specially Protected Reptile under the *Ontario Fish and Wildlife Conservation Act*. The Midland Painted Turtle has been designated as a Specially Protected Reptile under the *Ontario Fish and Wildlife Conservation Act*. The ORRA database noted observations of Midland Painted Turtle and Snapping Turtle in 2019, indicating recent presence in the vicinity of the Study Area.

Snapping Turtles, generally inhabit shallow waters, where they can hide under the soft mud and leaf litter and are usually found in large bodies of water but sometimes inhabit small ponds. During nesting season, female Snapping Turtles travel overland in search of suitable nesting sites and often take advantage of manmade structures for nest sites (especially gravel shoulders). Pettit *et al*., (1995) reported that females travelled up to 2.02 km between their residence and a nesting area, whereas Obbard and Brooks (1980) found that the maximum round trip distance travelled between home range and nesting site was 16 km.

Gravel road shoulders in the Study Area may provide suitable nesting habitat for Snapping Turtle, however, watercourses in the Study Area lack the leaf litter and mud substrate preferred by Snapping Turtles. Suitable habitat for Snapping Turtles may be present in waterbodies or ponds located beyond the Study Area.

Midland Painted Turtle generally inhabit shallow, slow-moving creek watercourses with the opportunity for basking areas associated with open areas on shorelines and in-stream boulders and rocks protruding from the water. The open watercourse features of the Study Area appear to provide potentially suitable habitat for Midland Painted Turtle.

4.1.4 Monarch Butterfly Habitat

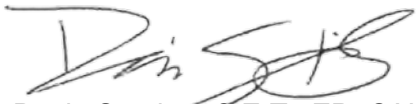
The Monarch (*Danaus plexippus*) was already assessed as a species of Special Concern in Ontario when the *Endangered Species Act* took effect in 2008. The Monarch's range extends from Central America to southern Canada. In Canada, Monarchs are most abundant in southern Ontario and Quebec, where breeding habitats, including milkweed plants, are widespread. Common Milkweed was observed at the edges of the SWMO1 and FOMM4-2 vegetation communities. Monarch butterflies were not observed within the SWMO1 and FOMM4-2 communities during the field assessment.

5.0 Preferred Solution

Project activities associated with the Alternative Solutions are anticipated to include but are not limited to grading and vegetation removal. Improvements are anticipated to be located primarily within the existing right-of-way with potential impact to trees and shrubs that encroach, including impact to wildlife species, Species of Special Concern (reptiles), SAR (bats), and associated habitat (e.g., snag trees, Milkweed, sole source food for Monarch), as a result of vegetation clearing and grading. It is anticipated that direct impact to wildlife species, Species of Special Concern, SAR can be avoided through timing and minimizing the footprint of construction.

Preferred Solution when determined will be evaluated for impacts and mitigation.

R.J. Burnside & Associates Limited



Devin Soeting, C.E.T., EP, CAN-CISEC
Project Coordinator

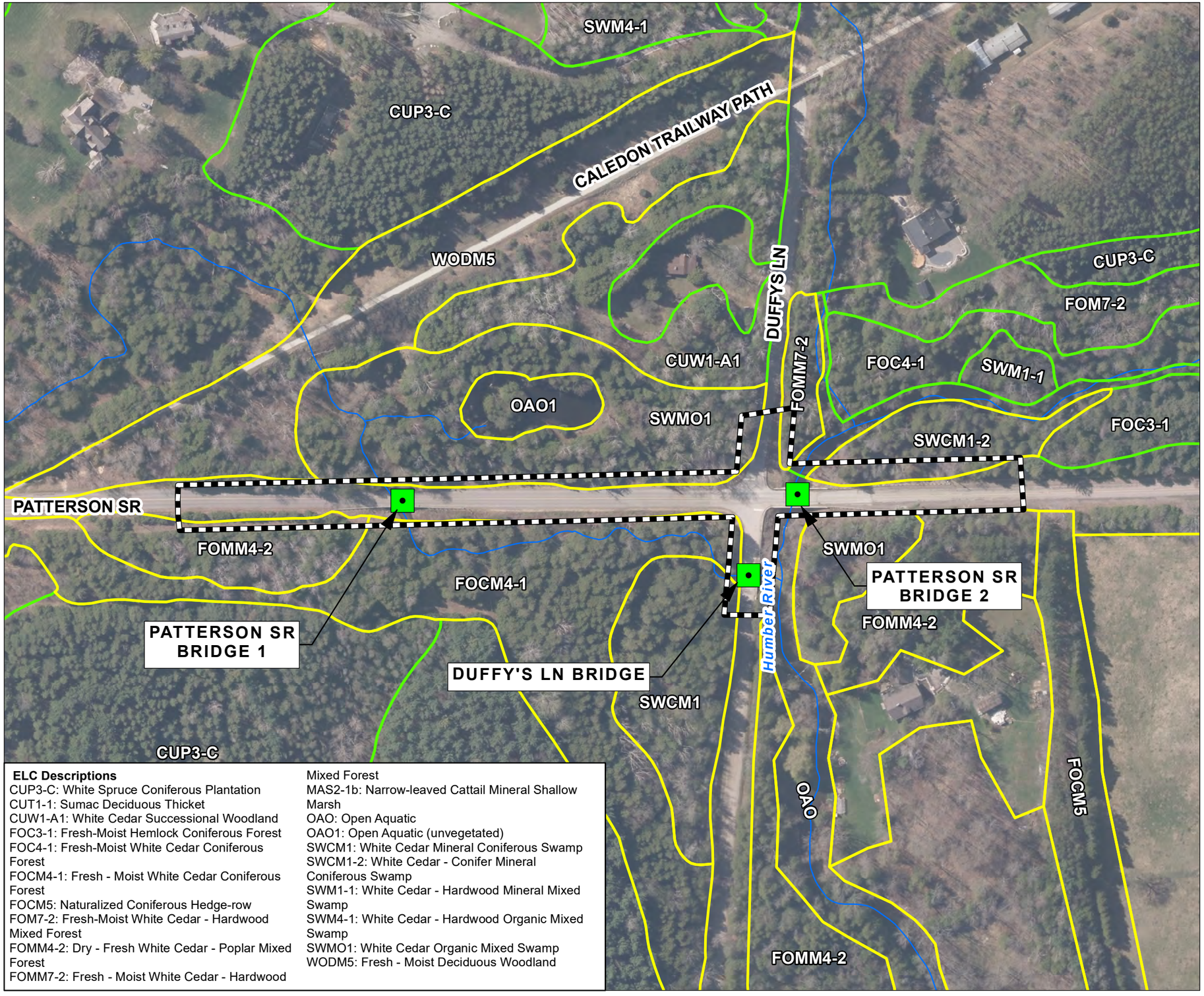
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Enclosure(s) Figure 1 – Existing Conditions: ELC
Appendix A – SAR Table

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ELC Descriptions

CUP3-C: White Spruce Coniferous Plantation
CUT1-1: Sumac Deciduous Thicket
CUW1-A1: White Cedar Successional Woodland
FOC3-1: Fresh-Moist Hemlock Coniferous Forest
FOC4-1: Fresh-Moist White Cedar Coniferous Forest
FOCM4-1: Fresh - Moist White Cedar Coniferous Forest
FOCM5: Naturalized Coniferous Hedge-row
FOM7-2: Fresh-Moist White Cedar - Hardwood Mixed Forest
FOMM4-2: Dry - Fresh White Cedar - Poplar Mixed Forest
FOMM7-2: Fresh - Moist White Cedar - Hardwood Mixed Forest
MAS2-1b: Narrow-leaved Cattail Mineral Shallow Marsh
OAO: Open Aquatic
OAO1: Open Aquatic (unvegetated)
SWCM1: White Cedar Mineral Coniferous Swamp
SWCM1-2: White Cedar - Conifer Mineral Coniferous Swamp
SWM1-1: White Cedar - Hardwood Mineral Mixed Swamp
SWM4-1: White Cedar - Hardwood Organic Mixed Swamp
SWMO1: White Cedar Organic Mixed Swamp
WODM5: Fresh - Moist Deciduous Woodland

Bridge
Watercourse
ELC Boundary (RJB)
ELC Boundary (TRCA)
Study Area

Sources:

1. Ministry of Natural Resources and Forestry, © Queen's Printer for Ontario.
2. Natural Resources Canada © Her Majesty the Queen in Right of Canada.

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This map is the product of a Geographic Information System (GIS). As such, the data represented on this map may be subject to updates and future reproductions may not be identical.

Datum: North American 1983 CSRS	
Coord. System: NAD 1983 CSRS UTM Zone 17N	
Projection: Transverse Mercator	
Central Meridian: 81°0'0.00"W	
False Easting: 500,000m	False Northing: 0m
Page Orientation: 309.54°	Scale Factor: 0.99960

Grid North

0 25 50 75 100
Metres

BURNSIDE

Client

TOWN OF CALEDON

Figure Title

PATTERSON SIDEROAD BRIDGE 1 AND 2

ECOLOGICAL LAND CLASSIFICATION

Drawn	Checked	Date	Figure No.
HN	SR	2020/12/04	1
Scale		Project No.	
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File Path: \\elmo\gis\Project\300\051839 (Patterson SR1)\Map\051839 Patterson - ELC.mxd Print Date: 2020/12/04 Time: 04:00 PM

Appendix A: Screening Table - Background Review of Species at Risk and Species of Conservation Concern Potentially Present in the Study Area

Patterson Bridge 1, 2 & Duffy Lane Bridge EA, Caledon (300051839.0000)

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
BIRDS									
Bank Swallow (Source: OBBA)	Riparia riparia	S4B	THR	THR	THR	1	In Ontario, Bank Swallows typically nest in exposed vertical earthen banks, created by erosion, along watercourses and lakeshores. It has also adapted to nesting in these banks in sand and gravel pits, along roadsides and in stockpiles of soil and other materials. The largest populations are supported by the shorelines of the lower Great Lakes, and they can also be found throughout southern Ontario in the Carolinian and Lake Simcoe-Rideau regions.[7]	No. No exposed, eroded riverbanks, pits, stockpiles, and other suitable habitat are not present on site.	No.
Barn Swallow (Source: OBBA)	Hirundo rustica	S4B	SC	SC	THR	1	Barn Swallows usually build mud nests on ledges of walls in, or outside, of a barn or other man-made structures, including buildings and bridges. Natural nesting locations include caves and cliffs, but they are now rarely used. They often nest in small colonies in areas often associated with other insectivores. Foraging occurs in open areas where insects are present: Over water, meadows, marshes, and agricultural fields. They are most abundant south of the Canadian Shield, within agricultural lands in the Carolinian and Lake Simcoe-Rideau regions.[5]	Yes. Bridge structures suitable for nesting on site.	No nests observed.
Bobolink (Source: OBBA)	Dolichonyx oryzivorus	S4B	THR	THR	THR	1	Bobolinks generally prefer open grasslands and hay fields for nesting, typically featuring relatively tall vegetation. Sometimes uses large fields (>50 ha) of winter wheat and rye in southwestern Ontario. Sensitive to vegetation structure and composition, they are positively associated with high grass-to-forb ratios, and moderate litter depth. They tolerate wetter portions of fields and are more likely to nest closer to field centers rather than field margins. They have a lower tolerance to the presence of patches of bare ground and appear to prefer larger fields (>10 ha).[5, 7] This area sensitivity is also heavily influenced by the amount of regional grassland cover.	No. No open grasslands featuring tall vegetation are present on site.	No.

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
Chimney Swift (Source: OBBA)	Chaetura pelagica	S4B,S4N	THR	THR	THR	1	Chimney Swifts have historically nested / roosted in deciduous and coniferous, typically wet, forest types, with a well-developed, dense shrub layer. Currently, most are found in anthropogenic structures, most commonly in uncapped chimneys.	No. No chimneys or suitable hollow trees were observed in the Study Area.	No.
Common Nighthawk (Source: Burnside)	Chordeiles minor	S4B	SC	SC	THR	1	Prefers open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks for breeding. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops).	Low. There are no open and flat areas of dune, beach or recently harvested forest, grassland pastures or marsh habitat suitable for breeding for this species. There are mixed and coniferous forests present but White Cedar dominated with a thick understory.	No.
Eastern Meadowlark (Source: OBBA)	Sturnella magna	S4B	THR	THR	THR	1	Generally, prefers grassy pastures, meadows, and hay fields. Prefers moderately tall grass with abundant litter cover, a high proportion of grass cover, moderate forb density, low proportions of shrub and woody vegetation cover, and low percent of bare ground. Prefers to nest in drier sites and frequently nests around field margins.[5, 7]	No. No field habitat suitable for nesting / foraging (i.e., tall grass pasture, and meadows, etc.) is present on site.	No.
Eastern Whip-poor-will (Source: MNRF, OBBA)	Antrostomus vociferus	S4B	THR	THR	THR	1	Generally, prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred. In winter they occupy primarily mixed woods near open areas.	No. The preferred semi-open deciduous forests with clearings are not present. Dense coniferous dominated SWM01, SWCM1-2, SWCM1, FOCM4-1/2 forests are present on-site.	No.
Eastern Wood-pewee (Source: OBBA)	Contopus virens	S4B	SC	SC	SC	1	This species is known to inhabit the mid-canopy layer of forest openings and edges of deciduous and mixed forests (MNRF 2018). It is most abundant in intermediate-age mature forest stands with little understorey vegetation (MNRF 2018). Eastern Wood-pewees generally nest in the interior of deciduous and mixed-wood forested habitats but are often found foraging along woodland edges and within forest gaps. They do not require large habitats, but occurrences are noted less frequently in woodlots surrounded by development than in those without. Species distribution is throughout southern and northern Ontario, occurring less in the Hudson's Bay Lowlands.[5]	Low. The mixed wooded FOMM4-2 community is present but with a thick understorey.	No.

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
Least Bittern (Source: Burnside)	Ixobrychus exilis	S4B	THR	THR	THR	1	This species is typically located near pools of open water in relatively large marshes dominated by cattail and other robust emergent vegetation.[5]	No. No suitable marsh wetland habitat is present on-site. The swamps present are White Cedar dominant with closed canopy.	No.
Red-headed Woodpecker (Source: OBBA)	Melanerpes erythrocephalus	S4B	SC	END	THR	1	Generally, prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, and cemeteries, as well as along beaver ponds and brooks.[6]	No. The preferred open deciduous forests and grasslands are not present. Roadsides are bordered by dense coniferous dominated SWM01, SWCM1-2, SWCM1, FOCM4-1/2 forests.	No.
Wood Thrush (Source: OBBA)	Hylocichla mustelina	S4B	SC	THR	THR	1	The Wood Thrush breeds in southeastern Canada, from southern Ontario, east to Nova Scotia. Nesting typically occurs in second-growth, mature deciduous, and mixed forests. The presence of tall trees and a thick understory are usually prerequisites for site occupancy.[6, 8] They prefer large forested areas, but they may also nest in small forest fragments. Nest building commonly occurs in Sugar Maples and American Beech saplings, trees or shrubs.[8] Wintering occurs in Central America, along the Atlantic and Pacific slopes.[6]	Low. The mixed wooded FOMM4-2 community is present but does not possess the tall mature deciduous trees; it is cedar dominated with poplars and not the preferred Sugar Maples and American Beech.	No.
INSECTS									
Monarch (Source: Burnside)	Danaus plexippus	S2N,S4B	SC	END	SC	1	Monarchs can be found in areas that Milkweed (Asclepius sp.) and other wildflowers are present. This includes open spaces (fields), abandoned farmland, and roadsides. Pin-sized green eggs are laid on the underside of Milkweed species (Asclepias spp.), which are the primary food source of the Monarch caterpillar. Adult Monarchs migrate in late summer / early fall. Overwintering occurs along the California coast, and the Oyamel Fir Forest in central Mexico.[8\\]	Yes. Appropriate foraging and breeding habitat was present in the open roadside area and noted within SWMO1 and FOMM4-2 community edges.	No. No Monarch were observed.
MAMMALS									
Eastern Small-Footed Myotis (Source: MNRF)	Myotis leibii	S2S3	END	-	-	-	Eastern Small-footed Myotis can be found from southern Georgian Bay to Lake Erie, and east to the Pembroke area. Record sightings also exist within the Bruce Peninsula, the Espanola area, and Lake Superior Provincial Park.[8]	No. Hibernacula is not present (i.e., caves / mines). Roosting habitat is not considered present, given its preference for open, sunny rocky	No.

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
							Roosting habitat: During the spring and summer they will roost under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines or hollow trees. They often change their roosting locations every day.[8] Hibernacula: Caves and abandoned mines that tend to be colder and drier than the hibernacula of similar bats, and they will return to the same hibernacula every year. As with Little Brown Myotis, Eastern Small-footed myotis populations have been declining rapidly due to a fungal infection (White-nose Syndrome) that affects bats while in hibernation.[8]	habitats within close proximity to its hibernacula.	
Little Brown Myotis (Source: MNRF)	Myotis lucifugus	S3	END	END	END	1	Population distribution within Canada includes the boreal forest, south of the tree line through to the U.S. border.[10] Roosting habitat: Mainly considered to be a cavity-roosting species, however, tree foliage and rock crevices may also be used for day and maternity roosting. Communal night roosts are used when temperatures are cool and tend to be in spaces that are warm or can be warmed by an accumulation of bats. Females prefer to roost in maternity colonies, preferring tree cavities, exfoliating bark, cracks and crevices in cliffs and small caves and crevices heated by hot springs. Temperature is the principal criterion for the selection of a maternity roost location. Maternity colonies form just after bats come out of hibernation (late April and early May) and are located within 1 km of water.[10] Hibernacula: Hibernation typically takes place in caves or abandoned mines, with favourable temperatures and humidity conditions. Migration to hibernation sites can be up to 1,000 km, and typically occurs in early September.[11] Little Brown Myotis populations in Ontario have declined dramatically in recent years due to White-nose Syndrome, a fungal infection caused by *Pseudogymnoascus destructans*, which infects bats while in hibernation.[10]	High. Snags were present in preferred swamp (SWM01, SWCM1-2, AND SWCM1) and forests (FOMM4-2, FOMM7-2) adjacent to and within ROW in the study area and permanent water body sources for foraging are present.	No.

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
Northern Myotis (Source: MNRF)	Myotis septentrionalis	S3	END	END	END	1	Roosting habitat: Males and non-breeding females roost alone or in small groups, choosing trees, caves, and buildings. Breeding females roost in tree hollows, cavities, crevices or under loose bark of living or decaying trees, sometimes in groups of up to 60 adults. They often change roosting locations every few days. Prey mainly includes terrestrial insects such as flies, moths, beetles, caddisflies, lacewings, and leafhoppers, as well as non-flying species, such as spiders and caterpillars. They tolerate cooler conditions than the Little Brown Myotis and are therefore not usually found near that species.[10] Hibernacula: Tend to enter hibernation later than other species, around late September to early November, and will emerge from hibernation sometime between March and May. They spend the summer relatively close to their hibernacula (56 km between summer and winter sites). [10] As with Little Brown Myotis, White-nose Syndrome has cause a dramatic decline in Ontario populations.[10]	High. Snags were present in preferred swamp (SWM01, SWCM1-2, AND SWCM1) and forests (FOMM4-2, FOMM7-2) adjacent to and within ROW in the study area and permanent water body sources for foraging are present.	No.
Tri-colored Bat (Source: MNRF)	Perimyotis subflavus	S3?	END	END	END	1	Roosting habitat: Females roost alone, or in small colonies, and have been shown to exhibit fidelity to small roosting areas. Foraging typically occurs in forested riparian areas, over open water and in relatively open areas. Studies have shown that Tri-coloured bats forage in forested areas with the greatest coverage, suggesting that they may avoid agricultural clearings, urban areas and areas where forest harvesting has occurred.[10] Hibernacula: Tends to hibernate in the deepest parts of caves or abandoned mines, where temperature is least variable and humidity levels are high. They hibernate solitarily and exhibit high fidelity to hibernacula.[10]	High. Snags were present in preferred swamp (SWM01, SWCM1-2, AND SWCM1) and forests (FOMM4-2, FOMM7-2) adjacent to and within ROW in the study area and permanent water body sources for foraging are present.	No.

Common Name	Scientific Name	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present in Study Area?	Species Observed In Study Area During Site Assessment?
REPTILES & AMPHIBIANS									
Midland Painted Turtle (Source: ORAA)	Chrysemys picta marginata	S4	-	SC	SC	-	Inhabits waterbodies, such as ponds, marshes, lakes, and slow-moving creeks, that have a soft bottom and provide abundant basking sites and aquatic vegetation. These turtles often bask on shorelines or on logs and rocks that protrude from the water. The midland painted turtle hibernates on the bottom of waterbodies.	Yes. Appropriate habitat exists within the study area.	No.
Snapping Turtle (Source: ORAA)	Chelydra serpentina	S3	SC	SC	SC	1	Snapping Turtles generally inhabit shallow waters, where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. They often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits. During nesting season, females travel overland in search of suitable nesting sites.[8]	Yes. Appropriate habitat exists within the study area.	No.

** Sources: Natural Heritage Information Centre (NHIC) database searched on December 1, 2020 for square 17NJ9625; Ontario Reptile and Amphibian Atlas (ORAA) for Square 17NK96, searched online on December 1, 2020; Ontario Breeding Bird Atlas (OBBA) 2001-2005 database for Square 17NK96 searched online on December 1, 2020.

[1]S-Ranks (provincial)
Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario (Please refer to: http://explorer.natureserve.org/nsranks.htm). S-Ranks obtained from the NHIC updated December 1, 2020.

SX — Presumed Extirpated - Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH — Possibly Extirpated (Historical) - Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
S1 — Critically Imperiled - Critically imperiled in the province or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2 — Imperiled - Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
S3 — Vulnerable - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 — Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 — Secure - Common, widespread, and abundant in the province.
SNR — Unranked - Province conservation status not yet assessed.
SU — Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA — Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S# — Range Rank - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
S#? – Inexact or Uncertain - Denotes inexact or uncertain numeric rank.

Breeding Status Qualifiers
B – Breeding Conservation status refers to the breeding population of the species in the nation or state/province.
N – Nonbreeding Conservation status refers to the non-breeding population of the species in the province.
M – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

[2]SARO *Endangered Species Act, 2007*
(Provincial status from https://www.ontario.ca/page/species-risk-ontario#section-1 updated November 13, 2018)
The provincial review process is implemented by the Committee on the Status of Species at Risk in Ontario (COSSARO).

Extinct - A species that no longer exists anywhere.
Extirpated (EXT) - Lives somewhere in the world, and at one time lived in the wild in Ontario, but no longer lives in the wild in Ontario.
Endangered (END) - Lives in the wild in Ontario but is facing imminent extinction or extirpation.
Threatened (THR) - Lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.
Special concern (SC) - Lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.
Not at Risk (NAR) - A species that has been evaluated and found to be not at risk.

Data Deficient (DD) - A species for which there is insufficient information for a provincial status recommendation.

[3]SARA (Federal *Species at Risk Act*) Status and Schedule (includes COSEWIC Status)
The Act establishes Schedule 1, as the official list of wildlife species at risk. It classifies those species as being either Extirpated, Endangered, Threatened, or Special Concern. Once listed, the measures to protect and recover a listed wildlife species are implemented. Obtained from the Species at Risk Public Registry on December 10, 2018.

Extinct - A wildlife species that no longer exists.
Extirpated (EXT) - A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.
Endangered (END) - A wildlife species facing imminent extirpation or extinction.
Threatened (THR) - A wildlife species that is likely to become an endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
Special Concern (SC) - A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
Data Deficient (DD) - A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.
Not At Risk (NAR) - A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

[4]SARA Schedule
Obtained from the Species at Risk Public Registry on December 10, 2018.
Schedule 1: is the official list of species that are classified as extirpated, endangered, threatened, and of special concern.
Schedule 2: species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3: species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

The Act establishes Schedule 1 as the official list of wildlife species at risk. However, please note that while Schedule 1 lists species that are extirpated, endangered, threatened and of special concern, the prohibitions do not apply to species of special concern.

Species that were designated at risk by COSEWIC prior to October 1999 (Schedule 2 & 3) must be reassessed using revised criteria before they can be considered for addition to Schedule 1 of SARA. After they have been assessed, the Governor in Council may on the recommendation of the Minister, decide on whether or not they should be added to the List of Wildlife Species at Risk.

Sources:
[5] Cadman, M.D., et al. (eds). 2007. *Atlas of the Breeding Birds of Ontario, 2001-2005*. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp
[6] Species at Risk Public Registry http://www.sararegistry.gc.ca
[7] McCracken, J.D. et al. 2013. Recovery Strategy for the Bobolink (Dolichonyx oryzivorus) and Eastern Meadowlark (Sturnella magna) in Ontario .Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario, viii + 88 pp.
[8] MNRF SARO List Species Descriptions (https://www.ontario.ca/page/species-risk-ontario#section-1)
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[11]Farrar, John Laird, 2017, *Trees in Canada*, Natural Resources Canada | Canada Forest Services, and, Fitchenry &Whiteside Limited, pp.238 – 239
[12]Significant Wildlife Habitat Technical Guide – Appendix G – Table G-3

Patterson Side Road Bridges 1 and 2 and Duffy's Lane Bridge Replacements Hydraulic Report

Town of Caledon
6311 Old Church Road
Caledon ON L7C 1J6

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April 13, 2021
300051839.7/8000

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
-	Yes	Yes	Toronto and Region Conservation Authority
-	Yes	Yes	Town of Caledon

Record of Revisions

Rev.	Date	Description
-	March 30, 2021	Initial Submission to Toronto and Region Conservation Authority

R.J. Burnside & Associates Limited

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Appendix A Hydraulic Summary Outputs
Appendix B Digital Modelling Files

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Town of Caledon (Town) to undertake the analysis and design required for the replacement of Patterson Side Road Bridge 1 and 2, and Duffy's Lane Bridge in the Town. Bridge 1 is located on Patterson Side Road, approximately 0.1 km West of Duffy's Lane (43.936134, -79.841697). Bridge 2 is located on Patterson Sideroad, approximately 0.03 km East of Duffy's Lane. (43.936795, -79.840397). Duffy's Lane Bridge is located just downstream of the two Patterson Side Road Bridges, approximately 0.03 km South of Patterson Side Road (43.936795, -79.840381).

This Report provides commentary and methodology used in the hydrological and hydraulic analysis of the existing structures, while providing recommendations for the proposed replacement structures.

2.0 Background Information

The Toronto and Region Conservation Authority (TRCA) provided an existing HEC-RAS model which Burnside has used as a base for modelling the three structures. A topographic survey was completed by Burnside in December 2020 to obtain existing bridge soffits, roadway and driveway elevations, building locations and existing topographic data, etc. which was used to update the existing TRCA model.

This survey data has been used to update the existing TRCA HEC-RAS model and also used for the design of the proposed structure upgrades. A summary of the existing structure information obtained from the 2020 survey is shown in Table 2.1.

Table 2.1: Existing Structure Information

Structure ID	Structure Description	Maximum Upstream Soffit	Minimum Downstream Soffit	Span
Bridge No. 1	Concrete Bridge	264.60	264.50	7.31
Bridge No. 2	Concrete Bridge	264.05	263.57	13.69
Duffy's Bridge	Concrete Bridge	262.97	262.66	9.35

The structures have existing guide rails present at the roadway surface. The existing modelling has been completed with the extents of the proposed guiderails for each crossing.

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The Patterson Side Road bridges have been identified for replacement based on the age and deteriorating condition of the bridges. At the time of writing of this Report, the Duffy's Lane bridge is being analyzed for options including.

a) Abandon the crossing;

b) Replace the crossing or;

c) Rehabilitate the crossing.

Should the preferred option for the Duffy's Lane bridge be considered for replacement, a larger structure may reduce tailwater conditions for the west Patterson Side Road crossing. If a full replacement is selected for the Duffy's Lane crossing location, commentary has been provided on a suitable replacement structure for Duffy's lane in Section 5.4. The decision for the future of the crossing will be vetted during the Municipal Class Environmental Assessment (MCEA) process of the project.

3.0 Design Criteria

The hydrologic and hydraulic design criteria will incorporate the policies and criteria of three agencies, including the Town, the Ministry of Transportation (MTO), and the TRCA. Based on Burnside's best judgment, the stormwater design criteria for the Patterson Side Road and Duffy's Lane bridge analysis are summarized below:

Patterson Side Road is classified as a collector road and accordingly, in accordance with Ministry of Transportation (MTO) Highway Drainage Design Standards WC-1 1.1.1, the Design flow for the bridge analysis is the 50-year peak flow.

a) For a collector road, in accordance with Ministry of Transportation (MTO) Highway Drainage Design Standards WC-2 3.2.1, ≥ 1.0m of freeboard shall be provided from the high water level for the design flow (i.e., the 50-year peak flow) to the edge of the travelled lane.

b) For a collector road, in accordance with Ministry of Transportation (MTO) Highway Drainage Design Standards WC-2 3.2.2, ≥ 1.0m of freeboard shall be provided from the high water level for the design flow (i.e., the 50-year peak flow) to the minimum soffit elevation.

Duffy's Lane is classified as a local road and accordingly, the following criteria have been used in the hydraulic analysis of the existing and proposed Duffy's Lane Structure:

- Based on the proposed structure having a combined span greater than 6.0 m and located on a rural local roadway, the Return Period for the Design Flood Event is the 25-year Storm, as per the MTO Highway Drainage Design Standards, WC-1 Design Flows (Bridges and Culverts).

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- The minimum freeboard to the edge of the travelled lane for a bridge crossing, as noted in WC-2 Freeboard and Clearance at Bridge Crossings, shall be 0.3 m for a Local Roadway. The minimum freeboard is measured vertically from the High-Water Level for the Design Flow to the edge of travelled lane. Bridges are also required to provide a minimum of 0.3 m of clearance from the High-Water Level for the Design Flow to the soffit.

4.0 Hydrology

The peak flows from the existing TRCA model were used for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year and Regional storm events. The flows from the Coffee Creek – Reach 1 and Upper Humber – Reach 4 used and are shown in Table 4.1.

Table 4.1: Summarized Peak Flows

Location	2-year (m^3/s)	5-year (m^3/s)	10-year (m^3/s)	25-year (m^3/s)	50-year (m^3/s)	100-year (m^3/s)	350-year (m^3/s)	500-year (m^3/s)	Regional (m^3/s)
Bridge No.1 Coffee Creek – Reach 1	0.278	0.829	1.725	1.725	4.56	6.091	11.415	17.314	68.433
Bridge No. 2 Upper Humber – Reach 4	2.54	5.157	8.347	8.347	15.875	19.703	33.638	48.605	182.704
Duffy's Lane Coffee Creek – Reach 1	0.278	0.829	1.725	1.725	4.56	6.091	11.415	17.314	68.433

5.0 Hydraulic Analysis

5.1 Hydraulic Model

The HEC-RAS version 5.0.7 computer model developed by the U.S. Army Corps of Engineers has been utilized. This model estimates the change in water surface elevation between selected valley cross-sections and routines to account for local increases in water levels due to culverts and/or other flow obstructions. The model is intended for utilization in the analysis of water surface profiles of steady state, gradually varied, one-dimensional flow in natural and man-made channels.

A number of considerations are required in the selection of data and variables to be used in the application of the HEC-RAS model to the floodplains of the study area, as follows:

- Cross-sections

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- Hydraulic Structures and Computational Routines
- Hydraulic Parameters
- Boundary Conditions

5.2 Patterson Side Road Bridge 1 - Hydraulic Results

The existing 7.31 m span bridge has been observed to convey all storm events up to the 500-year storm. Peak flows producing headwater elevations in excess of 263.82 m would overtop Patterson Side Road in existing conditions.

The existing road elevations are based on the future minor road profile increase of Morrison Hershfield's road reconstruction work that will be occurring prior to the bridge work being completed.

While the existing bridge configuration yields reasonable hydraulic results, alternatives were considered to maintain or improve conveyance in accordance with the design criteria outlined in Section 3.0 above, while improving aquatic habitat through the crossing. Table 5.1 illustrates the proposed 16.25 m span bridge characteristics vs the existing crossing.

Table 5.1: Patterson Bridge 1 Comparison

Crossing Characteristic	Existing Conditions	Proposed Conditions
Material	Concrete Bridge	Concrete Bridge
Span (m)	7.31	16.25
Rise (m)	1.73	2.44
Min. Soffit U/S (m)	264.50	265.21
Min. Soffit D/S (m)	264.50	265.21
Length (m)	7.60	12.2
Grade (m/m)	0.00	0.00
Channel and Tailwater Conditions		
CL Channel Invert U/S (m)	262.77	262.77
CL Channel Invert D/S (m)	262.83	262.83
Tailwater Conditions	From Ex. TRCA Model	From Ex. TRCA Model
Tailwater (m)	See Model	See Model
Roadway Data		
Low Point in C/L Road Elev (m)	263.89	264.21
Low Point in Road Elev at Edge of Travelled Lane (m)	263.82	264.14
Edge of Travelled Lane at Bridge limits (m)	265.50	265.76
Guiderail (Y/N)	Yes	Yes
Road Width (m)	6.80	10.0

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We have selected Cross Section 600.1245 of Coffey Creek, Reach 1 to compare the hydraulic results of the existing and proposed bridge. We have summarized the results in Table 5.2.

Table 5.2: Patterson Bridge 1 - Headwater Comparison at X-Sec 600.1245

Discharge Names	Total Discharge (cms)	Existing Headwater Elevation (m)	Proposed Headwater Elevation (m)	Difference (m)	Elevation of Edge of Travelled Lane (m)	Freeboard to Edge of Travelled Lane (m)	Lowest Soffit Elevation (m)	Clearance (m)
2-Yr	0.28	262.93	262.93	0	264.14	1.21	265.21	2.28
5-Yr	0.83	263.06	263.05	-0.01	264.14	1.09	265.21	2.16
10-Yr	1.73	263.21	263.18	-0.03	264.14	0.96	265.21	2.03
25-yr	1.73	263.21	263.18	-0.03	264.14	0.96	265.21	2.03
50-Yr	**4.53**	**263.51**	**263.43**	**-0.08**	**264.14**	**0.71**	**265.21**	**1.78**
100-Yr	6.09	263.63	263.52	-0.11	264.14	0.62	265.21	1.69
350-Yr	11.42	263.96	263.75	-0.21	264.14	0.39	265.21	1.46
500-Yr	17.31	264.29	263.93	-0.36	264.14	0.21	265.21	1.28
Regional	68.43	266.97	266.97	0	264.14	-2.83	265.21	-1.76

As illustrated in Table 5.2, the proposed 16.25 m span bridge has been observed to reduce headwater elevations in all storm events up to the 500-year storm by up to 0.36 m.

The calculated freeboard measured from the 50-year water surface elevation to edge of travelled lane at the low point in the roadway has been calculated at 0.71 m. This does not meet the MTO design requirement as outlined in Section 3.0. However, we note that the low point in Patterson Side Road is located approximately 130 m to the east of Bridge 1. The edge of travelled lane immediately east of Bridge 1, resides at 265.76 m. Should freeboard be calculated immediately east of Bridge 1, the proposed structure would have 2.33 m (265.76 m – 263.43 m) of freeboard. We have reviewed the watercourse hydraulics of Coffey Creek in the vicinity of the bridge and note that the 50-year peak flow generally resides at normal depth in the reach. This implies that the 50-year event is free flowing and not impeded by structures downstream of the crossing. Therefore in order to meet the MTO design criteria of 1 m of freeboard to the edge of travelled lane at the lowest point of Patterson Sideroad, approximately 130 m east of the bridge, the roadway profile would need to be elevated by approximately 0.3 m at this location. Elevating the roadway profile at the low point to achieve the required freeboard will be problematic as the fill required to elevate the roadway will impact headwater elevations. We note that the Regional Flood elevation is well in excess of the low point

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of the road and accordingly, this fill placement will displace Regional Floodplain storage. To satisfy TRCA floodplain regulations, fill placement in the floodplain is required to be accompanied by a cut of equal volume to balance floodplain storage. As the project limits is confined to the roadway right of way limits a compensation cut would not be able to be achieved. Therefore, the required freeboard of 1.0 m cannot be achieved in this location. However, the proposed bridge does provide 1.78 m of clearance, measured from the 50-year water surface elevation to the minimum soffit elevation. This exceeds the 1.0 m MTO design requirement as outlined in Section 3.0 and therefore maintains the free-flowing conditions at this crossing.

Complete hydraulic summary output tables can be found in Appendix A. hydraulic modelling digital files can be found in Appendix B.

5.3 Patterson Sideroad Bridge 2 - Hydraulic Results

The existing 13.69 m span bridge has been observed to convey all storm events up to the 500-year storm. Peak flows producing headwater elevations in excess of 263.89 m would overtop Patterson Sideroad in existing conditions.

The existing road elevations are based on the future minor road profile increase of Morrison Hershfield's road reconstruction work that will be occurring prior to the bridge work being completed.

The existing bridge configuration yields reasonable hydraulic results, however, alternatives were considered to improve conveyance in accordance with the design criteria outlined in Section 3.0 above, while improving aquatic habitat through the crossing. Table 5.3 illustrates the proposed 14.0 m span bridge characteristics vs the existing crossing.

Table 5.3: Patterson Bridge 2 Comparison

Crossing Characteristic	Existing Conditions	Proposed Conditions
Material	Concrete Bridge	Concrete Bridge
Span (m)	13.69	14.00
Rise (m)	2.208	2.437
Min. Soffit U/S (m)	263.57	263.80
Min. Soffit D/S (m)	263.57	263.80
Length (m)	8.380	10.97
Grade (m/m)	0.000	0.000
Channel and Tailwater Conditions		
CL Channel Invert U/S (m)	261.36	261.36
CL Channel Invert D/S (m)	261.24	261.24

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Crossing Characteristic	Existing Conditions	Proposed Conditions
Tailwater Conditions	From Ex. TRCA Model	From Ex. TRCA Model
Tailwater (m)	See Model	See Model
Roadway Data		
Low Point in Road Elev (m)	263.89	264.21
Low Point in Road Elev – Edge of Travelled Lane (m)	263.82	264.14
Edge of Travelled Lane at Bridge limits (m)	264.33	264.51
Guiderail (Y/N)	Yes	Yes
Road Width (m)	7.62	10

We have selected Cross Section 499.97 of Upper Humber, Reach 4 to compare the hydraulic results of the existing and proposed bridge. We have summarized the results in Table 5.4.

Table 5.4: Patterson Bridge 2 - Headwater Comparison at X-Sec 499.97

Discharge Names	Total Discharge (cms)	Existing Headwater Elevation (m)	Proposed Headwater Elevation (m)	Difference (m)	Elevation of Edge of Travelled Lane (m)	Freeboard to Edge of Travelled Lane (m)	Lowest Soffit Elevation (m)	Clearance (m)
2-Yr	2.54	261.74	261.73	-0.01	264.14	2.41	263.78	2.05
5-Yr	5.16	261.88	261.88	0	264.14	2.26	263.78	1.9
10-Yr	8.35	262.02	262.02	0	264.14	2.12	263.78	1.76
20-yr	8.35	262.02	262.02	0	264.14	2.12	263.78	1.76
50-Yr	**15.88**	**262.32**	**262.32**	**0**	**264.14**	**1.82**	**263.78**	**1.46**
100-Yr	19.7	262.46	262.46	0	264.14	1.68	263.78	1.32
350-Yr	33.64	262.82	262.82	0	264.14	1.32	263.78	0.96
500-Yr	48.6	263.1	263.08	-0.02	264.14	1.06	263.78	0.7
Regional	182.7	266.99	266.99	0	264.14	-2.85	263.78	-3.21

As illustrated in Table 5.4, the proposed 14 m span bridge has been observed to maintain headwater elevations in all storm events up to the Regional Storm.

The calculated freeboard measured from the 50-year water surface elevation to edge of travelled lane at the low point in the roadway has been calculated at 1.82 m. This does meet the MTO design requirement as outlined in Section 3.0. The proposed bridge also provides 1.46 m of clearance, measured from the 50-year water surface elevation to the

minimum soffit elevation. This exceeds the 1.0 m MTO design requirement as outlined in Section 3.0 and therefore maintains the free- flowing conditions at this crossing.

Complete hydraulic summary output tables can be found in Appendix A. hydraulic modelling digital files can be found in Appendix B.

5.4 Duffy's Lane Crossing

As noted in Section 2.0, the Duffy's Lane bridge is being analyzed for options including;

a) Abandon the crossing;

b) Replace the crossing or;

c) Rehabilitate the crossing.

The following commentary has been provided to illustrate a suitable replacement structure, should a full replacement be selected for this crossing location. The decision for the future of the Duffy's Lane crossing will be vetted during the MCEA process stage of the project.

5.4.1 Duffy's Lane – Hydraulic Results

The existing 9.35 m span bridge has been observed to convey all storm events up to the 500-year storm. Peak flows producing headwater elevations in excess of 262.40 m would overtop Duffy's Lane in existing conditions.

The existing bridge configuration yields favorable hydraulic results. Alternatives were considered to maintain or improve conveyance in accordance with the design criteria outlined in Section 3.0 above, while improving aquatic habitat through the crossing. Table 5.5 illustrates the proposed 10.36 m span bridge characteristics vs the existing crossing.

Table 5.5: Duffy's Lane Bridge Comparison

Crossing Characteristic	Existing Conditions	Proposed Conditions
Material	Concrete Bridge	Concrete Bridge
Span (m)	9.35	10.36
Rise (m)	1.544	1.546
Min. Soffit U/S (m)	262.66	262.67
CL Channel Invert U/S (m)	261.12	261.12
Min. Soffit D/S (m)	262.66	262.67
CL Channel Invert D/S (m)	261.12	261.12

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Crossing Characteristic	Existing Conditions	Proposed Conditions
Length (m)	8.930	8.93
Grade (m/m)	0.000	0.000
Tailwater Conditions	From Ex. TRCA Model	From Ex. TRCA Model
Tailwater (m)	See Model	See Model
Low Point in Road Elev with guiderail (m)	262.40	262.40
Guiderail (Y/N)	Yes	Yes
Road Width (m)	7.25	10

We have selected Cross Section 599.95 of Coffey Creek, Reach 1 to compare the hydraulic results of the existing and proposed bridge. We have summarized the results in Table 5.6.

Table 5.6: Duffy's Lane Bridge - Headwater Comparison at X-Sec 599.95

Discharge Names	Total Discharge (cms)	Existing Headwater Elevation (m)	Proposed Headwater Elevation (m)	Difference (m)	Elevation of Edge of Travelled Lane (m)	Freeboard to Edge of Travelled Lane (m)	Lowest Soffit Elevation (m)	Clearance (m)
2-year	0.28	261.28	261.28	0	262.4	1.12	263.78	2.5
5-year	0.83	261.42	261.42	0	262.4	0.98	263.78	2.36
10-year	1.73	261.58	261.58	0	262.4	0.82	263.78	2.2
25-year	**1.73**	**261.58**	**261.58**	**0**	**262.4**	**0.82**	**263.78**	**2.2**
50-year	4.53	261.93	261.93	0	262.4	0.47	263.78	1.85
100-year	6.09	262.07	262.07	0	262.4	0.33	263.78	1.71
350-year	11.42	262.49	262.48	-0.01	262.4	-0.08	263.78	1.3
500-year	17.31	262.75	262.74	-0.01	262.4	-0.34	263.78	1.04
Regional	68.43	266.97	266.97	0	262.4	-4.57	263.78	-3.19

As illustrated in Table 5.6, the proposed 10.36 m span bridge has been observed to maintain headwater elevations in all storm events up to the Regional Storm.

The calculated freeboard measured from the 25-year water surface elevation to edge of travelled lane at the low point in the roadway has been calculated at 0.82 m. This meets the MTO design requirement as outlined in Section 3.0. The proposed bridge also provides 2.2 m of clearance, measured from the 25-year water surface elevation to the

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minimum soffit elevation. This exceeds the 0.3 m MTO design requirement as outlined in Section 3.0 and therefore maintains the free-flowing conditions at this crossing.

Complete hydraulic summary output tables can be found in Appendix A. hydraulic modelling digital files can be found in Appendix B.

6.0 Recommendations and Conclusions

Burnside has completed a hydraulic analysis of the existing Patterson Side Road Bridges 1 and 2, Duffy's Lane Bridge and provided recommendations for bridge replacements as outlined in Section 5.0 above. The proposed bridge replacements reduce or have no effect on headwater elevations over existing conditions for the all storm events while maintaining aquatic habitat for the watercourse.

As a result, we believe that the proposed new structure represents the most practical solution for the replacement of the above noted structures in the Town of Caledon.

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Appendix A

Hydraulic Summary Ouputs

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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HEC-RAS Hydraulic Output Comparison Summary (Existing vs Proposed Conditions)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	Existing W.S. Elev (m)	Proposed W.S. Elev (m)	Diff (m)	Existing Vel Chnl (m/s)	Proposed Vel Chnl (m/s)	Diff (m)
Upper Humber	Reach4	499.9997 04.01.02	2-year	2.54	261.78	261.77	-0.01	0.001974	0.66	0.658026
Upper Humber	Reach4	499.9997 04.01.02	5-year	5.16	261.93	261.93	0	0.002263	0.91	0.907737
Upper Humber	Reach4	499.9997 04.01.02	10-year	8.35	262.08	262.08	0	0.002313	1.1	1.097687
Upper Humber	Reach4	499.9997 04.01.02	25-year	8.35	262.08	262.08	0	0.002313	1.1	1.097687
Upper Humber	Reach4	499.9997 04.01.02	50-year	15.88	262.39	262.39	0	0.002041	1.34	1.337959
Upper Humber	Reach4	499.9997 04.01.02	100-year	19.7	262.54	262.54	0	0.001787	1.39	1.388213
Upper Humber	Reach4	499.9997 04.01.02	350-year	33.64	262.97	262.97	0	0.001253	1.46	1.458747
Upper Humber	Reach4	499.9997 04.01.02	500-year	48.6	263.33	263.32	-0.01	0.001024	1.53	1.528976
Upper Humber	Reach4	499.9997 04.01.02	Regional	182.7	266.99	267	0.01	0.00007	0.81	0.80993
Upper Humber	Reach4	499.9704 04.01.01	2-year	2.54	261.74	261.73	-0.01	0.002785	0.76	0.757215
Upper Humber	Reach4	499.9704 04.01.01	5-year	5.16	261.88	261.88	0	0.003476	1.03	1.026524
Upper Humber	Reach4	499.9704 04.01.01	10-year	8.35	262.02	262.02	0	0.003804	1.26	1.256196
Upper Humber	Reach4	499.9704 04.01.01	25-year	8.35	262.02	262.02	0	0.003804	1.26	1.256196
Upper Humber	**Reach4**	**499.9704 04.01.01**	**50-year**	**15.88**	**262.32**	**262.32**	**0**	**0.003358**	**1.5**	**1.496642**
Upper Humber	Reach4	499.9704 04.01.01	100-year	19.7	262.46	262.46	0	0.003163	1.58	1.576837
Upper Humber	Reach4	499.9704 04.01.01	350-year	33.64	262.82	262.82	0	0.002835	1.89	1.887165
Upper Humber	Reach4	499.9704 04.01.01	500-year	48.6	263.1	263.08	-0.02	0.003008	2.24	2.236992
Upper Humber	Reach4	499.9704 04.01.01	Regional	182.7	266.99	266.99	0	0.000074	0.81	0.809926
Upper Humber	**Reach4**	**499.9582 x-116 (08.10.33)**		**Bridge**						
Upper Humber	Reach4	499.944 08.10.32	2-year	2.54	261.5	261.5	0	0.008335	1.04	1.031665
Upper Humber	Reach4	499.944 08.10.32	5-year	5.16	261.69	261.69	0	0.004754	1.13	1.125246
Upper Humber	Reach4	499.944 08.10.32	10-year	8.35	261.88	261.88	0	0.003341	1.22	1.216659
Upper Humber	Reach4	499.944 08.10.32	25-year	8.35	261.88	261.88	0	0.003341	1.22	1.216659
Upper Humber	Reach4	499.944 08.10.32	50-year	15.88	262.24	262.24	0	0.002266	1.4	1.397734
Upper Humber	Reach4	499.944 08.10.32	100-year	19.7	262.38	262.38	0	0.002117	1.49	1.487883
Upper Humber	Reach4	499.944 08.10.32	350-year	33.64	262.73	262.73	0	0.002308	1.88	1.877692
Upper Humber	Reach4	499.944 08.10.32	500-year	48.6	262.93	262.93	0	0.003063	2.37	2.366937
Upper Humber	Reach4	499.944 08.10.32	Regional	182.7	266.96	266.96	0	0.000067	0.81	0.809933
Coffey Creek	Reach1	600.1301 05.01.06	2-year	0.28	262.93	262.93	0	0.000175	0.17	0.169825
Coffey Creek	Reach1	600.1301 05.01.06	5-year	0.83	263.07	263.05	-0.02	0.000435	0.33	0.329565
Coffey Creek	Reach1	600.1301 05.01.06	10-year	1.73	263.21	263.19	-0.02	0.000526	0.47	0.469474
Coffey Creek	Reach1	600.1301 05.01.06	25-year	1.73	263.21	263.19	-0.02	0.000526	0.47	0.469474
Coffey Creek	Reach1	600.1301 05.01.06	50-year	4.53	263.54	263.46	-0.08	0.000291	0.53	0.529709
Coffey Creek	Reach1	600.1301 05.01.06	100-year	6.09	263.67	263.57	-0.1	0.000226	0.55	0.549774
Coffey Creek	Reach1	600.1301 05.01.06	350-year	11.42	264.03	263.86	-0.17	0.000114	0.52	0.519886
Coffey Creek	Reach1	600.1301 05.01.06	500-year	17.31	264.37	264.11	-0.26	0.000075	0.53	0.529925
Coffey Creek	Reach1	600.1301 05.01.06	Regional	68.43	266.97	266.97	0	0.000016	0.32	0.319984
Coffey Creek	Reach1	600.1245 05.01.05	2-year	0.28	262.93	262.93	0	0.000169	0.17	0.169831
Coffey Creek	Reach1	600.1245 05.01.05	5-year	0.83	263.06	263.05	-0.01	0.000375	0.32	0.319625
Coffey Creek	Reach1	600.1245 05.01.05	10-year	1.73	263.21	263.18	-0.03	0.00056	0.48	0.47944
Coffey Creek	Reach1	600.1245 05.01.05	25-year	1.73	263.21	263.18	-0.03	0.00056	0.48	0.47944
Coffey Creek	**Reach1**	**600.1245 05.01.05**	**50-year**	**4.53**	**263.51**	**263.43**	**-0.08**	**0.000777**	**0.81**	**0.809223**
Coffey Creek	Reach1	600.1245 05.01.05	100-year	6.09	263.63	263.52	-0.11	0.000868	0.96	0.959132
Coffey Creek	Reach1	600.1245 05.01.05	350-year	11.42	263.96	263.75	-0.21	0.000962	1.36	1.359038
Coffey Creek	Reach1	600.1245 05.01.05	500-year	17.31	264.29	263.93	-0.36	0.000864	1.71	1.709136
Coffey Creek	Reach1	600.1245 05.01.05	Regional	68.43	266.97	266.97	0	0.000013	0.29	0.289987
Coffey Creek	**Reach1**	**600.1142 x-143 (05.01.04)**		**Bridge**						
Coffey Creek	Reach1	600.1062 05.01.03	2-year	0.28	262.85	262.85	0	0.022063	0.81	0.787937
Coffey Creek	Reach1	600.1062 05.01.03	5-year	0.83	262.92	262.92	0	0.021327	1.19	1.168673
Coffey Creek	Reach1	600.1062 05.01.03	10-year	1.73	263.01	263.01	0	0.018115	1.44	1.421885
Coffey Creek	Reach1	600.1062 05.01.03	25-year	1.73	263.01	263.01	0	0.018115	1.44	1.421885
Coffey Creek	Reach1	600.1062 05.01.03	50-year	4.53	263.21	263.21	0	0.015543	1.77	1.754457
Coffey Creek	Reach1	600.1062 05.01.03	100-year	6.09	263.29	263.29	0	0.01424	1.87	1.85576
Coffey Creek	Reach1	600.1062 05.01.03	350-year	11.42	263.49	263.49	0	0.012202	2.22	2.207798
Coffey Creek	Reach1	600.1062 05.01.03	500-year	17.31	263.67	263.67	0	0.009577	2.42	2.410423
Coffey Creek	Reach1	600.1062 05.01.03	Regional	68.43	266.97	266.97	0	0.000008	0.22	0.219992

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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HEC-RAS Hydraulic Output Comparison Summary (Existing vs Proposed Conditions)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	Existing W.S. Elev (m)	Proposed W.S. Elev (m)	Diff (m)	Existing Vel Chnl (m/s)	Proposed Vel Chnl (m/s)	Diff (m)
Coffey Creek	Reach1	600.1004 05.01.02	2-year	0.28	262.11	262.11	0	0.000958	0	-0.000958
Coffey Creek	Reach1	600.1004 05.01.02	5-year	0.83	262.28	262.28	0	0.001141	0	-0.001141
Coffey Creek	Reach1	600.1004 05.01.02	10-year	1.73	262.42	262.42	0	0.001277	0	-0.001277
Coffey Creek	Reach1	600.1004 05.01.02	25-year	1.73	262.42	262.42	0	0.001277	0	-0.001277
Coffey Creek	Reach1	600.1004 05.01.02	50-year	4.53	262.67	262.68	0.01	0.001423	0.26	0.258577
Coffey Creek	Reach1	600.1004 05.01.02	100-year	6.09	262.76	262.76	0	0.001368	0.33	0.328632
Coffey Creek	Reach1	600.1004 05.01.02	350-year	11.42	262.99	262.99	0	0.00106	0.48	0.47894
Coffey Creek	Reach1	600.1004 05.01.02	500-year	17.31	263.18	263.18	0	0.001039	0.62	0.618961
Coffey Creek	Reach1	600.1004 05.01.02	Regional	68.43	266.97	266.97	0	0.000007	0.22	0.219993
Coffey Creek	Reach1	599.9592 08.01.38	2-year	0.28	261.31	261.31	0	0.025212	0.88	0.854788
Coffey Creek	Reach1	599.9592 08.01.38	5-year	0.83	261.43	261.43	0	0.009085	0.86	0.850915
Coffey Creek	Reach1	599.9592 08.01.38	10-year	1.73	261.58	261.58	0	0.004333	0.87	0.865667
Coffey Creek	Reach1	599.9592 08.01.38	25-year	1.73	261.58	261.58	0	0.004333	0.87	0.865667
Coffey Creek	Reach1	599.9592 08.01.38	50-year	4.53	261.93	261.93	0	0.002151	0.93	0.927849
Coffey Creek	Reach1	599.9592 08.01.38	100-year	6.09	262.07	262.07	0	0.001924	0.98	0.978076
Coffey Creek	Reach1	599.9592 08.01.38	350-year	11.42	262.48	262.47	-0.01	0.001091	0.96	0.958909
Coffey Creek	Reach1	599.9592 08.01.38	500-year	17.31	262.74	262.73	-0.01	0.000663	0.89	0.889337
Coffey Creek	Reach1	599.9592 08.01.38	Regional	68.43	266.97	266.97	0	0.000005	0.21	0.209995
Coffey Creek	Reach1	599.9497 08.01.37	2-year	0.28	261.28	261.28	0	0.002654	0.39	0.387346
Coffey Creek	Reach1	599.9497 08.01.37	5-year	0.83	261.42	261.42	0	0.002155	0.53	0.527845
Coffey Creek	Reach1	599.9497 08.01.37	10-year	1.73	261.58	261.58	0	0.001695	0.64	0.638305
Coffey Creek	Reach1	599.9497 08.01.37	25-year	1.73	261.58	261.58	0	0.001695	0.64	0.638305
Coffey Creek	**Reach1**	**599.9497 08.01.37**	**50-year**	**4.53**	**261.93**	**261.93**	**0**	**0.001225**	**0.78**	**0.778775**
Coffey Creek	Reach1	599.9497 08.01.37	100-year	6.09	262.07	262.07	0	0.001084	0.83	0.828916
Coffey Creek	Reach1	599.9497 08.01.37	350-year	11.42	262.49	262.48	-0.01	0.000344	0.64	0.639656
Coffey Creek	Reach1	599.9497 08.01.37	500-year	17.31	262.75	262.74	-0.01	0.000143	0.47	0.469857
Coffey Creek	Reach1	599.9497 08.01.37	Regional	68.43	266.97	266.97	0	0.000001	0.07	0.069999
Coffey Creek	**Reach1**	**599.9415 x-115 (08.01.36)**		**Bridge**						
Coffey Creek	Reach1	599.9346 08.01.35	2-year	0.28	261.21	261.21	0	0.008356	0.63	0.621644
Coffey Creek	Reach1	599.9346 08.01.35	5-year	0.83	261.37	261.37	0	0.003275	0.64	0.636725
Coffey Creek	Reach1	599.9346 08.01.35	10-year	1.73	261.55	261.55	0	0.001784	0.69	0.688216
Coffey Creek	Reach1	599.9346 08.01.35	25-year	1.73	261.55	261.55	0	0.001784	0.69	0.688216
Coffey Creek	Reach1	599.9346 08.01.35	50-year	4.53	261.91	261.91	0	0.001015	0.81	0.808985
Coffey Creek	Reach1	599.9346 08.01.35	100-year	6.09	262.05	262.05	0	0.000949	0.88	0.879051
Coffey Creek	Reach1	599.9346 08.01.35	350-year	11.42	262.42	262.42	0	0.000137	0.42	0.419863
Coffey Creek	Reach1	599.9346 08.01.35	500-year	17.31	262.68	262.68	0	0.00011	0.43	0.42989
Coffey Creek	Reach1	599.9346 08.01.35	Regional	68.43	266.97	266.97	0	0.000001	0.12	0.119999
Coffey Creek	Reach1	599.9304 08.01.34	2-year	0.28	261.21	261.21	0	0.000168	0.11	0.109832
Coffey Creek	Reach1	599.9304 08.01.34	5-year	0.83	261.38	261.38	0	0.000077	0.12	0.119923
Coffey Creek	Reach1	599.9304 08.01.34	10-year	1.73	261.56	261.56	0	0.000063	0.15	0.149937
Coffey Creek	Reach1	599.9304 08.01.34	25-year	1.73	261.56	261.56	0	0.000063	0.15	0.149937
Coffey Creek	Reach1	599.9304 08.01.34	50-year	4.53	261.92	261.92	0	0.000046	0.19	0.189954
Coffey Creek	Reach1	599.9304 08.01.34	100-year	6.09	262.06	262.06	0	0.000042	0.2	0.199958
Coffey Creek	Reach1	599.9304 08.01.34	350-year	11.42	262.42	262.42	0	0.000032	0.21	0.209968
Coffey Creek	Reach1	599.9304 08.01.34	500-year	17.31	262.68	262.68	0	0.000032	0.24	0.239968
Coffey Creek	Reach1	599.9304 08.01.34	Regional	68.43	266.97	266.97	0	0.000001	0.11	0.109999

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	507.003 04.05.04	2-year	2.63	282.18	282.65		282.69	0.004387	0.92	2.87	8.42	0.5
Upper Humber	Reach4	507.003 04.05.04	5-year	5.3	282.18	282.76		282.86	0.007567	1.37	3.87	9.33	0.68
Upper Humber	Reach4	507.003 04.05.04	10-year	8.41	282.18	282.81	282.78	283	0.013853	1.94	4.34	9.78	0.93
Upper Humber	Reach4	507.003 04.05.04	25-year	8.41	282.18	282.81	282.78	283	0.013853	1.94	4.34	9.78	0.93
Upper Humber	Reach4	507.003 04.05.04	50-year	15.26	282.18	283.03	283.03	283.27	0.015572	2.18	7.01	14.48	1
Upper Humber	Reach4	507.003 04.05.04	100-year	18.63	282.18	283.1	283.1	283.37	0.015571	2.32	8.04	15.1	1.01
Upper Humber	Reach4	507.003 04.05.04	350-year	29.84	282.18	283.31	283.31	283.66	0.01417	2.64	11.33	16.6	1.01
Upper Humber	Reach4	507.003 04.05.04	500-year	41.94	282.18	283.49	283.49	283.92	0.012773	2.92	14.52	17.78	1
Upper Humber	Reach4	507.003 04.05.04	Regional	146.98	282.18	284.63	284.63	285.54	0.00906	4.29	38.58	24.61	0.96
Upper Humber	Reach4	506.832 04.05.03	2-year	2.63	282.18	282.64		282.65	0.001618	0.6	6.66	35.06	0.33
Upper Humber	Reach4	506.832 04.05.03	5-year	5.3	282.18	282.78		282.8	0.001675	0.76	12.94	59.38	0.36
Upper Humber	Reach4	506.832 04.05.03	10-year	8.41	282.18	282.88		282.91	0.001642	0.85	22.55	115.32	0.36
Upper Humber	Reach4	506.832 04.05.03	25-year	8.41	282.18	282.88		282.91	0.001642	0.85	22.55	115.32	0.36
Upper Humber	Reach4	506.832 04.05.03	50-year	15.26	282.18	283.01		283.04	0.001777	1.01	41.14	163.32	0.39
Upper Humber	Reach4	506.832 04.05.03	100-year	18.63	282.18	283.06		283.09	0.001887	1.08	49.45	184.16	0.41
Upper Humber	Reach4	506.832 04.05.03	350-year	29.84	282.18	283.2		283.23	0.001861	1.19	77.57	227.2	0.41
Upper Humber	Reach4	506.832 04.05.03	500-year	41.94	282.18	283.29		283.33	0.001981	1.31	100.02	233.44	0.43
Upper Humber	Reach4	506.832 04.05.03	Regional	146.98	282.18	283.71		283.78	0.003291	2.09	209.93	284.01	0.58
Upper Humber	Reach4	506.8077 04.05.02	2-year	2.63	281.49	281.9	281.88	282.01	0.013011	1.44	1.83	7.1	0.9
Upper Humber	Reach4	506.8077 04.05.02	5-year	5.3	281.49	282.07	282.07	282.19	0.00994	1.56	4.76	33.63	0.83
Upper Humber	Reach4	506.8077 04.05.02	10-year	8.41	281.49	282.16	282.16	282.29	0.01039	1.72	8.29	42.97	0.87
Upper Humber	Reach4	506.8077 04.05.02	25-year	8.41	281.49	282.16	282.16	282.29	0.01039	1.72	8.29	42.97	0.87
Upper Humber	Reach4	506.8077 04.05.02	50-year	15.26	281.49	282.32	282.32	282.44	0.008113	1.85	18.44	98.62	0.81
Upper Humber	Reach4	506.8077 04.05.02	100-year	18.63	281.49	282.37	282.37	282.49	0.007398	1.89	24.36	121.49	0.78
Upper Humber	Reach4	506.8077 04.05.02	350-year	29.84	281.49	282.48	282.48	282.61	0.007885	2.17	39.97	175.31	0.83
Upper Humber	Reach4	506.8077 04.05.02	500-year	41.94	281.49	282.58	282.58	282.71	0.007211	2.28	59.97	220.98	0.81
Upper Humber	Reach4	506.8077 04.05.02	Regional	146.98	281.49	283.15		283.21	0.003012	2.11	237.29	345.8	0.57
Upper Humber	Reach4	506.7489 04.05.01	2-year	2.63	281.25	281.54		281.57	0.004258	0.86	4.32	19.51	0.52
Upper Humber	Reach4	506.7489 04.05.01	5-year	5.3	281.25	281.7		281.74	0.003434	0.98	9.62	44.24	0.5
Upper Humber	Reach4	506.7489 04.05.01	10-year	8.41	281.25	281.81		281.86	0.003019	1.08	15.59	66.65	0.49
Upper Humber	Reach4	506.7489 04.05.01	25-year	8.41	281.25	281.81		281.86	0.003019	1.08	15.59	66.65	0.49
Upper Humber	Reach4	506.7489 04.05.01	50-year	15.26	281.25	281.95		282.01	0.003529	1.37	27.62	108.22	0.55
Upper Humber	Reach4	506.7489 04.05.01	100-year	18.63	281.25	282		282.06	0.003736	1.48	33.61	129.07	0.57
Upper Humber	Reach4	506.7489 04.05.01	350-year	29.84	281.25	282.16		282.22	0.0031	1.55	55.79	146.94	0.54
Upper Humber	Reach4	506.7489 04.05.01	500-year	41.94	281.25	282.31		282.36	0.002544	1.56	79.73	189.59	0.5
Upper Humber	Reach4	506.7489 04.05.01	Regional	146.98	281.25	283.06		283.1	0.001269	1.61	296.23	314.63	0.39
Upper Humber	Reach4	506.632 04.03.16	2-year	2.6	280.65	281.06	280.93	281.11	0.003864	0.92	2.84	8.64	0.51
Upper Humber	Reach4	506.632 04.03.16	5-year	5.27	280.65	281.24	281.07	281.31	0.004108	1.17	4.56	13.35	0.56
Upper Humber	Reach4	506.632 04.03.16	10-year	8.42	280.65	281.38	281.21	281.48	0.0039	1.37	8.86	60.45	0.57
Upper Humber	Reach4	506.632 04.03.16	25-year	8.42	280.65	281.38	281.21	281.48	0.0039	1.37	8.86	60.45	0.57
Upper Humber	Reach4	506.632 04.03.16	50-year	15.54	280.65	281.6	281.49	281.68	0.002754	1.42	24.77	83.39	0.5
Upper Humber	Reach4	506.632 04.03.16	100-year	19.08	280.65	281.69	281.56	281.76	0.00235	1.41	32.96	95.78	0.47
Upper Humber	Reach4	506.632 04.03.16	350-year	31.12	280.65	281.91	281.68	281.97	0.001987	1.49	55.05	106.16	0.45
Upper Humber	Reach4	506.632 04.03.16	500-year	44.15	280.65	282.08	281.81	282.14	0.001917	1.61	73.88	113.92	0.45
Upper Humber	Reach4	506.632 04.03.16	Regional	157.85	280.65	282.8	282.36	282.92	0.002687	2.56	185.51	185.56	0.58
Upper Humber	Reach4	506.433 04.03.15	2-year	2.6	279.93	280.38	280.23	280.42	0.00308	0.85	3.07	8.9	0.46
Upper Humber	Reach4	506.433 04.03.15	5-year	5.27	279.93	280.58	280.37	280.64	0.002801	1.06	5.29	13.19	0.47
Upper Humber	Reach4	506.433 04.03.15	10-year	8.42	279.93	280.74	280.5	280.83	0.002794	1.27	7.89	23.16	0.49
Upper Humber	Reach4	506.433 04.03.15	25-year	8.42	279.93	280.74	280.5	280.83	0.002794	1.27	7.89	23.16	0.49
Upper Humber	Reach4	506.433 04.03.15	50-year	15.54	279.93	280.95	280.71	281.08	0.00347	1.69	13.58	34.64	0.57
Upper Humber	Reach4	506.433 04.03.15	100-year	19.08	279.93	281.02	280.86	281.18	0.003954	1.9	16.24	43.42	0.62
Upper Humber	Reach4	506.433 04.03.15	350-year	31.12	279.93	281.22	281.13	281.42	0.004409	2.27	26.48	60.96	0.67
Upper Humber	Reach4	506.433 04.03.15	500-year	44.15	279.93	281.4	281.33	281.62	0.004273	2.46	40.71	96.04	0.68
Upper Humber	Reach4	506.433 04.03.15	Regional	157.85	279.93	282.34	282.02	282.47	0.002226	2.54	196.08	189.9	0.54
Upper Humber	Reach4	506.230 04.03.14	2-year	2.6	279.66	280.21	279.96	280.24	0.001396	0.7	4.11	15.16	0.33
Upper Humber	Reach4	506.230 04.03.14	5-year	5.27	279.66	280.41	280.1	280.45	0.001571	0.94	7.39	19.98	0.37
Upper Humber	Reach4	506.230 04.03.14	10-year	8.42	279.66	280.56	280.26	280.62	0.001786	1.14	12.72	54.67	0.4
Upper Humber	Reach4	506.230 04.03.14	25-year	8.42	279.66	280.56	280.26	280.62	0.001786	1.14	12.72	54.67	0.4
Upper Humber	Reach4	506.230 04.03.14	50-year	15.54	279.66	280.76	280.5	280.83	0.002031	1.41	26.33	76.57	0.45
Upper Humber	Reach4	506.230 04.03.14	100-year	19.08	279.66	280.83	280.66	280.9	0.002052	1.48	32	79.56	0.45
Upper Humber	Reach4	506.230 04.03.14	350-year	31.12	279.66	281.04	280.83	281.12	0.002088	1.68	50.39	95.97	0.47
Upper Humber	Reach4	506.230 04.03.14	500-year	44.15	279.66	281.25	280.97	281.33	0.001925	1.78	72.63	118.01	0.46
Upper Humber	Reach4	506.230 04.03.14	Regional	157.85	279.66	282.24	281.74	282.3	0.001239	2.01	291.38	302.04	0.41
Upper Humber	Reach4	506.1837 04.03.13	2-year	2.6	279.39	279.8		279.86	0.005087	1.02	2.61	10.13	0.58
Upper Humber	Reach4	506.1837 04.03.13	5-year	5.27	279.39	279.96	279.84	280.05	0.004836	1.31	5.14	27.01	0.61
Upper Humber	Reach4	506.1837 04.03.13	10-year	8.42	279.39	280.09	279.99	280.19	0.004505	1.48	10.04	47.25	0.61
Upper Humber	Reach4	506.1837 04.03.13	25-year	8.42	279.39	280.09	279.99	280.19	0.004505	1.48	10.04	47.25	0.61
Upper Humber	Reach4	506.1837 04.03.13	50-year	15.54	279.39	280.27		280.38	0.004247	1.72	18.99	51.07	0.62
Upper Humber	Reach4	506.1837 04.03.13	100-year	19.08	279.39	280.35		280.46	0.004048	1.79	23.04	52.39	0.62
Upper Humber	Reach4	506.1837 04.03.13	350-year	31.12	279.39	280.65	280.39	280.75	0.0027	1.78	39.75	57.81	0.53
Upper Humber	Reach4	506.1837 04.03.13	500-year	44.15	279.39	280.84	280.53	280.96	0.002866	2.03	50.99	65.05	0.56
Upper Humber	Reach4	506.1837 04.03.13	Regional	157.85	279.39	281.72	281.3	281.96	0.004017	3.36	152.01	176.98	0.72
Upper Humber	Reach4	506.031 04.03.12	2-year	2.6	278.91	279.25	279.12	279.28	0.002881	0.73	3.57	12.36	0.43
Upper Humber	Reach4	506.031 04.03.12	5-year	5.27	278.91	279.41	279.24	279.46	0.003005	0.95	5.58	13.63	0.47
Upper Humber	Reach4	506.031 04.03.12	10-year	8.42	278.91	279.54	279.33	279.61	0.003058	1.13	7.8	27.09	0.49
Upper Humber	Reach4	506.031 04.03.12	25-year	8.42	278.91	279.54	279.33	279.61	0.003058	1.13	7.8	27.09	0.49
Upper Humber	Reach4	506.031 04.03.12	50-year	15.54	278.91	279.75	279.52	279.84	0.003019	1.39	16.37	49.75	0.52
Upper Humber	Reach4	506.031 04.03.12	100-year	19.08	278.91	279.81	279.64	279.91	0.003231	1.52	19.53	51.24	0.54
Upper Humber	Reach4	506.031 04.03.12	350-year	31.12	278.91	279.84	279.84	280.08	0.007328	2.34	21.08	51.48	0.82
Upper Humber	Reach4	506.031 04.03.12	500-year	44.15	278.91	279.98	279.98	280.27	0.007634	2.65	28.26	57.88	0.86
Upper Humber	Reach4	506.031 04.03.12	Regional	157.85	278.91	280.8	280.8	281.19	0.006189	3.6	110.22	258.21	0.86
Upper Humber	Reach4	505.828 04.03.11	2-year	2.6	277.95	278.35		278.41	0.00713	1.1	2.38	9.96	0.67
Upper Humber	Reach4	505.828 04.03.11	5-year	5.27	277.95	278.5		278.59	0.006539	1.34	4.42	15.72	0.68
Upper Humber	Reach4	505.828 04.03.11	10-year	8.42	277.95	278.63		278.75	0.006374	1.57	6.59	18.73	0.7
Upper Humber	Reach4	505.828 04.03.11	25-year	8.42	277.95	278.63		278.75	0.006374	1.57	6.59	18.73	0.7
Upper Humber	Reach4	505.828 04.03.11	50-year	15.54	277.95	278.85	278.76	279.01	0.005814	1.9	12.49	49.06	0.71
Upper Humber	Reach4	505.828 04.03.11	100-year	19.08	277.95	278.94	278.9	279.1	0.005067	1.92	18.47	71.68	0.68
Upper Humber	Reach4	505.828 04.03.11	350-year	31.12	277.95	279.4		279.46	0.001376	1.35	67.94	169.82	0.38
Upper Humber	Reach4	505.828 04.03.11	500-year	44.15	277.95	279.57		279.62	0.001341	1.44	101.29	226.32	0.38
Upper Humber	Reach4	505.828 04.03.11	Regional	157.85	277.95	280.19		280.26	0.001603	2.01	278.57	333.1	0.45
Upper Humber	Reach4	505.626 04.03.10	2-year	2.6	277.35	277.92		277.93	0.001095	0.51	5.11	14.65	0.28
Upper Humber	Reach4	505.626 04.03.10	5-year	5.27	277.35	278.12		278.14	0.001004	0.61	8.7	19.34	0.28
Upper Humber	Reach4	505.626 04.03.10	10-year	8.42	277.35	278.29		278.32	0.000935	0.72	12.68	29.16	0.28
Upper Humber	Reach4	505.626 04.03.10	25-year	8.42	277.35	278.29		278.32	0.000935	0.72	12.68	29.16	0.28
Upper Humber	Reach4	505.626 04.03.10	50-year	15.54	277.35	278.58		278.61	0.000838	0.86	25.77	57.59	0.28
Upper Humber	Reach4	505.626 04.03.10	100-year	19.08	277.35	278.7		278.74	0.000757	0.89	33.64	65.05	0.28
Upper Humber	Reach4	505.626 04.03.10	350-year	31.12	277.35	279.34		279.35	0.000218	0.65	131.72	233.35	0.16
Upper Humber	Reach4	505.626 04.03.10	500-year	44.15	277.35	279.49		279.5	0.000263	0.76	168.69	262.84	0.18
Upper Humber	Reach4	505.626 04.03.10	Regional	157.85	277.35	279.97		280.02	0.000839	1.58	297.63	272.93	0.33
Upper Humber	Reach4	505.553 04.03.09	2-year	2.6	277.26	277.74		277.78	0.002913	0.93	3.52	11.21	0.46
Upper Humber	Reach4	505.553 04.03.09	5-year	5.27	277.26	277.9		277.98	0.003782	1.32	5.56	17.52	0.56
Upper Humber	Reach4	505.553 04.03.09	10-year	8.42	277.26	278.06		278.16	0.003761	1.55	8.86	25.46	0.58
Upper Humber	Reach4	505.553 04.03.09	25-year	8.42	277.26	278.06		278.16	0.003761	1.55	8.86	25.46	0.58
Upper Humber	Reach4	505.553 04.03.09	50-year	15.54	277.26	278.4		278.49	0.002442	1.61	23.89	68.33	0.5
Upper Humber	Reach4	505.553 04.03.09	100-year	19.08	277.26	278.59		278.65	0.001406	1.37	40.08	106.3	0.39
Upper Humber	Reach4	505.553 04.03.09	350-year	31.12	277.26	279.33		279.33	0.00016	0.63	210.94	363	0.14
Upper Humber	Reach4	505.553 04.03.09	500-year	44.15	277.26	279.48		279.48	0.000191	0.72	266.63	403.83	0.16
Upper Humber	Reach4	505.553 04.03.09	Regional	157.85	277.26	279.94		279.96	0.000581	1.43	490.67	531.5	0.28
Upper Humber	Reach4	505.5255 04.03.08	2-year	2.6	277.23	277.69	277.56	277.74	0.004685	0.96	2.72	8.95	0.55
Upper Humber	Reach4	505.5255 04.03.08	5-year	5.27	277.23	277.86	277.72	277.94	0.004825	1.21	4.35	11.08	0.59
Upper Humber	Reach4	505.5255 04.03.08	10-year	8.42	277.23	278.02	277.85	278.12	0.004325	1.38	6.49	20.94	0.59
Upper Humber	Reach4	505.5255 04.03.08	25-year	8.42	277.23	278.02	277.85	278.12	0.004325	1.38	6.49	20.94	0.59
Upper Humber	Reach4	505.5255 04.03.08	50-year	15.54	277.23	278.34	278.07	278.46	0.003177	1.54	11.3	46.54	0.54
Upper Humber	Reach4	505.5255 04.03.08	100-year	19.08	277.23	278.49	278.16	278.61	0.002746	1.59	13.56	67.97	0.51
Upper Humber	Reach4	505.5255 04.03.08	350-year	31.12	277.23	279.3	278.4	279.33	0.0004	0.91	74.22	363.47	0.22
Upper Humber	Reach4	505.5255 04.03.08	500-year	44.15	277.23	279.47	278.61	279.48	0.000227	0.73	179.58	428.73	0.17
Upper Humber	Reach4	505.5255 04.03.08	Regional	157.85	277.23	279.93	279.37	279.95	0.000574	1.33	396.86	475.62	0.27

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	505.515 x-121 (04.03.07)		Bridge									
Upper Humber	Reach4	505.5029 04.03.06	2-year	2.6	277.23	277.59	277.48	277.63	0.004717	0.9	2.88	10.46	0.55
Upper Humber	Reach4	505.5029 04.03.06	5-year	5.27	277.23	277.7	277.62	277.78	0.007317	1.29	4.08	12.06	0.71
Upper Humber	Reach4	505.5029 04.03.06	10-year	8.42	277.23	277.81	277.73	277.93	0.008107	1.54	5.46	13.35	0.77
Upper Humber	Reach4	505.5029 04.03.06	25-year	8.42	277.23	277.81	277.73	277.93	0.008107	1.54	5.46	13.35	0.77
Upper Humber	Reach4	505.5029 04.03.06	50-year	15.54	277.23	278.05	277.92	278.2	0.006277	1.73	9	20.13	0.72
Upper Humber	Reach4	505.5029 04.03.06	100-year	19.08	277.23	278.11	277.99	278.3	0.006853	1.92	9.94	43.32	0.76
Upper Humber	Reach4	505.5029 04.03.06	350-year	31.12	277.23	278.22	278.21	278.58	0.010656	2.67	11.7	68.73	0.98
Upper Humber	Reach4	505.5029 04.03.06	500-year	44.15	277.23	278.41	278.41	278.88	0.010305	3.03	14.6	112.76	1
Upper Humber	Reach4	505.5029 04.03.06	Regional	157.85	277.23	279.82	279.24	279.83	0.000065	0.44	439.16	469.93	0.09
Upper Humber	Reach4	505.4726 04.03.05	2-year	2.6	277.2	277.42	277.42	277.51	0.018492	1.35	1.93	10.77	1.02
Upper Humber	Reach4	505.4726 04.03.05	5-year	5.27	277.2	277.62	277.53	277.69	0.006642	1.23	4.29	13.01	0.68
Upper Humber	Reach4	505.4726 04.03.05	10-year	8.42	277.2	277.7	277.64	277.83	0.008093	1.56	5.46	13.78	0.77
Upper Humber	Reach4	505.4726 04.03.05	25-year	8.42	277.2	277.7	277.64	277.83	0.008093	1.56	5.46	13.78	0.77
Upper Humber	Reach4	505.4726 04.03.05	50-year	15.54	277.2	277.83	277.83	278.07	0.01199	2.2	7.34	17.18	0.97
Upper Humber	Reach4	505.4726 04.03.05	100-year	19.08	277.2	277.93	277.93	278.18	0.010308	2.23	9.61	27.22	0.92
Upper Humber	Reach4	505.4726 04.03.05	350-year	31.12	277.2	278.19	278.19	278.42	0.006572	2.26	22.18	73.94	0.78
Upper Humber	Reach4	505.4726 04.03.05	500-year	44.15	277.2	278.37	278.37	278.59	0.005467	2.34	39.6	116.08	0.74
Upper Humber	Reach4	505.4726 04.03.05	Regional	157.85	277.2	279.81	278.93	279.82	0.00033	1.03	538.08	473	0.21
Upper Humber	Reach4	505.426 04.03.04	2-year	2.6	276.69	277.32		277.34	0.000799	0.55	4.72	9.35	0.25
Upper Humber	Reach4	505.426 04.03.04	5-year	5.27	276.69	277.53		277.55	0.000895	0.7	14.25	105.99	0.27
Upper Humber	Reach4	505.426 04.03.04	10-year	8.42	276.69	277.64		277.66	0.000919	0.79	28.59	152.79	0.29
Upper Humber	Reach4	505.426 04.03.04	25-year	8.42	276.69	277.64		277.66	0.000919	0.79	28.59	152.79	0.29
Upper Humber	Reach4	505.426 04.03.04	50-year	15.54	276.69	277.78		277.8	0.001027	0.93	52.45	185.64	0.31
Upper Humber	Reach4	505.426 04.03.04	100-year	19.08	276.69	277.83		277.86	0.001064	0.98	62.42	199.07	0.32
Upper Humber	Reach4	505.426 04.03.04	350-year	31.12	276.69	277.98		278.01	0.001095	1.1	95.02	224.01	0.33
Upper Humber	Reach4	505.426 04.03.04	500-year	44.15	276.69	278.13		278.15	0.001022	1.15	129.05	244.95	0.33
Upper Humber	Reach4	505.426 04.03.04	Regional	157.85	276.69	279.8		279.81	0.000098	0.62	816.04	475.86	0.12
Upper Humber	Reach4	505.226 04.03.03	2-year	2.6	276.48	276.87	276.83	276.95	0.010073	1.25	2.09	8.26	0.79
Upper Humber	Reach4	505.226 04.03.03	5-year	5.27	276.48	277.03	276.97	277.14	0.009303	1.46	3.94	15.82	0.8
Upper Humber	Reach4	505.226 04.03.03	10-year	8.42	276.48	277.19	277.12	277.29	0.006237	1.4	8.49	43.3	0.68
Upper Humber	Reach4	505.226 04.03.03	25-year	8.42	276.48	277.19	277.12	277.29	0.006237	1.4	8.49	43.3	0.68
Upper Humber	Reach4	505.226 04.03.03	50-year	15.54	276.48	277.41	277.29	277.48	0.003549	1.38	23.04	96.37	0.55
Upper Humber	Reach4	505.226 04.03.03	100-year	19.08	276.48	277.49	277.34	277.55	0.003043	1.38	30.89	108.16	0.52
Upper Humber	Reach4	505.226 04.03.03	350-year	31.12	276.48	277.69	277.5	277.75	0.002222	1.39	56.63	142.13	0.46
Upper Humber	Reach4	505.226 04.03.03	500-year	44.15	276.48	277.87	277.61	277.92	0.001853	1.43	83.65	162.61	0.43
Upper Humber	Reach4	505.226 04.03.03	Regional	157.85	276.48	279.78	278.12	279.79	0.000149	0.79	619.92	397.62	0.15
Upper Humber	Reach4	505.023 04.03.02	2-year	2.6	275.94	276.52	276.27	276.53	0.000905	0.49	5.32	14.01	0.25
Upper Humber	Reach4	505.023 04.03.02	5-year	5.27	275.94	276.75	276.37	276.77	0.000758	0.6	9.3	26.79	0.25
Upper Humber	Reach4	505.023 04.03.02	10-year	8.42	275.94	276.89	276.46	276.92	0.000899	0.75	14.72	51.88	0.28
Upper Humber	Reach4	505.023 04.03.02	25-year	8.42	275.94	276.89	276.46	276.92	0.000899	0.75	14.72	51.88	0.28
Upper Humber	Reach4	505.023 04.03.02	50-year	15.54	275.94	277.07	276.64	277.12	0.001184	1	25.59	64.71	0.33
Upper Humber	Reach4	505.023 04.03.02	100-year	19.08	275.94	277.14	276.73	277.19	0.001302	1.1	30.08	68.22	0.36
Upper Humber	Reach4	505.023 04.03.02	350-year	31.12	275.94	277.34	277	277.41	0.001522	1.35	44.62	86.43	0.4
Upper Humber	Reach4	505.023 04.03.02	500-year	44.15	275.94	277.5	277.11	277.59	0.001697	1.55	57.85	96.59	0.43
Upper Humber	Reach4	505.023 04.03.02	Regional	157.85	275.94	279.75	277.85	279.76	0.000132	0.83	643.34	423.29	0.14
Upper Humber	Reach4	504.823 04.03.01	2-year	2.6	275.58	276.26	275.93	276.29	0.001347	0.73	3.58	6.79	0.32
Upper Humber	Reach4	504.823 04.03.01	5-year	5.27	275.58	276.49	276.11	276.54	0.001597	0.96	8.42	62.39	0.37
Upper Humber	Reach4	504.823 04.03.01	10-year	8.42	275.58	276.62	276.27	276.67	0.001503	1.02	20.78	107.96	0.36
Upper Humber	Reach4	504.823 04.03.01	25-year	8.42	275.58	276.62	276.27	276.67	0.001503	1.02	20.78	107.96	0.36
Upper Humber	Reach4	504.823 04.03.01	50-year	15.54	275.58	276.81	276.64	276.84	0.001315	1.1	42.02	122.72	0.35
Upper Humber	Reach4	504.823 04.03.01	100-year	19.08	275.58	276.86	276.68	276.89	0.001466	1.19	47.87	126.51	0.37
Upper Humber	Reach4	504.823 04.03.01	350-year	31.12	275.58	276.99	276.8	277.04	0.00159	1.47	64.71	138.29	0.43
Upper Humber	Reach4	504.823 04.03.01	500-year	44.15	275.58	277.06	276.88	277.13	0.002574	1.79	74.91	141.26	0.51
Upper Humber	Reach4	504.823 04.03.01	Regional	157.85	275.58	279.74	277.33	279.74	0.000061	0.59	819.52	373.08	0.09
Upper Humber	Reach4	504.648 04.02.10	2-year	2.58	275.28	275.95	275.65	275.98	0.001365	0.7	4.64	18.19	0.32
Upper Humber	Reach4	504.648 04.02.10	5-year	5.24	275.28	276.09	275.86	276.14	0.001911	0.98	10.36	67.62	0.4
Upper Humber	Reach4	504.648 04.02.10	10-year	8.43	275.28	276.17	276.05	276.23	0.002608	1.24	16.58	107.06	0.47
Upper Humber	Reach4	504.648 04.02.10	25-year	8.43	275.28	276.17	276.05	276.23	0.002608	1.24	16.58	107.06	0.47
Upper Humber	Reach4	504.648 04.02.10	50-year	15.81	275.28	276.26	276.21	276.34	0.003911	1.65	31.74	211.77	0.59
Upper Humber	Reach4	504.648 04.02.10	100-year	19.53	275.28	276.31	276.21	276.39	0.003514	1.63	44.2	249.02	0.57
Upper Humber	Reach4	504.648 04.02.10	350-year	33.36	275.28	276.46	276.39	276.51	0.002696	1.59	83.58	276.57	0.51
Upper Humber	Reach4	504.648 04.02.10	500-year	47.88	275.28	276.62	276.44	276.65	0.001683	1.39	129.02	285.84	0.41
Upper Humber	Reach4	504.648 04.02.10	Regional	177.04	275.28	279.73	276.74	279.73	0.000021	0.37	1424.59	741.48	0.06
Upper Humber	Reach4	504.5171 04.02.09	2-year	2.58	275.19	275.83	275.5	275.85	0.000917	0.64	6.48	78.72	0.27
Upper Humber	Reach4	504.5171 04.02.09	5-year	5.24	275.19	275.93	275.66	275.95	0.001266	0.84	20.72	197.22	0.33
Upper Humber	Reach4	504.5171 04.02.09	10-year	8.43	275.19	276.01	275.93	276.03	0.001115	0.85	41.49	292.74	0.31
Upper Humber	Reach4	504.5171 04.02.09	25-year	8.43	275.19	276.01	275.93	276.03	0.001115	0.85	41.49	292.74	0.31
Upper Humber	Reach4	504.5171 04.02.09	50-year	15.81	275.19	276.15	276.01	276.16	0.000755	0.78	86.95	346.2	0.26
Upper Humber	Reach4	504.5171 04.02.09	100-year	19.53	275.19	276.2	276.03	276.21	0.000704	0.79	107.26	362.62	0.26
Upper Humber	Reach4	504.5171 04.02.09	350-year	33.36	275.19	276.37	276.1	276.38	0.000536	0.77	173.68	421.98	0.23
Upper Humber	Reach4	504.5171 04.02.09	500-year	47.88	275.19	276.56	276.15	276.56	0.000403	0.74	258.39	485.01	0.21
Upper Humber	Reach4	504.5171 04.02.09	Regional	177.04	275.19	279.73	276.41	279.73	0.000008	0.24	2504.9	966.14	0.04
Upper Humber	Reach4	504.432 04.02.08	2-year	2.58	275.25	275.74	275.57	275.75	0.001312	0.56	13.69	155.53	0.3
Upper Humber	Reach4	504.432 04.02.08	5-year	5.24	275.25	275.86	275.74	275.86	0.000745	0.5	35.09	200.62	0.24
Upper Humber	Reach4	504.432 04.02.08	10-year	8.43	275.25	275.95	275.78	275.95	0.000635	0.5	53.27	216.07	0.22
Upper Humber	Reach4	504.432 04.02.08	25-year	8.43	275.25	275.95	275.78	275.95	0.000635	0.5	53.27	216.07	0.22
Upper Humber	Reach4	504.432 04.02.08	50-year	15.81	275.25	276.09	275.84	276.1	0.000569	0.56	86.35	227.65	0.22
Upper Humber	Reach4	504.432 04.02.08	100-year	19.53	275.25	276.15	275.85	276.16	0.000555	0.58	99.78	228.3	0.22
Upper Humber	Reach4	504.432 04.02.08	350-year	33.36	275.25	276.33	275.93	276.33	0.000569	0.68	139.8	244.76	0.23
Upper Humber	Reach4	504.432 04.02.08	500-year	47.88	275.25	276.52	275.96	276.52	0.000486	0.72	184.48	303.78	0.22
Upper Humber	Reach4	504.432 04.02.08	Regional	177.04	275.25	279.73	276.27	279.73	0.000016	0.32	1510.13	494.59	0.05
Upper Humber	Reach4	504.4018 04.02.07	2-year	2.58	275.13	275.67	275.41	275.68	0.0003	0.29	23.31	111.33	0.15
Upper Humber	Reach4	504.4018 04.02.07	5-year	5.24	275.13	275.8	275.52	275.8	0.000353	0.37	41.58	212.8	0.17
Upper Humber	Reach4	504.4018 04.02.07	10-year	8.43	275.13	275.88	275.58	275.89	0.000382	0.43	62.25	246.53	0.18
Upper Humber	Reach4	504.4018 04.02.07	25-year	8.43	275.13	275.88	275.58	275.89	0.000382	0.43	62.25	246.53	0.18
Upper Humber	Reach4	504.4018 04.02.07	50-year	15.81	275.13	276.03	275.66	276.04	0.000374	0.49	99.39	254.99	0.18
Upper Humber	Reach4	504.4018 04.02.07	100-year	19.53	275.13	276.09	275.69	276.1	0.00038	0.52	114.54	257.84	0.19
Upper Humber	Reach4	504.4018 04.02.07	350-year	33.36	275.13	276.26	275.77	276.26	0.000436	0.63	159.32	277.58	0.21
Upper Humber	Reach4	504.4018 04.02.07	500-year	47.88	275.13	276.46	275.88	276.46	0.000381	0.67	217.81	309.13	0.2
Upper Humber	Reach4	504.4018 04.02.07	Regional	177.04	275.13	279.73	276.18	279.73	0.000014	0.31	1514.22	635.02	0.05
Upper Humber	Reach4	504.221 04.02.06	2-year	2.58	275.16	275.61		275.61	0.000397	0.32	16.53	86.17	0.17
Upper Humber	Reach4	504.221 04.02.06	5-year	5.24	275.16	275.72		275.72	0.00052	0.43	29.62	161.38	0.2
Upper Humber	Reach4	504.221 04.02.06	10-year	8.43	275.16	275.79		275.8	0.000618	0.52	41.96	166.99	0.22
Upper Humber	Reach4	504.221 04.02.06	25-year	8.43	275.16	275.79		275.8	0.000618	0.52	41.96	166.99	0.22
Upper Humber	Reach4	504.221 04.02.06	50-year	15.81	275.16	275.94		275.95	0.000649	0.63	67.42	176.72	0.24
Upper Humber	Reach4	504.221 04.02.06	100-year	19.53	275.16	275.99		276	0.0007	0.68	76.47	178.16	0.25
Upper Humber	Reach4	504.221 04.02.06	350-year	33.36	275.16	276.14		276.15	0.000869	0.86	103.75	185.79	0.29
Upper Humber	Reach4	504.221 04.02.06	500-year	47.88	275.16	276.36		276.37	0.000709	0.89	145.6	203.98	0.27
Upper Humber	Reach4	504.221 04.02.06	Regional	177.04	275.16	279.72		279.72	0.000016	0.33	1607.96	583.04	0.05
Upper Humber	Reach4	504.019 04.02.05	2-year	2.58	275.01	275.4	275.36	275.43	0.004712	0.93	7.49	78.61	0.55
Upper Humber	Reach4	504.019 04.02.05	5-year	5.24	275.01	275.47	275.44	275.51	0.005333	1.15	13.76	98.75	0.61
Upper Humber	Reach4	504.019 04.02.05	10-year	8.43	275.01	275.54	275.49	275.57	0.005173	1.26	20.98	117.42	0.62
Upper Humber	Reach4	504.019 04.02.05	25-year	8.43	275.01	275.54	275.49	275.57	0.005173	1.26	20.98	117.42	0.62
Upper Humber	Reach4	504.019 04.02.05	50-year	15.81	275.01	275.57	275.57	275.65	0.011967	2.01	24.68	121.52	0.95
Upper Humber	Reach4	504.019 04.02.05	100-year	19.53	275.01	275.6	275.6	275.69	0.012171	2.13	29.02	131.26	0.97
Upper Humber	Reach4	504.019 04.02.05	350-year	33.36	275.01	275.86	275.68	275.9	0.003622	1.54	68.72	175.22	0.57
Upper Humber	Reach4	504.019 04.02.05	500-year	47.88	275.01	276.22	275.76	276.24	0.00104	1.07	144.89	242.14	0.32
Upper Humber	Reach4	504.019 04.02.05	Regional	177.04	275.01	279.72	276.15	279.72	0.000011	0.29	1867.64	626.05	0.04
Upper Humber	Reach4	503.820 04.02.04	2-year	2.58	274.77	275.02	274.93	275.02	0.00126	0.27	9.47	77.57	0.25
Upper Humber	Reach4	503.820 04.02.04	5-year	5.24	274.77	275.09	274.96	275.1	0.001289	0.32	16.31	106.5	0.26
Upper Humber	Reach4	503.820 04.02.04	10-year	8.43	274.77	275.15	275	275.15	0.001365	0.37	22.84	130.92	0.28
Upper Humber	Reach4	503.820 04.02.04	25-year	8.43	274.77	275.15	275	275.15	0.001365	0.37	22.84	130.92	0.28
Upper Humber	Reach4	503.820 04.02.04	50-year	15.81	274.77	275.33	275.06	275.34	0.000495	0.33	49.96	160.33	0.18
Upper Humber	Reach4	503.820 04.02.04	100-year	19.53	274.77	275.44	275.09	275.45	0.000279	0.3	69.61	187.9	0.14

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	503.820 04.02.04	350-year	33.36	274.77	275.84	275.16	275.85	0.000083	0.25	157.57	246.23	0.09
Upper Humber	Reach4	503.820 04.02.04	500-year	47.88	274.77	276.21	275.21	276.21	0.000046	0.24	257.96	285.44	0.07
Upper Humber	Reach4	503.820 04.02.04	Regional	177.04	274.77	279.72	275.53	279.72	0.000003	0.16	1935.34	567.77	0.02
Upper Humber	Reach4	503.619 04.02.03	2-year	2.58	274.26	274.58	274.49	274.61	0.003817	0.79	4.13	26.96	0.49
Upper Humber	Reach4	503.619 04.02.03	5-year	5.24	274.26	274.76	274.59	274.78	0.002	0.8	12.91	81.81	0.39
Upper Humber	Reach4	503.619 04.02.03	10-year	8.43	274.26	274.94	274.7	274.95	0.000895	0.68	32.85	132.96	0.27
Upper Humber	Reach4	503.619 04.02.03	25-year	8.43	274.26	274.94	274.7	274.95	0.000895	0.68	32.85	132.96	0.27
Upper Humber	Reach4	503.619 04.02.03	50-year	15.81	274.26	275.26	274.85	275.26	0.000333	0.55	87.37	203.25	0.18
Upper Humber	Reach4	503.619 04.02.03	100-year	19.53	274.26	275.4	274.9	275.4	0.000236	0.5	115.95	209.08	0.15
Upper Humber	Reach4	503.619 04.02.03	350-year	33.36	274.26	275.83	275	275.83	0.000125	0.46	207.69	221.43	0.12
Upper Humber	Reach4	503.619 04.02.03	500-year	47.88	274.26	276.2	275.09	276.2	0.000104	0.48	305	285.15	0.11
Upper Humber	Reach4	503.619 04.02.03	Regional	177.04	274.26	279.72	275.5	279.72	0.000007	0.26	2143.51	651	0.04
Upper Humber	Reach4	503.4758 04.02.02	2-year	2.58	274.05	274.52		274.53	0.000288	0.27	13.9	60.41	0.14
Upper Humber	Reach4	503.4758 04.02.02	5-year	5.24	274.05	274.72		274.72	0.00023	0.32	27.55	83.67	0.14
Upper Humber	Reach4	503.4758 04.02.02	10-year	8.43	274.05	274.9		274.91	0.000186	0.35	44.8	100.37	0.13
Upper Humber	Reach4	503.4758 04.02.02	25-year	8.43	274.05	274.9		274.91	0.000186	0.35	44.8	100.37	0.13
Upper Humber	Reach4	503.4758 04.02.02	50-year	15.81	274.05	275.24		275.24	0.000144	0.39	84.22	139.45	0.12
Upper Humber	Reach4	503.4758 04.02.02	100-year	19.53	274.05	275.38		275.38	0.000132	0.41	104.74	156.55	0.12
Upper Humber	Reach4	503.4758 04.02.02	350-year	33.36	274.05	275.81		275.82	0.000105	0.45	178.72	193.31	0.11
Upper Humber	Reach4	503.4758 04.02.02	500-year	47.88	274.05	276.19		276.19	0.000087	0.47	255.38	218.73	0.1
Upper Humber	Reach4	503.4758 04.02.02	Regional	177.04	274.05	279.72		279.72	0.00001	0.31	1533.02	428.34	0.04
Upper Humber	Reach4	503.418 04.02.01	2-year	2.58	274.08	274.48	274.32	274.49	0.001483	0.55	5.58	27.74	0.31
Upper Humber	Reach4	503.418 04.02.01	5-year	5.24	274.08	274.68	274.41	274.7	0.000888	0.59	13.81	49.85	0.27
Upper Humber	Reach4	503.418 04.02.01	10-year	8.43	274.08	274.87	274.5	274.89	0.000629	0.62	25.23	72.71	0.24
Upper Humber	Reach4	503.418 04.02.01	25-year	8.43	274.08	274.87	274.5	274.89	0.000629	0.62	25.23	72.71	0.24
Upper Humber	Reach4	503.418 04.02.01	50-year	15.81	274.08	275.21	274.65	275.23	0.000394	0.64	54.16	99.98	0.2
Upper Humber	Reach4	503.418 04.02.01	100-year	19.53	274.08	275.36	274.73	275.37	0.000338	0.64	69.52	115.53	0.19
Upper Humber	Reach4	503.418 04.02.01	350-year	33.36	274.08	275.79	274.91	275.81	0.000252	0.68	124.77	167.74	0.17
Upper Humber	Reach4	503.418 04.02.01	500-year	47.88	274.08	276.17	275.03	276.18	0.000193	0.69	184.82	208.48	0.16
Upper Humber	Reach4	503.418 04.02.01	Regional	177.04	274.08	279.72	275.73	279.72	0.000017	0.4	1233.25	364.67	0.05
Upper Humber	Reach4	503.2201 04.01.40	2-year	2.54	273.81	274.45	274.12	274.45	0.000443	0.43	10.71	30.12	0.19
Upper Humber	Reach4	503.2201 04.01.40	5-year	5.16	273.81	274.65	274.22	274.66	0.000515	0.58	17.36	34.69	0.21
Upper Humber	Reach4	503.2201 04.01.40	10-year	8.35	273.81	274.84	274.23	274.86	0.000591	0.72	25.44	49.36	0.24
Upper Humber	Reach4	503.2201 04.01.40	25-year	8.35	273.81	274.84	274.23	274.86	0.000591	0.72	25.44	49.36	0.24
Upper Humber	Reach4	503.2201 04.01.40	50-year	15.88	273.81	275.18	274.49	275.2	0.000567	0.87	47.62	82.86	0.25
Upper Humber	Reach4	503.2201 04.01.40	100-year	19.7	273.81	275.33	274.56	275.35	0.00053	0.9	60.63	99.57	0.24
Upper Humber	Reach4	503.2201 04.01.40	350-year	33.64	273.81	275.77	274.7	275.79	0.000373	0.91	116.05	158.44	0.21
Upper Humber	Reach4	503.2201 04.01.40	500-year	48.6	273.81	276.16	275	276.17	0.00028	0.89	171.32	191.6	0.19
Upper Humber	Reach4	503.2201 04.01.40	Regional	182.7	273.81	279.72	275.89	279.72	0.000019	0.44	1195.81	337.09	0.06
Upper Humber	Reach4	503.1714 04.01.39	2-year	2.54	273.78	274.31	274.04	274.32	0.000764	0.49	6.31	23.13	0.24
Upper Humber	Reach4	503.1714 04.01.39	5-year	5.16	273.78	274.5	274.15	274.52	0.000807	0.64	11.71	34.23	0.26
Upper Humber	Reach4	503.1714 04.01.39	10-year	8.35	273.78	274.69	274.26	274.71	0.000736	0.73	18.84	42.61	0.26
Upper Humber	Reach4	503.1714 04.01.39	25-year	8.35	273.78	274.69	274.26	274.71	0.000736	0.73	18.84	42.61	0.26
Upper Humber	Reach4	503.1714 04.01.39	50-year	15.88	273.78	275.05	274.46	275.08	0.000559	0.82	45.79	110.2	0.24
Upper Humber	Reach4	503.1714 04.01.39	100-year	19.7	273.78	275.22	274.54	275.24	0.000435	0.79	69.69	182.57	0.22
Upper Humber	Reach4	503.1714 04.01.39	350-year	33.64	273.78	275.72	274.74	275.73	0.000169	0.61	183.75	279.74	0.14
Upper Humber	Reach4	503.1714 04.01.39	500-year	48.6	273.78	276.13	275	276.13	0.000106	0.55	297.27	334.91	0.12
Upper Humber	Reach4	503.1714 04.01.39	Regional	182.7	273.78	279.71	275.65	279.72	0.000008	0.29	1791.93	468.28	0.04
Upper Humber	Reach4	503.1632 04.01.38	2-year	2.54	273.75	274.3	273.99	274.31	0.000594	0.44	5.73	12.78	0.21
Upper Humber	Reach4	503.1632 04.01.38	5-year	5.16	273.75	274.49	274.09	274.51	0.000821	0.63	8.15	13.47	0.26
Upper Humber	Reach4	503.1632 04.01.38	10-year	8.35	273.75	274.67	274.2	274.7	0.000958	0.79	10.61	14.15	0.29
Upper Humber	Reach4	503.1632 04.01.38	25-year	8.35	273.75	274.67	274.2	274.7	0.000958	0.79	10.61	14.15	0.29
Upper Humber	Reach4	503.1632 04.01.38	50-year	15.88	273.75	275.01	274.39	275.06	0.001073	1.01	15.66	15.4	0.32
Upper Humber	Reach4	503.1632 04.01.38	100-year	19.7	273.75	275.16	274.49	275.22	0.001095	1.09	18.07	16.13	0.33
Upper Humber	Reach4	503.1632 04.01.38	350-year	33.64	273.75	275.62	274.75	275.71	0.001145	1.29	26	50.5	0.35
Upper Humber	Reach4	503.1632 04.01.38	500-year	48.6	273.75	275.99	274.99	276.1	0.001193	1.46	33.2	132.49	0.36
Upper Humber	Reach4	503.1632 04.01.38	Regional	182.7	273.75	279.71	276.38	279.71	0.000012	0.32	1580.52	498.2	0.04
Upper Humber	Reach4	503.1524 x-120 (04.01.37)		Bridge									
Upper Humber	Reach4	503.1405 04.01.36	2-year	2.54	273.75	274.28	274.02	274.29	0.0011	0.54	4.67	12.15	0.28
Upper Humber	Reach4	503.1405 04.01.36	5-year	5.16	273.75	274.45	274.14	274.48	0.001412	0.75	6.88	13.34	0.33
Upper Humber	Reach4	503.1405 04.01.36	10-year	8.35	273.75	274.62	274.25	274.67	0.001535	0.9	9.27	14.46	0.36
Upper Humber	Reach4	503.1405 04.01.36	25-year	8.35	273.75	274.62	274.25	274.67	0.001535	0.9	9.27	14.46	0.36
Upper Humber	Reach4	503.1405 04.01.36	50-year	15.88	273.75	274.96	274.46	275.02	0.001423	1.09	15.25	31.19	0.37
Upper Humber	Reach4	503.1405 04.01.36	100-year	19.7	273.75	275.11	274.55	275.18	0.001295	1.15	18.44	36.88	0.36
Upper Humber	Reach4	503.1405 04.01.36	350-year	33.64	273.75	275.56	274.82	275.64	0.001109	1.34	28.19	87.84	0.35
Upper Humber	Reach4	503.1405 04.01.36	500-year	48.6	273.75	275.83	275.05	275.96	0.001278	1.62	34.51	145.25	0.39
Upper Humber	Reach4	503.1405 04.01.36	Regional	182.7	273.75	279.71	276.33	279.71	0.000012	0.35	1438.8	436.88	0.05
Upper Humber	Reach4	503.1359 04.01.35	2-year	2.54	273.78	274.27	274.03	274.29	0.001217	0.65	5.28	36.4	0.31
Upper Humber	Reach4	503.1359 04.01.35	5-year	5.16	273.78	274.45	274.15	274.47	0.001095	0.77	16.98	100.89	0.31
Upper Humber	Reach4	503.1359 04.01.35	10-year	8.35	273.78	274.63	274.35	274.65	0.000578	0.66	36.79	109.99	0.23
Upper Humber	Reach4	503.1359 04.01.35	25-year	8.35	273.78	274.63	274.35	274.65	0.000578	0.66	36.79	109.99	0.23
Upper Humber	Reach4	503.1359 04.01.35	50-year	15.88	273.78	274.98	274.52	274.99	0.000295	0.6	76.72	119.19	0.18
Upper Humber	Reach4	503.1359 04.01.35	100-year	19.7	273.78	275.14	274.56	275.15	0.000245	0.59	95.64	124.16	0.16
Upper Humber	Reach4	503.1359 04.01.35	350-year	33.64	273.78	275.6	274.67	275.6	0.000177	0.61	154.26	133.37	0.15
Upper Humber	Reach4	503.1359 04.01.35	500-year	48.6	273.78	275.89	274.76	275.9	0.000188	0.7	194.64	140.27	0.15
Upper Humber	Reach4	503.1359 04.01.35	Regional	182.7	273.78	279.71	275.27	279.71	0.00002	0.46	1286.01	360.28	0.06
Upper Humber	Reach4	503.0932 04.01.34	2-year	2.54	273.78	274.24	274.05	274.25	0.000637	0.45	13.76	64.57	0.22
Upper Humber	Reach4	503.0932 04.01.34	5-year	5.16	273.78	274.44	274.11	274.44	0.000454	0.49	27.33	74.61	0.2
Upper Humber	Reach4	503.0932 04.01.34	10-year	8.35	273.78	274.62	274.21	274.63	0.00037	0.52	42.54	88.94	0.19
Upper Humber	Reach4	503.0932 04.01.34	25-year	8.35	273.78	274.62	274.21	274.63	0.00037	0.52	42.54	88.94	0.19
Upper Humber	Reach4	503.0932 04.01.34	50-year	15.88	273.78	274.98	274.32	274.98	0.000261	0.56	76.72	101.89	0.17
Upper Humber	Reach4	503.0932 04.01.34	100-year	19.7	273.78	275.13	274.37	275.14	0.000229	0.57	92.8	104.71	0.16
Upper Humber	Reach4	503.0932 04.01.34	350-year	33.64	273.78	275.59	274.49	275.6	0.000188	0.63	142.55	113.38	0.15
Upper Humber	Reach4	503.0932 04.01.34	500-year	48.6	273.78	275.88	274.61	275.89	0.000214	0.74	176.84	123.15	0.16
Upper Humber	Reach4	503.0932 04.01.34	Regional	182.7	273.78	279.71	275.2	279.71	0.000023	0.49	1205.2	374.39	0.06
Upper Humber	Reach4	503.017 04.01.33	2-year	2.54	273.69	274.23		274.23	0.000087	0.14	18.49	58.94	0.08
Upper Humber	Reach4	503.017 04.01.33	5-year	5.16	273.69	274.43		274.43	0.000077	0.18	31.12	72.3	0.08
Upper Humber	Reach4	503.017 04.01.33	10-year	8.35	273.69	274.61		274.62	0.00007	0.21	45.2	76.91	0.08
Upper Humber	Reach4	503.017 04.01.33	25-year	8.35	273.69	274.61		274.62	0.00007	0.21	45.2	76.91	0.08
Upper Humber	Reach4	503.017 04.01.33	50-year	15.88	273.69	274.97		274.97	0.000061	0.25	74.3	87.7	0.08
Upper Humber	Reach4	503.017 04.01.33	100-year	19.7	273.69	275.13		275.13	0.000058	0.27	88.38	92.12	0.08
Upper Humber	Reach4	503.017 04.01.33	350-year	33.64	273.69	275.58		275.59	0.000055	0.32	132.88	101.31	0.08
Upper Humber	Reach4	503.017 04.01.33	500-year	48.6	273.69	275.88		275.88	0.000064	0.39	163.35	107.65	0.09
Upper Humber	Reach4	503.017 04.01.33	Regional	182.7	273.69	279.71		279.71	0.000012	0.35	1076.15	303.51	0.05
Upper Humber	Reach4	502.816 04.01.32	2-year	2.54	273.57	274.23	273.76	274.23	0.000019	0.08	40.48	96.83	0.04
Upper Humber	Reach4	502.816 04.01.32	5-year	5.16	273.57	274.42	273.8	274.42	0.000024	0.12	60.12	103.63	0.05
Upper Humber	Reach4	502.816 04.01.32	10-year	8.35	273.57	274.61	273.86	274.61	0.000027	0.15	80	109.32	0.05
Upper Humber	Reach4	502.816 04.01.32	25-year	8.35	273.57	274.61	273.86	274.61	0.000027	0.15	80	109.32	0.05
Upper Humber	Reach4	502.816 04.01.32	50-year	15.88	273.57	274.96	273.93	274.96	0.00003	0.19	121.36	131.39	0.06
Upper Humber	Reach4	502.816 04.01.32	100-year	19.7	273.57	275.12	273.97	275.12	0.00003	0.21	144.67	167.25	0.06
Upper Humber	Reach4	502.816 04.01.32	350-year	33.64	273.57	275.58	274.05	275.58	0.000029	0.25	244.11	234.86	0.06
Upper Humber	Reach4	502.816 04.01.32	500-year	48.6	273.57	275.87	274.13	275.87	0.000032	0.29	313.75	239.47	0.06
Upper Humber	Reach4	502.816 04.01.32	Regional	182.7	273.57	279.71	274.65	279.71	0.000008	0.29	1329.64	290.73	0.04
Upper Humber	Reach4	502.614 04.01.31	2-year	2.54	273.6	274.22	273.77	274.22	0.000037	0.12	39.02	102.28	0.05
Upper Humber	Reach4	502.614 04.01.31	5-year	5.16	273.6	274.41	273.82	274.41	0.000046	0.17	60.12	116.9	0.06
Upper Humber	Reach4	502.614 04.01.31	10-year	8.35	273.6	274.6	273.87	274.6	0.00005	0.2	82.73	124.51	0.07
Upper Humber	Reach4	502.614 04.01.31	25-year	8.35	273.6	274.6	273.87	274.6	0.00005	0.2	82.73	124.51	0.07
Upper Humber	Reach4	502.614 04.01.31	50-year	15.88	273.6	274.95	273.95	274.96	0.00005	0.26	128.98	136.93	0.07
Upper Humber	Reach4	502.614 04.01.31	100-year	19.7	273.6	275.11	274	275.11	0.00005	0.28	151.02	148.22	0.07
Upper Humber	Reach4	502.614 04.01.31	350-year	33.64	273.6	275.57	274.11	275.57	0.000052	0.34	239.7	220.5	0.08
Upper Humber	Reach4	502.614 04.01.31	500-year	48.6	273.6	275.86	274.2	275.87	0.000056	0.39	304.64	222.66	0.08
Upper Humber	Reach4	502.614 04.01.31	Regional	182.7	273.6	279.7	274.75	279.71	0.000012	0.36	1200.88	252.69	0.05
Upper Humber	Reach4	502.413 04.01.30	2-year	2.54	273.54	274.22	273.69	274.22	0.000004	0.04	67.78	137.45	0.02
Upper Humber	Reach4	502.413 04.01.30	5-year	5.16	273.54	274.41	273.72	274.41	0.000005	0.05	94.87	142.97	0.02
Upper Humber	Reach4	502.413 04.01.30	10-year	8.35	273.54	274.6	273.74	274.6	0.000006	0.07	122.78	154.02	0.02

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	502.413 04.01.30	25-year	8.35	273.54	274.6	273.74	274.6	0.000006	0.07	122.78	154.02	0.02
Upper Humber	Reach4	502.413 04.01.30	50-year	15.88	273.54	274.95	273.8	274.95	0.000007	0.09	181.11	177.92	0.03
Upper Humber	Reach4	502.413 04.01.30	100-year	19.7	273.54	275.11	273.82	275.11	0.000007	0.1	209.93	196.93	0.03
Upper Humber	Reach4	502.413 04.01.30	350-year	33.64	273.54	275.57	273.88	275.57	0.000007	0.13	320.92	269.7	0.03
Upper Humber	Reach4	502.413 04.01.30	500-year	48.6	273.54	275.86	273.95	275.86	0.000009	0.16	400.07	271.21	0.03
Upper Humber	Reach4	502.413 04.01.30	Regional	182.7	273.54	279.7	274.29	279.71	0.000003	0.18	1482.95	302.02	0.02
Upper Humber	Reach4	502.213 04.01.29	2-year	2.54	273.57	274.22		274.22	0.000001	0.02	119.07	216.28	0.01
Upper Humber	Reach4	502.213 04.01.29	5-year	5.16	273.57	274.41		274.41	0.000002	0.03	161.09	222.63	0.01
Upper Humber	Reach4	502.213 04.01.29	10-year	8.35	273.57	274.6		274.6	0.000002	0.04	203.07	228.49	0.01
Upper Humber	Reach4	502.213 04.01.29	25-year	8.35	273.57	274.6		274.6	0.000002	0.04	203.07	228.49	0.01
Upper Humber	Reach4	502.213 04.01.29	50-year	15.88	273.57	274.95		274.95	0.000003	0.06	284.57	230.21	0.02
Upper Humber	Reach4	502.213 04.01.29	100-year	19.7	273.57	275.11		275.11	0.000003	0.07	320.63	231.02	0.02
Upper Humber	Reach4	502.213 04.01.29	350-year	33.64	273.57	275.57		275.57	0.000003	0.09	429.06	238.7	0.02
Upper Humber	Reach4	502.213 04.01.29	500-year	48.6	273.57	275.86		275.86	0.000004	0.11	499.15	240.53	0.02
Upper Humber	Reach4	502.213 04.01.29	Regional	182.7	273.57	279.7		279.71	0.000002	0.14	1695.56	380.62	0.02
Upper Humber	Reach4	502.1468 04.01.28	2-year	2.54	273.6	274.22		274.22	0.000015	0.08	42.33	112.86	0.03
Upper Humber	Reach4	502.1468 04.01.28	5-year	5.16	273.6	274.41		274.41	0.000019	0.11	67.76	156.09	0.04
Upper Humber	Reach4	502.1468 04.01.28	10-year	8.35	273.6	274.6		274.6	0.000018	0.13	102.3	196.16	0.04
Upper Humber	Reach4	502.1468 04.01.28	25-year	8.35	273.6	274.6		274.6	0.000018	0.13	102.3	196.16	0.04
Upper Humber	Reach4	502.1468 04.01.28	50-year	15.88	273.6	274.95		274.95	0.000015	0.14	173.03	203.55	0.04
Upper Humber	Reach4	502.1468 04.01.28	100-year	19.7	273.6	275.11		275.11	0.000014	0.15	205.01	206	0.04
Upper Humber	Reach4	502.1468 04.01.28	350-year	33.64	273.6	275.57		275.57	0.000013	0.17	302.03	218.1	0.04
Upper Humber	Reach4	502.1468 04.01.28	500-year	48.6	273.6	275.86		275.86	0.000015	0.2	367.02	224.27	0.04
Upper Humber	Reach4	502.1468 04.01.28	Regional	182.7	273.6	279.7		279.71	0.000004	0.19	1421.84	300.9	0.03
Upper Humber	Reach4	502.1416 04.01.27	2-year	2.54	273.66	274.22	273.81	274.22	0.000146	0.24	10.86	37.32	0.11
Upper Humber	Reach4	502.1416 04.01.27	5-year	5.16	273.66	274.4	273.89	274.41	0.000202	0.35	15.27	48.05	0.13
Upper Humber	Reach4	502.1416 04.01.27	10-year	8.35	273.66	274.58	273.97	274.59	0.000235	0.44	19.76	83.1	0.15
Upper Humber	Reach4	502.1416 04.01.27	25-year	8.35	273.66	274.58	273.97	274.59	0.000235	0.44	19.76	83.1	0.15
Upper Humber	Reach4	502.1416 04.01.27	50-year	15.88	273.66	274.93	274.1	274.95	0.000261	0.57	28.9	118.59	0.17
Upper Humber	Reach4	502.1416 04.01.27	100-year	19.7	273.66	275.08	274.17	275.1	0.000264	0.63	33.18	136.26	0.17
Upper Humber	Reach4	502.1416 04.01.27	350-year	33.64	273.66	275.53	274.35	275.56	0.00027	0.76	46.86	184.52	0.18
Upper Humber	Reach4	502.1416 04.01.27	500-year	48.6	273.66	275.85	274.52	275.86	0.000075	0.45	187.2	206.52	0.1
Upper Humber	Reach4	502.1416 04.01.27	Regional	182.7	273.66	279.7	275.6	279.71	0.000004	0.22	1210.01	296.19	0.03
Upper Humber	Reach4	502.1314 x-119 (04.01.26)		Bridge									
Upper Humber	Reach4	502.1225 04.01.25	2-year	2.54	273.66	274.2	273.87	274.21	0.000412	0.39	7.33	16.23	0.18
Upper Humber	Reach4	502.1225 04.01.25	5-year	5.16	273.66	274.38	273.97	274.39	0.000599	0.58	10.22	16.78	0.23
Upper Humber	Reach4	502.1225 04.01.25	10-year	8.35	273.66	274.55	274.06	274.57	0.000728	0.74	13.1	17.44	0.26
Upper Humber	Reach4	502.1225 04.01.25	25-year	8.35	273.66	274.55	274.06	274.57	0.000728	0.74	13.1	17.44	0.26
Upper Humber	Reach4	502.1225 04.01.25	50-year	15.88	273.66	274.86	274.24	274.91	0.000872	1.01	18.96	19.56	0.3
Upper Humber	Reach4	502.1225 04.01.25	100-year	19.7	273.66	275.01	274.32	275.06	0.000901	1.11	22.06	22.67	0.31
Upper Humber	Reach4	502.1225 04.01.25	350-year	33.64	273.66	275.42	274.56	275.51	0.000986	1.4	31.98	51.31	0.34
Upper Humber	Reach4	502.1225 04.01.25	500-year	48.6	273.66	275.63	274.79	275.78	0.001354	1.77	37.7	96.54	0.41
Upper Humber	Reach4	502.1225 04.01.25	Regional	182.7	273.66	279.7	276.27	279.7	0.000039	0.64	801.73	265.39	0.08
Upper Humber	Reach4	502.1203 04.01.24	2-year	2.54	273.63	274.2	273.83	274.21	0.000425	0.4	6.28	12.37	0.18
Upper Humber	Reach4	502.1203 04.01.24	5-year	5.16	273.63	274.37	273.93	274.39	0.000697	0.61	8.47	13.01	0.24
Upper Humber	Reach4	502.1203 04.01.24	10-year	8.35	273.63	274.54	274.04	274.57	0.000927	0.78	10.7	14.01	0.29
Upper Humber	Reach4	502.1203 04.01.24	25-year	8.35	273.63	274.54	274.04	274.57	0.000927	0.78	10.7	14.01	0.29
Upper Humber	Reach4	502.1203 04.01.24	50-year	15.88	273.63	274.86	274.25	274.91	0.001113	1.03	15.63	17.26	0.33
Upper Humber	Reach4	502.1203 04.01.24	100-year	19.7	273.63	275	274.34	275.06	0.001101	1.12	18.15	18.86	0.33
Upper Humber	Reach4	502.1203 04.01.24	350-year	33.64	273.63	275.43	274.62	275.5	0.000942	1.28	39.46	59.42	0.32
Upper Humber	Reach4	502.1203 04.01.24	500-year	48.6	273.63	275.65	274.86	275.75	0.001076	1.5	55.91	82.61	0.35
Upper Humber	Reach4	502.1203 04.01.24	Regional	182.7	273.63	279.69	276.14	279.7	0.000053	0.72	594.85	171.1	0.1
Upper Humber	Reach4	502.118 04.01.23	2-year	2.54	273.81	274.1	274.1	274.2	0.014647	1.43	2.05	11.28	0.94
Upper Humber	Reach4	502.118 04.01.23	5-year	5.16	273.81	274.22	274.22	274.37	0.013783	1.81	3.49	11.96	0.97
Upper Humber	Reach4	502.118 04.01.23	10-year	8.35	273.81	274.34	274.34	274.55	0.012754	2.11	4.98	12.48	0.98
Upper Humber	Reach4	502.118 04.01.23	25-year	8.35	273.81	274.34	274.34	274.55	0.012754	2.11	4.98	12.48	0.98
Upper Humber	Reach4	502.118 04.01.23	50-year	15.88	273.81	274.57	274.57	274.88	0.011609	2.63	8.01	14.02	1
Upper Humber	Reach4	502.118 04.01.23	100-year	19.7	273.81	274.65	274.65	275.03	0.012121	2.89	9.2	14.76	1.04
Upper Humber	Reach4	502.118 04.01.23	350-year	33.64	273.81	275.17	275.17	275.47	0.005575	2.74	24.26	46.23	0.77
Upper Humber	Reach4	502.118 04.01.23	500-year	48.6	273.81	275.37	275.37	275.72	0.005872	3.1	34.15	52.81	0.81
Upper Humber	Reach4	502.118 04.01.23	Regional	182.7	273.81	279.69	276.39	279.7	0.000085	0.92	521.4	149.05	0.12
Upper Humber	Reach4	502.1158 04.01.22	2-year	2.54	271.75	273.8	271.97	273.8	0.000014	0.19	17.89	8.74	0.04
Upper Humber	Reach4	502.1158 04.01.22	5-year	5.16	271.75	274.03	272.11	274.04	0.00004	0.34	19.95	8.74	0.07
Upper Humber	Reach4	502.1158 04.01.22	10-year	8.35	271.75	274.25	272.26	274.26	0.000078	0.51	21.83	8.74	0.1
Upper Humber	Reach4	502.1158 04.01.22	25-year	8.35	271.75	274.25	272.26	274.26	0.000078	0.51	21.83	8.74	0.1
Upper Humber	Reach4	502.1158 04.01.22	50-year	15.88	271.75	274.63	272.53	274.67	0.000186	0.86	25.54	15.58	0.16
Upper Humber	Reach4	502.1158 04.01.22	100-year	19.7	271.75	274.78	272.65	274.83	0.000238	1.01	28.22	19.37	0.19
Upper Humber	Reach4	502.1158 04.01.22	350-year	33.64	271.75	275.12	273.05	275.23	0.00047	1.52	37.21	41.37	0.26
Upper Humber	Reach4	502.1158 04.01.22	500-year	48.6	271.75	275.25	273.41	275.44	0.000833	2.08	43.41	54.45	0.35
Upper Humber	Reach4	502.1158 04.01.22	Regional	182.7	271.75	279.68	276.18	279.7	0.000069	1.03	546.28	139.05	0.12
Upper Humber	Reach4	502.11 x-118 (04.01.21)		Inl Struct									
Upper Humber	Reach4	502.1052 04.01.20	2-year	2.54	270.15	270.36	270.3	270.39	0.005697	0.76	3.34	18.26	0.57
Upper Humber	Reach4	502.1052 04.01.20	5-year	5.16	270.15	270.44	270.38	270.5	0.006977	1.06	4.88	18.9	0.66
Upper Humber	Reach4	502.1052 04.01.20	10-year	8.35	270.15	270.52	270.46	270.6	0.007924	1.32	6.34	19.37	0.74
Upper Humber	Reach4	502.1052 04.01.20	25-year	8.35	270.15	270.52	270.46	270.6	0.007924	1.32	6.34	19.37	0.74
Upper Humber	Reach4	502.1052 04.01.20	50-year	15.88	270.15	270.73	270.6	270.84	0.005595	1.49	10.66	20.8	0.66
Upper Humber	Reach4	502.1052 04.01.20	100-year	19.7	270.15	270.84	270.67	270.96	0.004628	1.51	13.02	21.48	0.62
Upper Humber	Reach4	502.1052 04.01.20	350-year	33.64	270.15	271.2	270.87	271.33	0.002887	1.59	21.38	25.78	0.53
Upper Humber	Reach4	502.1052 04.01.20	500-year	48.6	270.15	271.51	271.05	271.66	0.002293	1.72	30.13	30.29	0.49
Upper Humber	Reach4	502.1052 04.01.20	Regional	182.7	270.15	279.68	272.17	279.69	0.000012	0.48	790.03	131.11	0.05
Upper Humber	Reach4	502.0994 04.01.19	2-year	2.54	270.09	270.26	270.26	270.33	0.020681	1.11	2.32	19.95	1.01
Upper Humber	Reach4	502.0994 04.01.19	5-year	5.16	270.09	270.34	270.34	270.43	0.015294	1.34	4.02	22.11	0.95
Upper Humber	Reach4	502.0994 04.01.19	10-year	8.35	270.09	270.46	270.42	270.55	0.008382	1.35	6.75	23.72	0.76
Upper Humber	Reach4	502.0994 04.01.19	25-year	8.35	270.09	270.46	270.42	270.55	0.008382	1.35	6.75	23.72	0.76
Upper Humber	Reach4	502.0994 04.01.19	50-year	15.88	270.09	270.72	270.55	270.81	0.00418	1.4	13.11	28.01	0.59
Upper Humber	Reach4	502.0994 04.01.19	100-year	19.7	270.09	270.83	270.62	270.93	0.00337	1.42	16.49	29.26	0.54
Upper Humber	Reach4	502.0994 04.01.19	350-year	33.64	270.09	271.2	270.81	271.31	0.002231	1.54	28.02	34.05	0.48
Upper Humber	Reach4	502.0994 04.01.19	500-year	48.6	270.09	271.52	270.98	271.64	0.001856	1.66	38.99	36.03	0.45
Upper Humber	Reach4	502.0994 04.01.19	Regional	182.7	270.09	279.68	272.08	279.69	0.000013	0.51	796.43	125.66	0.05
Upper Humber	Reach4	502.0513 04.01.18	2-year	2.54	269.4	269.82		269.86	0.003947	0.92	2.77	8.54	0.52
Upper Humber	Reach4	502.0513 04.01.18	5-year	5.16	269.4	269.98		270.06	0.00455	1.23	4.2	9.27	0.58
Upper Humber	Reach4	502.0513 04.01.18	10-year	8.35	269.4	270.13		270.24	0.004997	1.48	5.65	10.12	0.63
Upper Humber	Reach4	502.0513 04.01.18	25-year	8.35	269.4	270.13		270.24	0.004997	1.48	5.65	10.12	0.63
Upper Humber	Reach4	502.0513 04.01.18	50-year	15.88	269.4	270.42		270.58	0.00514	1.79	8.87	12.11	0.67
Upper Humber	Reach4	502.0513 04.01.18	100-year	19.7	269.4	270.55		270.73	0.004938	1.88	10.49	12.91	0.67
Upper Humber	Reach4	502.0513 04.01.18	350-year	33.64	269.4	270.92		271.15	0.004492	2.12	15.91	16.02	0.66
Upper Humber	Reach4	502.0513 04.01.18	500-year	48.6	269.4	271.2		271.49	0.00426	2.41	21.12	21.38	0.67
Upper Humber	Reach4	502.0513 04.01.18	Regional	182.7	269.4	279.69		279.69	0.000012	0.48	999.92	185.65	0.05
Upper Humber	Reach4	502.011 04.01.17	2-year	2.54	269.31	269.68		269.71	0.003393	0.79	3.21	11.08	0.47
Upper Humber	Reach4	502.011 04.01.17	5-year	5.16	269.31	269.84		269.89	0.003185	1.02	5.09	12.04	0.49
Upper Humber	Reach4	502.011 04.01.17	10-year	8.35	269.31	270		270.07	0.00301	1.22	7.06	13.11	0.5
Upper Humber	Reach4	502.011 04.01.17	25-year	8.35	269.31	270		270.07	0.00301	1.22	7.06	13.11	0.5
Upper Humber	Reach4	502.011 04.01.17	50-year	15.88	269.31	270.31		270.42	0.00266	1.51	11.48	15.51	0.5
Upper Humber	Reach4	502.011 04.01.17	100-year	19.7	269.31	270.44		270.57	0.00254	1.61	13.74	17.53	0.5
Upper Humber	Reach4	502.011 04.01.17	350-year	33.64	269.31	270.82		271.01	0.002523	1.97	21.55	25.49	0.53
Upper Humber	Reach4	502.011 04.01.17	500-year	48.6	269.31	271.1		271.35	0.002724	2.31	30.34	36.83	0.57
Upper Humber	Reach4	502.011 04.01.17	Regional	182.7	269.31	279.69		279.69	0.00001	0.46	1129.2	181.2	0.05
Upper Humber	Reach4	501.813 04.01.16	2-year	2.54	268.71	269.14		269.17	0.002226	0.73	3.5	10.03	0.39
Upper Humber	Reach4	501.813 04.01.16	5-year	5.16	268.71	269.33		269.38	0.002143	0.95	5.51	11.04	0.41
Upper Humber	Reach4	501.813 04.01.16	10-year	8.35	268.71	269.53		269.59	0.001985	1.12	7.74	11.92	0.42
Upper Humber	Reach4	501.813 04.01.16	25-year	8.35	268.71	269.53		269.59	0.001985	1.12	7.74	11.92	0.42
Upper Humber	Reach4	501.813 04.01.16	50-year	15.88	268.71	269.87		269.97	0.001921	1.43	12.18	14.2	0.44
Upper Humber	Reach4	501.813 04.01.16	100-year	19.7	268.71	270		270.13	0.002008	1.57	14.22	21.76	0.46
Upper Humber	Reach4	501.813 04.01.16	350-year	33.64	268.71	270.39		270.56	0.002003	1.9	26.86	42.08	0.48
Upper Humber	Reach4	501.813 04.01.16	500-year	48.6	268.71	270.64	270.21	270.85	0.002245	2.21	38.56	54.59	0.52

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	501.813 04.01.16	Regional	182.7	268.71	279.69		279.69	0.000003	0.28	1924.8	272.06	0.03
Upper Humber	Reach4	501.611 04.01.15	2-year	2.54	268.17	268.59		268.63	0.003232	0.91	2.87	8.85	0.48
Upper Humber	Reach4	501.611 04.01.15	5-year	5.16	268.17	268.78		268.85	0.003204	1.19	4.74	10.71	0.51
Upper Humber	Reach4	501.611 04.01.15	10-year	8.35	268.17	268.91		269.03	0.004153	1.55	6.23	14.03	0.6
Upper Humber	Reach4	501.611 04.01.15	25-year	8.35	268.17	268.91		269.03	0.004153	1.55	6.23	14.03	0.6
Upper Humber	Reach4	501.611 04.01.15	50-year	15.88	268.17	269.11	269.01	269.33	0.005879	2.19	9.78	20.02	0.74
Upper Humber	Reach4	501.611 04.01.15	100-year	19.7	268.17	269.22	269.1	269.47	0.005785	2.35	12.17	23.03	0.75
Upper Humber	Reach4	501.611 04.01.15	350-year	33.64	268.17	269.44	269.44	269.84	0.007361	3.04	17.71	25.47	0.88
Upper Humber	Reach4	501.611 04.01.15	500-year	48.6	268.17	269.84		270.2	0.00488	2.99	28.49	28.68	0.75
Upper Humber	Reach4	501.611 04.01.15	Regional	182.7	268.17	279.69		279.69	0.000005	0.34	1679.1	251.31	0.03
Upper Humber	Reach4	501.410 04.01.14	2-year	2.54	267.75	268.02		268.04	0.002681	0.62	4.11	17.38	0.41
Upper Humber	Reach4	501.410 04.01.14	5-year	5.16	267.75	268.11		268.15	0.003661	0.89	5.81	17.97	0.5
Upper Humber	Reach4	501.410 04.01.14	10-year	8.35	267.75	268.26		268.31	0.002929	0.99	8.46	18.93	0.47
Upper Humber	Reach4	501.410 04.01.14	25-year	8.35	267.75	268.26		268.31	0.002929	0.99	8.46	18.93	0.47
Upper Humber	Reach4	501.410 04.01.14	50-year	15.88	267.75	268.52		268.59	0.002308	1.19	13.67	21.83	0.45
Upper Humber	Reach4	501.410 04.01.14	100-year	19.7	267.75	268.59		268.68	0.002594	1.34	15.2	22.5	0.49
Upper Humber	Reach4	501.410 04.01.14	350-year	33.64	267.75	268.97		269.08	0.001905	1.5	24.6	26.2	0.44
Upper Humber	Reach4	501.410 04.01.14	500-year	48.6	267.75	269.77		269.84	0.000627	1.22	50.37	36.25	0.28
Upper Humber	Reach4	501.410 04.01.14	Regional	182.7	267.75	279.68		279.69	0.000007	0.42	981.19	146.54	0.04
Upper Humber	Reach4	501.209 04.01.13	2-year	2.54	266.85	267.13	267.08	267.19	0.007747	1.07	2.46	11.3	0.69
Upper Humber	Reach4	501.209 04.01.13	5-year	5.16	266.85	267.34	267.19	267.41	0.003772	1.12	5.11	14.12	0.53
Upper Humber	Reach4	501.209 04.01.13	10-year	8.35	266.85	267.44	267.3	267.55	0.005082	1.48	6.53	15.5	0.64
Upper Humber	Reach4	501.209 04.01.13	25-year	8.35	266.85	267.44	267.3	267.55	0.005082	1.48	6.53	15.5	0.64
Upper Humber	Reach4	501.209 04.01.13	50-year	15.88	266.85	267.6	267.53	267.81	0.007445	2.13	9.11	17.02	0.81
Upper Humber	Reach4	501.209 04.01.13	100-year	19.7	266.85	267.79	267.6	267.98	0.004867	2.02	12.77	20.4	0.68
Upper Humber	Reach4	501.209 04.01.13	350-year	33.64	266.85	268.72	267.92	268.81	0.001006	1.48	38.03	33.94	0.35
Upper Humber	Reach4	501.209 04.01.13	500-year	48.6	266.85	269.68	268.13	269.74	0.000409	1.25	80.2	66.93	0.24
Upper Humber	Reach4	501.209 04.01.13	Regional	182.7	266.85	279.68	269.64	279.68	0.000004	0.33	1466.63	164.8	0.03
Upper Humber	Reach4	501.009 04.01.12	2-year	2.54	266.04	266.4	266.25	266.42	0.002238	0.69	3.69	11.89	0.39
Upper Humber	Reach4	501.009 04.01.12	5-year	5.16	266.04	266.46	266.36	266.53	0.005143	1.18	4.43	12.14	0.61
Upper Humber	Reach4	501.009 04.01.12	10-year	8.35	266.04	266.66	266.46	266.74	0.003262	1.24	6.95	12.85	0.52
Upper Humber	Reach4	501.009 04.01.12	25-year	8.35	266.04	266.66	266.46	266.74	0.003262	1.24	6.95	12.85	0.52
Upper Humber	Reach4	501.009 04.01.12	50-year	15.88	266.04	267.3	266.66	267.36	0.000935	1.09	17.64	23.03	0.31
Upper Humber	Reach4	501.009 04.01.12	100-year	19.7	266.04	267.62	266.76	267.67	0.000616	1.03	25.54	27.19	0.27
Upper Humber	Reach4	501.009 04.01.12	350-year	33.64	266.04	268.68	267.05	268.71	0.000229	0.89	69.07	51.61	0.18
Upper Humber	Reach4	501.009 04.01.12	500-year	48.6	266.04	269.66	267.34	269.69	0.000127	0.82	129.21	76.93	0.14
Upper Humber	Reach4	501.009 04.01.12	Regional	182.7	266.04	279.68	268.81	279.68	0.000003	0.3	1668.69	190.03	0.03
Upper Humber	Reach4	500.808 04.01.11	2-year	2.54	265.47	265.76	265.68	265.8	0.004508	0.84	3.04	12.11	0.53
Upper Humber	Reach4	500.808 04.01.11	5-year	5.16	265.47	266.13	265.78	266.15	0.000933	0.69	7.89	14.92	0.28
Upper Humber	Reach4	500.808 04.01.11	10-year	8.35	265.47	266.51	265.88	266.53	0.000463	0.67	14.97	24	0.21
Upper Humber	Reach4	500.808 04.01.11	25-year	8.35	265.47	266.51	265.88	266.53	0.000463	0.67	14.97	24	0.21
Upper Humber	Reach4	500.808 04.01.11	50-year	15.88	265.47	267.26	266.07	267.27	0.000206	0.65	36.15	31.8	0.16
Upper Humber	Reach4	500.808 04.01.11	100-year	19.7	265.47	267.59	266.16	267.61	0.000163	0.65	47.2	34.87	0.14
Upper Humber	Reach4	500.808 04.01.11	350-year	33.64	265.47	268.66	266.44	268.68	0.000101	0.67	94.71	64.38	0.12
Upper Humber	Reach4	500.808 04.01.11	500-year	48.6	265.47	269.65	266.7	269.67	0.000064	0.64	176.1	99.87	0.1
Upper Humber	Reach4	500.808 04.01.11	Regional	182.7	265.47	279.68	268.04	279.68	0.000003	0.29	1684.15	175.25	0.02
Upper Humber	Reach4	500.7833 04.01.10	2-year	2.54	265.29	265.74	265.49	265.75	0.000808	0.46	5.5	14.56	0.24
Upper Humber	Reach4	500.7833 04.01.10	5-year	5.16	265.29	266.12	265.59	266.13	0.000352	0.45	11.41	16.58	0.17
Upper Humber	Reach4	500.7833 04.01.10	10-year	8.35	265.29	266.51	265.68	266.52	0.00022	0.46	18.24	19.11	0.15
Upper Humber	Reach4	500.7833 04.01.10	25-year	8.35	265.29	266.51	265.68	266.52	0.00022	0.46	18.24	19.11	0.15
Upper Humber	Reach4	500.7833 04.01.10	50-year	15.88	265.29	267.26	265.86	267.27	0.00012	0.49	35.58	29.73	0.12
Upper Humber	Reach4	500.7833 04.01.10	100-year	19.7	265.29	267.59	265.94	267.6	0.0001	0.5	46.69	38.16	0.11
Upper Humber	Reach4	500.7833 04.01.10	350-year	33.64	265.29	268.66	266.19	268.67	0.000061	0.52	98.82	61.4	0.09
Upper Humber	Reach4	500.7833 04.01.10	500-year	48.6	265.29	269.65	266.4	269.66	0.000041	0.51	176.71	89.93	0.08
Upper Humber	Reach4	500.7833 04.01.10	Regional	182.7	265.29	279.68	267.76	279.68	0.000002	0.27	1623.78	168.07	0.02
Upper Humber	Reach4	500.7713 04.01.09	2-year	2.54	265.11	265.72	265.4	265.74	0.000962	0.58	4.34	9.08	0.27
Upper Humber	Reach4	500.7713 04.01.09	5-year	5.16	265.11	266.1	265.55	266.12	0.000576	0.64	8.06	11.96	0.23
Upper Humber	Reach4	500.7713 04.01.09	10-year	8.35	265.11	266.48	265.68	266.51	0.000418	0.7	11.85	14.48	0.21
Upper Humber	Reach4	500.7713 04.01.09	25-year	8.35	265.11	266.48	265.68	266.51	0.000418	0.7	11.85	14.48	0.21
Upper Humber	Reach4	500.7713 04.01.09	50-year	15.88	265.11	267.22	265.93	267.25	0.000301	0.83	19.23	20.79	0.19
Upper Humber	Reach4	500.7713 04.01.09	100-year	19.7	265.11	267.55	266.03	267.59	0.000274	0.88	22.51	24.21	0.19
Upper Humber	Reach4	500.7713 04.01.09	350-year	33.64	265.11	268.59	266.34	268.65	0.000224	1.02	32.98	53.69	0.18
Upper Humber	Reach4	500.7713 04.01.09	500-year	48.6	265.11	269.56	266.63	269.63	0.000198	1.14	42.7	73.29	0.18
Upper Humber	Reach4	500.7713 04.01.09	Regional	182.7	265.11	279.68	268.54	279.68	0.000004	0.37	1181.19	167.33	0.03
Upper Humber	Reach4	500.7536 x-117 (04.01.08)		Culvert									
Upper Humber	Reach4	500.7281 04.01.07	2-year	2.54	265.08	265.34	265.33	265.45	0.016921	1.48	1.71	7.67	1
Upper Humber	Reach4	500.7281 04.01.07	5-year	5.16	265.08	265.48	265.48	265.65	0.014624	1.83	2.82	8.27	1
Upper Humber	Reach4	500.7281 04.01.07	10-year	8.35	265.08	265.61	265.61	265.84	0.013149	2.12	3.93	8.8	0.99
Upper Humber	Reach4	500.7281 04.01.07	25-year	8.35	265.08	265.61	265.61	265.84	0.013149	2.12	3.93	8.8	0.99
Upper Humber	Reach4	500.7281 04.01.07	50-year	15.88	265.08	265.86	265.86	266.21	0.012011	2.62	6.06	9.68	1.01
Upper Humber	Reach4	500.7281 04.01.07	100-year	19.7	265.08	265.97	265.97	266.37	0.011271	2.78	7.09	10.05	1
Upper Humber	Reach4	500.7281 04.01.07	350-year	33.64	265.08	266.31	266.31	266.87	0.010419	3.3	10.21	11.35	1
Upper Humber	Reach4	500.7281 04.01.07	500-year	48.6	265.08	266.63	266.63	267.33	0.009538	3.69	13.18	13.77	0.99
Upper Humber	Reach4	500.7281 04.01.07	Regional	182.7	265.08	268.61	268.61	270.27	0.007108	5.72	32.82	39	0.99
Upper Humber	Reach4	500.7203 04.01.06	2-year	2.54	265.05	265.3		265.32	0.003784	0.59	4.27	24.84	0.46
Upper Humber	Reach4	500.7203 04.01.06	5-year	5.16	265.05	265.42		265.45	0.002677	0.7	7.34	25.52	0.42
Upper Humber	Reach4	500.7203 04.01.06	10-year	8.35	265.05	265.56		265.59	0.001915	0.76	10.97	26.3	0.38
Upper Humber	Reach4	500.7203 04.01.06	25-year	8.35	265.05	265.56		265.59	0.001915	0.76	10.97	26.3	0.38
Upper Humber	Reach4	500.7203 04.01.06	50-year	15.88	265.05	265.83		265.87	0.00139	0.87	18.15	27.65	0.34
Upper Humber	Reach4	500.7203 04.01.06	100-year	19.7	265.05	265.94		265.99	0.001269	0.92	21.39	28.12	0.34
Upper Humber	Reach4	500.7203 04.01.06	350-year	33.64	265.05	266.28		266.34	0.001105	1.08	31.16	29.63	0.33
Upper Humber	Reach4	500.7203 04.01.06	500-year	48.6	265.05	266.58		266.65	0.001032	1.23	40.16	32.22	0.33
Upper Humber	Reach4	500.7203 04.01.06	Regional	182.7	265.05	268.18		268.37	0.000985	2.01	115.43	64.07	0.37
Upper Humber	Reach4	500.607 04.01.05	2-year	2.54	264.42	264.84	264.71	264.89	0.003816	0.91	2.8	8.63	0.51
Upper Humber	Reach4	500.607 04.01.05	5-year	5.16	264.42	265.05	264.85	265.11	0.003533	1.1	4.69	10.13	0.52
Upper Humber	Reach4	500.607 04.01.05	10-year	8.35	264.42	265.22	264.99	265.3	0.003514	1.27	6.59	11.46	0.53
Upper Humber	Reach4	500.607 04.01.05	25-year	8.35	264.42	265.22	264.99	265.3	0.003514	1.27	6.59	11.46	0.53
Upper Humber	Reach4	500.607 04.01.05	50-year	15.88	264.42	265.48	265.23	265.62	0.003727	1.64	9.9	14.69	0.58
Upper Humber	Reach4	500.607 04.01.05	100-year	19.7	264.42	265.58	265.33	265.74	0.003924	1.82	11.55	19.06	0.61
Upper Humber	Reach4	500.607 04.01.05	350-year	33.64	264.42	265.78	265.64	266.08	0.005619	2.48	16.25	25.77	0.75
Upper Humber	Reach4	500.607 04.01.05	500-year	48.6	264.42	265.97	265.92	266.39	0.006299	2.93	21.71	28.55	0.82
Upper Humber	Reach4	500.607 04.01.05	Regional	182.7	264.42	267.2	267.2	268.07	0.006667	4.69	75.64	77.28	0.94
Upper Humber	Reach4	500.406 04.01.04	2-year	2.54	263.37	263.69	263.64	263.77	0.008782	1.23	2.16	10.37	0.75
Upper Humber	Reach4	500.406 04.01.04	5-year	5.16	263.37	263.8	263.78	263.95	0.010823	1.72	3.48	12.31	0.88
Upper Humber	Reach4	500.406 04.01.04	10-year	8.35	263.37	263.91	263.91	264.12	0.011464	2.1	4.94	13.85	0.95
Upper Humber	Reach4	500.406 04.01.04	25-year	8.35	263.37	263.91	263.91	264.12	0.011464	2.1	4.94	13.85	0.95
Upper Humber	Reach4	500.406 04.01.04	50-year	15.88	263.37	264.16	264.16	264.45	0.009786	2.53	8.76	17.7	0.94
Upper Humber	Reach4	500.406 04.01.04	100-year	19.7	263.37	264.26	264.26	264.58	0.009233	2.68	10.66	18.83	0.93
Upper Humber	Reach4	500.406 04.01.04	350-year	33.64	263.37	264.65	264.65	264.94	0.005795	2.73	25.01	55.16	0.78
Upper Humber	Reach4	500.406 04.01.04	500-year	48.6	263.37	264.89	264.89	265.19	0.005362	2.95	39.53	65.88	0.78
Upper Humber	Reach4	500.406 04.01.04	Regional	182.7	263.37	267.13	265.87	267.2	0.000666	1.93	282.4	136.95	0.32
Upper Humber	Reach4	500.205 04.01.03	2-year	2.54	262.11	262.43	262.34	262.47	0.004818	0.88	2.92	11.8	0.55
Upper Humber	Reach4	500.205 04.01.03	5-year	5.16	262.11	262.59	262.46	262.65	0.004163	1.09	4.88	13.01	0.55
Upper Humber	Reach4	500.205 04.01.03	10-year	8.35	262.11	262.73	262.56	262.82	0.003977	1.28	6.83	13.94	0.56
Upper Humber	Reach4	500.205 04.01.03	25-year	8.35	262.11	262.73	262.56	262.82	0.003977	1.28	6.83	13.94	0.56
Upper Humber	Reach4	500.205 04.01.03	50-year	15.88	262.11	262.98	262.76	263.11	0.003986	1.65	10.41	15.58	0.6
Upper Humber	Reach4	500.205 04.01.03	100-year	19.7	262.11	263.07	262.84	263.24	0.004162	1.82	11.9	16.35	0.63
Upper Humber	Reach4	500.205 04.01.03	350-year	33.64	262.11	263.34	263.12	263.61	0.004867	2.36	16.56	20.3	0.71
Upper Humber	Reach4	500.205 04.01.03	500-year	48.6	262.11	263.57	263.37	263.94	0.005253	2.77	22.16	31.04	0.76
Upper Humber	Reach4	500.205 04.01.03	Regional	182.7	262.11	266.93	264.77	267.07	0.00054	2.04	178.91	58.25	0.3
Upper Humber	Reach4	499.9997 04.01.02	2-year	2.54	261.39	261.78	261.6	261.8	0.001974	0.66	3.84	11.64	0.37
Upper Humber	Reach4	499.9997 04.01.02	5-year	5.16	261.39	261.93	261.72	261.97	0.002263	0.91	5.85	16.42	0.42
Upper Humber	Reach4	499.9997 04.01.02	10-year	8.35	261.39	262.08	261.83	262.14	0.002313	1.1	8.47	18.25	0.44
Upper Humber	Reach4	499.9997 04.01.02	25-year	8.35	261.39	262.08	261.83	262.14	0.002313	1.1	8.47	18.25	0.44
Upper Humber	Reach4	499.9997 04.01.02	50-year	15.88	261.39	262.39	262.03	262.47	0.002041	1.34	15.27	30.96	0.44

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	499.9997 04.01.02	100-year	19.7	261.39	262.54	262.12	262.62	0.001787	1.39	20.86	42.93	0.43
Upper Humber	Reach4	499.9997 04.01.02	350-year	33.64	261.39	262.97	262.41	263.06	0.001253	1.46	43.06	59.15	0.38
Upper Humber	Reach4	499.9997 04.01.02	500-year	48.6	261.39	263.33	262.65	263.41	0.001024	1.51	65.31	65.62	0.35
Upper Humber	Reach4	499.9997 04.01.02	Regional	182.7	261.39	266.99	263.8	267	0.00007	0.81	570.2	195.53	0.11
Upper Humber	Reach4	499.9704 04.01.01	2-year	2.54	261.36	261.74	261.6	261.77	0.002785	0.75	3.39	10.98	0.43
Upper Humber	Reach4	499.9704 04.01.01	5-year	5.16	261.36	261.88	261.71	261.93	0.003476	1.04	4.98	11.66	0.51
Upper Humber	Reach4	499.9704 04.01.01	10-year	8.35	261.36	262.02	261.82	262.1	0.003804	1.26	6.63	12.35	0.55
Upper Humber	Reach4	499.9704 04.01.01	25-year	8.35	261.36	262.02	261.82	262.1	0.003804	1.26	6.63	12.35	0.55
Upper Humber	Reach4	499.9704 04.01.01	50-year	15.88	261.36	262.32	262.04	262.43	0.003358	1.5	10.58	13.66	0.54
Upper Humber	Reach4	499.9704 04.01.01	100-year	19.7	261.36	262.46	262.12	262.58	0.003163	1.58	12.49	14.27	0.54
Upper Humber	Reach4	499.9704 04.01.01	350-year	33.64	261.36	262.82	262.4	263	0.002835	1.88	18.49	34.09	0.54
Upper Humber	Reach4	499.9704 04.01.01	500-year	48.6	261.36	263.1	262.64	263.34	0.003008	2.21	23.95	48.17	0.57
Upper Humber	Reach4	499.9704 04.01.01	Regional	182.7	261.36	266.99	264.12	267	0.000074	0.81	551.31	196.1	0.11
Upper Humber	Reach4	499.9582 x-116 (08.10.33)		Bridge									
Upper Humber	Reach4	499.944 08.10.32	2-year	2.54	261.12	261.5	261.45	261.56	0.008335	1.04	2.44	10.99	0.71
Upper Humber	Reach4	499.944 08.10.32	5-year	5.16	261.12	261.69	261.56	261.75	0.004754	1.13	4.57	12.08	0.58
Upper Humber	Reach4	499.944 08.10.32	10-year	8.35	261.12	261.88	261.67	261.95	0.003341	1.22	6.92	12.98	0.52
Upper Humber	Reach4	499.944 08.10.32	25-year	8.35	261.12	261.88	261.67	261.95	0.003341	1.22	6.92	12.98	0.52
Upper Humber	Reach4	499.944 08.10.32	50-year	15.88	261.12	262.24	261.88	262.33	0.002266	1.4	11.89	14.73	0.47
Upper Humber	Reach4	499.944 08.10.32	100-year	19.7	261.12	262.38	261.96	262.49	0.002117	1.49	14.11	15.73	0.46
Upper Humber	Reach4	499.944 08.10.32	350-year	33.64	261.12	262.73	262.23	262.91	0.002308	1.88	20.4	20.03	0.51
Upper Humber	Reach4	499.944 08.10.32	500-year	48.6	261.12	262.93	262.49	263.2	0.003063	2.37	24.89	27.2	0.59
Upper Humber	Reach4	499.944 08.10.32	Regional	182.7	261.12	266.96	264.07	266.98	0.000067	0.81	480.58	160.35	0.11
Upper Humber	Reach4	499.9253 08.10.31	2-year	2.54	261.12	261.46	261.36	261.51	0.004975	0.93	2.72	9.73	0.56
Upper Humber	Reach4	499.9253 08.10.31	5-year	5.16	261.12	261.66	261.49	261.72	0.003699	1.08	4.78	10.99	0.52
Upper Humber	Reach4	499.9253 08.10.31	10-year	8.35	261.12	261.85	261.61	261.93	0.003073	1.19	7	11.96	0.5
Upper Humber	Reach4	499.9253 08.10.31	25-year	8.35	261.12	261.85	261.61	261.93	0.003073	1.19	7	11.96	0.5
Upper Humber	Reach4	499.9253 08.10.31	50-year	15.88	261.12	262.22	261.83	262.31	0.002425	1.35	11.78	14.02	0.47
Upper Humber	Reach4	499.9253 08.10.31	100-year	19.7	261.12	262.37	261.93	262.47	0.002228	1.42	13.91	14.75	0.46
Upper Humber	Reach4	499.9253 08.10.31	350-year	33.64	261.12	262.73	262.21	262.88	0.002383	1.74	21.24	27.26	0.49
Upper Humber	Reach4	499.9253 08.10.31	500-year	48.6	261.12	262.93	262.46	263.15	0.002923	2.11	27.92	40.25	0.56
Upper Humber	Reach4	499.9253 08.10.31	Regional	182.7	261.12	266.96	263.82	266.97	0.000055	0.71	504.6	160.91	0.1
Upper Humber	Reach3	403.011 08.10.29	2-year	2.62	260.55	261		261.02	0.001618	0.67	3.89	9.74	0.34
Upper Humber	Reach3	403.011 08.10.29	5-year	5.42	260.55	261.18		261.23	0.002045	0.94	5.76	10.68	0.4
Upper Humber	Reach3	403.011 08.10.29	10-year	9.14	260.55	261.35		261.43	0.002395	1.22	7.65	11.66	0.46
Upper Humber	Reach3	403.011 08.10.29	25-year	9.14	260.55	261.35		261.43	0.002395	1.22	7.65	11.66	0.46
Upper Humber	Reach3	403.011 08.10.29	50-year	18.68	260.55	261.67		261.82	0.002934	1.71	12.05	27.24	0.54
Upper Humber	Reach3	403.011 08.10.29	100-year	23.69	260.55	261.78	261.44	261.96	0.003252	1.93	15.71	37.88	0.57
Upper Humber	Reach3	403.011 08.10.29	350-year	42.09	260.55	262.09	262	262.33	0.003527	2.36	34.07	81.09	0.62
Upper Humber	Reach3	403.011 08.10.29	500-year	62.95	260.55	262.37	262.27	262.6	0.003105	2.49	59.99	102.33	0.6
Upper Humber	Reach3	403.011 08.10.29	Regional	252.35	260.55	266.95		266.96	0.000065	0.85	726.99	173.78	0.11
Upper Humber	Reach3	402.9478 08.10.28	2-year	2.62	260.43	260.7	260.69	260.79	0.014886	1.36	1.93	9.05	0.94
Upper Humber	Reach3	402.9478 08.10.28	5-year	5.42	260.43	260.88		260.99	0.008031	1.46	3.99	11.89	0.76
Upper Humber	Reach3	402.9478 08.10.28	10-year	9.14	260.43	261.06		261.19	0.006089	1.64	6.23	12.95	0.7
Upper Humber	Reach3	402.9478 08.10.28	25-year	9.14	260.43	261.06		261.19	0.006089	1.64	6.23	12.95	0.7
Upper Humber	Reach3	402.9478 08.10.28	50-year	18.68	260.43	261.41	261.22	261.59	0.00449	1.95	13.69	35.49	0.65
Upper Humber	Reach3	402.9478 08.10.28	100-year	23.69	260.43	261.56		261.73	0.003789	1.99	19.31	39.12	0.62
Upper Humber	Reach3	402.9478 08.10.28	350-year	42.09	260.43	261.96		262.11	0.00267	2.06	48.47	97.33	0.54
Upper Humber	Reach3	402.9478 08.10.28	500-year	62.95	260.43	262.3		262.41	0.001856	1.98	82.8	101.68	0.47
Upper Humber	Reach3	402.9478 08.10.28	Regional	252.35	260.43	266.94		266.96	0.000081	0.96	715.87	175.6	0.12
Upper Humber	Reach3	402.860 08.10.27	2-year	2.62	260.07	260.5		260.52	0.001163	0.58	4.55	11.82	0.29
Upper Humber	Reach3	402.860 08.10.27	5-year	5.42	260.07	260.69		260.72	0.001399	0.82	6.89	13.44	0.34
Upper Humber	Reach3	402.860 08.10.27	10-year	9.14	260.07	260.88		260.93	0.001522	1.03	9.63	15.36	0.37
Upper Humber	Reach3	402.860 08.10.27	25-year	9.14	260.07	260.88		260.93	0.001522	1.03	9.63	15.36	0.37
Upper Humber	Reach3	402.860 08.10.27	50-year	18.68	260.07	261.24		261.34	0.0017	1.4	16.51	24.21	0.42
Upper Humber	Reach3	402.860 08.10.27	100-year	23.69	260.07	261.39		261.5	0.00177	1.55	21.1	41.67	0.44
Upper Humber	Reach3	402.860 08.10.27	350-year	42.09	260.07	261.79		261.93	0.001668	1.8	42.68	55.46	0.44
Upper Humber	Reach3	402.860 08.10.27	500-year	62.95	260.07	262.1		262.26	0.001747	2.07	60.47	59.75	0.47
Upper Humber	Reach3	402.860 08.10.27	Regional	252.35	260.07	266.94		266.95	0.000064	0.89	796.36	213.07	0.11
Upper Humber	Reach3	402.710 08.10.26	2-year	2.62	259.89	260.22		260.25	0.003084	0.77	3.42	12.85	0.45
Upper Humber	Reach3	402.710 08.10.26	5-year	5.42	259.89	260.4		260.45	0.002611	0.98	6.15	15.88	0.45
Upper Humber	Reach3	402.710 08.10.26	10-year	9.14	259.89	260.6		260.67	0.002182	1.13	9.46	16.9	0.44
Upper Humber	Reach3	402.710 08.10.26	25-year	9.14	259.89	260.6		260.67	0.002182	1.13	9.46	16.9	0.44
Upper Humber	Reach3	402.710 08.10.26	50-year	18.68	259.89	260.96		261.06	0.00204	1.45	16.84	27.41	0.45
Upper Humber	Reach3	402.710 08.10.26	100-year	23.69	259.89	261.11		261.22	0.00199	1.56	21.83	38.88	0.46
Upper Humber	Reach3	402.710 08.10.26	350-year	42.09	259.89	261.54		261.68	0.001831	1.84	45.48	78.93	0.46
Upper Humber	Reach3	402.710 08.10.26	500-year	62.95	259.89	261.9		262.03	0.001504	1.9	79.26	99.41	0.43
Upper Humber	Reach3	402.710 08.10.26	Regional	252.35	259.89	266.94		266.95	0.000043	0.75	935.67	213.26	0.09
Upper Humber	Reach3	402.562 08.10.25	2-year	2.62	259.38	259.81		259.83	0.001446	0.61	4.29	11.46	0.32
Upper Humber	Reach3	402.562 08.10.25	5-year	5.42	259.38	260.04		260.07	0.001329	0.77	7.05	12.47	0.33
Upper Humber	Reach3	402.562 08.10.25	10-year	9.14	259.38	260.26		260.31	0.001341	0.91	10.08	16.52	0.34
Upper Humber	Reach3	402.562 08.10.25	25-year	9.14	259.38	260.26		260.31	0.001341	0.91	10.08	16.52	0.34
Upper Humber	Reach3	402.562 08.10.25	50-year	18.68	259.38	260.7		260.75	0.001072	1.1	21.78	31.98	0.33
Upper Humber	Reach3	402.562 08.10.25	100-year	23.69	259.38	260.86		260.92	0.001036	1.18	27.04	32.78	0.33
Upper Humber	Reach3	402.562 08.10.25	350-year	42.09	259.38	261.28		261.38	0.001128	1.48	41.92	37.58	0.36
Upper Humber	Reach3	402.562 08.10.25	500-year	62.95	259.38	261.62		261.75	0.001265	1.77	55.01	39.83	0.39
Upper Humber	Reach3	402.562 08.10.25	Regional	252.35	259.38	266.92		266.94	0.000052	0.84	929.53	265.95	0.1
Upper Humber	Reach3	402.412 08.10.24	2-year	2.62	259.2	259.74		259.75	0.000563	0.45	5.88	12.55	0.21
Upper Humber	Reach3	402.412 08.10.24	5-year	5.42	259.2	259.96		259.98	0.000669	0.64	8.8	13.16	0.24
Upper Humber	Reach3	402.412 08.10.24	10-year	9.14	259.2	260.18		260.22	0.000772	0.82	11.74	13.92	0.27
Upper Humber	Reach3	402.412 08.10.24	25-year	9.14	259.2	260.18		260.22	0.000772	0.82	11.74	13.92	0.27
Upper Humber	Reach3	402.412 08.10.24	50-year	18.68	259.2	260.6		260.67	0.000892	1.13	19.26	24.06	0.31
Upper Humber	Reach3	402.412 08.10.24	100-year	23.69	259.2	260.75		260.83	0.000979	1.27	23.19	28.21	0.33
Upper Humber	Reach3	402.412 08.10.24	350-year	42.09	259.2	261.14		261.27	0.001286	1.69	36.79	39.28	0.39
Upper Humber	Reach3	402.412 08.10.24	500-year	62.95	259.2	261.43		261.62	0.001619	2.09	49.94	53.8	0.45
Upper Humber	Reach3	402.412 08.10.24	Regional	252.35	259.2	266.92		266.93	0.000036	0.72	1111.74	290	0.08
Upper Humber	Reach3	402.258 08.10.23	2-year	2.62	259.05	259.37	259.37	259.49	0.016223	1.51	1.78	8.16	1
Upper Humber	Reach3	402.258 08.10.23	5-year	5.42	259.05	259.53	259.53	259.7	0.012114	1.84	3.38	12.7	0.94
Upper Humber	Reach3	402.258 08.10.23	10-year	9.14	259.05	259.67	259.67	259.9	0.011069	2.17	5.33	14.16	0.94
Upper Humber	Reach3	402.258 08.10.23	25-year	9.14	259.05	259.67	259.67	259.9	0.011069	2.17	5.33	14.16	0.94
Upper Humber	Reach3	402.258 08.10.23	50-year	18.68	259.05	259.9	259.9	260.29	0.012585	2.93	8.82	18.4	1.07
Upper Humber	Reach3	402.258 08.10.23	100-year	23.69	259.05	260.07	259.89	260.45	0.009947	2.97	12.36	22.45	0.98
Upper Humber	Reach3	402.258 08.10.23	350-year	42.09	259.05	260.57	260.48	260.89	0.005386	2.91	27.77	44.35	0.78
Upper Humber	Reach3	402.258 08.10.23	500-year	62.95	259.05	260.97		261.25	0.003871	2.91	51.45	64.76	0.69
Upper Humber	Reach3	402.258 08.10.23	Regional	252.35	259.05	266.91		266.92	0.00007	1.02	887.31	257.39	0.12
Upper Humber	Reach3	402.107 08.10.22	2-year	2.62	258.6	259.06		259.07	0.000481	0.39	7.16	18.69	0.19
Upper Humber	Reach3	402.107 08.10.22	5-year	5.42	258.6	259.31		259.32	0.000436	0.5	11.89	19.59	0.19
Upper Humber	Reach3	402.107 08.10.22	10-year	9.14	258.6	259.54		259.56	0.000457	0.62	16.49	20.5	0.21
Upper Humber	Reach3	402.107 08.10.22	25-year	9.14	258.6	259.54		259.56	0.000457	0.62	16.49	20.5	0.21
Upper Humber	Reach3	402.107 08.10.22	50-year	18.68	258.6	259.93		259.97	0.000553	0.87	28.32	39.72	0.24
Upper Humber	Reach3	402.107 08.10.22	100-year	23.69	258.6	260.08		260.13	0.000575	0.96	34.51	40.91	0.25
Upper Humber	Reach3	402.107 08.10.22	350-year	42.09	258.6	260.54		260.61	0.000639	1.21	61.31	80.08	0.28
Upper Humber	Reach3	402.107 08.10.22	500-year	62.95	258.6	260.93		261	0.00062	1.35	98.39	109.42	0.28
Upper Humber	Reach3	402.107 08.10.22	Regional	252.35	258.6	266.91		266.92	0.00002	0.57	1214.16	228	0.06
Upper Humber	Reach3	401.959 08.10.21	2-year	2.62	258.39	258.97	258.63	258.98	0.000685	0.55	5.24	11.91	0.24
Upper Humber	Reach3	401.959 08.10.21	5-year	5.42	258.39	259.2	258.76	259.23	0.000853	0.77	8.69	18.8	0.28
Upper Humber	Reach3	401.959 08.10.21	10-year	9.14	258.39	259.41	258.9	259.46	0.00102	0.99	12.97	24.62	0.32
Upper Humber	Reach3	401.959 08.10.21	25-year	9.14	258.39	259.41	258.9	259.46	0.00102	0.99	12.97	24.62	0.32
Upper Humber	Reach3	401.959 08.10.21	50-year	18.68	258.39	259.77	259.23	259.84	0.001288	1.36	22.45	29.63	0.38
Upper Humber	Reach3	401.959 08.10.21	100-year	23.69	258.39	259.91	259.35	260	0.001385	1.51	26.72	31.36	0.4
Upper Humber	Reach3	401.959 08.10.21	350-year	42.09	258.39	260.33	259.71	260.46	0.001553	1.89	43.04	44.51	0.44
Upper Humber	Reach3	401.959 08.10.21	500-year	62.95	258.39	260.7	260.01	260.86	0.001612	2.16	61.09	53.44	0.46
Upper Humber	Reach3	401.959 08.10.21	Regional	252.35	258.39	266.91	261.75	266.91	0.00003	0.71	1213.41	330.39	0.08
Upper Humber	Reach3	401.8453 08.10.20	2-year	2.62	258.3	258.89		258.9	0.000814	0.53	4.97	12.33	0.25
Upper Humber	Reach3	401.8453 08.10.20	5-year	5.42	258.3	259.1		259.13	0.001004	0.72	8.56	19.6	0.29

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach3	401.8453 08.10.20	10-year	9.14	258.3	259.3		259.33	0.001125	0.88	12.93	25.58	0.32
Upper Humber	Reach3	401.8453 08.10.20	25-year	9.14	258.3	259.3		259.33	0.001125	0.88	12.93	25.58	0.32
Upper Humber	Reach3	401.8453 08.10.20	50-year	18.68	258.3	259.63		259.69	0.001333	1.19	22.84	35.05	0.36
Upper Humber	Reach3	401.8453 08.10.20	100-year	23.69	258.3	259.76		259.84	0.001338	1.29	27.74	35.93	0.37
Upper Humber	Reach3	401.8453 08.10.20	350-year	42.09	258.3	260.2		260.29	0.001262	1.53	47.35	52.66	0.38
Upper Humber	Reach3	401.8453 08.10.20	500-year	62.95	258.3	260.58		260.69	0.001219	1.72	68.3	58.39	0.38
Upper Humber	Reach3	401.8453 08.10.20	Regional	252.35	258.3	266.91		266.91	0.000013	0.46	1699.34	480.49	0.05
Upper Humber	Reach3	401.806 08.10.19	2-year	2.62	258.3	258.85	258.56	258.87	0.000842	0.57	5.25	16.89	0.26
Upper Humber	Reach3	401.806 08.10.19	5-year	5.42	258.3	259.06	258.68	259.09	0.00101	0.79	9.31	24.62	0.3
Upper Humber	Reach3	401.806 08.10.19	10-year	9.14	258.3	259.25	258.82	259.29	0.001139	0.98	14.57	29.21	0.33
Upper Humber	Reach3	401.806 08.10.19	25-year	9.14	258.3	259.25	258.82	259.29	0.001139	0.98	14.57	29.21	0.33
Upper Humber	Reach3	401.806 08.10.19	50-year	18.68	258.3	259.57	259.1	259.64	0.001383	1.32	25	38.22	0.38
Upper Humber	Reach3	401.806 08.10.19	100-year	23.69	258.3	259.7	259.23	259.78	0.001441	1.45	30.47	41.81	0.4
Upper Humber	Reach3	401.806 08.10.19	350-year	42.09	258.3	260.13	259.54	260.24	0.001427	1.73	50.13	49.8	0.41
Upper Humber	Reach3	401.806 08.10.19	500-year	62.95	258.3	260.48	259.81	260.63	0.00165	2.09	69.04	66.06	0.46
Upper Humber	Reach3	401.806 08.10.19	Regional	252.35	258.3	266.91	261.27	266.91	0.000021	0.59	1435.13	381	0.06
Upper Humber	Reach3	401.653 08.10.18	2-year	2.62	258.21	258.7	258.47	258.72	0.00118	0.56	4.81	14.14	0.29
Upper Humber	Reach3	401.653 08.10.18	5-year	5.42	258.21	258.88	258.58	258.91	0.001356	0.78	7.68	18.72	0.33
Upper Humber	Reach3	401.653 08.10.18	10-year	9.14	258.21	259.03	258.7	259.08	0.001598	0.99	10.97	22.28	0.38
Upper Humber	Reach3	401.653 08.10.18	25-year	9.14	258.21	259.03	258.7	259.08	0.001598	0.99	10.97	22.28	0.38
Upper Humber	Reach3	401.653 08.10.18	50-year	18.68	258.21	259.2	258.95	259.32	0.003072	1.59	15.32	28.13	0.54
Upper Humber	Reach3	401.653 08.10.18	100-year	23.69	258.21	259.25	259.05	259.42	0.004046	1.89	16.69	28.73	0.63
Upper Humber	Reach3	401.653 08.10.18	350-year	42.09	258.21	259.35	259.35	259.76	0.008682	2.97	19.68	30.45	0.93
Upper Humber	Reach3	401.653 08.10.18	500-year	62.95	258.21	259.63	259.63	260.11	0.008015	3.33	28.71	35.55	0.93
Upper Humber	Reach3	401.653 08.10.18	Regional	252.35	258.21	266.9	261.09	266.91	0.000015	0.51	1342.49	253.15	0.06
Upper Humber	Reach3	401.5635 08.10.17	2-year	2.62	258.09	258.4	258.34	258.44	0.007401	0.96	3.22	17.1	0.66
Upper Humber	Reach3	401.5635 08.10.17	5-year	5.42	258.09	258.48	258.45	258.57	0.010418	1.4	4.92	27.51	0.83
Upper Humber	Reach3	401.5635 08.10.17	10-year	9.14	258.09	258.56	258.56	258.69	0.01104	1.71	8.94	75.4	0.89
Upper Humber	Reach3	401.5635 08.10.17	25-year	9.14	258.09	258.56	258.56	258.69	0.01104	1.71	8.94	75.4	0.89
Upper Humber	Reach3	401.5635 08.10.17	50-year	18.68	258.09	258.74	258.71	258.82	0.005879	1.62	32	153.67	0.69
Upper Humber	Reach3	401.5635 08.10.17	100-year	23.69	258.09	258.82	258.76	258.88	0.004242	1.51	46.18	184.24	0.6
Upper Humber	Reach3	401.5635 08.10.17	350-year	42.09	258.09	259.11	258.88	259.14	0.001611	1.19	102.43	201.99	0.39
Upper Humber	Reach3	401.5635 08.10.17	500-year	62.95	258.09	259.73	258.95	259.73	0.000308	0.73	228.96	209.5	0.19
Upper Humber	Reach3	401.5635 08.10.17	Regional	252.35	258.09	266.9	259.38	266.9	0.000004	0.26	2415.37	381.61	0.03
Upper Humber	Reach3	401.5301 08.10.16	2-year	2.62	258.06	258.31	258.3	258.36	0.011421	1.1	4.04	37.75	0.81
Upper Humber	Reach3	401.5301 08.10.16	5-year	5.42	258.06	258.37	258.37	258.45	0.015214	1.51	6.46	39.39	0.97
Upper Humber	Reach3	401.5301 08.10.16	10-year	9.14	258.06	258.45	258.45	258.55	0.0153	1.76	9.54	42.78	1.01
Upper Humber	Reach3	401.5301 08.10.16	25-year	9.14	258.06	258.45	258.45	258.55	0.0153	1.76	9.54	42.78	1.01
Upper Humber	Reach3	401.5301 08.10.16	50-year	18.68	258.06	258.69	258.59	258.75	0.006701	1.48	30.77	134.94	0.71
Upper Humber	Reach3	401.5301 08.10.16	100-year	23.69	258.06	258.79	258.66	258.84	0.004149	1.32	43.54	146.3	0.58
Upper Humber	Reach3	401.5301 08.10.16	350-year	42.09	258.06	259.09	258.78	259.12	0.001799	1.17	87.88	183.51	0.41
Upper Humber	Reach3	401.5301 08.10.16	500-year	62.95	258.06	259.72	258.88	259.73	0.000343	0.74	218.66	229.42	0.2
Upper Humber	Reach3	401.5301 08.10.16	Regional	252.35	258.06	266.9	259.39	266.9	0.000003	0.22	2678.88	425.96	0.02
Upper Humber	Reach3	401.5193 x-111 (08.10.15)		Culvert									
Upper Humber	Reach3	401.5072 08.10.14	2-year	2.62	257.61	258.11	257.94	258.15	0.002834	0.8	3.28	11.09	0.44
Upper Humber	Reach3	401.5072 08.10.14	5-year	5.42	257.61	258.31	258.09	258.35	0.002896	0.98	6.54	20.48	0.47
Upper Humber	Reach3	401.5072 08.10.14	10-year	9.14	257.61	258.45	258.26	258.52	0.003324	1.2	9.96	36.77	0.52
Upper Humber	Reach3	401.5072 08.10.14	25-year	9.14	257.61	258.45	258.26	258.52	0.003324	1.2	9.96	36.77	0.52
Upper Humber	Reach3	401.5072 08.10.14	50-year	18.68	257.61	258.65	258.54	258.75	0.003615	1.51	25.9	131.55	0.56
Upper Humber	Reach3	401.5072 08.10.14	100-year	23.69	257.61	258.75	258.63	258.83	0.003014	1.49	35.74	142.39	0.53
Upper Humber	Reach3	401.5072 08.10.14	350-year	42.09	257.61	259.05	258.81	259.11	0.001906	1.46	75.76	212.82	0.44
Upper Humber	Reach3	401.5072 08.10.14	500-year	62.95	257.61	259.71	258.91	259.72	0.000308	0.8	223.49	297.22	0.19
Upper Humber	Reach3	401.5072 08.10.14	Regional	252.35	257.61	266.9	259.55	266.9	0.000003	0.21	3010.77	452.83	0.02
Upper Humber	Reach3	401.4879 08.10.13	2-year	2.62	257.61	258.09	257.9	258.13	0.002279	0.79	3.41	12.17	0.4
Upper Humber	Reach3	401.4879 08.10.13	5-year	5.42	257.61	258.28	258.05	258.33	0.002468	1.01	7.9	47.7	0.44
Upper Humber	Reach3	401.4879 08.10.13	10-year	9.14	257.61	258.43	258.24	258.48	0.002566	1.17	14.82	114.86	0.46
Upper Humber	Reach3	401.4879 08.10.13	25-year	9.14	257.61	258.43	258.24	258.48	0.002566	1.17	14.82	114.86	0.46
Upper Humber	Reach3	401.4879 08.10.13	50-year	18.68	257.61	258.65	258.51	258.68	0.001463	1.07	58.78	230.08	0.37
Upper Humber	Reach3	401.4879 08.10.13	100-year	23.69	257.61	258.75	258.55	258.77	0.001084	0.99	82.46	244.92	0.32
Upper Humber	Reach3	401.4879 08.10.13	350-year	42.09	257.61	259.05	258.68	259.06	0.000552	0.85	163.44	279.91	0.24
Upper Humber	Reach3	401.4879 08.10.13	500-year	62.95	257.61	259.71	258.76	259.71	0.000117	0.52	360.01	318.46	0.12
Upper Humber	Reach3	401.4879 08.10.13	Regional	252.35	257.61	266.9	259.17	266.9	0.000002	0.19	3163.59	451.41	0.02
Upper Humber	Reach3	401.354 08.10.12	2-year	2.62	257.31	257.92	257.64	257.93	0.00086	0.57	6.99	28.8	0.26
Upper Humber	Reach3	401.354 08.10.12	5-year	5.42	257.31	258.13	257.79	258.15	0.000767	0.69	18.28	89.32	0.26
Upper Humber	Reach3	401.354 08.10.12	10-year	9.14	257.31	258.3	257.93	258.32	0.000635	0.72	37.56	133.85	0.25
Upper Humber	Reach3	401.354 08.10.12	25-year	9.14	257.31	258.3	257.93	258.32	0.000635	0.72	37.56	133.85	0.25
Upper Humber	Reach3	401.354 08.10.12	50-year	18.68	257.31	258.55	258.18	258.56	0.000556	0.8	76.82	200.2	0.24
Upper Humber	Reach3	401.354 08.10.12	100-year	23.69	257.31	258.66	258.27	258.67	0.00054	0.83	100.27	226.01	0.24
Upper Humber	Reach3	401.354 08.10.12	350-year	42.09	257.31	259	258.41	259.01	0.000353	0.79	181.08	248.93	0.2
Upper Humber	Reach3	401.354 08.10.12	500-year	62.95	257.31	259.7	258.52	259.7	0.000097	0.53	362.18	268.47	0.11
Upper Humber	Reach3	401.354 08.10.12	Regional	252.35	257.31	266.9	259.04	266.9	0.000002	0.22	2877.08	412.1	0.02
Upper Humber	Reach3	401.200 08.10.11	2-year	2.62	257.25	257.82	257.58	257.84	0.001501	0.68	4.59	20.26	0.33
Upper Humber	Reach3	401.200 08.10.11	5-year	5.42	257.25	258.04	257.74	258.06	0.001202	0.79	12.64	57.21	0.32
Upper Humber	Reach3	401.200 08.10.11	10-year	9.14	257.25	258.23	257.91	258.25	0.000876	0.8	28.1	95.19	0.28
Upper Humber	Reach3	401.200 08.10.11	25-year	9.14	257.25	258.23	257.91	258.25	0.000876	0.8	28.1	95.19	0.28
Upper Humber	Reach3	401.200 08.10.11	50-year	18.68	257.25	258.48	258.16	258.5	0.000881	0.96	53.53	111.51	0.3
Upper Humber	Reach3	401.200 08.10.11	100-year	23.69	257.25	258.59	258.21	258.61	0.000844	1.01	66.12	118.23	0.3
Upper Humber	Reach3	401.200 08.10.11	350-year	42.09	257.25	258.94	258.38	258.97	0.000684	1.08	109.37	144.78	0.28
Upper Humber	Reach3	401.200 08.10.11	500-year	62.95	257.25	259.68	258.53	259.69	0.000214	0.78	216.89	206.38	0.17
Upper Humber	Reach3	401.200 08.10.11	Regional	252.35	257.25	266.9	259.21	266.9	0.000001	0.17	2809.97	437.32	0.02
Upper Humber	Reach3	401.053 08.10.10	2-year	2.62	256.77	257.35	257.17	257.4	0.002932	1.08	3.24	8.35	0.48
Upper Humber	Reach3	401.053 08.10.10	5-year	5.42	256.77	257.58	257.35	257.67	0.003214	1.44	5.88	18.18	0.54
Upper Humber	Reach3	401.053 08.10.10	10-year	9.14	256.77	257.75	257.57	257.89	0.00402	1.86	11.18	42.72	0.62
Upper Humber	Reach3	401.053 08.10.10	25-year	9.14	256.77	257.75	257.57	257.89	0.00402	1.86	11.18	42.72	0.62
Upper Humber	Reach3	401.053 08.10.10	50-year	18.68	256.77	258.12	257.95	258.21	0.002378	1.79	28.79	53.52	0.51
Upper Humber	Reach3	401.053 08.10.10	100-year	23.69	256.77	258.24	258.02	258.33	0.002325	1.88	35.34	56.71	0.51
Upper Humber	Reach3	401.053 08.10.10	350-year	42.09	256.77	258.67	258.25	258.74	0.001692	1.92	60.52	61.37	0.45
Upper Humber	Reach3	401.053 08.10.10	500-year	62.95	256.77	259.59	258.43	259.62	0.000465	1.32	131.95	124.66	0.25
Upper Humber	Reach3	401.053 08.10.10	Regional	252.35	256.77	266.9	259.41	266.9	0.000004	0.27	2483.72	462.37	0.03
Upper Humber	Reach3	401.0192 08.10.09	2-year	2.62	256.71	257.29	257.04	257.32	0.001851	0.76	3.45	7.92	0.37
Upper Humber	Reach3	401.0192 08.10.09	5-year	5.42	256.71	257.53	257.21	257.57	0.001825	0.96	6.73	30.4	0.39
Upper Humber	Reach3	401.0192 08.10.09	10-year	9.14	256.71	257.75	257.37	257.79	0.00126	0.97	17.65	54	0.34
Upper Humber	Reach3	401.0192 08.10.09	25-year	9.14	256.71	257.75	257.37	257.79	0.00126	0.97	17.65	54	0.34
Upper Humber	Reach3	401.0192 08.10.09	50-year	18.68	256.71	258.11	257.73	258.14	0.000921	1.05	37.41	56.48	0.31
Upper Humber	Reach3	401.0192 08.10.09	100-year	23.69	256.71	258.22	257.8	258.26	0.000961	1.14	43.99	57.17	0.32
Upper Humber	Reach3	401.0192 08.10.09	350-year	42.09	256.71	258.65	258	258.69	0.000862	1.31	69.97	77.13	0.32
Upper Humber	Reach3	401.0192 08.10.09	500-year	62.95	256.71	259.59	258.17	259.61	0.000191	0.82	163.18	151.01	0.16
Upper Humber	Reach3	401.0192 08.10.09	Regional	252.35	256.71	266.9	259.17	266.9	0.000002	0.18	2889.82	741.43	0.02
Upper Humber	Reach3	400.903 08.10.08	2-year	2.62	256.5	257.04	256.84	257.08	0.002257	0.86	3.13	7.77	0.41
Upper Humber	Reach3	400.903 08.10.08	5-year	5.42	256.5	257.28	257	257.34	0.002294	1.15	5.08	8.85	0.45
Upper Humber	Reach3	400.903 08.10.08	10-year	9.14	256.5	257.49	257.17	257.6	0.002502	1.45	7.17	10.53	0.49
Upper Humber	Reach3	400.903 08.10.08	25-year	9.14	256.5	257.49	257.17	257.6	0.002502	1.45	7.17	10.53	0.49
Upper Humber	Reach3	400.903 08.10.08	50-year	18.68	256.5	257.93	257.51	258.02	0.001676	1.54	28.34	68.6	0.43
Upper Humber	Reach3	400.903 08.10.08	100-year	23.69	256.5	258.06	257.83	258.14	0.001579	1.59	37.38	71.83	0.42
Upper Humber	Reach3	400.903 08.10.08	350-year	42.09	256.5	258.55	258.07	258.61	0.000969	1.51	76.14	95.35	0.35
Upper Humber	Reach3	400.903 08.10.08	500-year	62.95	256.5	259.58	258.25	259.59	0.000178	0.86	196.75	166.91	0.16
Upper Humber	Reach3	400.903 08.10.08	Regional	252.35	256.5	266.9	259.14	266.9	0.000002	0.21	2874.73	503.51	0.02
Upper Humber	Reach3	400.752 08.10.07	2-year	2.62	256.32	256.87	256.56	256.88	0.000817	0.55	5.06	11.66	0.25
Upper Humber	Reach3	400.752 08.10.07	5-year	5.42	256.32	257.09	256.69	257.12	0.000945	0.76	8.24	17.64	0.29
Upper Humber	Reach3	400.752 08.10.07	10-year	9.14	256.32	257.31	256.83	257.35	0.001044	0.95	12.89	26.35	0.32
Upper Humber	Reach3	400.752 08.10.07	25-year	9.14	256.32	257.31	256.83	257.35	0.001044	0.95	12.89	26.35	0.32
Upper Humber	Reach3	400.752 08.10.07	50-year	18.68	256.32	257.87	257.11	257.9	0.000444	0.85	52.22	91.19	0.22
Upper Humber	Reach3	400.752 08.10.07	100-year	23.69	256.32	258	257.25	258.03	0.000449	0.91	64.96	102.89	0.23
Upper Humber	Reach3	400.752 08.10.07	350-year	42.09	256.32	258.52	257.66	258.54	0.000278	0.86	128.56	133.39	0.19
Upper Humber	Reach3	400.752 08.10.07	500-year	62.95	256.32	259.58	257.87	259.58	0.000069	0.56	288.39	209.84	0.1
Upper Humber	Reach3	400.752 08.10.07	Regional	252.35	256.32	266.9	258.68	266.9	0.000002	0.19	2680.41	412.59	0.02

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach3	400.602 08.10.06	2-year	2.62	256.17	256.6	256.42	256.63	0.002644	0.81	3.27	10.19	0.43
Upper Humber	Reach3	400.602 08.10.06	5-year	5.42	256.17	256.85	256.57	256.89	0.001922	0.93	6.92	22.21	0.39
Upper Humber	Reach3	400.602 08.10.06	10-year	9.14	256.17	257.14	256.73	257.17	0.000987	0.88	19.53	57.34	0.3
Upper Humber	Reach3	400.602 08.10.06	25-year	9.14	256.17	257.14	256.73	257.17	0.000987	0.88	19.53	57.34	0.3
Upper Humber	Reach3	400.602 08.10.06	50-year	18.68	256.17	257.83	257.05	257.84	0.000253	0.66	63.56	68.84	0.17
Upper Humber	Reach3	400.602 08.10.06	100-year	23.69	256.17	257.95	257.13	257.97	0.000288	0.74	72.25	70.58	0.18
Upper Humber	Reach3	400.602 08.10.06	350-year	42.09	256.17	258.48	257.36	258.5	0.000273	0.86	114.05	85.99	0.19
Upper Humber	Reach3	400.602 08.10.06	500-year	62.95	256.17	259.56	257.53	259.57	0.000093	0.66	242.15	166.73	0.12
Upper Humber	Reach3	400.602 08.10.06	Regional	252.35	256.17	266.9	258.54	266.9	0.000004	0.31	2008.81	330.03	0.03
Upper Humber	Reach3	400.451 08.10.05	2-year	2.62	255.9	256.5	256.14	256.51	0.000471	0.45	7.97	34.65	0.19
Upper Humber	Reach3	400.451 08.10.05	5-year	5.42	255.9	256.79	256.26	256.8	0.00033	0.5	19.23	40.46	0.17
Upper Humber	Reach3	400.451 08.10.05	10-year	9.14	255.9	257.1	256.4	257.11	0.000248	0.54	32.3	42.85	0.16
Upper Humber	Reach3	400.451 08.10.05	25-year	9.14	255.9	257.1	256.4	257.11	0.000248	0.54	32.3	42.85	0.16
Upper Humber	Reach3	400.451 08.10.05	50-year	18.68	255.9	257.81	256.67	257.82	0.000158	0.59	64.9	50.58	0.14
Upper Humber	Reach3	400.451 08.10.05	100-year	23.69	255.9	257.92	256.74	257.94	0.000198	0.69	71.28	56.65	0.16
Upper Humber	Reach3	400.451 08.10.05	350-year	42.09	255.9	258.44	256.97	258.47	0.000286	0.96	115.9	124.49	0.2
Upper Humber	Reach3	400.451 08.10.05	500-year	62.95	255.9	259.55	257.17	259.56	0.00008	0.65	274.67	150.53	0.11
Upper Humber	Reach3	400.451 08.10.05	Regional	252.35	255.9	266.9	258.77	266.9	0.000006	0.36	1776.9	250.69	0.04
Upper Humber	Reach3	400.301 08.10.04	2-year	2.62	255.81	256.43	256.07	256.44	0.000513	0.48	7.43	27.89	0.21
Upper Humber	Reach3	400.301 08.10.04	5-year	5.42	255.81	256.74	256.19	256.75	0.00033	0.52	22.66	73.58	0.18
Upper Humber	Reach3	400.301 08.10.04	10-year	9.14	255.81	257.08	256.34	257.08	0.00018	0.48	50.29	96.58	0.14
Upper Humber	Reach3	400.301 08.10.04	25-year	9.14	255.81	257.08	256.34	257.08	0.00018	0.48	50.29	96.58	0.14
Upper Humber	Reach3	400.301 08.10.04	50-year	18.68	255.81	257.8	256.65	257.8	0.000072	0.41	122.89	109.95	0.09
Upper Humber	Reach3	400.301 08.10.04	100-year	23.69	255.81	257.91	256.75	257.92	0.000091	0.48	136.5	123.7	0.11
Upper Humber	Reach3	400.301 08.10.04	350-year	42.09	255.81	258.43	256.95	258.44	0.0001	0.58	207.67	142.79	0.12
Upper Humber	Reach3	400.301 08.10.04	500-year	62.95	255.81	259.55	257.04	259.55	0.000041	0.48	378.44	161.68	0.08
Upper Humber	Reach3	400.301 08.10.04	Regional	252.35	255.81	266.9	257.88	266.9	0.000005	0.35	1886.39	290.02	0.03
Upper Humber	Reach3	400.150 08.10.03	2-year	2.62	255.6	256.35	255.94	256.36	0.000542	0.54	7.41	44.16	0.21
Upper Humber	Reach3	400.150 08.10.03	5-year	5.42	255.6	256.68	256.13	256.7	0.000455	0.65	16.12	72.97	0.21
Upper Humber	Reach3	400.150 08.10.03	10-year	9.14	255.6	257.03	256.29	257.05	0.000318	0.67	28.58	76.08	0.19
Upper Humber	Reach3	400.150 08.10.03	25-year	9.14	255.6	257.03	256.29	257.05	0.000318	0.67	28.58	76.08	0.19
Upper Humber	Reach3	400.150 08.10.03	50-year	18.68	255.6	257.77	256.56	257.78	0.000209	0.73	61.14	92.91	0.16
Upper Humber	Reach3	400.150 08.10.03	100-year	23.69	255.6	257.88	256.73	257.9	0.000268	0.85	66.69	94.35	0.18
Upper Humber	Reach3	400.150 08.10.03	350-year	42.09	255.6	258.37	256.99	258.41	0.000408	1.21	104.24	139.69	0.24
Upper Humber	Reach3	400.150 08.10.03	500-year	62.95	255.6	259.53	257.22	259.54	0.000123	0.84	220.09	151.91	0.14
Upper Humber	Reach3	400.150 08.10.03	Regional	252.35	255.6	266.89	258.8	266.9	0.000005	0.34	2103.79	327.37	0.03
Upper Humber	Reach3	400.0705 08.10.02	2-year	2.62	255.6	256.32	255.89	256.32	0.000207	0.3	8.99	30.06	0.13
Upper Humber	Reach3	400.0705 08.10.02	5-year	5.42	255.6	256.66	255.99	256.67	0.000159	0.36	18.76	43.84	0.12
Upper Humber	Reach3	400.0705 08.10.02	10-year	9.14	255.6	257.02	256.09	257.03	0.000126	0.41	32.44	53.36	0.12
Upper Humber	Reach3	400.0705 08.10.02	25-year	9.14	255.6	257.02	256.09	257.03	0.000126	0.41	32.44	53.36	0.12
Upper Humber	Reach3	400.0705 08.10.02	50-year	18.68	255.6	257.76	256.29	257.77	0.000089	0.47	72.29	97.43	0.11
Upper Humber	Reach3	400.0705 08.10.02	100-year	23.69	255.6	257.87	256.4	257.88	0.000116	0.55	79.75	104.12	0.12
Upper Humber	Reach3	400.0705 08.10.02	350-year	42.09	255.6	258.37	256.69	258.38	0.000145	0.71	120.6	121.37	0.14
Upper Humber	Reach3	400.0705 08.10.02	500-year	62.95	255.6	259.52	256.94	259.53	0.000068	0.62	236.8	163.13	0.1
Upper Humber	Reach3	400.0705 08.10.02	Regional	252.35	255.6	266.89	258.32	266.9	0.000003	0.29	2439.81	392.79	0.03
Upper Humber	Reach3	400.0388 08.10.01	2-year	2.62	255.6	256.31	255.88	256.32	0.000282	0.38	7.78	15.59	0.15
Upper Humber	Reach3	400.0388 08.10.01	5-year	5.42	255.6	256.65	256	256.66	0.000261	0.49	13.05	19.38	0.16
Upper Humber	Reach3	400.0388 08.10.01	10-year	9.14	255.6	257	256.11	257.02	0.000245	0.58	18.94	28.11	0.16
Upper Humber	Reach3	400.0388 08.10.01	25-year	9.14	255.6	257	256.11	257.02	0.000245	0.58	18.94	28.11	0.16
Upper Humber	Reach3	400.0388 08.10.01	50-year	18.68	255.6	257.75	256.36	257.76	0.00017	0.66	50.68	58.07	0.15
Upper Humber	Reach3	400.0388 08.10.01	100-year	23.69	255.6	257.85	256.46	257.87	0.000222	0.77	55.41	61.72	0.17
Upper Humber	Reach3	400.0388 08.10.01	350-year	42.09	255.6	258.34	256.8	258.37	0.000281	1	85.19	77.64	0.2
Upper Humber	Reach3	400.0388 08.10.01	500-year	62.95	255.6	259.51	257.11	259.53	0.000118	0.83	180.67	107.49	0.14
Upper Humber	Reach3	400.0388 08.10.01	Regional	252.35	255.6	266.89	258.67	266.9	0.000005	0.34	2264.58	394.86	0.03
Upper Humber	Reach3	400.02 x-110 (07.01.03)		Culvert									
Upper Humber	Reach3	400.000 07.01.02	2-year	2.62	255.18	255.6	255.47	255.64	0.003525	0.83	3.16	10.64	0.48
Upper Humber	Reach3	400.000 07.01.02	5-year	5.42	255.18	255.84	255.6	255.89	0.002173	0.92	6.02	14.66	0.41
Upper Humber	Reach3	400.000 07.01.02	10-year	9.14	255.18	256.1	255.73	256.15	0.00153	1.02	9.63	32.26	0.37
Upper Humber	Reach3	400.000 07.01.02	25-year	9.14	255.18	256.1	255.73	256.15	0.00153	1.02	9.63	32.26	0.37
Upper Humber	Reach3	400.000 07.01.02	50-year	18.68	255.18	256.61	255.98	256.68	0.001118	1.22	17.47	125.59	0.35
Upper Humber	Reach3	400.000 07.01.02	100-year	23.69	255.18	256.88	256.1	256.96	0.000902	1.25	21.93	156.72	0.32
Upper Humber	Reach3	400.000 07.01.02	350-year	42.09	255.18	258.17	256.44	258.17	0.000064	0.5	216.46	177.9	0.09
Upper Humber	Reach3	400.000 07.01.02	500-year	62.95	255.18	259.52	256.75	259.52	0.000022	0.38	456.98	217.22	0.06
Upper Humber	Reach3	400.000 07.01.02	Regional	252.35	255.18	266.89	257.64	266.89	0.000002	0.22	2874.18	389.67	0.02
Upper Humber	Reach3	399.9675 07.01.01	2-year	2.62	255.09	255.6	255.31	255.61	0.000742	0.47	5.64	14.29	0.23
Upper Humber	Reach3	399.9675 07.01.01	5-year	5.42	255.09	255.84	255.42	255.86	0.000707	0.6	9.65	20.93	0.24
Upper Humber	Reach3	399.9675 07.01.01	10-year	9.14	255.09	256.1	255.54	256.12	0.000577	0.67	20.1	64.64	0.23
Upper Humber	Reach3	399.9675 07.01.01	25-year	9.14	255.09	256.1	255.54	256.12	0.000577	0.67	20.1	64.64	0.23
Upper Humber	Reach3	399.9675 07.01.01	50-year	18.68	255.09	256.61	255.78	256.62	0.000211	0.55	90.01	170.13	0.15
Upper Humber	Reach3	399.9675 07.01.01	100-year	23.69	255.09	256.9	255.89	256.9	0.000116	0.47	138.42	173.38	0.12
Upper Humber	Reach3	399.9675 07.01.01	350-year	42.09	255.09	258.17	256.26	258.17	0.000022	0.3	364.35	184.05	0.06
Upper Humber	Reach3	399.9675 07.01.01	500-year	62.95	255.09	259.52	256.45	259.52	0.000011	0.27	637.92	243.24	0.04
Upper Humber	Reach3	399.9675 07.01.01	Regional	252.35	255.09	266.89	257.08	266.89	0.000001	0.19	3141.32	405.91	0.02
Coffey Creek	Reach1	605.657 05.04.19	2-year	0.22	298.05	298.12	298.12	298.13	0.018514	0.61	0.35	6.57	0.83
Coffey Creek	Reach1	605.657 05.04.19	5-year	0.62	298.05	298.16	298.16	298.2	0.02136	0.91	0.68	7.57	0.97
Coffey Creek	Reach1	605.657 05.04.19	10-year	1.27	298.05	298.23	298.21	298.28	0.01548	1.04	1.22	8.82	0.89
Coffey Creek	Reach1	605.657 05.04.19	25-year	1.27	298.05	298.23	298.21	298.28	0.01548	1.04	1.22	8.82	0.89
Coffey Creek	Reach1	605.657 05.04.19	50-year	3.29	298.05	298.37	298.33	298.45	0.011166	1.28	2.57	10.58	0.83
Coffey Creek	Reach1	605.657 05.04.19	100-year	4.41	298.05	298.45	298.39	298.53	0.008086	1.26	3.51	11.67	0.73
Coffey Creek	Reach1	605.657 05.04.19	350-year	8.19	298.05	298.53	298.53	298.7	0.014633	1.86	4.41	12.73	1.01
Coffey Creek	Reach1	605.657 05.04.19	500-year	12.35	298.05	298.65	298.65	298.86	0.013911	2.01	6.16	15.22	1.01
Coffey Creek	Reach1	605.657 05.04.19	Regional	48.6	298.05	301.19		301.2	0.000109	0.67	146.36	75.8	0.12
Coffey Creek	Reach1	605.4805 05.04.18	2-year	0.22	296.82	296.95	296.89	296.96	0.002976	0.4	0.53	4.61	0.38
Coffey Creek	Reach1	605.4805 05.04.18	5-year	0.62	296.82	297.06	296.96	297.07	0.003021	0.58	1.06	5.31	0.42
Coffey Creek	Reach1	605.4805 05.04.18	10-year	1.27	296.82	297.17	297.03	297.2	0.003246	0.74	1.72	6.33	0.45
Coffey Creek	Reach1	605.4805 05.04.18	25-year	1.27	296.82	297.17	297.03	297.2	0.003246	0.74	1.72	6.33	0.45
Coffey Creek	Reach1	605.4805 05.04.18	50-year	3.29	296.82	297.39	297.2	297.44	0.003409	0.98	3.36	8.34	0.49
Coffey Creek	Reach1	605.4805 05.04.18	100-year	4.41	296.82	297.53	297.27	297.57	0.003858	0.91	4.85	14.97	0.51
Coffey Creek	Reach1	605.4805 05.04.18	350-year	8.19	296.82	297.85	297.5	297.86	0.001231	0.55	14.93	41.99	0.29
Coffey Creek	Reach1	605.4805 05.04.18	500-year	12.35	296.82	298.2	297.66	298.2	0.000379	0.35	35.67	82.76	0.17
Coffey Creek	Reach1	605.4805 05.04.18	Regional	48.6	296.82	301.19	298.05	301.19	0.000005	0.15	348.64	118.94	0.03
Coffey Creek	Reach1	605.4582 05.04.17	2-year	0.22	296.76	296.91	296.85	296.92	0.003314	0.44	0.49	4.05	0.4
Coffey Creek	Reach1	605.4582 05.04.17	5-year	0.62	296.76	297	296.92	297.03	0.003949	0.67	0.92	4.54	0.48
Coffey Creek	Reach1	605.4582 05.04.17	10-year	1.27	296.76	297.1	297	297.14	0.005053	0.93	1.37	4.95	0.56
Coffey Creek	Reach1	605.4582 05.04.17	25-year	1.27	296.76	297.1	297	297.14	0.005053	0.93	1.37	4.95	0.56
Coffey Creek	Reach1	605.4582 05.04.17	50-year	3.29	296.76	297.26	297.19	297.37	0.008239	1.49	2.22	6.03	0.76
Coffey Creek	Reach1	605.4582 05.04.17	100-year	4.41	296.76	297.39	297.26	297.5	0.005693	1.46	3.19	10.08	0.66
Coffey Creek	Reach1	605.4582 05.04.17	350-year	8.19	296.76	297.78	297.54	297.84	0.001938	1.2	13.02	38.25	0.42
Coffey Creek	Reach1	605.4582 05.04.17	500-year	12.35	296.76	298.16	297.68	298.19	0.000727	0.95	31.79	61.4	0.27
Coffey Creek	Reach1	605.4582 05.04.17	Regional	48.6	296.76	301.19	298.32	301.19	0.000026	0.41	336.6	134.6	0.06
Coffey Creek	Reach1	605.455 05.04.16	2-year	0.22	296.73	296.83	296.83	296.87	0.026866	0.89	0.24	3.3	1.05
Coffey Creek	Reach1	605.455 05.04.16	5-year	0.62	296.73	296.91	296.91	296.98	0.020214	1.13	0.55	4.26	1
Coffey Creek	Reach1	605.455 05.04.16	10-year	1.27	296.73	297	297	297.09	0.017165	1.32	0.96	5.23	0.98
Coffey Creek	Reach1	605.455 05.04.16	25-year	1.27	296.73	297	297	297.09	0.017165	1.32	0.96	5.23	0.98
Coffey Creek	Reach1	605.455 05.04.16	50-year	3.29	296.73	297.23	297.17	297.33	0.008351	1.35	2.44	7.37	0.75
Coffey Creek	Reach1	605.455 05.04.16	100-year	4.41	296.73	297.38	297.23	297.46	0.005095	1.21	3.63	8.9	0.61
Coffey Creek	Reach1	605.455 05.04.16	350-year	8.19	296.73	297.77	297.43	297.83	0.001782	1.06	7.98	31.81	0.4
Coffey Creek	Reach1	605.455 05.04.16	500-year	12.35	296.73	298.11	297.57	298.17	0.00111	1.08	11.92	46.78	0.33
Coffey Creek	Reach1	605.455 05.04.16	Regional	48.6	296.73	301.1	298.32	301.16	0.000199	1.11	46.22	108.87	0.18
Coffey Creek	Reach1	605.4416 x-113 (05.04.15)		Culvert									
Coffey Creek	Reach1	605.4291 05.04.14	2-year	0.22	296.31	296.45	296.42	296.46	0.006818	0.55	0.39	4.01	0.56
Coffey Creek	Reach1	605.4291 05.04.14	5-year	0.62	296.31	296.55	296.48	296.57	0.005974	0.73	0.84	4.94	0.57
Coffey Creek	Reach1	605.4291 05.04.14	10-year	1.27	296.31	296.66	296.56	296.7	0.004837	0.87	1.45	5.63	0.55
Coffey Creek	Reach1	605.4291 05.04.14	25-year	1.27	296.31	296.66	296.56	296.7	0.004837	0.87	1.45	5.63	0.55

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	605.4291 05.04.14	50-year	3.29	296.31	296.91	296.74	296.97	0.004044	1.09	3.02	7.24	0.54
Coffey Creek	Reach1	605.4291 05.04.14	100-year	4.41	296.31	297.02	296.81	297.09	0.003705	1.13	3.91	8.36	0.53
Coffey Creek	Reach1	605.4291 05.04.14	350-year	8.19	296.31	297.34	297.02	297.41	0.002348	1.18	7.02	19.54	0.45
Coffey Creek	Reach1	605.4291 05.04.14	500-year	12.35	296.31	297.56	297.18	297.66	0.002102	1.34	9.49	27.65	0.44
Coffey Creek	Reach1	605.4291 05.04.14	Regional	48.6	296.31	297.98	297.98	298.63	0.009181	3.59	14.29	42.39	0.99
Coffey Creek	Reach1	605.3933 05.04.13	2-year	0.22	296.25	296.34	296.34	296.37	0.017745	0.76	0.28	3.63	0.87
Coffey Creek	Reach1	605.3933 05.04.13	5-year	0.62	296.25	296.41	296.41	296.48	0.018814	1.13	0.55	4.02	0.97
Coffey Creek	Reach1	605.3933 05.04.13	10-year	1.27	296.25	296.49	296.49	296.6	0.018468	1.44	0.88	4.41	1.03
Coffey Creek	Reach1	605.3933 05.04.13	25-year	1.27	296.25	296.49	296.49	296.6	0.018468	1.44	0.88	4.41	1.03
Coffey Creek	Reach1	605.3933 05.04.13	50-year	3.29	296.25	296.68	296.68	296.85	0.014884	1.82	1.81	5.33	1
Coffey Creek	Reach1	605.3933 05.04.13	100-year	4.41	296.25	296.76	296.76	296.96	0.014264	1.98	2.23	5.99	1
Coffey Creek	Reach1	605.3933 05.04.13	350-year	8.19	296.25	296.97	296.97	297.25	0.011568	2.37	3.76	8.23	0.97
Coffey Creek	Reach1	605.3933 05.04.13	500-year	12.35	296.25	297.21	297.21	297.51	0.008047	2.47	6.69	17.59	0.85
Coffey Creek	Reach1	605.3933 05.04.13	Regional	48.6	296.25	297.95	297.95	298.27	0.00598	3.22	40.07	63.03	0.82
Coffey Creek	Reach1	605.251 05.04.12	2-year	0.22	295.11	295.23		295.25	0.005084	0.48	0.49	6.43	0.48
Coffey Creek	Reach1	605.251 05.04.12	5-year	0.62	295.11	295.33		295.35	0.004419	0.63	1.22	9.17	0.49
Coffey Creek	Reach1	605.251 05.04.12	10-year	1.27	295.11	295.42		295.44	0.004377	0.8	2.1	11.18	0.52
Coffey Creek	Reach1	605.251 05.04.12	25-year	1.27	295.11	295.42		295.44	0.004377	0.8	2.1	11.18	0.52
Coffey Creek	Reach1	605.251 05.04.12	50-year	3.29	295.11	295.59	295.47	295.64	0.004252	1.13	4.45	15.94	0.56
Coffey Creek	Reach1	605.251 05.04.12	100-year	4.41	295.11	295.65		295.72	0.004396	1.26	5.54	17.24	0.58
Coffey Creek	Reach1	605.251 05.04.12	350-year	8.19	295.11	295.84	295.66	295.94	0.004617	1.61	9.6	26.72	0.63
Coffey Creek	Reach1	605.251 05.04.12	500-year	12.35	295.11	295.89	295.86	296.07	0.007638	2.17	11.01	28.06	0.82
Coffey Creek	Reach1	605.251 05.04.12	Regional	48.6	295.11	296.47	296.32	296.78	0.008269	3.36	43.11	85.92	0.94
Coffey Creek	Reach1	605.050 05.04.11	2-year	0.22	293.1	293.31	293.29	293.35	0.013222	0.85	0.25	2.14	0.79
Coffey Creek	Reach1	605.050 05.04.11	5-year	0.62	293.1	293.41	293.4	293.49	0.015707	1.2	0.52	2.98	0.92
Coffey Creek	Reach1	605.050 05.04.11	10-year	1.27	293.1	293.53	293.52	293.63	0.015269	1.4	0.91	4.05	0.94
Coffey Creek	Reach1	605.050 05.04.11	25-year	1.27	293.1	293.53	293.52	293.63	0.015269	1.4	0.91	4.05	0.94
Coffey Creek	Reach1	605.050 05.04.11	50-year	3.29	293.1	293.71	293.71	293.88	0.014608	1.78	1.9	7.35	0.99
Coffey Creek	Reach1	605.050 05.04.11	100-year	4.41	293.1	293.79	293.79	293.97	0.013188	1.93	2.49	8.82	0.97
Coffey Creek	Reach1	605.050 05.04.11	350-year	8.19	293.1	293.98	293.98	294.23	0.011276	2.31	4.55	12.56	0.96
Coffey Creek	Reach1	605.050 05.04.11	500-year	12.35	293.1	294.23	294.23	294.41	0.005993	2.12	11.29	36.46	0.74
Coffey Creek	Reach1	605.050 05.04.11	Regional	48.6	293.1	294.82	294.82	295.07	0.005914	3.02	47.23	81.6	0.8
Coffey Creek	Reach1	604.848 05.04.10	2-year	0.22	291.03	291.13	291.11	291.15	0.009596	0.57	0.37	4.59	0.64
Coffey Creek	Reach1	604.848 05.04.10	5-year	0.62	291.03	291.21		291.24	0.008615	0.81	0.76	5.16	0.67
Coffey Creek	Reach1	604.848 05.04.10	10-year	1.27	291.03	291.29	291.25	291.35	0.009078	1.05	1.21	5.74	0.73
Coffey Creek	Reach1	604.848 05.04.10	25-year	1.27	291.03	291.29	291.25	291.35	0.009078	1.05	1.21	5.74	0.73
Coffey Creek	Reach1	604.848 05.04.10	50-year	3.29	291.03	291.46		291.57	0.009268	1.44	2.29	6.81	0.79
Coffey Creek	Reach1	604.848 05.04.10	100-year	4.41	291.03	291.55	291.48	291.67	0.00871	1.53	2.88	7.42	0.78
Coffey Creek	Reach1	604.848 05.04.10	350-year	8.19	291.03	291.75	291.66	291.92	0.007297	1.81	4.97	16.19	0.77
Coffey Creek	Reach1	604.848 05.04.10	500-year	12.35	291.03	291.92	291.92	292.1	0.006181	1.97	10.1	47.15	0.73
Coffey Creek	Reach1	604.848 05.04.10	Regional	48.6	291.03	292.4	292.4	292.7	0.007438	3.03	37.65	62.59	0.88
Coffey Creek	Reach1	604.646 05.04.09	2-year	0.22	289.41	289.54	289.5	289.55	0.006619	0.48	0.44	5.33	0.54
Coffey Creek	Reach1	604.646 05.04.09	5-year	0.62	289.41	289.61		289.63	0.007322	0.69	0.89	6.68	0.61
Coffey Creek	Reach1	604.646 05.04.09	10-year	1.27	289.41	289.69	289.63	289.73	0.006991	0.87	1.47	9.23	0.63
Coffey Creek	Reach1	604.646 05.04.09	25-year	1.27	289.41	289.69	289.63	289.73	0.006991	0.87	1.47	9.23	0.63
Coffey Creek	Reach1	604.646 05.04.09	50-year	3.29	289.41	289.83	289.78	289.9	0.007299	1.22	3.46	18.38	0.7
Coffey Creek	Reach1	604.646 05.04.09	100-year	4.41	289.41	289.87	289.84	289.96	0.008003	1.37	4.33	19.44	0.74
Coffey Creek	Reach1	604.646 05.04.09	350-year	8.19	289.41	289.97	289.97	290.12	0.010932	1.87	6.41	25.64	0.9
Coffey Creek	Reach1	604.646 05.04.09	500-year	12.35	289.41	290.09	290.09	290.26	0.009265	2.02	10.7	46.01	0.87
Coffey Creek	Reach1	604.646 05.04.09	Regional	48.6	289.41	290.55	290.55	290.82	0.009438	3.05	36.46	61.57	0.97
Coffey Creek	Reach1	604.444 05.04.08	2-year	0.22	287.4	287.48		287.5	0.017268	0.56	0.38	7.63	0.8
Coffey Creek	Reach1	604.444 05.04.08	5-year	0.62	287.4	287.53		287.56	0.015325	0.79	0.78	8.31	0.83
Coffey Creek	Reach1	604.444 05.04.08	10-year	1.27	287.4	287.58	287.57	287.64	0.01659	1.06	1.19	8.77	0.92
Coffey Creek	Reach1	604.444 05.04.08	25-year	1.27	287.4	287.58	287.57	287.64	0.01659	1.06	1.19	8.77	0.92
Coffey Creek	Reach1	604.444 05.04.08	50-year	3.29	287.4	287.69	287.69	287.8	0.015089	1.51	2.24	11.23	0.99
Coffey Creek	Reach1	604.444 05.04.08	100-year	4.41	287.4	287.74	287.74	287.88	0.014143	1.63	2.91	12.98	0.96
Coffey Creek	Reach1	604.444 05.04.08	350-year	8.19	287.4	287.92	287.92	288.05	0.008578	1.74	7.26	36.99	0.81
Coffey Creek	Reach1	604.444 05.04.08	500-year	12.35	287.4	288.02	288.02	288.17	0.00815	1.93	11.46	47.93	0.82
Coffey Creek	Reach1	604.444 05.04.08	Regional	48.6	287.4	288.45	288.45	288.71	0.008908	2.95	38.63	69.72	0.94
Coffey Creek	Reach1	604.242 05.04.07	2-year	0.22	285.12	285.22		285.23	0.008172	0.51	0.43	5.62	0.59
Coffey Creek	Reach1	604.242 05.04.07	5-year	0.62	285.12	285.28		285.31	0.008874	0.75	0.82	6.41	0.67
Coffey Creek	Reach1	604.242 05.04.07	10-year	1.27	285.12	285.36		285.41	0.008173	0.91	1.39	7.49	0.68
Coffey Creek	Reach1	604.242 05.04.07	25-year	1.27	285.12	285.36		285.41	0.008173	0.91	1.39	7.49	0.68
Coffey Creek	Reach1	604.242 05.04.07	50-year	3.29	285.12	285.51		285.6	0.00804	1.27	2.59	8.57	0.73
Coffey Creek	Reach1	604.242 05.04.07	100-year	4.41	285.12	285.57		285.68	0.008295	1.43	3.1	9.31	0.76
Coffey Creek	Reach1	604.242 05.04.07	350-year	8.19	285.12	285.71	285.67	285.89	0.009654	1.87	4.64	11.59	0.86
Coffey Creek	Reach1	604.242 05.04.07	500-year	12.35	285.12	285.83	285.83	286.08	0.010614	2.24	6.29	20.89	0.93
Coffey Creek	Reach1	604.242 05.04.07	Regional	48.6	285.12	286.44	286.44	286.76	0.007395	3	33.94	54.76	0.88
Coffey Creek	Reach1	604.040 05.04.06	2-year	0.22	282.9	282.99	282.97	283.01	0.015676	0.7	0.31	4.1	0.81
Coffey Creek	Reach1	604.040 05.04.06	5-year	0.62	282.9	283.07	283.05	283.11	0.01384	0.94	0.66	5.11	0.83
Coffey Creek	Reach1	604.040 05.04.06	10-year	1.27	282.9	283.13	283.12	283.21	0.015195	1.23	1.03	5.65	0.92
Coffey Creek	Reach1	604.040 05.04.06	25-year	1.27	282.9	283.13	283.12	283.21	0.015195	1.23	1.03	5.65	0.92
Coffey Creek	Reach1	604.040 05.04.06	50-year	3.29	282.9	283.29	283.29	283.43	0.015109	1.67	1.98	6.84	0.99
Coffey Creek	Reach1	604.040 05.04.06	100-year	4.41	282.9	283.35	283.35	283.52	0.014282	1.82	2.44	7.67	0.99
Coffey Creek	Reach1	604.040 05.04.06	350-year	8.19	282.9	283.53	283.53	283.76	0.011624	2.15	4.25	11.01	0.95
Coffey Creek	Reach1	604.040 05.04.06	500-year	12.35	282.9	283.7	283.7	283.98	0.009885	2.39	6.29	14.09	0.92
Coffey Creek	Reach1	604.040 05.04.06	Regional	48.6	282.9	284.54	284.54	284.87	0.005544	3.05	36.68	63.23	0.79
Coffey Creek	Reach1	603.838 05.04.05	2-year	0.22	281.73	281.85	281.8	281.86	0.0044	0.4	0.53	6.17	0.44
Coffey Creek	Reach1	603.838 05.04.05	5-year	0.62	281.73	281.93	281.87	281.95	0.004788	0.6	1.03	7.01	0.5
Coffey Creek	Reach1	603.838 05.04.05	10-year	1.27	281.73	282.02	281.93	282.05	0.004476	0.75	1.69	7.81	0.51
Coffey Creek	Reach1	603.838 05.04.05	25-year	1.27	281.73	282.02	281.93	282.05	0.004476	0.75	1.69	7.81	0.51
Coffey Creek	Reach1	603.838 05.04.05	50-year	3.29	281.73	282.23	282.07	282.28	0.003315	0.95	3.46	8.84	0.49
Coffey Creek	Reach1	603.838 05.04.05	100-year	4.41	281.73	282.33	282.12	282.38	0.002899	1.01	4.38	9.29	0.47
Coffey Creek	Reach1	603.838 05.04.05	350-year	8.19	281.73	282.51	282.28	282.6	0.003599	1.33	6.16	10.01	0.54
Coffey Creek	Reach1	603.838 05.04.05	500-year	12.35	281.73	282.65	282.43	282.79	0.004427	1.63	7.58	10.68	0.61
Coffey Creek	Reach1	603.838 05.04.05	Regional	48.6	281.73	283.45	283.27	283.86	0.00526	2.91	20.35	23.15	0.76
Coffey Creek	Reach1	603.636 05.04.04	2-year	0.22	280.83	281.02		281.03	0.004684	0.49	0.45	5.85	0.47
Coffey Creek	Reach1	603.636 05.04.04	5-year	0.62	280.83	281.12	281.05	281.14	0.004093	0.61	1.33	10.8	0.47
Coffey Creek	Reach1	603.636 05.04.04	10-year	1.27	280.83	281.21		281.23	0.004282	0.74	2.42	14.84	0.5
Coffey Creek	Reach1	603.636 05.04.04	25-year	1.27	280.83	281.21		281.23	0.004282	0.74	2.42	14.84	0.5
Coffey Creek	Reach1	603.636 05.04.04	50-year	3.29	280.83	281.3	281.25	281.36	0.008097	1.23	4.05	19.09	0.73
Coffey Creek	Reach1	603.636 05.04.04	100-year	4.41	280.83	281.32	281.3	281.42	0.011998	1.55	4.36	19.64	0.89
Coffey Creek	Reach1	603.636 05.04.04	350-year	8.19	280.83	281.48	281.44	281.59	0.009215	1.75	7.93	24.05	0.83
Coffey Creek	Reach1	603.636 05.04.04	500-year	12.35	280.83	281.63	281.5	281.75	0.007261	1.85	11.92	28.15	0.77
Coffey Creek	Reach1	603.636 05.04.04	Regional	48.6	280.83	282.12	282.11	282.49	0.011103	3.43	28.42	38.57	1.05
Coffey Creek	Reach1	603.434 05.04.03	2-year	0.22	279.15	279.26	279.25	279.28	0.016422	0.72	0.3	3.94	0.83
Coffey Creek	Reach1	603.434 05.04.03	5-year	0.62	279.15	279.32	279.32	279.38	0.022309	1.05	0.59	5.44	1.03
Coffey Creek	Reach1	603.434 05.04.03	10-year	1.27	279.15	279.4	279.4	279.46	0.020102	1.15	1.1	8.35	1.01
Coffey Creek	Reach1	603.434 05.04.03	25-year	1.27	279.15	279.4	279.4	279.46	0.020102	1.15	1.1	8.35	1.01
Coffey Creek	Reach1	603.434 05.04.03	50-year	3.29	279.15	279.56	279.53	279.63	0.007734	1.19	4.1	33.32	0.71
Coffey Creek	Reach1	603.434 05.04.03	100-year	4.41	279.15	279.63	279.59	279.69	0.0055	1.16	6.65	39.94	0.62
Coffey Creek	Reach1	603.434 05.04.03	350-year	8.19	279.15	279.72	279.69	279.8	0.007163	1.53	10.32	43.45	0.73
Coffey Creek	Reach1	603.434 05.04.03	500-year	12.35	279.15	279.77	279.77	279.9	0.009845	1.93	12.64	44.22	0.88
Coffey Creek	Reach1	603.434 05.04.03	Regional	48.6	279.15	280.3	280.18	280.51	0.007226	2.7	38.45	52.05	0.85
Coffey Creek	Reach1	603.232 05.04.02	2-year	0.22	277.53	277.66		277.67	0.005995	0.51	0.42	4.38	0.52
Coffey Creek	Reach1	603.232 05.04.02	5-year	0.62	277.53	277.76		277.78	0.004603	0.68	0.91	4.91	0.51
Coffey Creek	Reach1	603.232 05.04.02	10-year	1.27	277.53	277.87		277.91	0.004344	0.85	1.49	5.48	0.52
Coffey Creek	Reach1	603.232 05.04.02	25-year	1.27	277.53	277.87		277.91	0.004344	0.85	1.49	5.48	0.52
Coffey Creek	Reach1	603.232 05.04.02	50-year	3.29	277.53	277.99		278.11	0.010143	1.5	2.2	6.51	0.82
Coffey Creek	Reach1	603.232 05.04.02	100-year	4.41	277.53	278.01	278.01	278.19	0.015043	1.87	2.36	6.72	1.01
Coffey Creek	Reach1	603.232 05.04.02	350-year	8.19	277.53	278.28	278.21	278.45	0.008417	1.82	4.5	8.84	0.8
Coffey Creek	Reach1	603.232 05.04.02	500-year	12.35	277.53	278.51	278.37	278.67	0.005332	1.82	9.33	38.26	0.68
Coffey Creek	Reach1	603.232 05.04.02	Regional	48.6	277.53	279.03	279.03	279.31	0.006611	2.89	38.61	67.66	0.82
Coffey Creek	Reach1	603.030 05.04.01	2-year	0.22	276.18	276.3	276.26	276.31	0.006056	0.52	0.42	4.24	0.53
Coffey Creek	Reach1	603.030 05.04.01	5-year	0.62	276.18	276.37	276.32	276.4	0.008436	0.81	0.76	4.97	0.67
Coffey Creek	Reach1	603.030 05.04.01	10-year	1.27	276.18	276.45	276.41	276.51	0.009345	1.07	1.19	5.59	0.74

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	603.030 05.04.01	25-year	1.27	276.18	276.45	276.41	276.51	0.009345	1.07	1.19	5.59	0.74
Coffey Creek	Reach1	603.030 05.04.01	50-year	3.29	276.18	276.74	276.58	276.79	0.003679	1.07	3.25	11.45	0.52
Coffey Creek	Reach1	603.030 05.04.01	100-year	4.41	276.18	276.85	276.64	276.91	0.002813	1.1	5.09	20.63	0.47
Coffey Creek	Reach1	603.030 05.04.01	350-year	8.19	276.18	276.97	276.83	277.08	0.004511	1.58	7.69	27.82	0.62
Coffey Creek	Reach1	603.030 05.04.01	500-year	12.35	276.18	277.01	277.01	277.22	0.007797	2.17	9.05	34.15	0.82
Coffey Creek	Reach1	603.030 05.04.01	Regional	48.6	276.18	278.78	277.55	278.79	0.000146	0.69	206.38	136.98	0.14
Coffey Creek	Reach1	602.9023 05.01.30	2-year	0.28	275.28	275.44	275.41	275.46	0.006801	0.58	0.48	4.48	0.57
Coffey Creek	Reach1	602.9023 05.01.30	5-year	0.83	275.28	275.57	275.49	275.6	0.004946	0.76	1.09	5.3	0.53
Coffey Creek	Reach1	602.9023 05.01.30	10-year	1.73	275.28	275.7	275.59	275.75	0.004248	0.93	1.85	5.81	0.53
Coffey Creek	Reach1	602.9023 05.01.30	25-year	1.73	275.28	275.7	275.59	275.75	0.004248	0.93	1.85	5.81	0.53
Coffey Creek	Reach1	602.9023 05.01.30	50-year	4.53	275.28	275.84	275.78	275.99	0.009769	1.7	2.68	6.85	0.84
Coffey Creek	Reach1	602.9023 05.01.30	100-year	6.09	275.28	275.88	275.88	276.1	0.013731	2.1	2.94	7.32	1
Coffey Creek	Reach1	602.9023 05.01.30	350-year	11.42	275.28	276.26	276.17	276.41	0.005375	1.85	9.88	34.94	0.68
Coffey Creek	Reach1	602.9023 05.01.30	500-year	17.31	275.28	276.75	276.36	276.79	0.001032	1.13	38.2	68.73	0.32
Coffey Creek	Reach1	602.9023 05.01.30	Regional	68.43	275.28	278.75	276.94	278.77	0.000181	0.89	190.04	82.93	0.16
Coffey Creek	Reach1	602.8092 05.01.29	2-year	0.28	274.8	274.98	274.91	275	0.002973	0.47	0.6	4.1	0.39
Coffey Creek	Reach1	602.8092 05.01.29	5-year	0.83	274.8	275.11	275	275.14	0.003779	0.68	1.22	5.67	0.47
Coffey Creek	Reach1	602.8092 05.01.29	10-year	1.73	274.8	275.22	275.1	275.26	0.004711	0.92	1.92	8.91	0.55
Coffey Creek	Reach1	602.8092 05.01.29	25-year	1.73	274.8	275.22	275.1	275.26	0.004711	0.92	1.92	8.91	0.55
Coffey Creek	Reach1	602.8092 05.01.29	50-year	4.53	274.8	275.55	275.32	275.58	0.001729	0.89	7.97	25.29	0.37
Coffey Creek	Reach1	602.8092 05.01.29	100-year	6.09	274.8	275.73	275.4	275.76	0.00104	0.83	13.08	31.06	0.3
Coffey Creek	Reach1	602.8092 05.01.29	350-year	11.42	274.8	276.24	275.58	276.26	0.000401	0.73	33.43	43.49	0.21
Coffey Creek	Reach1	602.8092 05.01.29	500-year	17.31	274.8	276.72	275.7	276.73	0.000237	0.69	56.21	49.77	0.17
Coffey Creek	Reach1	602.8092 05.01.29	Regional	68.43	274.8	278.76	276.43	278.76	0.00002	0.33	619.99	251.13	0.05
Coffey Creek	Reach1	602.7863 05.01.28	2-year	0.28	274.77	274.87	274.87	274.91	0.02134	0.88	0.31	3.68	0.96
Coffey Creek	Reach1	602.7863 05.01.28	5-year	0.83	274.77	274.96	274.96	275.04	0.018857	1.2	0.69	4.62	0.99
Coffey Creek	Reach1	602.7863 05.01.28	10-year	1.73	274.77	275.1	275.06	275.18	0.010877	1.24	1.39	5.85	0.81
Coffey Creek	Reach1	602.7863 05.01.28	25-year	1.73	274.77	275.1	275.06	275.18	0.010877	1.24	1.39	5.85	0.81
Coffey Creek	Reach1	602.7863 05.01.28	50-year	4.53	274.77	275.48	275.26	275.55	0.002844	1.13	3.99	15.29	0.48
Coffey Creek	Reach1	602.7863 05.01.28	100-year	6.09	274.77	275.64	275.34	275.72	0.002221	1.19	5.14	19.41	0.44
Coffey Creek	Reach1	602.7863 05.01.28	350-year	11.42	274.77	276.12	275.56	276.21	0.001485	1.35	8.45	25.6	0.39
Coffey Creek	Reach1	602.7863 05.01.28	500-year	17.31	274.77	276.55	275.76	276.67	0.001224	1.51	11.5	37.46	0.38
Coffey Creek	Reach1	602.7863 05.01.28	Regional	68.43	274.77	277.04	277.04	278.11	0.00804	4.59	14.92	46.41	1
Coffey Creek	Reach1	602.7761 x-114 (05.01.27)		Culvert									
Coffey Creek	Reach1	602.7625 05.01.26	2-year	0.28	274.59	274.7	274.67	274.72	0.007012	0.55	0.51	5.66	0.56
Coffey Creek	Reach1	602.7625 05.01.26	5-year	0.83	274.59	274.77	274.75	274.82	0.011104	0.94	0.88	6.21	0.77
Coffey Creek	Reach1	602.7625 05.01.26	10-year	1.73	274.59	274.84	274.83	274.93	0.014984	1.36	1.27	6.78	0.94
Coffey Creek	Reach1	602.7625 05.01.26	25-year	1.73	274.59	274.84	274.83	274.93	0.014984	1.36	1.27	6.78	0.94
Coffey Creek	Reach1	602.7625 05.01.26	50-year	4.53	274.59	275.01	275.01	275.2	0.014554	1.91	2.37	8.1	1.01
Coffey Creek	Reach1	602.7625 05.01.26	100-year	6.09	274.59	275.1	275.1	275.32	0.013452	2.07	2.95	8.61	1
Coffey Creek	Reach1	602.7625 05.01.26	350-year	11.42	274.59	275.33	275.33	275.65	0.0118	2.52	4.53	9.93	1
Coffey Creek	Reach1	602.7625 05.01.26	500-year	17.31	274.59	275.54	275.54	275.96	0.010646	2.89	5.99	11.65	1
Coffey Creek	Reach1	602.7625 05.01.26	Regional	68.43	274.59	276	276	276.03	0.001193	1.29	111.59	185.52	0.36
Coffey Creek	Reach1	602.7381 05.01.25	2-year	0.28	274.5	274.58	274.58	274.6	0.019399	0.64	0.53	11.22	0.86
Coffey Creek	Reach1	602.7381 05.01.25	5-year	0.83	274.5	274.63	274.63	274.67	0.017943	0.92	1.26	18.03	0.91
Coffey Creek	Reach1	602.7381 05.01.25	10-year	1.73	274.5	274.69	274.69	274.74	0.016006	1.13	2.5	26.88	0.92
Coffey Creek	Reach1	602.7381 05.01.25	25-year	1.73	274.5	274.69	274.69	274.74	0.016006	1.13	2.5	26.88	0.92
Coffey Creek	Reach1	602.7381 05.01.25	50-year	4.53	274.5	274.79	274.79	274.87	0.014083	1.48	5.94	38.47	0.94
Coffey Creek	Reach1	602.7381 05.01.25	100-year	6.09	274.5	274.83	274.83	274.92	0.014547	1.63	7.38	40.04	0.97
Coffey Creek	Reach1	602.7381 05.01.25	350-year	11.42	274.5	274.97	274.93	275.06	0.010501	1.73	14.35	69.79	0.87
Coffey Creek	Reach1	602.7381 05.01.25	500-year	17.31	274.5	275.14	275.04	275.19	0.004774	1.42	29.47	97.32	0.62
Coffey Creek	Reach1	602.7381 05.01.25	Regional	68.43	274.5	275.63		275.69	0.003587	1.89	100.16	176.23	0.6
Coffey Creek	Reach1	602.626 05.01.24	2-year	0.28	273.3	273.48	273.42	273.49	0.002828	0.39	0.71	6.19	0.37
Coffey Creek	Reach1	602.626 05.01.24	5-year	0.83	273.3	273.59	273.48	273.61	0.002838	0.55	1.51	7.94	0.4
Coffey Creek	Reach1	602.626 05.01.24	10-year	1.73	273.3	273.7	273.57	273.73	0.002936	0.7	2.45	9.05	0.43
Coffey Creek	Reach1	602.626 05.01.24	25-year	1.73	273.3	273.7	273.57	273.73	0.002936	0.7	2.45	9.05	0.43
Coffey Creek	Reach1	602.626 05.01.24	50-year	4.53	273.3	273.91	273.72	273.96	0.002901	1	4.84	14.39	0.47
Coffey Creek	Reach1	602.626 05.01.24	100-year	6.09	273.3	274	273.79	274.06	0.002849	1.12	6.18	15.93	0.48
Coffey Creek	Reach1	602.626 05.01.24	350-year	11.42	273.3	274.25	273.98	274.34	0.00259	1.37	10.88	26.12	0.49
Coffey Creek	Reach1	602.626 05.01.24	500-year	17.31	273.3	274.33	274.15	274.5	0.004182	1.85	14.27	56.2	0.63
Coffey Creek	Reach1	602.626 05.01.24	Regional	68.43	273.3	274.95	274.84	275.12	0.003705	2.48	67.27	98.9	0.65
Coffey Creek	Reach1	602.424 05.01.23	2-year	0.28	272.31	272.42	272.42	272.45	0.019961	0.8	0.35	4.43	0.92
Coffey Creek	Reach1	602.424 05.01.23	5-year	0.83	272.31	272.5	272.5	272.57	0.019989	1.2	0.69	4.84	1.01
Coffey Creek	Reach1	602.424 05.01.23	10-year	1.73	272.31	272.59	272.59	272.7	0.017359	1.48	1.17	5.34	1.01
Coffey Creek	Reach1	602.424 05.01.23	25-year	1.73	272.31	272.59	272.59	272.7	0.017359	1.48	1.17	5.34	1.01
Coffey Creek	Reach1	602.424 05.01.23	50-year	4.53	272.31	272.79	272.79	272.99	0.014727	1.97	2.3	5.9	1.01
Coffey Creek	Reach1	602.424 05.01.23	100-year	6.09	272.31	272.88	272.88	273.11	0.014036	2.14	2.84	6.16	1.01
Coffey Creek	Reach1	602.424 05.01.23	350-year	11.42	272.31	273.13	273.13	273.46	0.012697	2.55	4.49	6.86	1
Coffey Creek	Reach1	602.424 05.01.23	500-year	17.31	272.31	273.5	273.5	273.7	0.005112	2.15	15	53.49	0.68
Coffey Creek	Reach1	602.424 05.01.23	Regional	68.43	272.31	274.25		274.46	0.00406	2.78	60.07	63.09	0.67
Coffey Creek	Reach1	602.222 05.01.22	2-year	0.28	271.17	271.29		271.3	0.002645	0.35	0.8	7.94	0.35
Coffey Creek	Reach1	602.222 05.01.22	5-year	0.83	271.17	271.39		271.41	0.002218	0.5	1.66	8.3	0.36
Coffey Creek	Reach1	602.222 05.01.22	10-year	1.73	271.17	271.52		271.54	0.002066	0.64	2.69	8.72	0.37
Coffey Creek	Reach1	602.222 05.01.22	25-year	1.73	271.17	271.52		271.54	0.002066	0.64	2.69	8.72	0.37
Coffey Creek	Reach1	602.222 05.01.22	50-year	4.53	271.17	271.78		271.82	0.001817	0.91	5.09	9.64	0.38
Coffey Creek	Reach1	602.222 05.01.22	100-year	6.09	271.17	271.91		271.96	0.001658	0.99	6.37	10.13	0.38
Coffey Creek	Reach1	602.222 05.01.22	350-year	11.42	271.17	272.18		272.27	0.001901	1.32	9.29	11.39	0.43
Coffey Creek	Reach1	602.222 05.01.22	500-year	17.31	271.17	272.31		272.47	0.002878	1.77	11.1	17.77	0.54
Coffey Creek	Reach1	602.222 05.01.22	Regional	68.43	271.17	273.01	273.01	273.49	0.00561	3.43	41.44	69.59	0.82
Coffey Creek	Reach1	602.020 05.01.21	2-year	0.28	270.3	270.52		270.54	0.005755	0.59	0.47	3.76	0.53
Coffey Creek	Reach1	602.020 05.01.21	5-year	0.83	270.3	270.63		270.67	0.006735	0.94	0.9	4.47	0.63
Coffey Creek	Reach1	602.020 05.01.21	10-year	1.73	270.3	270.74		270.82	0.00715	1.28	1.46	5.21	0.7
Coffey Creek	Reach1	602.020 05.01.21	25-year	1.73	270.3	270.74		270.82	0.00715	1.28	1.46	5.21	0.7
Coffey Creek	Reach1	602.020 05.01.21	50-year	4.53	270.3	270.99	270.91	271.16	0.007386	1.87	2.92	6.48	0.78
Coffey Creek	Reach1	602.020 05.01.21	100-year	6.09	270.3	271.08	271.02	271.3	0.007956	2.14	3.56	7.14	0.83
Coffey Creek	Reach1	602.020 05.01.21	350-year	11.42	270.3	271.37	271.37	271.62	0.006369	2.43	10.51	47.93	0.79
Coffey Creek	Reach1	602.020 05.01.21	500-year	17.31	270.3	271.57	271.56	271.75	0.004605	2.34	22.31	64.73	0.69
Coffey Creek	Reach1	602.020 05.01.21	Regional	68.43	270.3	272.45		272.54	0.002273	2.38	90.57	85.83	0.53
Coffey Creek	Reach1	601.818 05.01.20	2-year	0.28	269.4	269.68		269.69	0.003231	0.52	0.54	3.33	0.41
Coffey Creek	Reach1	601.818 05.01.20	5-year	0.83	269.4	269.86		269.88	0.002515	0.67	1.24	4.27	0.4
Coffey Creek	Reach1	601.818 05.01.20	10-year	1.73	269.4	270.07		270.1	0.002092	0.77	2.24	7.05	0.38
Coffey Creek	Reach1	601.818 05.01.20	25-year	1.73	269.4	270.07		270.1	0.002092	0.77	2.24	7.05	0.38
Coffey Creek	Reach1	601.818 05.01.20	50-year	4.53	269.4	270.35		270.4	0.002126	1.1	5.95	17.24	0.42
Coffey Creek	Reach1	601.818 05.01.20	100-year	6.09	269.4	270.45		270.52	0.002144	1.22	7.86	18.62	0.43
Coffey Creek	Reach1	601.818 05.01.20	350-year	11.42	269.4	270.74	270.43	270.83	0.002121	1.48	14	24.19	0.45
Coffey Creek	Reach1	601.818 05.01.20	500-year	17.31	269.4	270.86	270.6	271.01	0.003138	1.94	17.25	27.96	0.56
Coffey Creek	Reach1	601.818 05.01.20	Regional	68.43	269.4	271.71	271.6	271.97	0.003998	3.11	64.56	81.25	0.69
Coffey Creek	Reach1	601.616 05.01.19	2-year	0.28	268.68	268.92	268.85	268.94	0.004363	0.6	0.46	2.88	0.48
Coffey Creek	Reach1	601.616 05.01.19	5-year	0.83	268.68	269.04	268.97	269.09	0.007387	1.01	0.82	3.47	0.66
Coffey Creek	Reach1	601.616 05.01.19	10-year	1.73	268.68	269.12	269.1	269.24	0.012877	1.52	1.14	3.92	0.9
Coffey Creek	Reach1	601.616 05.01.19	25-year	1.73	268.68	269.12	269.1	269.24	0.012877	1.52	1.14	3.92	0.9
Coffey Creek	Reach1	601.616 05.01.19	50-year	4.53	268.68	269.37	269.37	269.57	0.011201	1.97	2.65	8.87	0.91
Coffey Creek	Reach1	601.616 05.01.19	100-year	6.09	268.68	269.47	269.47	269.69	0.01063	2.14	3.54	11	0.91
Coffey Creek	Reach1	601.616 05.01.19	350-year	11.42	268.68	269.69	269.69	270	0.010689	2.66	6.93	24.58	0.96
Coffey Creek	Reach1	601.616 05.01.19	500-year	17.31	268.68	269.95	269.95	270.16	0.006108	2.43	16.29	41.37	0.76
Coffey Creek	Reach1	601.616 05.01.19	Regional	68.43	268.68	270.57	270.57	270.9	0.0078	3.76	50.98	64.22	0.93
Coffey Creek	Reach1	601.414 05.01.18	2-year	0.28	267.69	267.79		267.81	0.007161	0.54	0.52	5.66	0.57
Coffey Creek	Reach1	601.414 05.01.18	5-year	0.83	267.69	267.91		267.93	0.004393	0.67	1.24	6.77	0.5
Coffey Creek	Reach1	601.414 05.01.18	10-year	1.73	267.69	268.05		268.08	0.003103	0.77	2.25	8.06	0.45
Coffey Creek	Reach1	601.414 05.01.18	25-year	1.73	267.69	268.05		268.08	0.003103	0.77	2.25	8.06	0.45
Coffey Creek	Reach1	601.414 05.01.18	50-year	4.53	267.69	268.32		268.38	0.002233	1.02	5.26	16.97	0.43
Coffey Creek	Reach1	601.414 05.01.18	100-year	6.09	267.69	268.42		268.49	0.002221	1.13	7.69	33.7	0.44
Coffey Creek	Reach1	601.414 05.01.18	350-year	11.42	267.69	268.68		268.74	0.001785	1.25	18.72	47.7	0.41
Coffey Creek	Reach1	601.414 05.01.18	500-year	17.31	267.69	268.89		268.95	0.001502	1.32	29.8	55.02	0.39
Coffey Creek	Reach1	601.414 05.01.18	Regional	68.43	267.69	269.69		269.81	0.002016	2.17	81.21	75.89	0.5

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	601.212 05.01.17	2-year	0.28	267	267.21		267.22	0.001619	0.38	0.72	4.21	0.3
Coffey Creek	Reach1	601.212 05.01.17	5-year	0.83	267	267.36		267.38	0.001958	0.6	1.39	4.81	0.35
Coffey Creek	Reach1	601.212 05.01.17	10-year	1.73	267	267.51		267.54	0.002375	0.8	2.15	5.43	0.41
Coffey Creek	Reach1	601.212 05.01.17	25-year	1.73	267	267.51		267.54	0.002375	0.8	2.15	5.43	0.41
Coffey Creek	Reach1	601.212 05.01.17	50-year	4.53	267	267.75		267.83	0.003436	1.28	3.92	13.84	0.52
Coffey Creek	Reach1	601.212 05.01.17	100-year	6.09	267	267.84		267.94	0.003585	1.44	5.46	16.93	0.55
Coffey Creek	Reach1	601.212 05.01.17	350-year	11.42	267	268.03	267.92	268.2	0.004934	1.98	8.98	23.86	0.67
Coffey Creek	Reach1	601.212 05.01.17	500-year	17.31	267	268.16	268.05	268.42	0.00652	2.49	13.43	43.7	0.79
Coffey Creek	Reach1	601.212 05.01.17	Regional	68.43	267	268.81	268.81	269.19	0.007394	3.69	47.51	57.46	0.91
Coffey Creek	Reach1	601.010 05.01.16	2-year	0.28	266.49	266.69	266.63	266.71	0.004123	0.52	0.54	4.03	0.46
Coffey Creek	Reach1	601.010 05.01.16	5-year	0.83	266.49	266.85	266.73	266.87	0.003189	0.66	1.25	5.42	0.44
Coffey Creek	Reach1	601.010 05.01.16	10-year	1.73	266.49	267.01	266.83	267.04	0.002553	0.76	2.29	8.25	0.42
Coffey Creek	Reach1	601.010 05.01.16	25-year	1.73	266.49	267.01	266.83	267.04	0.002553	0.76	2.29	8.25	0.42
Coffey Creek	Reach1	601.010 05.01.16	50-year	4.53	266.49	267.27	267.04	267.31	0.001925	0.97	9.01	51.07	0.4
Coffey Creek	Reach1	601.010 05.01.16	100-year	6.09	266.49	267.32	267.14	267.37	0.002266	1.11	12.05	64.88	0.44
Coffey Creek	Reach1	601.010 05.01.16	350-year	11.42	266.49	267.47	267.37	267.53	0.002401	1.31	23.95	84.59	0.47
Coffey Creek	Reach1	601.010 05.01.16	500-year	17.31	266.49	267.59	267.47	267.64	0.002507	1.46	33.67	87.72	0.49
Coffey Creek	Reach1	601.010 05.01.16	Regional	68.43	266.49	268.58	267.84	268.6	0.000657	1.22	172.23	166.03	0.28
Coffey Creek	Reach1	600.808 05.01.15	2-year	0.28	265.86	266.02	265.95	266.03	0.002827	0.44	0.64	4.66	0.38
Coffey Creek	Reach1	600.808 05.01.15	5-year	0.83	265.86	266.13	266.04	266.16	0.003848	0.71	1.17	5.22	0.48
Coffey Creek	Reach1	600.808 05.01.15	10-year	1.73	265.86	266.21	266.13	266.27	0.006277	1.08	1.61	5.69	0.64
Coffey Creek	Reach1	600.808 05.01.15	25-year	1.73	265.86	266.21	266.13	266.27	0.006277	1.08	1.61	5.69	0.64
Coffey Creek	Reach1	600.808 05.01.15	50-year	4.53	265.86	266.36	266.36	266.53	0.012334	1.82	2.67	12.45	0.94
Coffey Creek	Reach1	600.808 05.01.15	100-year	6.09	265.86	266.48	266.48	266.62	0.007635	1.71	5.57	33.2	0.77
Coffey Creek	Reach1	600.808 05.01.15	350-year	11.42	265.86	266.64	266.64	266.8	0.007486	2.02	11.87	46.19	0.8
Coffey Creek	Reach1	600.808 05.01.15	500-year	17.31	265.86	266.76	266.76	266.93	0.007296	2.23	17.82	51.37	0.81
Coffey Creek	Reach1	600.808 05.01.15	Regional	68.43	265.86	268.45	267.26	268.49	0.00065	1.44	120.63	72.01	0.29
Coffey Creek	Reach1	600.6965 05.01.14	2-year	0.28	265.17	265.23	265.23	265.26	0.034009	0.78	0.35	7.04	1.12
Coffey Creek	Reach1	600.6965 05.01.14	5-year	0.83	265.17	265.3	265.29	265.34	0.018329	0.9	0.93	9.49	0.91
Coffey Creek	Reach1	600.6965 05.01.14	10-year	1.73	265.17	265.4	265.36	265.43	0.008838	0.84	2.04	13.23	0.69
Coffey Creek	Reach1	600.6965 05.01.14	25-year	1.73	265.17	265.4	265.36	265.43	0.008838	0.84	2.04	13.23	0.69
Coffey Creek	Reach1	600.6965 05.01.14	50-year	4.53	265.17	265.59	265.48	265.63	0.003878	0.9	5.54	23.79	0.51
Coffey Creek	Reach1	600.6965 05.01.14	100-year	6.09	265.17	265.68	265.52	265.72	0.003037	0.94	7.6	24.76	0.47
Coffey Creek	Reach1	600.6965 05.01.14	350-year	11.42	265.17	265.89	265.66	265.95	0.002339	1.09	14.03	38.81	0.44
Coffey Creek	Reach1	600.6965 05.01.14	500-year	17.31	265.17	266.03	265.77	266.1	0.002571	1.31	19.82	49.87	0.48
Coffey Creek	Reach1	600.6965 05.01.14	Regional	68.43	265.17	268.46	266.42	268.46	0.00008	0.6	270.96	129.39	0.11
Coffey Creek	Reach1	600.606 05.01.13	2-year	0.28	264.48	264.72	264.61	264.73	0.001616	0.37	0.75	4.57	0.29
Coffey Creek	Reach1	600.606 05.01.13	5-year	0.83	264.48	264.84	264.7	264.86	0.002383	0.6	1.38	5.44	0.38
Coffey Creek	Reach1	600.606 05.01.13	10-year	1.73	264.48	264.97	264.81	265.01	0.002945	0.81	2.12	6.22	0.45
Coffey Creek	Reach1	600.606 05.01.13	25-year	1.73	264.48	264.97	264.81	265.01	0.002945	0.81	2.12	6.22	0.45
Coffey Creek	Reach1	600.606 05.01.13	50-year	4.53	264.48	265.22	265.02	265.29	0.003756	1.18	3.85	7.84	0.53
Coffey Creek	Reach1	600.606 05.01.13	100-year	6.09	264.48	265.32	265.11	265.4	0.004	1.31	4.76	11.21	0.56
Coffey Creek	Reach1	600.606 05.01.13	350-year	11.42	264.48	265.52	265.35	265.66	0.004552	1.68	10.04	60.84	0.63
Coffey Creek	Reach1	600.606 05.01.13	500-year	17.31	264.48	265.65	265.65	265.79	0.004579	1.88	20.21	89.86	0.65
Coffey Creek	Reach1	600.606 05.01.13	Regional	68.43	264.48	268.45	266.06	268.46	0.00005	0.51	361.58	142.15	0.09
Coffey Creek	Reach1	600.404 05.01.12	2-year	0.28	263.88	263.98	263.97	264	0.030304	0.72	0.38	7.91	1.05
Coffey Creek	Reach1	600.404 05.01.12	5-year	0.83	263.88	264.05	264.03	264.09	0.012284	0.82	1.01	8.61	0.77
Coffey Creek	Reach1	600.404 05.01.12	10-year	1.73	263.88	264.13	264.09	264.18	0.009229	0.99	1.74	9.06	0.72
Coffey Creek	Reach1	600.404 05.01.12	25-year	1.73	263.88	264.13	264.09	264.18	0.009229	0.99	1.74	9.06	0.72
Coffey Creek	Reach1	600.404 05.01.12	50-year	4.53	263.88	264.31	264.24	264.4	0.007578	1.33	3.4	9.86	0.72
Coffey Creek	Reach1	600.404 05.01.12	100-year	6.09	263.88	264.38	264.3	264.49	0.007272	1.47	4.15	10.16	0.73
Coffey Creek	Reach1	600.404 05.01.12	350-year	11.42	263.88	264.62	264.48	264.77	0.006108	1.73	6.68	11.37	0.71
Coffey Creek	Reach1	600.404 05.01.12	500-year	17.31	263.88	264.84	264.73	264.99	0.004177	1.75	15.05	46.39	0.62
Coffey Creek	Reach1	600.404 05.01.12	Regional	68.43	263.88	268.44	265.32	268.45	0.000041	0.54	307.95	103.31	0.08
Coffey Creek	Reach1	600.2568 05.01.11	2-year	0.28	262.74	262.97	262.87	262.97	0.002049	0.43	0.65	3.82	0.33
Coffey Creek	Reach1	600.2568 05.01.11	5-year	0.83	262.74	263.12	262.97	263.14	0.00252	0.64	1.3	4.94	0.4
Coffey Creek	Reach1	600.2568 05.01.11	10-year	1.73	262.74	263.28	263.07	263.31	0.002598	0.79	2.17	5.99	0.42
Coffey Creek	Reach1	600.2568 05.01.11	25-year	1.73	262.74	263.28	263.07	263.31	0.002598	0.79	2.17	5.99	0.42
Coffey Creek	Reach1	600.2568 05.01.11	50-year	4.53	262.74	263.6	263.3	263.66	0.002162	1.06	4.4	8.42	0.42
Coffey Creek	Reach1	600.2568 05.01.11	100-year	6.09	262.74	263.73	263.39	263.8	0.002023	1.16	5.72	10.75	0.42
Coffey Creek	Reach1	600.2568 05.01.11	350-year	11.42	262.74	264.13	263.64	264.22	0.001529	1.33	12.38	22.08	0.39
Coffey Creek	Reach1	600.2568 05.01.11	500-year	17.31	262.74	264.51	263.88	264.59	0.001103	1.36	22.57	31.19	0.35
Coffey Creek	Reach1	600.2568 05.01.11	Regional	68.43	262.74	268.44	264.93	268.44	0.000019	0.41	520.23	171.38	0.06
Coffey Creek	Reach1	600.2281 05.01.10	2-year	0.28	262.74	262.95	262.85	262.96	0.001628	0.36	0.78	5.16	0.29
Coffey Creek	Reach1	600.2281 05.01.10	5-year	0.83	262.74	263.1	262.94	263.12	0.001508	0.5	1.66	6.14	0.31
Coffey Creek	Reach1	600.2281 05.01.10	10-year	1.73	262.74	263.26	263.03	263.28	0.001548	0.64	2.69	6.94	0.33
Coffey Creek	Reach1	600.2281 05.01.10	25-year	1.73	262.74	263.26	263.03	263.28	0.001548	0.64	2.69	6.94	0.33
Coffey Creek	Reach1	600.2281 05.01.10	50-year	4.53	262.74	263.59	263.22	263.63	0.001565	0.87	5.21	8.52	0.35
Coffey Creek	Reach1	600.2281 05.01.10	100-year	6.09	262.74	263.73	263.31	263.77	0.001508	0.95	6.41	9.29	0.36
Coffey Creek	Reach1	600.2281 05.01.10	350-year	11.42	262.74	264.13	263.53	264.19	0.001242	1.12	10.29	26.26	0.35
Coffey Creek	Reach1	600.2281 05.01.10	500-year	17.31	262.74	264.51	263.73	264.58	0.001031	1.25	14.08	37.2	0.33
Coffey Creek	Reach1	600.2281 05.01.10	Regional	68.43	262.74	268.3	264.79	268.39	0.000216	1.35	52	180.21	0.19
Coffey Creek	Reach1	600.2056 x-112 (05.01.09)		Culvert									
Coffey Creek	Reach1	600.182 05.01.08	2-year	0.28	262.68	262.95	262.77	262.95	0.000322	0.2	1.38	6.37	0.14
Coffey Creek	Reach1	600.182 05.01.08	5-year	0.83	262.68	263.09	262.84	263.1	0.000553	0.35	2.37	7.05	0.19
Coffey Creek	Reach1	600.182 05.01.08	10-year	1.73	262.68	263.24	262.92	263.26	0.000787	0.49	3.49	8.01	0.24
Coffey Creek	Reach1	600.182 05.01.08	25-year	1.73	262.68	263.24	262.92	263.26	0.000787	0.49	3.49	8.01	0.24
Coffey Creek	Reach1	600.182 05.01.08	50-year	4.53	262.68	263.55	263.1	263.57	0.001011	0.72	6.28	18.38	0.29
Coffey Creek	Reach1	600.182 05.01.08	100-year	6.09	262.68	263.67	263.18	263.7	0.001031	0.81	7.51	28.22	0.3
Coffey Creek	Reach1	600.182 05.01.08	350-year	11.42	262.68	264.03	263.43	264.08	0.000997	1.03	11.05	51.38	0.31
Coffey Creek	Reach1	600.182 05.01.08	500-year	17.31	262.68	264.36	263.6	264.43	0.000951	1.2	14.39	60.1	0.32
Coffey Creek	Reach1	600.182 05.01.08	Regional	68.43	262.68	266.94	264.6	267.09	0.000486	1.7	40.17	94.06	0.27
Coffey Creek	Reach1	600.1341 05.01.07	2-year	0.28	262.68	262.94	262.78	262.95	0.000455	0.23	1.22	5.97	0.16
Coffey Creek	Reach1	600.1341 05.01.07	5-year	0.83	262.68	263.09	262.86	263.09	0.000749	0.39	2.14	6.87	0.22
Coffey Creek	Reach1	600.1341 05.01.07	10-year	1.73	262.68	263.23	262.94	263.25	0.000878	0.54	3.51	13.35	0.26
Coffey Creek	Reach1	600.1341 05.01.07	25-year	1.73	262.68	263.23	262.94	263.25	0.000878	0.54	3.51	13.35	0.26
Coffey Creek	Reach1	600.1341 05.01.07	50-year	4.53	262.68	263.54	263.13	263.57	0.000818	0.74	10.27	30.78	0.27
Coffey Creek	Reach1	600.1341 05.01.07	100-year	6.09	262.68	263.67	263.22	263.69	0.000758	0.78	14.32	34.93	0.27
Coffey Creek	Reach1	600.1341 05.01.07	350-year	11.42	262.68	264.03	263.45	264.05	0.00054	0.83	30.15	46.72	0.24
Coffey Creek	Reach1	600.1341 05.01.07	500-year	17.31	262.68	264.37	263.63	264.39	0.000408	0.85	46.73	51.28	0.21
Coffey Creek	Reach1	600.1341 05.01.07	Regional	68.43	262.68	266.96	264.28	266.97	0.000083	0.73	271.88	132.47	0.11
Coffey Creek	Reach1	600.1301 05.01.06	2-year	0.28	262.56	262.93	262.67	262.94	0.000175	0.17	1.66	6.39	0.1
Coffey Creek	Reach1	600.1301 05.01.06	5-year	0.83	262.56	263.07	262.76	263.07	0.000435	0.32	2.6	7.86	0.17
Coffey Creek	Reach1	600.1301 05.01.06	10-year	1.73	262.56	263.21	262.86	263.22	0.000526	0.43	6.17	40.41	0.2
Coffey Creek	Reach1	600.1301 05.01.06	25-year	1.73	262.56	263.21	262.86	263.22	0.000526	0.43	6.17	40.41	0.2
Coffey Creek	Reach1	600.1301 05.01.06	50-year	4.53	262.56	263.54	263.05	263.54	0.000291	0.44	25.22	98.43	0.16
Coffey Creek	Reach1	600.1301 05.01.06	100-year	6.09	262.56	263.67	263.2	263.67	0.000226	0.43	40.02	122.88	0.15
Coffey Creek	Reach1	600.1301 05.01.06	350-year	11.42	262.56	264.03	263.35	264.04	0.000114	0.39	87.98	137.68	0.11
Coffey Creek	Reach1	600.1301 05.01.06	500-year	17.31	262.56	264.37	263.45	264.38	0.000075	0.37	136.77	145.04	0.09
Coffey Creek	Reach1	600.1301 05.01.06	Regional	68.43	262.56	266.97	263.85	266.97	0.000016	0.32	560.98	194.79	0.05
Coffey Creek	Reach1	600.1245 05.01.05	2-year	0.28	262.56	262.93	262.71	262.93	0.000169	0.16	1.85	32.34	0.1
Coffey Creek	Reach1	600.1245 05.01.05	5-year	0.83	262.56	263.06	262.79	263.07	0.000375	0.31	2.95	48.2	0.16
Coffey Creek	Reach1	600.1245 05.01.05	10-year	1.73	262.56	263.21	262.87	263.22	0.00056	0.46	4.22	52.25	0.21
Coffey Creek	Reach1	600.1245 05.01.05	25-year	1.73	262.56	263.21	262.87	263.22	0.00056	0.46	4.22	52.25	0.21
Coffey Creek	Reach1	600.1245 05.01.05	50-year	4.53	262.56	263.51	263.04	263.53	0.000777	0.72	7.19	84.57	0.26
Coffey Creek	Reach1	600.1245 05.01.05	100-year	6.09	262.56	263.63	263.11	263.66	0.000868	0.84	8.52	100.63	0.28
Coffey Creek	Reach1	600.1245 05.01.05	350-year	11.42	262.56	263.96	263.32	264.02	0.000962	1.1	14.31	123.23	0.32
Coffey Creek	Reach1	600.1245 05.01.05	500-year	17.31	262.56	264.29	263.51	264.36	0.000864	1.22	21.76	139.57	0.31
Coffey Creek	Reach1	600.1245 05.01.05	Regional	68.43	262.56	266.97	264.39	266.97	0.000013	0.29	604.66	221.42	0.05
Coffey Creek	Reach1	600.1142 x-143 (05.01.04)		Bridge									
Coffey Creek	Reach1	600.1062 05.01.03	2-year	0.28	262.74	262.85	262.85	262.89	0.022063	0.81	0.34	42.03	0.96
Coffey Creek	Reach1	600.1062 05.01.03	5-year	0.83	262.74	262.92	262.92	263	0.021327	1.19	0.7	49.79	1.04
Coffey Creek	Reach1	600.1062 05.01.03	10-year	1.73	262.74	263.01	263.01	263.12	0.018115	1.44	1.2	57.95	1.02
Coffey Creek	Reach1	600.1062 05.01.03	25-year	1.73	262.74	263.01	263.01	263.12	0.018115	1.44	1.2	57.95	1.02
Coffey Creek	Reach1	600.1062 05.01.03	50-year	4.53	262.74	263.21	263.21	263.37	0.015543	1.77	2.56	76.15	1.02

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Exising Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	600.1062 05.01.03	100-year	6.09	262.74	263.29	263.29	263.47	0.01424	1.87	3.27	91.05	1
Coffey Creek	Reach1	600.1062 05.01.03	350-year	11.42	262.74	263.49	263.49	263.74	0.012202	2.22	5.26	117.22	0.98
Coffey Creek	Reach1	600.1062 05.01.03	500-year	17.31	262.74	263.67	263.67	263.96	0.009577	2.42	8.37	154.56	0.92
Coffey Creek	Reach1	600.1062 05.01.03	Regional	68.43	262.74	266.97	264.4	266.97	0.000008	0.22	716.45	235.45	0.04
Coffey Creek	Reach1	600.1004 05.01.02	2-year	0.28	262.53	262.11	261.88	262.11	0.000958		2.12	11.95	0
Coffey Creek	Reach1	600.1004 05.01.02	5-year	0.83	262.53	262.28	261.97	262.28	0.001141		4.88	20.9	0
Coffey Creek	Reach1	600.1004 05.01.02	10-year	1.73	262.53	262.42	262.05	262.42	0.001277		8.46	28.64	0
Coffey Creek	Reach1	600.1004 05.01.02	25-year	1.73	262.53	262.42	262.05	262.42	0.001277		8.46	28.64	0
Coffey Creek	Reach1	600.1004 05.01.02	50-year	4.53	262.53	262.67	262.18	262.68	0.001423	0.26	17.89	51.62	0.26
Coffey Creek	Reach1	600.1004 05.01.02	100-year	6.09	262.53	262.76	262.25	262.76	0.001368	0.33	22.77	63.75	0.27
Coffey Creek	Reach1	600.1004 05.01.02	350-year	11.42	262.53	262.99	262.37	263	0.00106	0.48	40.6	88.13	0.27
Coffey Creek	Reach1	600.1004 05.01.02	500-year	17.31	262.53	263.18	262.46	263.18	0.001039	0.62	60.01	118.4	0.28
Coffey Creek	Reach1	600.1004 05.01.02	Regional	68.43	262.53	266.97	262.91	266.97	0.000007	0.22	752.14	225.67	0.03
Coffey Creek	Reach1	600.000 05.01.01	2-year	0.28	261.75	261.89	261.86	261.9	0.007614	0.53	0.52	6.06	0.58
Coffey Creek	Reach1	600.000 05.01.01	5-year	0.83	261.75	261.94	261.93	261.99	0.015989	0.99	0.83	6.58	0.89
Coffey Creek	Reach1	600.000 05.01.01	10-year	1.73	261.75	262	262	262.1	0.018249	1.34	1.29	7.19	1.01
Coffey Creek	Reach1	600.000 05.01.01	25-year	1.73	261.75	262	262	262.1	0.018249	1.34	1.29	7.19	1.01
Coffey Creek	Reach1	600.000 05.01.01	50-year	4.53	261.75	262.17	262.17	262.33	0.015019	1.76	2.59	8.52	1
Coffey Creek	Reach1	600.000 05.01.01	100-year	6.09	261.75	262.24	262.24	262.43	0.013533	1.9	3.25	8.99	0.98
Coffey Creek	Reach1	600.000 05.01.01	350-year	11.42	261.75	262.44	262.44	262.71	0.012606	2.31	5.12	10.28	1
Coffey Creek	Reach1	600.000 05.01.01	500-year	17.31	261.75	262.69	262.69	262.93	0.00814	2.25	10.61	43.66	0.85
Coffey Creek	Reach1	600.000 05.01.01	Regional	68.43	261.75	266.97	263.27	266.97	0.000012	0.31	534.62	179.97	0.04
Coffey Creek	Reach1	599.9592 08.01.38	2-year	0.28	261.18	261.31	261.31	261.35	0.025212	0.88	0.32	4.19	1.03
Coffey Creek	Reach1	599.9592 08.01.38	5-year	0.83	261.18	261.43	261.39	261.47	0.009085	0.86	0.96	6.15	0.7
Coffey Creek	Reach1	599.9592 08.01.38	10-year	1.73	261.18	261.58	261.48	261.62	0.004333	0.87	1.99	7.22	0.53
Coffey Creek	Reach1	599.9592 08.01.38	25-year	1.73	261.18	261.58	261.48	261.62	0.004333	0.87	1.99	7.22	0.53
Coffey Creek	Reach1	599.9592 08.01.38	50-year	4.53	261.18	261.93	261.65	261.98	0.002151	0.93	4.87	9.25	0.41
Coffey Creek	Reach1	599.9592 08.01.38	100-year	6.09	261.18	262.07	261.73	262.12	0.001924	0.98	6.25	10.15	0.4
Coffey Creek	Reach1	599.9592 08.01.38	350-year	11.42	261.18	262.48	261.95	262.52	0.001091	0.95	20.39	81.13	0.32
Coffey Creek	Reach1	599.9592 08.01.38	500-year	17.31	261.18	262.74	262.13	262.77	0.000663	0.88	47.25	114.73	0.26
Coffey Creek	Reach1	599.9592 08.01.38	Regional	68.43	261.18	266.97	262.88	266.97	0.000005	0.21	784.5	219.07	0.03
Coffey Creek	Reach1	599.9497 08.01.37	2-year	0.28	261.12	261.28	261.22	261.29	0.002654	0.39	0.71	5.85	0.36
Coffey Creek	Reach1	599.9497 08.01.37	5-year	0.83	261.12	261.42	261.29	261.43	0.002155	0.53	1.55	6.86	0.36
Coffey Creek	Reach1	599.9497 08.01.37	10-year	1.73	261.12	261.58	261.37	261.6	0.001695	0.64	2.72	7.71	0.34
Coffey Creek	Reach1	599.9497 08.01.37	25-year	1.73	261.12	261.58	261.37	261.6	0.001695	0.64	2.72	7.71	0.34
Coffey Creek	Reach1	599.9497 08.01.37	50-year	4.53	261.12	261.93	261.55	261.96	0.001225	0.77	5.94	10.72	0.32
Coffey Creek	Reach1	599.9497 08.01.37	100-year	6.09	261.12	262.07	261.62	262.11	0.001084	0.83	7.54	11.58	0.31
Coffey Creek	Reach1	599.9497 08.01.37	350-year	11.42	261.12	262.49	261.85	262.5	0.000344	0.63	28.1	99.43	0.19
Coffey Creek	Reach1	599.9497 08.01.37	500-year	17.31	261.12	262.75	262.03	262.75	0.000143	0.46	57.39	135.28	0.12
Coffey Creek	Reach1	599.9497 08.01.37	Regional	68.43	261.12	266.97	262.64	266.97	0.000001	0.07	1069.59	274.99	0.01
Coffey Creek	Reach1	599.9415 x-115 (08.01.36)		Bridge									
Coffey Creek	Reach1	599.9346 08.01.35	2-year	0.28	261.06	261.21	261.18	261.23	0.008356	0.63	0.44	4.23	0.62
Coffey Creek	Reach1	599.9346 08.01.35	5-year	0.83	261.06	261.37	261.26	261.39	0.003275	0.64	1.33	7.37	0.44
Coffey Creek	Reach1	599.9346 08.01.35	10-year	1.73	261.06	261.55	261.36	261.57	0.001784	0.69	3	17.4	0.36
Coffey Creek	Reach1	599.9346 08.01.35	25-year	1.73	261.06	261.55	261.36	261.57	0.001784	0.69	3	17.4	0.36
Coffey Creek	Reach1	599.9346 08.01.35	50-year	4.53	261.06	261.91	261.54	261.93	0.001015	0.81	8.19	122.69	0.3
Coffey Creek	Reach1	599.9346 08.01.35	100-year	6.09	261.06	262.05	261.63	262.08	0.000949	0.88	10.6	147.27	0.3
Coffey Creek	Reach1	599.9346 08.01.35	350-year	11.42	261.06	262.42	261.82	262.42	0.000137	0.42	75.65	165.42	0.12
Coffey Creek	Reach1	599.9346 08.01.35	500-year	17.31	261.06	262.68	262	262.69	0.00011	0.43	115.28	167.25	0.11
Coffey Creek	Reach1	599.9346 08.01.35	Regional	68.43	261.06	266.97	262.41	266.97	0.000001	0.12	1318.94	307.43	0.02
Coffey Creek	Reach1	599.9304 08.01.34	2-year	0.28	261.06	261.21	261.1	261.21	0.000168	0.11	5.99	54.09	0.09
Coffey Creek	Reach1	599.9304 08.01.34	5-year	0.83	261.06	261.38	261.13	261.38	0.000077	0.12	15.65	62.06	0.07
Coffey Creek	Reach1	599.9304 08.01.34	10-year	1.73	261.06	261.56	261.15	261.56	0.000063	0.15	28.72	84	0.07
Coffey Creek	Reach1	599.9304 08.01.34	25-year	1.73	261.06	261.56	261.15	261.56	0.000063	0.15	28.72	84	0.07
Coffey Creek	Reach1	599.9304 08.01.34	50-year	4.53	261.06	261.92	261.22	261.92	0.000046	0.19	71.6	156.73	0.07
Coffey Creek	Reach1	599.9304 08.01.34	100-year	6.09	261.06	262.06	261.25	262.06	0.000042	0.2	95.27	172.97	0.06
Coffey Creek	Reach1	599.9304 08.01.34	350-year	11.42	261.06	262.42	261.32	262.42	0.000032	0.21	160.13	185.32	0.06
Coffey Creek	Reach1	599.9304 08.01.34	500-year	17.31	261.06	262.68	261.38	262.68	0.000032	0.24	209.14	188.5	0.06
Coffey Creek	Reach1	599.9304 08.01.34	Regional	68.43	261.06	266.97	261.76	266.97	0.000001	0.11	1460.7	329.81	0.01

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

Proposed Condition HEC-RAS Hydraulic Output Summary

BURNSIDE
R. J. Burnside & Associates Limited
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River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	507.003 04.05.04	2-year	2.63	282.18	282.65		282.69	0.004387	0.92	2.87	8.42	0.5
Upper Humber	Reach4	507.003 04.05.04	5-year	5.3	282.18	282.76		282.86	0.007567	1.37	3.87	9.33	0.68
Upper Humber	Reach4	507.003 04.05.04	10-year	8.41	282.18	282.81	282.78	283	0.013853	1.94	4.34	9.78	0.93
Upper Humber	Reach4	507.003 04.05.04	25-year	8.41	282.18	282.81	282.78	283	0.013853	1.94	4.34	9.78	0.93
Upper Humber	Reach4	507.003 04.05.04	50-year	15.26	282.18	283.03	283.03	283.27	0.015572	2.18	7.01	14.48	1
Upper Humber	Reach4	507.003 04.05.04	100-year	18.63	282.18	283.1	283.1	283.37	0.015571	2.32	8.04	15.1	1.01
Upper Humber	Reach4	507.003 04.05.04	350-year	29.84	282.18	283.31	283.31	283.66	0.01417	2.64	11.33	16.6	1.01
Upper Humber	Reach4	507.003 04.05.04	500-year	41.94	282.18	283.49	283.49	283.92	0.012773	2.92	14.52	17.78	1
Upper Humber	Reach4	507.003 04.05.04	Regional	146.98	282.18	284.63	284.63	285.54	0.00906	4.29	38.58	24.61	0.96
Upper Humber	Reach4	506.832 04.05.03	2-year	2.63	282.18	282.64		282.65	0.001618	0.6	6.66	35.06	0.33
Upper Humber	Reach4	506.832 04.05.03	5-year	5.3	282.18	282.78		282.8	0.001675	0.76	12.94	59.38	0.36
Upper Humber	Reach4	506.832 04.05.03	10-year	8.41	282.18	282.88		282.91	0.001642	0.85	22.55	115.32	0.36
Upper Humber	Reach4	506.832 04.05.03	25-year	8.41	282.18	282.88		282.91	0.001642	0.85	22.55	115.32	0.36
Upper Humber	Reach4	506.832 04.05.03	50-year	15.26	282.18	283.01		283.04	0.001777	1.01	41.14	163.32	0.39
Upper Humber	Reach4	506.832 04.05.03	100-year	18.63	282.18	283.06		283.09	0.001887	1.08	49.45	184.16	0.41
Upper Humber	Reach4	506.832 04.05.03	350-year	29.84	282.18	283.2		283.23	0.001861	1.19	77.57	227.2	0.41
Upper Humber	Reach4	506.832 04.05.03	500-year	41.94	282.18	283.29		283.33	0.001981	1.31	100.02	233.44	0.43
Upper Humber	Reach4	506.832 04.05.03	Regional	146.98	282.18	283.71		283.78	0.003291	2.09	209.93	284.01	0.58
Upper Humber	Reach4	506.8077 04.05.02	2-year	2.63	281.49	281.9	281.88	282.01	0.013011	1.44	1.83	7.1	0.9
Upper Humber	Reach4	506.8077 04.05.02	5-year	5.3	281.49	282.07	282.07	282.19	0.00994	1.56	4.76	33.63	0.83
Upper Humber	Reach4	506.8077 04.05.02	10-year	8.41	281.49	282.16	282.16	282.29	0.01039	1.72	8.29	42.97	0.87
Upper Humber	Reach4	506.8077 04.05.02	25-year	8.41	281.49	282.16	282.16	282.29	0.01039	1.72	8.29	42.97	0.87
Upper Humber	Reach4	506.8077 04.05.02	50-year	15.26	281.49	282.32	282.32	282.44	0.008113	1.85	18.44	98.62	0.81
Upper Humber	Reach4	506.8077 04.05.02	100-year	18.63	281.49	282.37	282.37	282.49	0.007398	1.89	24.36	121.49	0.78
Upper Humber	Reach4	506.8077 04.05.02	350-year	29.84	281.49	282.48	282.48	282.61	0.007885	2.17	39.97	175.31	0.83
Upper Humber	Reach4	506.8077 04.05.02	500-year	41.94	281.49	282.58	282.58	282.71	0.007211	2.28	59.97	220.98	0.81
Upper Humber	Reach4	506.8077 04.05.02	Regional	146.98	281.49	283.15		283.21	0.003012	2.11	237.29	345.8	0.57
Upper Humber	Reach4	506.7489 04.05.01	2-year	2.63	281.25	281.54		281.57	0.004258	0.86	4.32	19.51	0.52
Upper Humber	Reach4	506.7489 04.05.01	5-year	5.3	281.25	281.7		281.74	0.003434	0.98	9.62	44.24	0.5
Upper Humber	Reach4	506.7489 04.05.01	10-year	8.41	281.25	281.81		281.86	0.003019	1.08	15.59	66.65	0.49
Upper Humber	Reach4	506.7489 04.05.01	25-year	8.41	281.25	281.81		281.86	0.003019	1.08	15.59	66.65	0.49
Upper Humber	Reach4	506.7489 04.05.01	50-year	15.26	281.25	281.95		282.01	0.003529	1.37	27.62	108.22	0.55
Upper Humber	Reach4	506.7489 04.05.01	100-year	18.63	281.25	282		282.06	0.003736	1.48	33.61	129.07	0.57
Upper Humber	Reach4	506.7489 04.05.01	350-year	29.84	281.25	282.16		282.22	0.0031	1.55	55.79	146.94	0.54
Upper Humber	Reach4	506.7489 04.05.01	500-year	41.94	281.25	282.31		282.36	0.002544	1.56	79.73	189.59	0.5
Upper Humber	Reach4	506.7489 04.05.01	Regional	146.98	281.25	283.06		283.1	0.001269	1.61	296.23	314.63	0.39
Upper Humber	Reach4	506.632 04.03.16	2-year	2.6	280.65	281.06	280.93	281.11	0.003864	0.92	2.84	8.64	0.51
Upper Humber	Reach4	506.632 04.03.16	5-year	5.27	280.65	281.24	281.07	281.31	0.004108	1.17	4.56	13.35	0.56
Upper Humber	Reach4	506.632 04.03.16	10-year	8.42	280.65	281.38	281.21	281.48	0.0039	1.37	8.86	60.45	0.57
Upper Humber	Reach4	506.632 04.03.16	25-year	8.42	280.65	281.38	281.21	281.48	0.0039	1.37	8.86	60.45	0.57
Upper Humber	Reach4	506.632 04.03.16	50-year	15.54	280.65	281.6	281.49	281.68	0.002754	1.42	24.77	83.39	0.5
Upper Humber	Reach4	506.632 04.03.16	100-year	19.08	280.65	281.69	281.56	281.76	0.00235	1.41	32.96	95.78	0.47
Upper Humber	Reach4	506.632 04.03.16	350-year	31.12	280.65	281.91	281.68	281.97	0.001987	1.49	55.05	106.16	0.45
Upper Humber	Reach4	506.632 04.03.16	500-year	44.15	280.65	282.08	281.81	282.14	0.001917	1.61	73.88	113.92	0.45
Upper Humber	Reach4	506.632 04.03.16	Regional	157.85	280.65	282.8	282.36	282.92	0.002687	2.56	185.51	185.56	0.58
Upper Humber	Reach4	506.433 04.03.15	2-year	2.6	279.93	280.38	280.23	280.42	0.00308	0.85	3.07	8.9	0.46
Upper Humber	Reach4	506.433 04.03.15	5-year	5.27	279.93	280.58	280.37	280.64	0.002801	1.06	5.29	13.19	0.47
Upper Humber	Reach4	506.433 04.03.15	10-year	8.42	279.93	280.74	280.5	280.83	0.002794	1.27	7.89	23.16	0.49
Upper Humber	Reach4	506.433 04.03.15	25-year	8.42	279.93	280.74	280.5	280.83	0.002794	1.27	7.89	23.16	0.49
Upper Humber	Reach4	506.433 04.03.15	50-year	15.54	279.93	280.95	280.71	281.08	0.00347	1.69	13.58	34.64	0.57
Upper Humber	Reach4	506.433 04.03.15	100-year	19.08	279.93	281.02	280.86	281.18	0.003954	1.9	16.24	43.42	0.62
Upper Humber	Reach4	506.433 04.03.15	350-year	31.12	279.93	281.22	281.13	281.42	0.004409	2.27	26.48	60.96	0.67
Upper Humber	Reach4	506.433 04.03.15	500-year	44.15	279.93	281.4	281.33	281.62	0.004273	2.46	40.71	96.04	0.68
Upper Humber	Reach4	506.433 04.03.15	Regional	157.85	279.93	282.34	282.02	282.47	0.002226	2.54	196.08	189.9	0.54
Upper Humber	Reach4	506.230 04.03.14	2-year	2.6	279.66	280.21	279.96	280.24	0.001396	0.7	4.11	15.16	0.33
Upper Humber	Reach4	506.230 04.03.14	5-year	5.27	279.66	280.41	280.1	280.45	0.001571	0.94	7.39	19.98	0.37
Upper Humber	Reach4	506.230 04.03.14	10-year	8.42	279.66	280.56	280.26	280.62	0.001786	1.14	12.72	54.67	0.4
Upper Humber	Reach4	506.230 04.03.14	25-year	8.42	279.66	280.56	280.26	280.62	0.001786	1.14	12.72	54.67	0.4
Upper Humber	Reach4	506.230 04.03.14	50-year	15.54	279.66	280.76	280.5	280.83	0.002031	1.41	26.33	76.57	0.45
Upper Humber	Reach4	506.230 04.03.14	100-year	19.08	279.66	280.83	280.66	280.9	0.002052	1.48	32	79.56	0.45
Upper Humber	Reach4	506.230 04.03.14	350-year	31.12	279.66	281.04	280.83	281.12	0.002088	1.68	50.39	95.97	0.47
Upper Humber	Reach4	506.230 04.03.14	500-year	44.15	279.66	281.25	280.97	281.33	0.001925	1.78	72.63	118.01	0.46
Upper Humber	Reach4	506.230 04.03.14	Regional	157.85	279.66	282.24	281.74	282.3	0.001239	2.01	291.38	302.04	0.41
Upper Humber	Reach4	506.1837 04.03.13	2-year	2.6	279.39	279.8		279.86	0.005087	1.02	2.61	10.13	0.58
Upper Humber	Reach4	506.1837 04.03.13	5-year	5.27	279.39	279.96	279.84	280.05	0.004836	1.31	5.14	27.01	0.61
Upper Humber	Reach4	506.1837 04.03.13	10-year	8.42	279.39	280.09	279.99	280.19	0.004505	1.48	10.04	47.25	0.61
Upper Humber	Reach4	506.1837 04.03.13	25-year	8.42	279.39	280.09	279.99	280.19	0.004505	1.48	10.04	47.25	0.61
Upper Humber	Reach4	506.1837 04.03.13	50-year	15.54	279.39	280.27		280.38	0.004247	1.72	18.99	51.07	0.62
Upper Humber	Reach4	506.1837 04.03.13	100-year	19.08	279.39	280.35		280.46	0.004048	1.79	23.04	52.39	0.62
Upper Humber	Reach4	506.1837 04.03.13	350-year	31.12	279.39	280.65	280.39	280.75	0.0027	1.78	39.75	57.81	0.53
Upper Humber	Reach4	506.1837 04.03.13	500-year	44.15	279.39	280.84	280.53	280.96	0.002866	2.03	50.99	65.05	0.56
Upper Humber	Reach4	506.1837 04.03.13	Regional	157.85	279.39	281.72	281.3	281.96	0.004017	3.36	152.01	176.98	0.72
Upper Humber	Reach4	506.031 04.03.12	2-year	2.6	278.91	279.25	279.12	279.28	0.002881	0.73	3.57	12.36	0.43
Upper Humber	Reach4	506.031 04.03.12	5-year	5.27	278.91	279.41	279.24	279.46	0.003005	0.95	5.58	13.63	0.47
Upper Humber	Reach4	506.031 04.03.12	10-year	8.42	278.91	279.54	279.33	279.61	0.003058	1.13	7.8	27.09	0.49
Upper Humber	Reach4	506.031 04.03.12	25-year	8.42	278.91	279.54	279.33	279.61	0.003058	1.13	7.8	27.09	0.49
Upper Humber	Reach4	506.031 04.03.12	50-year	15.54	278.91	279.75	279.52	279.84	0.003019	1.39	16.37	49.75	0.52
Upper Humber	Reach4	506.031 04.03.12	100-year	19.08	278.91	279.81	279.64	279.91	0.003231	1.52	19.53	51.24	0.54
Upper Humber	Reach4	506.031 04.03.12	350-year	31.12	278.91	279.84	279.84	280.08	0.007328	2.34	21.08	51.48	0.82
Upper Humber	Reach4	506.031 04.03.12	500-year	44.15	278.91	279.98	279.98	280.27	0.007634	2.65	28.26	57.88	0.86
Upper Humber	Reach4	506.031 04.03.12	Regional	157.85	278.91	280.8	280.8	281.19	0.006189	3.6	110.22	258.21	0.86
Upper Humber	Reach4	505.828 04.03.11	2-year	2.6	277.95	278.35		278.41	0.00713	1.1	2.38	9.96	0.67
Upper Humber	Reach4	505.828 04.03.11	5-year	5.27	277.95	278.5		278.59	0.006539	1.34	4.42	15.72	0.68
Upper Humber	Reach4	505.828 04.03.11	10-year	8.42	277.95	278.63		278.75	0.006374	1.57	6.59	18.73	0.7
Upper Humber	Reach4	505.828 04.03.11	25-year	8.42	277.95	278.63		278.75	0.006374	1.57	6.59	18.73	0.7
Upper Humber	Reach4	505.828 04.03.11	50-year	15.54	277.95	278.85	278.76	279.01	0.005814	1.9	12.49	49.06	0.71
Upper Humber	Reach4	505.828 04.03.11	100-year	19.08	277.95	278.94	278.9	279.1	0.005067	1.92	18.47	71.68	0.68
Upper Humber	Reach4	505.828 04.03.11	350-year	31.12	277.95	279.4		279.46	0.001376	1.35	67.94	169.82	0.38
Upper Humber	Reach4	505.828 04.03.11	500-year	44.15	277.95	279.57		279.62	0.001341	1.44	101.29	226.32	0.38
Upper Humber	Reach4	505.828 04.03.11	Regional	157.85	277.95	280.19		280.26	0.001603	2.01	278.57	333.1	0.45
Upper Humber	Reach4	505.626 04.03.10	2-year	2.6	277.35	277.92		277.93	0.001095	0.51	5.11	14.65	0.28
Upper Humber	Reach4	505.626 04.03.10	5-year	5.27	277.35	278.12		278.14	0.001004	0.61	8.7	19.34	0.28
Upper Humber	Reach4	505.626 04.03.10	10-year	8.42	277.35	278.29		278.32	0.000935	0.72	12.68	29.16	0.28
Upper Humber	Reach4	505.626 04.03.10	25-year	8.42	277.35	278.29		278.32	0.000935	0.72	12.68	29.16	0.28
Upper Humber	Reach4	505.626 04.03.10	50-year	15.54	277.35	278.58		278.61	0.000838	0.86	25.77	57.59	0.28
Upper Humber	Reach4	505.626 04.03.10	100-year	19.08	277.35	278.7		278.74	0.000757	0.89	33.64	65.05	0.28
Upper Humber	Reach4	505.626 04.03.10	350-year	31.12	277.35	279.34		279.35	0.000218	0.65	131.72	233.35	0.16
Upper Humber	Reach4	505.626 04.03.10	500-year	44.15	277.35	279.49		279.5	0.000263	0.76	168.69	262.84	0.18
Upper Humber	Reach4	505.626 04.03.10	Regional	157.85	277.35	279.97		280.02	0.000839	1.58	297.63	272.93	0.33
Upper Humber	Reach4	505.553 04.03.09	2-year	2.6	277.26	277.74		277.78	0.002913	0.93	3.52	11.21	0.46
Upper Humber	Reach4	505.553 04.03.09	5-year	5.27	277.26	277.9		277.98	0.003782	1.32	5.56	17.52	0.56
Upper Humber	Reach4	505.553 04.03.09	10-year	8.42	277.26	278.06		278.16	0.003761	1.55	8.86	25.46	0.58
Upper Humber	Reach4	505.553 04.03.09	25-year	8.42	277.26	278.06		278.16	0.003761	1.55	8.86	25.46	0.58
Upper Humber	Reach4	505.553 04.03.09	50-year	15.54	277.26	278.4		278.49	0.002442	1.61	23.89	68.33	0.5
Upper Humber	Reach4	505.553 04.03.09	100-year	19.08	277.26	278.59		278.65	0.001406	1.37	40.08	106.3	0.39
Upper Humber	Reach4	505.553 04.03.09	350-year	31.12	277.26	279.33		279.33	0.00016	0.63	210.94	363	0.14
Upper Humber	Reach4	505.553 04.03.09	500-year	44.15	277.26	279.48		279.48	0.000191	0.72	266.63	403.83	0.16
Upper Humber	Reach4	505.553 04.03.09	Regional	157.85	277.26	279.94		279.96	0.000581	1.43	490.67	531.5	0.28

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

Proposed Condition HEC-RAS Hydraulic Output Summary

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River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	505.5255 04.03.08	2-year	2.6	277.23	277.69	277.56	277.74	0.004685	0.96	2.72	8.95	0.55
Upper Humber	Reach4	505.5255 04.03.08	5-year	5.27	277.23	277.86	277.72	277.94	0.004825	1.21	4.35	11.08	0.59
Upper Humber	Reach4	505.5255 04.03.08	10-year	8.42	277.23	278.02	277.85	278.12	0.004325	1.38	6.49	20.94	0.59
Upper Humber	Reach4	505.5255 04.03.08	25-year	8.42	277.23	278.02	277.85	278.12	0.004325	1.38	6.49	20.94	0.59
Upper Humber	Reach4	505.5255 04.03.08	50-year	15.54	277.23	278.34	278.07	278.46	0.003177	1.54	11.3	46.54	0.54
Upper Humber	Reach4	505.5255 04.03.08	100-year	19.08	277.23	278.49	278.16	278.61	0.002746	1.59	13.56	67.97	0.51
Upper Humber	Reach4	505.5255 04.03.08	350-year	31.12	277.23	279.3	278.4	279.33	0.0004	0.91	74.22	363.47	0.22
Upper Humber	Reach4	505.5255 04.03.08	500-year	44.15	277.23	279.47	278.61	279.48	0.000227	0.73	179.58	428.73	0.17
Upper Humber	Reach4	505.5255 04.03.08	Regional	157.85	277.23	279.93	279.37	279.95	0.000574	1.33	396.86	475.62	0.27
Upper Humber	Reach4	505.515 x-121 (04.03.07)		Bridge									
Upper Humber	Reach4	505.5029 04.03.06	2-year	2.6	277.23	277.59	277.48	277.63	0.004717	0.9	2.88	10.46	0.55
Upper Humber	Reach4	505.5029 04.03.06	5-year	5.27	277.23	277.7	277.62	277.78	0.007317	1.29	4.08	12.06	0.71
Upper Humber	Reach4	505.5029 04.03.06	10-year	8.42	277.23	277.81	277.73	277.93	0.008107	1.54	5.46	13.35	0.77
Upper Humber	Reach4	505.5029 04.03.06	25-year	8.42	277.23	277.81	277.73	277.93	0.008107	1.54	5.46	13.35	0.77
Upper Humber	Reach4	505.5029 04.03.06	50-year	15.54	277.23	278.05	277.92	278.2	0.006277	1.73	9	20.13	0.72
Upper Humber	Reach4	505.5029 04.03.06	100-year	19.08	277.23	278.11	277.99	278.3	0.006853	1.92	9.94	43.32	0.76
Upper Humber	Reach4	505.5029 04.03.06	350-year	31.12	277.23	278.22	278.21	278.58	0.010656	2.67	11.7	68.73	0.98
Upper Humber	Reach4	505.5029 04.03.06	500-year	44.15	277.23	278.41	278.41	278.88	0.010305	3.03	14.6	112.76	1
Upper Humber	Reach4	505.5029 04.03.06	Regional	157.85	277.23	279.82	279.24	279.83	0.000065	0.44	439.16	469.93	0.09
Upper Humber	Reach4	505.4726 04.03.05	2-year	2.6	277.2	277.42	277.42	277.51	0.018492	1.35	1.93	10.77	1.02
Upper Humber	Reach4	505.4726 04.03.05	5-year	5.27	277.2	277.62	277.53	277.69	0.006642	1.23	4.29	13.01	0.68
Upper Humber	Reach4	505.4726 04.03.05	10-year	8.42	277.2	277.7	277.64	277.83	0.008093	1.56	5.46	13.78	0.77
Upper Humber	Reach4	505.4726 04.03.05	25-year	8.42	277.2	277.7	277.64	277.83	0.008093	1.56	5.46	13.78	0.77
Upper Humber	Reach4	505.4726 04.03.05	50-year	15.54	277.2	277.83	277.83	278.07	0.01199	2.2	7.34	17.18	0.97
Upper Humber	Reach4	505.4726 04.03.05	100-year	19.08	277.2	277.93	277.93	278.18	0.010308	2.23	9.61	27.22	0.92
Upper Humber	Reach4	505.4726 04.03.05	350-year	31.12	277.2	278.19	278.19	278.42	0.006572	2.26	22.18	73.94	0.78
Upper Humber	Reach4	505.4726 04.03.05	500-year	44.15	277.2	278.37	278.37	278.59	0.005467	2.34	39.6	116.08	0.74
Upper Humber	Reach4	505.4726 04.03.05	Regional	157.85	277.2	279.81	278.93	279.82	0.00033	1.03	538.08	473	0.21
Upper Humber	Reach4	505.426 04.03.04	2-year	2.6	276.69	277.32		277.34	0.000799	0.55	4.72	9.35	0.25
Upper Humber	Reach4	505.426 04.03.04	5-year	5.27	276.69	277.53		277.55	0.000895	0.7	14.25	105.99	0.27
Upper Humber	Reach4	505.426 04.03.04	10-year	8.42	276.69	277.64		277.66	0.000919	0.79	28.59	152.79	0.29
Upper Humber	Reach4	505.426 04.03.04	25-year	8.42	276.69	277.64		277.66	0.000919	0.79	28.59	152.79	0.29
Upper Humber	Reach4	505.426 04.03.04	50-year	15.54	276.69	277.78		277.8	0.001027	0.93	52.45	185.64	0.31
Upper Humber	Reach4	505.426 04.03.04	100-year	19.08	276.69	277.83		277.86	0.001064	0.98	62.42	199.07	0.32
Upper Humber	Reach4	505.426 04.03.04	350-year	31.12	276.69	277.98		278.01	0.001095	1.1	95.02	224.01	0.33
Upper Humber	Reach4	505.426 04.03.04	500-year	44.15	276.69	278.13		278.15	0.001022	1.15	129.05	244.95	0.33
Upper Humber	Reach4	505.426 04.03.04	Regional	157.85	276.69	279.8		279.81	0.000098	0.62	816.04	475.86	0.12
Upper Humber	Reach4	505.226 04.03.03	2-year	2.6	276.48	276.87	276.83	276.95	0.010073	1.25	2.09	8.26	0.79
Upper Humber	Reach4	505.226 04.03.03	5-year	5.27	276.48	277.03	276.97	277.14	0.009303	1.46	3.94	15.82	0.8
Upper Humber	Reach4	505.226 04.03.03	10-year	8.42	276.48	277.19	277.12	277.29	0.006237	1.4	8.49	43.3	0.68
Upper Humber	Reach4	505.226 04.03.03	25-year	8.42	276.48	277.19	277.12	277.29	0.006237	1.4	8.49	43.3	0.68
Upper Humber	Reach4	505.226 04.03.03	50-year	15.54	276.48	277.41	277.29	277.48	0.003549	1.38	23.04	96.37	0.55
Upper Humber	Reach4	505.226 04.03.03	100-year	19.08	276.48	277.49	277.34	277.55	0.003043	1.38	30.89	108.16	0.52
Upper Humber	Reach4	505.226 04.03.03	350-year	31.12	276.48	277.69	277.5	277.75	0.002222	1.39	56.63	142.13	0.46
Upper Humber	Reach4	505.226 04.03.03	500-year	44.15	276.48	277.87	277.61	277.92	0.001853	1.43	83.65	162.61	0.43
Upper Humber	Reach4	505.226 04.03.03	Regional	157.85	276.48	279.78	278.12	279.79	0.000149	0.79	619.92	397.62	0.15
Upper Humber	Reach4	505.023 04.03.02	2-year	2.6	275.94	276.52	276.27	276.53	0.000905	0.49	5.32	14.01	0.25
Upper Humber	Reach4	505.023 04.03.02	5-year	5.27	275.94	276.75	276.37	276.77	0.000758	0.6	9.3	26.79	0.25
Upper Humber	Reach4	505.023 04.03.02	10-year	8.42	275.94	276.89	276.46	276.92	0.000899	0.75	14.72	51.88	0.28
Upper Humber	Reach4	505.023 04.03.02	25-year	8.42	275.94	276.89	276.46	276.92	0.000899	0.75	14.72	51.88	0.28
Upper Humber	Reach4	505.023 04.03.02	50-year	15.54	275.94	277.07	276.64	277.12	0.001184	1	25.59	64.71	0.33
Upper Humber	Reach4	505.023 04.03.02	100-year	19.08	275.94	277.14	276.73	277.19	0.001302	1.1	30.08	68.22	0.36
Upper Humber	Reach4	505.023 04.03.02	350-year	31.12	275.94	277.34	277	277.41	0.001522	1.35	44.62	86.43	0.4
Upper Humber	Reach4	505.023 04.03.02	500-year	44.15	275.94	277.5	277.11	277.59	0.001697	1.55	57.85	96.59	0.43
Upper Humber	Reach4	505.023 04.03.02	Regional	157.85	275.94	279.75	277.85	279.76	0.000132	0.83	643.34	423.29	0.14
Upper Humber	Reach4	504.823 04.03.01	2-year	2.6	275.58	276.26	275.93	276.29	0.001347	0.73	3.58	6.79	0.32
Upper Humber	Reach4	504.823 04.03.01	5-year	5.27	275.58	276.49	276.11	276.54	0.001597	0.96	8.42	62.39	0.37
Upper Humber	Reach4	504.823 04.03.01	10-year	8.42	275.58	276.62	276.27	276.67	0.001503	1.02	20.78	107.96	0.36
Upper Humber	Reach4	504.823 04.03.01	25-year	8.42	275.58	276.62	276.27	276.67	0.001503	1.02	20.78	107.96	0.36
Upper Humber	Reach4	504.823 04.03.01	50-year	15.54	275.58	276.81	276.64	276.84	0.001315	1.1	42.02	122.72	0.35
Upper Humber	Reach4	504.823 04.03.01	100-year	19.08	275.58	276.86	276.68	276.89	0.001466	1.19	47.87	126.51	0.37
Upper Humber	Reach4	504.823 04.03.01	350-year	31.12	275.58	276.99	276.8	277.04	0.00189	1.47	64.71	138.29	0.43
Upper Humber	Reach4	504.823 04.03.01	500-year	44.15	275.58	277.06	276.88	277.13	0.002574	1.79	74.91	141.26	0.51
Upper Humber	Reach4	504.823 04.03.01	Regional	157.85	275.58	279.74	277.33	279.74	0.000061	0.59	819.52	373.08	0.09
Upper Humber	Reach4	504.648 04.02.10	2-year	2.58	275.28	275.95	275.65	275.98	0.001365	0.7	4.64	18.19	0.32
Upper Humber	Reach4	504.648 04.02.10	5-year	5.24	275.28	276.09	275.86	276.14	0.001911	0.98	10.36	67.62	0.4
Upper Humber	Reach4	504.648 04.02.10	10-year	8.43	275.28	276.17	276.05	276.23	0.002608	1.24	16.58	107.06	0.47
Upper Humber	Reach4	504.648 04.02.10	25-year	8.43	275.28	276.17	276.05	276.23	0.002608	1.24	16.58	107.06	0.47
Upper Humber	Reach4	504.648 04.02.10	50-year	15.81	275.28	276.26	276.21	276.34	0.003911	1.65	31.74	211.77	0.59
Upper Humber	Reach4	504.648 04.02.10	100-year	19.53	275.28	276.31	276.21	276.39	0.003514	1.63	44.2	249.02	0.57
Upper Humber	Reach4	504.648 04.02.10	350-year	33.36	275.28	276.46	276.39	276.51	0.002696	1.59	83.58	276.57	0.51
Upper Humber	Reach4	504.648 04.02.10	500-year	47.88	275.28	276.62	276.44	276.65	0.001683	1.39	129.02	285.84	0.41
Upper Humber	Reach4	504.648 04.02.10	Regional	177.04	275.28	279.73	276.74	279.73	0.000021	0.37	1424.59	741.48	0.06
Upper Humber	Reach4	504.5171 04.02.09	2-year	2.58	275.19	275.83	275.5	275.85	0.000917	0.64	6.48	78.72	0.27
Upper Humber	Reach4	504.5171 04.02.09	5-year	5.24	275.19	275.93	275.66	275.95	0.001266	0.84	20.72	197.22	0.33
Upper Humber	Reach4	504.5171 04.02.09	10-year	8.43	275.19	276.01	275.93	276.03	0.001115	0.85	41.49	292.74	0.31
Upper Humber	Reach4	504.5171 04.02.09	25-year	8.43	275.19	276.01	275.93	276.03	0.001115	0.85	41.49	292.74	0.31
Upper Humber	Reach4	504.5171 04.02.09	50-year	15.81	275.19	276.15	276.01	276.16	0.000755	0.78	86.95	346.2	0.26
Upper Humber	Reach4	504.5171 04.02.09	100-year	19.53	275.19	276.2	276.03	276.21	0.000704	0.79	107.26	362.62	0.26
Upper Humber	Reach4	504.5171 04.02.09	350-year	33.36	275.19	276.37	276.1	276.38	0.000536	0.77	173.68	421.98	0.23
Upper Humber	Reach4	504.5171 04.02.09	500-year	47.88	275.19	276.56	276.15	276.56	0.000403	0.74	258.39	485.01	0.21
Upper Humber	Reach4	504.5171 04.02.09	Regional	177.04	275.19	279.73	276.41	279.73	0.000008	0.24	2504.9	966.14	0.04
Upper Humber	Reach4	504.432 04.02.08	2-year	2.58	275.25	275.74	275.57	275.75	0.001312	0.56	13.69	155.53	0.3
Upper Humber	Reach4	504.432 04.02.08	5-year	5.24	275.25	275.86	275.74	275.86	0.000745	0.5	35.09	200.62	0.24
Upper Humber	Reach4	504.432 04.02.08	10-year	8.43	275.25	275.95	275.78	275.95	0.000635	0.5	53.27	216.07	0.22
Upper Humber	Reach4	504.432 04.02.08	25-year	8.43	275.25	275.95	275.78	275.95	0.000635	0.5	53.27	216.07	0.22
Upper Humber	Reach4	504.432 04.02.08	50-year	15.81	275.25	276.09	275.84	276.1	0.000569	0.56	86.35	227.65	0.22
Upper Humber	Reach4	504.432 04.02.08	100-year	19.53	275.25	276.15	275.85	276.16	0.000555	0.58	99.78	228.3	0.22
Upper Humber	Reach4	504.432 04.02.08	350-year	33.36	275.25	276.33	275.93	276.33	0.000569	0.68	139.8	244.76	0.23
Upper Humber	Reach4	504.432 04.02.08	500-year	47.88	275.25	276.52	275.96	276.52	0.000486	0.72	184.48	303.78	0.22
Upper Humber	Reach4	504.432 04.02.08	Regional	177.04	275.25	279.73	276.27	279.73	0.000016	0.32	1510.13	494.59	0.05
Upper Humber	Reach4	504.4018 04.02.07	2-year	2.58	275.13	275.67	275.41	275.68	0.0003	0.29	23.31	111.33	0.15
Upper Humber	Reach4	504.4018 04.02.07	5-year	5.24	275.13	275.8	275.52	275.8	0.000353	0.37	41.58	212.8	0.17
Upper Humber	Reach4	504.4018 04.02.07	10-year	8.43	275.13	275.88	275.58	275.89	0.000382	0.43	62.25	246.53	0.18
Upper Humber	Reach4	504.4018 04.02.07	25-year	8.43	275.13	275.88	275.58	275.89	0.000382	0.43	62.25	246.53	0.18
Upper Humber	Reach4	504.4018 04.02.07	50-year	15.81	275.13	276.03	275.66	276.04	0.000374	0.49	99.39	254.99	0.18
Upper Humber	Reach4	504.4018 04.02.07	100-year	19.53	275.13	276.09	275.69	276.1	0.00038	0.52	114.54	257.84	0.19
Upper Humber	Reach4	504.4018 04.02.07	350-year	33.36	275.13	276.26	275.77	276.26	0.000436	0.63	159.32	277.58	0.21
Upper Humber	Reach4	504.4018 04.02.07	500-year	47.88	275.13	276.46	275.88	276.46	0.000381	0.67	217.81	309.13	0.2
Upper Humber	Reach4	504.4018 04.02.07	Regional	177.04	275.13	279.73	276.18	279.73	0.000014	0.31	1514.22	635.02	0.05
Upper Humber	Reach4	504.221 04.02.06	2-year	2.58	275.16	275.61		275.61	0.000397	0.32	16.53	86.17	0.17
Upper Humber	Reach4	504.221 04.02.06	5-year	5.24	275.16	275.72		275.72	0.00052	0.43	29.62	161.38	0.2
Upper Humber	Reach4	504.221 04.02.06	10-year	8.43	275.16	275.79		275.8	0.000618	0.52	41.96	166.99	0.22
Upper Humber	Reach4	504.221 04.02.06	25-year	8.43	275.16	275.79		275.8	0.000618	0.52	41.96	166.99	0.22
Upper Humber	Reach4	504.221 04.02.06	50-year	15.81	275.16	275.94		275.95	0.000649	0.63	67.42	176.72	0.24
Upper Humber	Reach4	504.221 04.02.06	100-year	19.53	275.16	275.99		276	0.0007	0.68	76.47	178.16	0.25

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	504.221 04.02.06	350-year	33.36	275.16	276.14		276.15	0.000869	0.86	103.75	185.79	0.29
Upper Humber	Reach4	504.221 04.02.06	500-year	47.88	275.16	276.36		276.37	0.000709	0.89	145.6	203.98	0.27
Upper Humber	Reach4	504.221 04.02.06	Regional	177.04	275.16	279.72		279.72	0.000016	0.33	1607.96	583.04	0.05
Upper Humber	Reach4	504.019 04.02.05	2-year	2.58	275.01	275.4	275.36	275.43	0.004712	0.93	7.49	78.61	0.55
Upper Humber	Reach4	504.019 04.02.05	5-year	5.24	275.01	275.47	275.44	275.51	0.005333	1.15	13.76	98.75	0.61
Upper Humber	Reach4	504.019 04.02.05	10-year	8.43	275.01	275.54	275.49	275.57	0.005173	1.26	20.98	117.42	0.62
Upper Humber	Reach4	504.019 04.02.05	25-year	8.43	275.01	275.54	275.49	275.57	0.005173	1.26	20.98	117.42	0.62
Upper Humber	Reach4	504.019 04.02.05	50-year	15.81	275.01	275.57	275.57	275.65	0.011967	2.01	24.68	121.52	0.95
Upper Humber	Reach4	504.019 04.02.05	100-year	19.53	275.01	275.6	275.6	275.69	0.012171	2.13	29.02	131.26	0.97
Upper Humber	Reach4	504.019 04.02.05	350-year	33.36	275.01	275.86	275.68	275.9	0.003622	1.54	68.72	175.22	0.57
Upper Humber	Reach4	504.019 04.02.05	500-year	47.88	275.01	276.22	275.76	276.24	0.00104	1.07	144.89	242.14	0.32
Upper Humber	Reach4	504.019 04.02.05	Regional	177.04	275.01	279.72	276.15	279.72	0.000011	0.29	1867.64	626.05	0.04
Upper Humber	Reach4	503.820 04.02.04	2-year	2.58	274.77	275.02	274.93	275.02	0.00126	0.27	9.47	77.57	0.25
Upper Humber	Reach4	503.820 04.02.04	5-year	5.24	274.77	275.09	274.96	275.1	0.001289	0.32	16.31	106.5	0.26
Upper Humber	Reach4	503.820 04.02.04	10-year	8.43	274.77	275.15	275	275.15	0.001365	0.37	22.84	130.92	0.28
Upper Humber	Reach4	503.820 04.02.04	25-year	8.43	274.77	275.15	275	275.15	0.001365	0.37	22.84	130.92	0.28
Upper Humber	Reach4	503.820 04.02.04	50-year	15.81	274.77	275.33	275.06	275.34	0.000495	0.33	49.96	160.33	0.18
Upper Humber	Reach4	503.820 04.02.04	100-year	19.53	274.77	275.44	275.09	275.45	0.000279	0.3	69.61	187.9	0.14
Upper Humber	Reach4	503.820 04.02.04	350-year	33.36	274.77	275.84	275.16	275.85	0.000083	0.25	157.57	246.23	0.09
Upper Humber	Reach4	503.820 04.02.04	500-year	47.88	274.77	276.21	275.21	276.21	0.000046	0.24	257.96	285.44	0.07
Upper Humber	Reach4	503.820 04.02.04	Regional	177.04	274.77	279.72	275.53	279.72	0.000003	0.16	1935.34	567.77	0.02
Upper Humber	Reach4	503.619 04.02.03	2-year	2.58	274.26	274.58	274.49	274.61	0.003817	0.79	4.13	26.96	0.49
Upper Humber	Reach4	503.619 04.02.03	5-year	5.24	274.26	274.76	274.59	274.78	0.002	0.8	12.91	81.81	0.39
Upper Humber	Reach4	503.619 04.02.03	10-year	8.43	274.26	274.94	274.7	274.95	0.000895	0.68	32.85	132.96	0.27
Upper Humber	Reach4	503.619 04.02.03	25-year	8.43	274.26	274.94	274.7	274.95	0.000895	0.68	32.85	132.96	0.27
Upper Humber	Reach4	503.619 04.02.03	50-year	15.81	274.26	275.26	274.85	275.26	0.000333	0.55	87.37	203.25	0.18
Upper Humber	Reach4	503.619 04.02.03	100-year	19.53	274.26	275.4	274.9	275.4	0.000236	0.5	115.95	209.08	0.15
Upper Humber	Reach4	503.619 04.02.03	350-year	33.36	274.26	275.83	275	275.83	0.000125	0.46	207.69	221.43	0.12
Upper Humber	Reach4	503.619 04.02.03	500-year	47.88	274.26	276.2	275.09	276.2	0.000104	0.48	305	285.15	0.11
Upper Humber	Reach4	503.619 04.02.03	Regional	177.04	274.26	279.72	275.5	279.72	0.000007	0.26	2143.51	651	0.04
Upper Humber	Reach4	503.4758 04.02.02	2-year	2.58	274.05	274.52		274.53	0.000288	0.27	13.9	60.41	0.14
Upper Humber	Reach4	503.4758 04.02.02	5-year	5.24	274.05	274.72		274.72	0.00023	0.32	27.55	83.67	0.14
Upper Humber	Reach4	503.4758 04.02.02	10-year	8.43	274.05	274.9		274.91	0.000186	0.35	44.8	100.37	0.13
Upper Humber	Reach4	503.4758 04.02.02	25-year	8.43	274.05	274.9		274.91	0.000186	0.35	44.8	100.37	0.13
Upper Humber	Reach4	503.4758 04.02.02	50-year	15.81	274.05	275.24		275.24	0.000144	0.39	84.22	139.45	0.12
Upper Humber	Reach4	503.4758 04.02.02	100-year	19.53	274.05	275.38		275.38	0.000132	0.41	104.74	156.55	0.12
Upper Humber	Reach4	503.4758 04.02.02	350-year	33.36	274.05	275.81		275.82	0.000105	0.45	178.72	193.31	0.11
Upper Humber	Reach4	503.4758 04.02.02	500-year	47.88	274.05	276.19		276.19	0.000087	0.47	255.38	218.73	0.1
Upper Humber	Reach4	503.4758 04.02.02	Regional	177.04	274.05	279.72		279.72	0.00001	0.31	1533.02	428.34	0.04
Upper Humber	Reach4	503.418 04.02.01	2-year	2.58	274.08	274.48	274.32	274.49	0.001483	0.55	5.58	27.74	0.31
Upper Humber	Reach4	503.418 04.02.01	5-year	5.24	274.08	274.68	274.41	274.7	0.000888	0.59	13.81	49.85	0.27
Upper Humber	Reach4	503.418 04.02.01	10-year	8.43	274.08	274.87	274.5	274.89	0.000629	0.62	25.23	72.71	0.24
Upper Humber	Reach4	503.418 04.02.01	25-year	8.43	274.08	274.87	274.5	274.89	0.000629	0.62	25.23	72.71	0.24
Upper Humber	Reach4	503.418 04.02.01	50-year	15.81	274.08	275.21	274.65	275.23	0.000394	0.64	54.16	99.98	0.2
Upper Humber	Reach4	503.418 04.02.01	100-year	19.53	274.08	275.36	274.73	275.37	0.000338	0.64	69.52	115.53	0.19
Upper Humber	Reach4	503.418 04.02.01	350-year	33.36	274.08	275.79	274.91	275.81	0.000252	0.68	124.77	167.74	0.17
Upper Humber	Reach4	503.418 04.02.01	500-year	47.88	274.08	276.17	275.03	276.18	0.000193	0.69	184.82	208.48	0.16
Upper Humber	Reach4	503.418 04.02.01	Regional	177.04	274.08	279.72	275.73	279.72	0.000017	0.4	1233.25	364.67	0.05
Upper Humber	Reach4	503.2201 04.01.40	2-year	2.54	273.81	274.45	274.12	274.45	0.000443	0.43	10.71	30.12	0.19
Upper Humber	Reach4	503.2201 04.01.40	5-year	5.16	273.81	274.65	274.22	274.66	0.000515	0.58	17.36	34.69	0.21
Upper Humber	Reach4	503.2201 04.01.40	10-year	8.35	273.81	274.84	274.23	274.86	0.000591	0.72	25.44	49.36	0.24
Upper Humber	Reach4	503.2201 04.01.40	25-year	8.35	273.81	274.84	274.23	274.86	0.000591	0.72	25.44	49.36	0.24
Upper Humber	Reach4	503.2201 04.01.40	50-year	15.88	273.81	275.18	274.49	275.2	0.000567	0.87	47.62	82.86	0.25
Upper Humber	Reach4	503.2201 04.01.40	100-year	19.7	273.81	275.33	274.56	275.35	0.00053	0.9	60.63	99.57	0.24
Upper Humber	Reach4	503.2201 04.01.40	350-year	33.64	273.81	275.77	274.7	275.79	0.000373	0.91	116.05	158.44	0.21
Upper Humber	Reach4	503.2201 04.01.40	500-year	48.6	273.81	276.16	275	276.17	0.00028	0.89	171.32	191.6	0.19
Upper Humber	Reach4	503.2201 04.01.40	Regional	182.7	273.81	279.72	275.89	279.72	0.000019	0.44	1195.81	337.09	0.06
Upper Humber	Reach4	503.1714 04.01.39	2-year	2.54	273.78	274.31	274.04	274.32	0.000764	0.49	6.31	23.13	0.24
Upper Humber	Reach4	503.1714 04.01.39	5-year	5.16	273.78	274.5	274.15	274.52	0.000807	0.64	11.71	34.23	0.26
Upper Humber	Reach4	503.1714 04.01.39	10-year	8.35	273.78	274.69	274.26	274.71	0.000736	0.73	18.84	42.61	0.26
Upper Humber	Reach4	503.1714 04.01.39	25-year	8.35	273.78	274.69	274.26	274.71	0.000736	0.73	18.84	42.61	0.26
Upper Humber	Reach4	503.1714 04.01.39	50-year	15.88	273.78	275.05	274.46	275.08	0.000559	0.82	45.79	110.2	0.24
Upper Humber	Reach4	503.1714 04.01.39	100-year	19.7	273.78	275.22	274.54	275.24	0.000435	0.79	69.69	182.57	0.22
Upper Humber	Reach4	503.1714 04.01.39	350-year	33.64	273.78	275.72	274.74	275.73	0.000169	0.61	183.75	279.74	0.14
Upper Humber	Reach4	503.1714 04.01.39	500-year	48.6	273.78	276.13	275	276.13	0.000106	0.55	297.27	334.91	0.12
Upper Humber	Reach4	503.1714 04.01.39	Regional	182.7	273.78	279.71	275.65	279.72	0.000008	0.29	1791.93	468.28	0.04
Upper Humber	Reach4	503.1632 04.01.38	2-year	2.54	273.75	274.3	273.99	274.31	0.000594	0.44	5.73	12.78	0.21
Upper Humber	Reach4	503.1632 04.01.38	5-year	5.16	273.75	274.49	274.09	274.51	0.000821	0.63	8.15	13.47	0.26
Upper Humber	Reach4	503.1632 04.01.38	10-year	8.35	273.75	274.67	274.2	274.7	0.000958	0.79	10.61	14.15	0.29
Upper Humber	Reach4	503.1632 04.01.38	25-year	8.35	273.75	274.67	274.2	274.7	0.000958	0.79	10.61	14.15	0.29
Upper Humber	Reach4	503.1632 04.01.38	50-year	15.88	273.75	275.01	274.39	275.06	0.001073	1.01	15.66	15.4	0.32
Upper Humber	Reach4	503.1632 04.01.38	100-year	19.7	273.75	275.16	274.49	275.22	0.001095	1.09	18.07	16.13	0.33
Upper Humber	Reach4	503.1632 04.01.38	350-year	33.64	273.75	275.62	274.75	275.71	0.001145	1.29	26	50.5	0.35
Upper Humber	Reach4	503.1632 04.01.38	500-year	48.6	273.75	275.99	274.99	276.1	0.001193	1.46	33.2	132.49	0.36
Upper Humber	Reach4	503.1632 04.01.38	Regional	182.7	273.75	279.71	276.38	279.71	0.000012	0.32	1580.52	498.2	0.04
Upper Humber	Reach4	503.1524 x-120 (04.01.37)		Bridge									
Upper Humber	Reach4	503.1405 04.01.36	2-year	2.54	273.75	274.28	274.02	274.29	0.0011	0.54	4.67	12.15	0.28
Upper Humber	Reach4	503.1405 04.01.36	5-year	5.16	273.75	274.45	274.14	274.48	0.001412	0.75	6.88	13.34	0.33
Upper Humber	Reach4	503.1405 04.01.36	10-year	8.35	273.75	274.62	274.25	274.67	0.001535	0.9	9.27	14.46	0.36
Upper Humber	Reach4	503.1405 04.01.36	25-year	8.35	273.75	274.62	274.25	274.67	0.001535	0.9	9.27	14.46	0.36
Upper Humber	Reach4	503.1405 04.01.36	50-year	15.88	273.75	274.96	274.46	275.02	0.001423	1.09	15.25	31.19	0.37
Upper Humber	Reach4	503.1405 04.01.36	100-year	19.7	273.75	275.11	274.55	275.18	0.001295	1.15	18.44	36.88	0.36
Upper Humber	Reach4	503.1405 04.01.36	350-year	33.64	273.75	275.56	274.82	275.64	0.001109	1.34	28.19	87.84	0.35
Upper Humber	Reach4	503.1405 04.01.36	500-year	48.6	273.75	275.83	275.05	275.96	0.001278	1.62	34.51	145.25	0.39
Upper Humber	Reach4	503.1405 04.01.36	Regional	182.7	273.75	279.71	276.33	279.71	0.000012	0.35	1438.8	436.88	0.05
Upper Humber	Reach4	503.1359 04.01.35	2-year	2.54	273.78	274.27	274.03	274.29	0.001217	0.65	5.28	36.4	0.31
Upper Humber	Reach4	503.1359 04.01.35	5-year	5.16	273.78	274.45	274.15	274.47	0.001095	0.77	16.98	100.89	0.31
Upper Humber	Reach4	503.1359 04.01.35	10-year	8.35	273.78	274.63	274.35	274.65	0.000578	0.66	36.79	109.99	0.23
Upper Humber	Reach4	503.1359 04.01.35	25-year	8.35	273.78	274.63	274.35	274.65	0.000578	0.66	36.79	109.99	0.23
Upper Humber	Reach4	503.1359 04.01.35	50-year	15.88	273.78	274.98	274.52	274.99	0.000295	0.6	76.72	119.19	0.18
Upper Humber	Reach4	503.1359 04.01.35	100-year	19.7	273.78	275.14	274.56	275.15	0.000245	0.59	95.64	124.16	0.16
Upper Humber	Reach4	503.1359 04.01.35	350-year	33.64	273.78	275.6	274.67	275.6	0.000177	0.61	154.26	133.37	0.15
Upper Humber	Reach4	503.1359 04.01.35	500-year	48.6	273.78	275.89	274.76	275.9	0.000188	0.7	194.64	140.27	0.15
Upper Humber	Reach4	503.1359 04.01.35	Regional	182.7	273.78	279.71	275.27	279.71	0.00002	0.46	1286.01	360.28	0.06
Upper Humber	Reach4	503.0932 04.01.34	2-year	2.54	273.78	274.24	274.05	274.25	0.000637	0.45	13.76	64.57	0.22
Upper Humber	Reach4	503.0932 04.01.34	5-year	5.16	273.78	274.44	274.11	274.44	0.000454	0.49	27.33	74.61	0.2
Upper Humber	Reach4	503.0932 04.01.34	10-year	8.35	273.78	274.62	274.21	274.63	0.00037	0.52	42.54	88.94	0.19
Upper Humber	Reach4	503.0932 04.01.34	25-year	8.35	273.78	274.62	274.21	274.63	0.00037	0.52	42.54	88.94	0.19
Upper Humber	Reach4	503.0932 04.01.34	50-year	15.88	273.78	274.98	274.32	274.98	0.000261	0.56	76.72	101.89	0.17
Upper Humber	Reach4	503.0932 04.01.34	100-year	19.7	273.78	275.13	274.37	275.14	0.000229	0.57	92.8	104.71	0.16
Upper Humber	Reach4	503.0932 04.01.34	350-year	33.64	273.78	275.59	274.49	275.6	0.000188	0.63	142.55	113.38	0.15
Upper Humber	Reach4	503.0932 04.01.34	500-year	48.6	273.78	275.88	274.61	275.89	0.000214	0.74	176.84	123.15	0.16
Upper Humber	Reach4	503.0932 04.01.34	Regional	182.7	273.78	279.71	275.2	279.71	0.000023	0.49	1205.2	374.39	0.06
Upper Humber	Reach4	503.017 04.01.33	2-year	2.54	273.69	274.23		274.23	0.000087	0.14	18.49	58.94	0.08
Upper Humber	Reach4	503.017 04.01.33	5-year	5.16	273.69	274.43		274.43	0.000077	0.18	31.12	72.3	0.08
Upper Humber	Reach4	503.017 04.01.33	10-year	8.35	273.69	274.61		274.62	0.00007	0.21	45.2	76.91	0.08

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	503.017 04.01.33	25-year	8.35	273.69	274.61		274.62	0.00007	0.21	45.2	76.91	0.08
Upper Humber	Reach4	503.017 04.01.33	50-year	15.88	273.69	274.97		274.97	0.000061	0.25	74.3	87.7	0.08
Upper Humber	Reach4	503.017 04.01.33	100-year	19.7	273.69	275.13		275.13	0.000058	0.27	88.38	92.12	0.08
Upper Humber	Reach4	503.017 04.01.33	350-year	33.64	273.69	275.58		275.59	0.000055	0.32	132.88	101.31	0.08
Upper Humber	Reach4	503.017 04.01.33	500-year	48.6	273.69	275.88		275.88	0.000064	0.39	163.35	107.65	0.09
Upper Humber	Reach4	503.017 04.01.33	Regional	182.7	273.69	279.71		279.71	0.000012	0.35	1076.15	303.51	0.05
Upper Humber	Reach4	502.816 04.01.32	2-year	2.54	273.57	274.23	273.76	274.23	0.000019	0.08	40.48	96.83	0.04
Upper Humber	Reach4	502.816 04.01.32	5-year	5.16	273.57	274.42	273.8	274.42	0.000024	0.12	60.12	103.63	0.05
Upper Humber	Reach4	502.816 04.01.32	10-year	8.35	273.57	274.61	273.86	274.61	0.000027	0.15	80	109.32	0.05
Upper Humber	Reach4	502.816 04.01.32	25-year	8.35	273.57	274.61	273.86	274.61	0.000027	0.15	80	109.32	0.05
Upper Humber	Reach4	502.816 04.01.32	50-year	15.88	273.57	274.96	273.93	274.96	0.00003	0.19	121.36	131.39	0.06
Upper Humber	Reach4	502.816 04.01.32	100-year	19.7	273.57	275.12	273.97	275.12	0.00003	0.21	144.67	167.25	0.06
Upper Humber	Reach4	502.816 04.01.32	350-year	33.64	273.57	275.58	274.05	275.58	0.000029	0.25	244.11	234.86	0.06
Upper Humber	Reach4	502.816 04.01.32	500-year	48.6	273.57	275.87	274.13	275.87	0.000032	0.29	313.75	239.47	0.06
Upper Humber	Reach4	502.816 04.01.32	Regional	182.7	273.57	279.71	274.65	279.71	0.000008	0.29	1329.64	290.73	0.04
Upper Humber	Reach4	502.614 04.01.31	2-year	2.54	273.6	274.22	273.77	274.22	0.000037	0.12	39.02	102.28	0.05
Upper Humber	Reach4	502.614 04.01.31	5-year	5.16	273.6	274.41	273.82	274.41	0.000046	0.17	60.12	116.9	0.06
Upper Humber	Reach4	502.614 04.01.31	10-year	8.35	273.6	274.6	273.87	274.6	0.00005	0.2	82.73	124.51	0.07
Upper Humber	Reach4	502.614 04.01.31	25-year	8.35	273.6	274.6	273.87	274.6	0.00005	0.2	82.73	124.51	0.07
Upper Humber	Reach4	502.614 04.01.31	50-year	15.88	273.6	274.95	273.95	274.96	0.00005	0.26	128.98	136.93	0.07
Upper Humber	Reach4	502.614 04.01.31	100-year	19.7	273.6	275.11	274	275.11	0.00005	0.28	151.02	148.22	0.07
Upper Humber	Reach4	502.614 04.01.31	350-year	33.64	273.6	275.57	274.11	275.57	0.000052	0.34	239.7	220.5	0.08
Upper Humber	Reach4	502.614 04.01.31	500-year	48.6	273.6	275.86	274.2	275.87	0.000056	0.39	304.64	222.66	0.08
Upper Humber	Reach4	502.614 04.01.31	Regional	182.7	273.6	279.7	274.75	279.71	0.000012	0.36	1200.88	252.69	0.05
Upper Humber	Reach4	502.413 04.01.30	2-year	2.54	273.54	274.22	273.69	274.22	0.000004	0.04	67.78	137.45	0.02
Upper Humber	Reach4	502.413 04.01.30	5-year	5.16	273.54	274.41	273.72	274.41	0.000005	0.05	94.87	142.97	0.02
Upper Humber	Reach4	502.413 04.01.30	10-year	8.35	273.54	274.6	273.74	274.6	0.000006	0.07	122.78	154.02	0.02
Upper Humber	Reach4	502.413 04.01.30	25-year	8.35	273.54	274.6	273.74	274.6	0.000006	0.07	122.78	154.02	0.02
Upper Humber	Reach4	502.413 04.01.30	50-year	15.88	273.54	274.95	273.8	274.95	0.000007	0.09	181.11	177.92	0.03
Upper Humber	Reach4	502.413 04.01.30	100-year	19.7	273.54	275.11	273.82	275.11	0.000007	0.1	209.93	196.93	0.03
Upper Humber	Reach4	502.413 04.01.30	350-year	33.64	273.54	275.57	273.88	275.57	0.000007	0.13	320.92	269.7	0.03
Upper Humber	Reach4	502.413 04.01.30	500-year	48.6	273.54	275.86	273.95	275.86	0.000009	0.16	400.07	271.21	0.03
Upper Humber	Reach4	502.413 04.01.30	Regional	182.7	273.54	279.7	274.29	279.71	0.000003	0.18	1482.95	302.02	0.02
Upper Humber	Reach4	502.213 04.01.29	2-year	2.54	273.57	274.22		274.22	0.000001	0.02	119.07	216.28	0.01
Upper Humber	Reach4	502.213 04.01.29	5-year	5.16	273.57	274.41		274.41	0.000002	0.03	161.09	222.63	0.01
Upper Humber	Reach4	502.213 04.01.29	10-year	8.35	273.57	274.6		274.6	0.000002	0.04	203.07	228.49	0.01
Upper Humber	Reach4	502.213 04.01.29	25-year	8.35	273.57	274.6		274.6	0.000002	0.04	203.07	228.49	0.01
Upper Humber	Reach4	502.213 04.01.29	50-year	15.88	273.57	274.95		274.95	0.000003	0.06	284.57	230.21	0.02
Upper Humber	Reach4	502.213 04.01.29	100-year	19.7	273.57	275.11		275.11	0.000003	0.07	320.63	231.02	0.02
Upper Humber	Reach4	502.213 04.01.29	350-year	33.64	273.57	275.57		275.57	0.000003	0.09	429.06	238.7	0.02
Upper Humber	Reach4	502.213 04.01.29	500-year	48.6	273.57	275.86		275.86	0.000004	0.11	499.15	240.53	0.02
Upper Humber	Reach4	502.213 04.01.29	Regional	182.7	273.57	279.7		279.71	0.000002	0.14	1695.56	380.62	0.02
Upper Humber	Reach4	502.1468 04.01.28	2-year	2.54	273.6	274.22		274.22	0.000015	0.08	42.33	112.86	0.03
Upper Humber	Reach4	502.1468 04.01.28	5-year	5.16	273.6	274.41		274.41	0.000019	0.11	67.76	156.09	0.04
Upper Humber	Reach4	502.1468 04.01.28	10-year	8.35	273.6	274.6		274.6	0.000018	0.13	102.3	196.16	0.04
Upper Humber	Reach4	502.1468 04.01.28	25-year	8.35	273.6	274.6		274.6	0.000018	0.13	102.3	196.16	0.04
Upper Humber	Reach4	502.1468 04.01.28	50-year	15.88	273.6	274.95		274.95	0.000015	0.14	173.03	203.55	0.04
Upper Humber	Reach4	502.1468 04.01.28	100-year	19.7	273.6	275.11		275.11	0.000014	0.15	205.01	206	0.04
Upper Humber	Reach4	502.1468 04.01.28	350-year	33.64	273.6	275.57		275.57	0.000013	0.17	302.03	218.1	0.04
Upper Humber	Reach4	502.1468 04.01.28	500-year	48.6	273.6	275.86		275.86	0.000015	0.2	367.02	224.27	0.04
Upper Humber	Reach4	502.1468 04.01.28	Regional	182.7	273.6	279.7		279.71	0.000004	0.19	1421.84	300.9	0.03
Upper Humber	Reach4	502.1416 04.01.27	2-year	2.54	273.66	274.22	273.81	274.22	0.000146	0.24	10.86	37.32	0.11
Upper Humber	Reach4	502.1416 04.01.27	5-year	5.16	273.66	274.4	273.89	274.41	0.000202	0.35	15.27	48.05	0.13
Upper Humber	Reach4	502.1416 04.01.27	10-year	8.35	273.66	274.58	273.97	274.59	0.000235	0.44	19.76	83.1	0.15
Upper Humber	Reach4	502.1416 04.01.27	25-year	8.35	273.66	274.58	273.97	274.59	0.000235	0.44	19.76	83.1	0.15
Upper Humber	Reach4	502.1416 04.01.27	50-year	15.88	273.66	274.93	274.1	274.95	0.000261	0.57	28.9	118.59	0.17
Upper Humber	Reach4	502.1416 04.01.27	100-year	19.7	273.66	275.08	274.17	275.1	0.000264	0.63	33.18	136.26	0.17
Upper Humber	Reach4	502.1416 04.01.27	350-year	33.64	273.66	275.53	274.35	275.56	0.00027	0.76	46.86	184.52	0.18
Upper Humber	Reach4	502.1416 04.01.27	500-year	48.6	273.66	275.85	274.52	275.86	0.000075	0.45	187.2	206.52	0.1
Upper Humber	Reach4	502.1416 04.01.27	Regional	182.7	273.66	279.7	275.6	279.71	0.000004	0.22	1210.01	296.19	0.03
Upper Humber	Reach4	502.1314 x-119 (04.01.26)		Bridge									
Upper Humber	Reach4	502.1225 04.01.25	2-year	2.54	273.66	274.2	273.87	274.21	0.000412	0.39	7.33	16.23	0.18
Upper Humber	Reach4	502.1225 04.01.25	5-year	5.16	273.66	274.38	273.97	274.39	0.000599	0.58	10.22	16.78	0.23
Upper Humber	Reach4	502.1225 04.01.25	10-year	8.35	273.66	274.55	274.06	274.57	0.000728	0.74	13.1	17.44	0.26
Upper Humber	Reach4	502.1225 04.01.25	25-year	8.35	273.66	274.55	274.06	274.57	0.000728	0.74	13.1	17.44	0.26
Upper Humber	Reach4	502.1225 04.01.25	50-year	15.88	273.66	274.86	274.24	274.91	0.000872	1.01	18.96	19.56	0.3
Upper Humber	Reach4	502.1225 04.01.25	100-year	19.7	273.66	275.01	274.32	275.06	0.000901	1.11	22.06	22.67	0.31
Upper Humber	Reach4	502.1225 04.01.25	350-year	33.64	273.66	275.42	274.56	275.51	0.000986	1.4	31.98	51.31	0.34
Upper Humber	Reach4	502.1225 04.01.25	500-year	48.6	273.66	275.63	274.79	275.78	0.001354	1.77	37.7	96.54	0.41
Upper Humber	Reach4	502.1225 04.01.25	Regional	182.7	273.66	279.7	276.27	279.7	0.000039	0.64	801.73	265.39	0.08
Upper Humber	Reach4	502.1203 04.01.24	2-year	2.54	273.63	274.2	273.83	274.21	0.000425	0.4	6.28	12.37	0.18
Upper Humber	Reach4	502.1203 04.01.24	5-year	5.16	273.63	274.37	273.93	274.39	0.000697	0.61	8.47	13.01	0.24
Upper Humber	Reach4	502.1203 04.01.24	10-year	8.35	273.63	274.54	274.04	274.57	0.000927	0.78	10.7	14.01	0.29
Upper Humber	Reach4	502.1203 04.01.24	25-year	8.35	273.63	274.54	274.04	274.57	0.000927	0.78	10.7	14.01	0.29
Upper Humber	Reach4	502.1203 04.01.24	50-year	15.88	273.63	274.86	274.25	274.91	0.001113	1.03	15.63	17.26	0.33
Upper Humber	Reach4	502.1203 04.01.24	100-year	19.7	273.63	275	274.34	275.06	0.001101	1.12	18.15	18.86	0.33
Upper Humber	Reach4	502.1203 04.01.24	350-year	33.64	273.63	275.43	274.62	275.5	0.000942	1.28	39.46	59.42	0.32
Upper Humber	Reach4	502.1203 04.01.24	500-year	48.6	273.63	275.65	274.86	275.75	0.001076	1.5	55.91	82.61	0.35
Upper Humber	Reach4	502.1203 04.01.24	Regional	182.7	273.63	279.69	276.14	279.7	0.000053	0.72	594.85	171.1	0.1
Upper Humber	Reach4	502.118 04.01.23	2-year	2.54	273.81	274.1	274.1	274.2	0.014647	1.43	2.05	11.28	0.94
Upper Humber	Reach4	502.118 04.01.23	5-year	5.16	273.81	274.22	274.22	274.37	0.013783	1.81	3.49	11.96	0.97
Upper Humber	Reach4	502.118 04.01.23	10-year	8.35	273.81	274.34	274.34	274.55	0.012754	2.11	4.98	12.48	0.98
Upper Humber	Reach4	502.118 04.01.23	25-year	8.35	273.81	274.34	274.34	274.55	0.012754	2.11	4.98	12.48	0.98
Upper Humber	Reach4	502.118 04.01.23	50-year	15.88	273.81	274.57	274.57	274.88	0.011609	2.63	8.01	14.02	1
Upper Humber	Reach4	502.118 04.01.23	100-year	19.7	273.81	274.65	274.65	275.03	0.012121	2.89	9.2	14.76	1.04
Upper Humber	Reach4	502.118 04.01.23	350-year	33.64	273.81	275.17	275.17	275.47	0.005575	2.74	24.26	46.23	0.77
Upper Humber	Reach4	502.118 04.01.23	500-year	48.6	273.81	275.37	275.37	275.72	0.005872	3.1	34.15	52.81	0.81
Upper Humber	Reach4	502.118 04.01.23	Regional	182.7	273.81	279.69	276.39	279.7	0.000085	0.92	521.4	149.05	0.12
Upper Humber	Reach4	502.1158 04.01.22	2-year	2.54	271.75	273.8	271.97	273.8	0.000014	0.19	17.89	8.74	0.04
Upper Humber	Reach4	502.1158 04.01.22	5-year	5.16	271.75	274.03	272.11	274.04	0.00004	0.34	19.95	8.74	0.07
Upper Humber	Reach4	502.1158 04.01.22	10-year	8.35	271.75	274.25	272.26	274.26	0.000078	0.51	21.83	8.74	0.1
Upper Humber	Reach4	502.1158 04.01.22	25-year	8.35	271.75	274.25	272.26	274.26	0.000078	0.51	21.83	8.74	0.1
Upper Humber	Reach4	502.1158 04.01.22	50-year	15.88	271.75	274.63	272.53	274.67	0.000186	0.86	25.54	15.58	0.16
Upper Humber	Reach4	502.1158 04.01.22	100-year	19.7	271.75	274.78	272.65	274.83	0.000238	1.01	28.22	19.37	0.19
Upper Humber	Reach4	502.1158 04.01.22	350-year	33.64	271.75	275.12	273.05	275.23	0.00047	1.52	37.21	41.37	0.26
Upper Humber	Reach4	502.1158 04.01.22	500-year	48.6	271.75	275.25	273.41	275.44	0.000833	2.08	43.41	54.45	0.35
Upper Humber	Reach4	502.1158 04.01.22	Regional	182.7	271.75	279.68	276.18	279.7	0.000069	1.03	546.28	139.05	0.12
Upper Humber	Reach4	502.11 x-118 (04.01.21)		Inl Struct									
Upper Humber	Reach4	502.1052 04.01.20	2-year	2.54	270.15	270.36	270.3	270.39	0.005697	0.76	3.34	18.26	0.57
Upper Humber	Reach4	502.1052 04.01.20	5-year	5.16	270.15	270.44	270.38	270.5	0.006977	1.06	4.88	18.9	0.66
Upper Humber	Reach4	502.1052 04.01.20	10-year	8.35	270.15	270.52	270.46	270.6	0.007924	1.32	6.34	19.37	0.74
Upper Humber	Reach4	502.1052 04.01.20	25-year	8.35	270.15	270.52	270.46	270.6	0.007924	1.32	6.34	19.37	0.74
Upper Humber	Reach4	502.1052 04.01.20	50-year	15.88	270.15	270.73	270.6	270.84	0.005595	1.49	10.66	20.8	0.66
Upper Humber	Reach4	502.1052 04.01.20	100-year	19.7	270.15	270.84	270.67	270.96	0.004628	1.51	13.02	21.48	0.62
Upper Humber	Reach4	502.1052 04.01.20	350-year	33.64	270.15	271.2	270.87	271.33	0.002887	1.59	21.38	25.78	0.53
Upper Humber	Reach4	502.1052 04.01.20	500-year	48.6	270.15	271.51	271.05	271.66	0.002293	1.72	30.13	30.29	0.49

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

Proposed Condition HEC-RAS Hydraulic Output Summary

BURNSIDE
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River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	502.1052 04.01.20	Regional	182.7	270.15	279.68	272.17	279.69	0.000012	0.48	790.03	131.11	0.05
Upper Humber	Reach4	502.0994 04.01.19	2-year	2.54	270.09	270.26	270.26	270.33	0.020681	1.11	2.32	19.95	1.01
Upper Humber	Reach4	502.0994 04.01.19	5-year	5.16	270.09	270.34	270.34	270.43	0.015294	1.34	4.02	22.11	0.95
Upper Humber	Reach4	502.0994 04.01.19	10-year	8.35	270.09	270.46	270.42	270.55	0.008382	1.35	6.75	23.72	0.76
Upper Humber	Reach4	502.0994 04.01.19	25-year	8.35	270.09	270.46	270.42	270.55	0.008382	1.35	6.75	23.72	0.76
Upper Humber	Reach4	502.0994 04.01.19	50-year	15.88	270.09	270.72	270.55	270.81	0.00418	1.4	13.11	28.01	0.59
Upper Humber	Reach4	502.0994 04.01.19	100-year	19.7	270.09	270.83	270.62	270.93	0.00337	1.42	16.49	29.26	0.54
Upper Humber	Reach4	502.0994 04.01.19	350-year	33.64	270.09	271.2	270.81	271.31	0.002231	1.54	28.02	34.05	0.48
Upper Humber	Reach4	502.0994 04.01.19	500-year	48.6	270.09	271.52	270.98	271.64	0.001856	1.66	38.99	36.03	0.45
Upper Humber	Reach4	502.0994 04.01.19	Regional	182.7	270.09	279.68	272.08	279.69	0.000013	0.51	796.43	125.66	0.05
Upper Humber	Reach4	502.0513 04.01.18	2-year	2.54	269.4	269.82		269.86	0.003947	0.92	2.77	8.54	0.52
Upper Humber	Reach4	502.0513 04.01.18	5-year	5.16	269.4	269.98		270.06	0.00455	1.23	4.2	9.27	0.58
Upper Humber	Reach4	502.0513 04.01.18	10-year	8.35	269.4	270.13		270.24	0.004997	1.48	5.65	10.12	0.63
Upper Humber	Reach4	502.0513 04.01.18	25-year	8.35	269.4	270.13		270.24	0.004997	1.48	5.65	10.12	0.63
Upper Humber	Reach4	502.0513 04.01.18	50-year	15.88	269.4	270.42		270.58	0.00514	1.79	8.87	12.11	0.67
Upper Humber	Reach4	502.0513 04.01.18	100-year	19.7	269.4	270.55		270.73	0.004938	1.88	10.49	12.91	0.67
Upper Humber	Reach4	502.0513 04.01.18	350-year	33.64	269.4	270.92		271.15	0.004492	2.12	15.91	16.02	0.66
Upper Humber	Reach4	502.0513 04.01.18	500-year	48.6	269.4	271.2		271.49	0.00426	2.41	21.12	21.38	0.67
Upper Humber	Reach4	502.0513 04.01.18	Regional	182.7	269.4	279.69		279.69	0.000012	0.48	999.92	185.65	0.05
Upper Humber	Reach4	502.011 04.01.17	2-year	2.54	269.31	269.68		269.71	0.003393	0.79	3.21	11.08	0.47
Upper Humber	Reach4	502.011 04.01.17	5-year	5.16	269.31	269.84		269.89	0.003185	1.02	5.09	12.04	0.49
Upper Humber	Reach4	502.011 04.01.17	10-year	8.35	269.31	270		270.07	0.00301	1.22	7.06	13.11	0.5
Upper Humber	Reach4	502.011 04.01.17	25-year	8.35	269.31	270		270.07	0.00301	1.22	7.06	13.11	0.5
Upper Humber	Reach4	502.011 04.01.17	50-year	15.88	269.31	270.31		270.42	0.00266	1.51	11.48	15.51	0.5
Upper Humber	Reach4	502.011 04.01.17	100-year	19.7	269.31	270.44		270.57	0.00254	1.61	13.74	17.53	0.5
Upper Humber	Reach4	502.011 04.01.17	350-year	33.64	269.31	270.82		271.01	0.002523	1.97	21.55	25.49	0.53
Upper Humber	Reach4	502.011 04.01.17	500-year	48.6	269.31	271.1		271.35	0.002724	2.31	30.34	36.83	0.57
Upper Humber	Reach4	502.011 04.01.17	Regional	182.7	269.31	279.69		279.69	0.00001	0.46	1129.2	181.2	0.05
Upper Humber	Reach4	501.813 04.01.16	2-year	2.54	268.71	269.14		269.17	0.002226	0.73	3.5	10.03	0.39
Upper Humber	Reach4	501.813 04.01.16	5-year	5.16	268.71	269.33		269.38	0.002143	0.95	5.51	11.04	0.41
Upper Humber	Reach4	501.813 04.01.16	10-year	8.35	268.71	269.53		269.59	0.001985	1.12	7.74	11.92	0.42
Upper Humber	Reach4	501.813 04.01.16	25-year	8.35	268.71	269.53		269.59	0.001985	1.12	7.74	11.92	0.42
Upper Humber	Reach4	501.813 04.01.16	50-year	15.88	268.71	269.87		269.97	0.001921	1.43	12.18	14.2	0.44
Upper Humber	Reach4	501.813 04.01.16	100-year	19.7	268.71	270		270.13	0.002008	1.57	14.22	21.76	0.46
Upper Humber	Reach4	501.813 04.01.16	350-year	33.64	268.71	270.39		270.56	0.002003	1.9	26.86	42.08	0.48
Upper Humber	Reach4	501.813 04.01.16	500-year	48.6	268.71	270.64	270.21	270.85	0.002245	2.21	38.56	54.59	0.52
Upper Humber	Reach4	501.813 04.01.16	Regional	182.7	268.71	279.69		279.69	0.000003	0.28	1924.8	272.06	0.03
Upper Humber	Reach4	501.611 04.01.15	2-year	2.54	268.17	268.59		268.63	0.003232	0.91	2.87	8.85	0.48
Upper Humber	Reach4	501.611 04.01.15	5-year	5.16	268.17	268.78		268.85	0.003204	1.19	4.74	10.71	0.51
Upper Humber	Reach4	501.611 04.01.15	10-year	8.35	268.17	268.91		269.03	0.004153	1.55	6.23	14.03	0.6
Upper Humber	Reach4	501.611 04.01.15	25-year	8.35	268.17	268.91		269.03	0.004153	1.55	6.23	14.03	0.6
Upper Humber	Reach4	501.611 04.01.15	50-year	15.88	268.17	269.11	269.01	269.33	0.005879	2.19	9.78	20.02	0.74
Upper Humber	Reach4	501.611 04.01.15	100-year	19.7	268.17	269.22	269.1	269.47	0.005785	2.35	12.17	23.03	0.75
Upper Humber	Reach4	501.611 04.01.15	350-year	33.64	268.17	269.44	269.44	269.84	0.007361	3.04	17.71	25.47	0.88
Upper Humber	Reach4	501.611 04.01.15	500-year	48.6	268.17	269.84		270.2	0.00488	2.99	28.49	28.68	0.75
Upper Humber	Reach4	501.611 04.01.15	Regional	182.7	268.17	279.69		279.69	0.000005	0.34	1679.1	251.31	0.03
Upper Humber	Reach4	501.410 04.01.14	2-year	2.54	267.75	268.02		268.04	0.002681	0.62	4.11	17.38	0.41
Upper Humber	Reach4	501.410 04.01.14	5-year	5.16	267.75	268.11		268.15	0.003661	0.89	5.81	17.97	0.5
Upper Humber	Reach4	501.410 04.01.14	10-year	8.35	267.75	268.26		268.31	0.002929	0.99	8.46	18.93	0.47
Upper Humber	Reach4	501.410 04.01.14	25-year	8.35	267.75	268.26		268.31	0.002929	0.99	8.46	18.93	0.47
Upper Humber	Reach4	501.410 04.01.14	50-year	15.88	267.75	268.52		268.59	0.002308	1.19	13.67	21.83	0.45
Upper Humber	Reach4	501.410 04.01.14	100-year	19.7	267.75	268.59		268.68	0.002594	1.34	15.2	22.5	0.49
Upper Humber	Reach4	501.410 04.01.14	350-year	33.64	267.75	268.97		269.08	0.001905	1.5	24.6	26.2	0.44
Upper Humber	Reach4	501.410 04.01.14	500-year	48.6	267.75	269.77		269.84	0.000627	1.22	50.37	36.25	0.28
Upper Humber	Reach4	501.410 04.01.14	Regional	182.7	267.75	279.68		279.69	0.000007	0.42	981.19	146.54	0.04
Upper Humber	Reach4	501.209 04.01.13	2-year	2.54	266.85	267.13	267.08	267.19	0.007747	1.07	2.46	11.3	0.69
Upper Humber	Reach4	501.209 04.01.13	5-year	5.16	266.85	267.34	267.19	267.41	0.003772	1.12	5.11	14.12	0.53
Upper Humber	Reach4	501.209 04.01.13	10-year	8.35	266.85	267.44	267.3	267.55	0.005082	1.48	6.53	15.5	0.64
Upper Humber	Reach4	501.209 04.01.13	25-year	8.35	266.85	267.44	267.3	267.55	0.005082	1.48	6.53	15.5	0.64
Upper Humber	Reach4	501.209 04.01.13	50-year	15.88	266.85	267.6	267.53	267.81	0.007445	2.13	9.11	17.02	0.81
Upper Humber	Reach4	501.209 04.01.13	100-year	19.7	266.85	267.79	267.6	267.98	0.004867	2.02	12.77	20.4	0.68
Upper Humber	Reach4	501.209 04.01.13	350-year	33.64	266.85	268.72	267.92	268.81	0.001006	1.48	38.03	33.94	0.35
Upper Humber	Reach4	501.209 04.01.13	500-year	48.6	266.85	269.68	268.13	269.74	0.000409	1.25	80.2	66.93	0.24
Upper Humber	Reach4	501.209 04.01.13	Regional	182.7	266.85	279.68	269.64	279.68	0.000004	0.33	1466.63	164.8	0.03
Upper Humber	Reach4	501.009 04.01.12	2-year	2.54	266.04	266.4	266.25	266.42	0.002238	0.69	3.69	11.89	0.39
Upper Humber	Reach4	501.009 04.01.12	5-year	5.16	266.04	266.46	266.36	266.53	0.005143	1.18	4.43	12.14	0.61
Upper Humber	Reach4	501.009 04.01.12	10-year	8.35	266.04	266.66	266.46	266.74	0.003262	1.24	6.95	12.85	0.52
Upper Humber	Reach4	501.009 04.01.12	25-year	8.35	266.04	266.66	266.46	266.74	0.003262	1.24	6.95	12.85	0.52
Upper Humber	Reach4	501.009 04.01.12	50-year	15.88	266.04	267.3	266.66	267.36	0.000935	1.09	17.64	23.03	0.31
Upper Humber	Reach4	501.009 04.01.12	100-year	19.7	266.04	267.62	266.76	267.67	0.000616	1.03	25.54	27.19	0.27
Upper Humber	Reach4	501.009 04.01.12	350-year	33.64	266.04	268.68	267.05	268.71	0.000229	0.89	69.07	51.61	0.18
Upper Humber	Reach4	501.009 04.01.12	500-year	48.6	266.04	269.66	267.34	269.69	0.000127	0.82	129.21	76.93	0.14
Upper Humber	Reach4	501.009 04.01.12	Regional	182.7	266.04	279.68	268.81	279.68	0.000003	0.3	1668.69	190.03	0.03
Upper Humber	Reach4	500.808 04.01.11	2-year	2.54	265.47	265.76	265.68	265.8	0.004508	0.84	3.04	12.11	0.53
Upper Humber	Reach4	500.808 04.01.11	5-year	5.16	265.47	266.13	265.78	266.15	0.000933	0.69	7.89	14.92	0.28
Upper Humber	Reach4	500.808 04.01.11	10-year	8.35	265.47	266.51	265.88	266.53	0.000463	0.67	14.97	24	0.21
Upper Humber	Reach4	500.808 04.01.11	25-year	8.35	265.47	266.51	265.88	266.53	0.000463	0.67	14.97	24	0.21
Upper Humber	Reach4	500.808 04.01.11	50-year	15.88	265.47	267.26	266.07	267.27	0.000206	0.65	36.15	31.8	0.16
Upper Humber	Reach4	500.808 04.01.11	100-year	19.7	265.47	267.59	266.16	267.61	0.000163	0.65	47.2	34.87	0.14
Upper Humber	Reach4	500.808 04.01.11	350-year	33.64	265.47	268.66	266.44	268.68	0.000101	0.67	94.71	64.38	0.12
Upper Humber	Reach4	500.808 04.01.11	500-year	48.6	265.47	269.65	266.7	269.67	0.000064	0.64	176.1	99.87	0.1
Upper Humber	Reach4	500.808 04.01.11	Regional	182.7	265.47	279.68	268.04	279.68	0.000003	0.29	1684.15	175.25	0.02
Upper Humber	Reach4	500.7833 04.01.10	2-year	2.54	265.29	265.74	265.49	265.75	0.000808	0.46	5.5	14.56	0.24
Upper Humber	Reach4	500.7833 04.01.10	5-year	5.16	265.29	266.12	265.59	266.13	0.000352	0.45	11.41	16.58	0.17
Upper Humber	Reach4	500.7833 04.01.10	10-year	8.35	265.29	266.51	265.68	266.52	0.00022	0.46	18.24	19.11	0.15
Upper Humber	Reach4	500.7833 04.01.10	25-year	8.35	265.29	266.51	265.68	266.52	0.00022	0.46	18.24	19.11	0.15
Upper Humber	Reach4	500.7833 04.01.10	50-year	15.88	265.29	267.26	265.86	267.27	0.00012	0.49	35.58	29.73	0.12
Upper Humber	Reach4	500.7833 04.01.10	100-year	19.7	265.29	267.59	265.94	267.6	0.0001	0.5	46.69	38.16	0.11
Upper Humber	Reach4	500.7833 04.01.10	350-year	33.64	265.29	268.66	266.19	268.67	0.000061	0.52	98.82	61.4	0.09
Upper Humber	Reach4	500.7833 04.01.10	500-year	48.6	265.29	269.65	266.4	269.66	0.000041	0.51	176.71	89.93	0.08
Upper Humber	Reach4	500.7833 04.01.10	Regional	182.7	265.29	279.68	267.76	279.68	0.000002	0.27	1623.78	168.07	0.02
Upper Humber	Reach4	500.7713 04.01.09	2-year	2.54	265.11	265.72	265.4	265.74	0.000962	0.58	4.34	9.08	0.27
Upper Humber	Reach4	500.7713 04.01.09	5-year	5.16	265.11	266.1	265.55	266.12	0.000576	0.64	8.06	11.96	0.23
Upper Humber	Reach4	500.7713 04.01.09	10-year	8.35	265.11	266.48	265.68	266.51	0.000418	0.7	11.85	14.48	0.21
Upper Humber	Reach4	500.7713 04.01.09	25-year	8.35	265.11	266.48	265.68	266.51	0.000418	0.7	11.85	14.48	0.21
Upper Humber	Reach4	500.7713 04.01.09	50-year	15.88	265.11	267.22	265.93	267.25	0.000301	0.83	19.23	20.79	0.19
Upper Humber	Reach4	500.7713 04.01.09	100-year	19.7	265.11	267.55	266.03	267.59	0.000274	0.88	22.51	24.21	0.19
Upper Humber	Reach4	500.7713 04.01.09	350-year	33.64	265.11	268.59	266.34	268.65	0.000224	1.02	32.98	53.69	0.18
Upper Humber	Reach4	500.7713 04.01.09	500-year	48.6	265.11	269.56	266.63	269.63	0.000198	1.14	42.7	73.29	0.18
Upper Humber	Reach4	500.7713 04.01.09	Regional	182.7	265.11	279.68	268.54	279.68	0.000004	0.37	1181.19	167.33	0.03
Upper Humber	Reach4	500.7536 x-117 (04.01.08)		Culvert									
Upper Humber	Reach4	500.7281 04.01.07	2-year	2.54	265.08	265.34	265.33	265.45	0.016939	1.48	1.71	7.67	1
Upper Humber	Reach4	500.7281 04.01.07	5-year	5.16	265.08	265.48	265.48	265.65	0.014624	1.83	2.82	8.27	1
Upper Humber	Reach4	500.7281 04.01.07	10-year	8.35	265.08	265.61	265.61	265.84	0.013149	2.12	3.93	8.8	0.99
Upper Humber	Reach4	500.7281 04.01.07	25-year	8.35	265.08	265.61	265.61	265.84	0.013149	2.12	3.93	8.8	0.99
Upper Humber	Reach4	500.7281 04.01.07	50-year	15.88	265.08	265.86	265.86	266.21	0.012011	2.62	6.06	9.68	1.01

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach4	500.7281 04.01.07	100-year	19.7	265.08	265.97	265.97	266.37	0.011271	2.78	7.09	10.05	1
Upper Humber	Reach4	500.7281 04.01.07	350-year	33.64	265.08	266.31	266.31	266.87	0.010419	3.3	10.21	11.35	1
Upper Humber	Reach4	500.7281 04.01.07	500-year	48.6	265.08	266.63	266.63	267.33	0.009538	3.69	13.18	13.77	0.99
Upper Humber	Reach4	500.7281 04.01.07	Regional	182.7	265.08	268.61	268.61	270.27	0.007108	5.72	32.82	39	0.99
Upper Humber	Reach4	500.7203 04.01.06	2-year	2.54	265.05	265.3		265.32	0.003808	0.6	4.27	24.84	0.46
Upper Humber	Reach4	500.7203 04.01.06	5-year	5.16	265.05	265.42		265.45	0.002676	0.7	7.34	25.52	0.42
Upper Humber	Reach4	500.7203 04.01.06	10-year	8.35	265.05	265.56		265.59	0.001915	0.76	10.97	26.3	0.38
Upper Humber	Reach4	500.7203 04.01.06	25-year	8.35	265.05	265.56		265.59	0.001915	0.76	10.97	26.3	0.38
Upper Humber	Reach4	500.7203 04.01.06	50-year	15.88	265.05	265.83		265.87	0.00139	0.87	18.15	27.65	0.34
Upper Humber	Reach4	500.7203 04.01.06	100-year	19.7	265.05	265.94		265.99	0.001269	0.92	21.39	28.12	0.34
Upper Humber	Reach4	500.7203 04.01.06	350-year	33.64	265.05	266.28		266.34	0.001105	1.08	31.16	29.63	0.33
Upper Humber	Reach4	500.7203 04.01.06	500-year	48.6	265.05	266.58		266.65	0.001032	1.23	40.16	32.22	0.33
Upper Humber	Reach4	500.7203 04.01.06	Regional	182.7	265.05	268.18		268.37	0.000985	2.01	115.43	64.07	0.37
Upper Humber	Reach4	500.607 04.01.05	2-year	2.54	264.42	264.85	264.71	264.89	0.00378	0.9	2.81	8.64	0.51
Upper Humber	Reach4	500.607 04.01.05	5-year	5.16	264.42	265.05	264.85	265.11	0.003533	1.1	4.69	10.13	0.52
Upper Humber	Reach4	500.607 04.01.05	10-year	8.35	264.42	265.22	264.99	265.3	0.003514	1.27	6.59	11.46	0.53
Upper Humber	Reach4	500.607 04.01.05	25-year	8.35	264.42	265.22	264.99	265.3	0.003514	1.27	6.59	11.46	0.53
Upper Humber	Reach4	500.607 04.01.05	50-year	15.88	264.42	265.48	265.23	265.62	0.003726	1.64	9.9	14.69	0.58
Upper Humber	Reach4	500.607 04.01.05	100-year	19.7	264.42	265.58	265.33	265.74	0.003924	1.82	11.55	19.06	0.61
Upper Humber	Reach4	500.607 04.01.05	350-year	33.64	264.42	265.78	265.64	266.08	0.00562	2.48	16.25	25.77	0.75
Upper Humber	Reach4	500.607 04.01.05	500-year	48.6	264.42	265.97	265.92	266.39	0.006299	2.93	21.71	28.55	0.82
Upper Humber	Reach4	500.607 04.01.05	Regional	182.7	264.42	267.2	267.2	268.07	0.006667	4.69	75.64	77.28	0.94
Upper Humber	Reach4	500.406 04.01.04	2-year	2.54	263.37	263.69	263.64	263.76	0.009117	1.24	2.13	10.11	0.76
Upper Humber	Reach4	500.406 04.01.04	5-year	5.16	263.37	263.8	263.78	263.95	0.010815	1.72	3.48	12.31	0.88
Upper Humber	Reach4	500.406 04.01.04	10-year	8.35	263.37	263.91	263.91	264.12	0.011464	2.1	4.94	13.85	0.95
Upper Humber	Reach4	500.406 04.01.04	25-year	8.35	263.37	263.91	263.91	264.12	0.011464	2.1	4.94	13.85	0.95
Upper Humber	Reach4	500.406 04.01.04	50-year	15.88	263.37	264.16	264.16	264.45	0.009786	2.53	8.76	17.7	0.94
Upper Humber	Reach4	500.406 04.01.04	100-year	19.7	263.37	264.26	264.26	264.58	0.009233	2.68	10.66	18.83	0.93
Upper Humber	Reach4	500.406 04.01.04	350-year	33.64	263.37	264.65	264.65	264.94	0.005795	2.73	25.01	55.16	0.78
Upper Humber	Reach4	500.406 04.01.04	500-year	48.6	263.37	264.89	264.89	265.19	0.005362	2.95	39.53	65.88	0.78
Upper Humber	Reach4	500.406 04.01.04	Regional	182.7	263.37	267.14	265.87	267.21	0.000659	1.92	283.39	137.06	0.32
Upper Humber	Reach4	500.205 04.01.03	2-year	2.54	262.11	262.44	262.34	262.47	0.004672	0.87	2.95	11.82	0.54
Upper Humber	Reach4	500.205 04.01.03	5-year	5.16	262.11	262.59	262.46	262.65	0.004166	1.09	4.88	13	0.55
Upper Humber	Reach4	500.205 04.01.03	10-year	8.35	262.11	262.73	262.56	262.82	0.003977	1.28	6.83	13.94	0.56
Upper Humber	Reach4	500.205 04.01.03	25-year	8.35	262.11	262.73	262.56	262.82	0.003977	1.28	6.83	13.94	0.56
Upper Humber	Reach4	500.205 04.01.03	50-year	15.88	262.11	262.98	262.76	263.11	0.003984	1.65	10.41	15.58	0.6
Upper Humber	Reach4	500.205 04.01.03	100-year	19.7	262.11	263.07	262.84	263.24	0.004162	1.82	11.9	16.35	0.63
Upper Humber	Reach4	500.205 04.01.03	350-year	33.64	262.11	263.34	263.12	263.61	0.004862	2.35	16.57	20.31	0.71
Upper Humber	Reach4	500.205 04.01.03	500-year	48.6	262.11	263.57	263.37	263.94	0.005282	2.78	22.1	31.02	0.76
Upper Humber	Reach4	500.205 04.01.03	Regional	182.7	262.11	266.94	264.77	267.08	0.000536	2.03	179.4	58.3	0.3
Upper Humber	Reach4	499.9997 04.01.02	2-year	2.54	261.39	261.77	261.6	261.8	0.00201	0.66	3.82	11.63	0.37
Upper Humber	Reach4	499.9997 04.01.02	5-year	5.16	261.39	261.93	261.72	261.97	0.00226	0.91	5.86	16.42	0.42
Upper Humber	Reach4	499.9997 04.01.02	10-year	8.35	261.39	262.08	261.83	262.14	0.002313	1.1	8.47	18.25	0.44
Upper Humber	Reach4	499.9997 04.01.02	25-year	8.35	261.39	262.08	261.83	262.14	0.002313	1.1	8.47	18.25	0.44
Upper Humber	Reach4	499.9997 04.01.02	50-year	15.88	261.39	262.39	262.03	262.47	0.002044	1.34	15.26	30.92	0.44
Upper Humber	Reach4	499.9997 04.01.02	100-year	19.7	261.39	262.54	262.12	262.62	0.001787	1.39	20.85	42.93	0.43
Upper Humber	Reach4	499.9997 04.01.02	350-year	33.64	261.39	262.97	262.41	263.05	0.001264	1.46	42.88	59.12	0.38
Upper Humber	Reach4	499.9997 04.01.02	500-year	48.6	261.39	263.32	262.65	263.4	0.001047	1.53	64.68	65.35	0.36
Upper Humber	Reach4	499.9997 04.01.02	Regional	182.7	261.39	267	263.8	267.01	0.000069	0.81	571.68	195.65	0.11
Upper Humber	Reach4	499.9704 04.01.01	2-year	2.54	261.36	261.73	261.6	261.76	0.002872	0.76	3.36	10.96	0.44
Upper Humber	Reach4	499.9704 04.01.01	5-year	5.16	261.36	261.88	261.71	261.93	0.003468	1.03	4.98	11.66	0.51
Upper Humber	Reach4	499.9704 04.01.01	10-year	8.35	261.36	262.02	261.82	262.1	0.003805	1.26	6.63	12.35	0.55
Upper Humber	Reach4	499.9704 04.01.01	25-year	8.35	261.36	262.02	261.82	262.1	0.003805	1.26	6.63	12.35	0.55
Upper Humber	Reach4	499.9704 04.01.01	50-year	15.88	261.36	262.32	262.04	262.43	0.003364	1.5	10.57	13.66	0.55
Upper Humber	Reach4	499.9704 04.01.01	100-year	19.7	261.36	262.46	262.12	262.58	0.003164	1.58	12.49	14.27	0.54
Upper Humber	Reach4	499.9704 04.01.01	350-year	33.64	261.36	262.82	262.4	263	0.002876	1.89	18.4	33.93	0.54
Upper Humber	Reach4	499.9704 04.01.01	500-year	48.6	261.36	263.08	262.64	263.33	0.003123	2.24	23.59	47.22	0.58
Upper Humber	Reach4	499.9704 04.01.01	Regional	182.7	261.36	266.99	264.12	267.01	0.000073	0.81	552.82	196.24	0.11
Upper Humber	Reach4	499.9582 x-116 (08.10.33)		Bridge									
Upper Humber	Reach4	499.944 08.10.32	2-year	2.54	261.12	261.5	261.45	261.56	0.008335	1.04	2.44	10.99	0.71
Upper Humber	Reach4	499.944 08.10.32	5-year	5.16	261.12	261.69	261.56	261.75	0.004754	1.13	4.57	12.08	0.58
Upper Humber	Reach4	499.944 08.10.32	10-year	8.35	261.12	261.88	261.67	261.95	0.003341	1.22	6.92	12.98	0.52
Upper Humber	Reach4	499.944 08.10.32	25-year	8.35	261.12	261.88	261.67	261.95	0.003341	1.22	6.92	12.98	0.52
Upper Humber	Reach4	499.944 08.10.32	50-year	15.88	261.12	262.24	261.88	262.33	0.002266	1.4	11.89	14.73	0.47
Upper Humber	Reach4	499.944 08.10.32	100-year	19.7	261.12	262.38	261.96	262.49	0.002117	1.49	14.11	15.73	0.46
Upper Humber	Reach4	499.944 08.10.32	350-year	33.64	261.12	262.73	262.23	262.91	0.002308	1.88	20.4	20.03	0.51
Upper Humber	Reach4	499.944 08.10.32	500-year	48.6	261.12	262.93	262.49	263.2	0.003063	2.37	24.89	27.2	0.59
Upper Humber	Reach4	499.944 08.10.32	Regional	182.7	261.12	266.96	264.07	266.98	0.000067	0.81	480.58	160.35	0.11
Upper Humber	Reach4	499.9253 08.10.31	2-year	2.54	261.12	261.46	261.36	261.51	0.004975	0.93	2.72	9.73	0.56
Upper Humber	Reach4	499.9253 08.10.31	5-year	5.16	261.12	261.66	261.49	261.72	0.003699	1.08	4.78	10.99	0.52
Upper Humber	Reach4	499.9253 08.10.31	10-year	8.35	261.12	261.85	261.61	261.93	0.003073	1.19	7	11.96	0.5
Upper Humber	Reach4	499.9253 08.10.31	25-year	8.35	261.12	261.85	261.61	261.93	0.003073	1.19	7	11.96	0.5
Upper Humber	Reach4	499.9253 08.10.31	50-year	15.88	261.12	262.22	261.83	262.31	0.002425	1.35	11.78	14.02	0.47
Upper Humber	Reach4	499.9253 08.10.31	100-year	19.7	261.12	262.37	261.93	262.47	0.002228	1.42	13.91	14.75	0.46
Upper Humber	Reach4	499.9253 08.10.31	350-year	33.64	261.12	262.73	262.21	262.88	0.002383	1.74	21.24	27.26	0.49
Upper Humber	Reach4	499.9253 08.10.31	500-year	48.6	261.12	262.93	262.46	263.15	0.002923	2.11	27.92	40.25	0.56
Upper Humber	Reach4	499.9253 08.10.31	Regional	182.7	261.12	266.96	263.82	266.97	0.000055	0.71	504.6	160.91	0.1
Upper Humber	Reach3	403.011 08.10.29	2-year	2.62	260.55	261		261.02	0.001618	0.67	3.89	9.74	0.34
Upper Humber	Reach3	403.011 08.10.29	5-year	5.42	260.55	261.18		261.23	0.002045	0.94	5.76	10.68	0.4
Upper Humber	Reach3	403.011 08.10.29	10-year	9.14	260.55	261.35		261.43	0.002395	1.22	7.65	11.66	0.46
Upper Humber	Reach3	403.011 08.10.29	25-year	9.14	260.55	261.35		261.43	0.002395	1.22	7.65	11.66	0.46
Upper Humber	Reach3	403.011 08.10.29	50-year	18.68	260.55	261.67		261.82	0.002934	1.71	12.05	27.24	0.54
Upper Humber	Reach3	403.011 08.10.29	100-year	23.69	260.55	261.78	261.44	261.96	0.003252	1.93	15.71	37.88	0.57
Upper Humber	Reach3	403.011 08.10.29	350-year	42.09	260.55	262.09	262	262.33	0.003527	2.36	34.07	81.09	0.62
Upper Humber	Reach3	403.011 08.10.29	500-year	62.95	260.55	262.37	262.27	262.6	0.003105	2.49	59.99	102.33	0.6
Upper Humber	Reach3	403.011 08.10.29	Regional	252.35	260.55	266.95		266.96	0.000065	0.85	726.99	173.78	0.11
Upper Humber	Reach3	402.9478 08.10.28	2-year	2.62	260.43	260.7	260.69	260.79	0.014886	1.36	1.93	9.05	0.94
Upper Humber	Reach3	402.9478 08.10.28	5-year	5.42	260.43	260.88		260.99	0.008031	1.46	3.99	11.89	0.76
Upper Humber	Reach3	402.9478 08.10.28	10-year	9.14	260.43	261.06		261.19	0.006089	1.64	6.23	12.95	0.7
Upper Humber	Reach3	402.9478 08.10.28	25-year	9.14	260.43	261.06		261.19	0.006089	1.64	6.23	12.95	0.7
Upper Humber	Reach3	402.9478 08.10.28	50-year	18.68	260.43	261.41	261.22	261.59	0.00449	1.95	13.69	35.49	0.65
Upper Humber	Reach3	402.9478 08.10.28	100-year	23.69	260.43	261.56		261.73	0.003789	1.99	19.31	39.12	0.62
Upper Humber	Reach3	402.9478 08.10.28	350-year	42.09	260.43	261.96		262.11	0.00267	2.06	48.47	97.33	0.54
Upper Humber	Reach3	402.9478 08.10.28	500-year	62.95	260.43	262.3		262.41	0.001856	1.98	82.8	101.68	0.47
Upper Humber	Reach3	402.9478 08.10.28	Regional	252.35	260.43	266.94		266.96	0.000081	0.96	715.87	175.6	0.12
Upper Humber	Reach3	402.860 08.10.27	2-year	2.62	260.07	260.5		260.52	0.001163	0.58	4.55	11.82	0.29
Upper Humber	Reach3	402.860 08.10.27	5-year	5.42	260.07	260.69		260.72	0.001399	0.82	6.89	13.44	0.34
Upper Humber	Reach3	402.860 08.10.27	10-year	9.14	260.07	260.88		260.93	0.001522	1.03	9.63	15.36	0.37
Upper Humber	Reach3	402.860 08.10.27	25-year	9.14	260.07	260.88		260.93	0.001522	1.03	9.63	15.36	0.37
Upper Humber	Reach3	402.860 08.10.27	50-year	18.68	260.07	261.24		261.34	0.0017	1.4	16.51	24.21	0.42
Upper Humber	Reach3	402.860 08.10.27	100-year	23.69	260.07	261.39		261.5	0.00177	1.55	21.1	41.67	0.44
Upper Humber	Reach3	402.860 08.10.27	350-year	42.09	260.07	261.79		261.93	0.001668	1.8	42.68	55.46	0.44
Upper Humber	Reach3	402.860 08.10.27	500-year	62.95	260.07	262.1		262.26	0.001747	2.07	60.47	59.75	0.47
Upper Humber	Reach3	402.860 08.10.27	Regional	252.35	260.07	266.94		266.95	0.000064	0.89	796.36	213.07	0.11
Upper Humber	Reach3	402.710 08.10.26	2-year	2.62	259.89	260.22		260.25	0.003084	0.77	3.42	12.85	0.45
Upper Humber	Reach3	402.710 08.10.26	5-year	5.42	259.89	260.4		260.45	0.002611	0.98	6.15	15.88	0.45

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

Proposed Condition HEC-RAS Hydraulic Output Summary

BURNSIDE
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River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach3	402.710 08.10.26	10-year	9.14	259.89	260.6		260.67	0.002182	1.13	9.46	16.9	0.44
Upper Humber	Reach3	402.710 08.10.26	25-year	9.14	259.89	260.6		260.67	0.002182	1.13	9.46	16.9	0.44
Upper Humber	Reach3	402.710 08.10.26	50-year	18.68	259.89	260.96		261.06	0.00204	1.45	16.84	27.41	0.45
Upper Humber	Reach3	402.710 08.10.26	100-year	23.69	259.89	261.11		261.22	0.00199	1.56	21.83	38.88	0.46
Upper Humber	Reach3	402.710 08.10.26	350-year	42.09	259.89	261.54		261.68	0.001831	1.84	45.48	78.93	0.46
Upper Humber	Reach3	402.710 08.10.26	500-year	62.95	259.89	261.9		262.03	0.001504	1.9	79.26	99.41	0.43
Upper Humber	Reach3	402.710 08.10.26	Regional	252.35	259.89	266.94		266.95	0.000043	0.75	935.67	213.26	0.09
Upper Humber	Reach3	402.562 08.10.25	2-year	2.62	259.38	259.81		259.83	0.001446	0.61	4.29	11.46	0.32
Upper Humber	Reach3	402.562 08.10.25	5-year	5.42	259.38	260.04		260.07	0.001329	0.77	7.05	12.47	0.33
Upper Humber	Reach3	402.562 08.10.25	10-year	9.14	259.38	260.26		260.31	0.001341	0.91	10.08	16.52	0.34
Upper Humber	Reach3	402.562 08.10.25	25-year	9.14	259.38	260.26		260.31	0.001341	0.91	10.08	16.52	0.34
Upper Humber	Reach3	402.562 08.10.25	50-year	18.68	259.38	260.7		260.75	0.001072	1.1	21.78	31.98	0.33
Upper Humber	Reach3	402.562 08.10.25	100-year	23.69	259.38	260.86		260.92	0.001036	1.18	27.04	32.78	0.33
Upper Humber	Reach3	402.562 08.10.25	350-year	42.09	259.38	261.28		261.38	0.001128	1.48	41.92	37.58	0.36
Upper Humber	Reach3	402.562 08.10.25	500-year	62.95	259.38	261.62		261.75	0.001265	1.77	55.01	39.83	0.39
Upper Humber	Reach3	402.562 08.10.25	Regional	252.35	259.38	266.92		266.94	0.000052	0.84	929.53	265.95	0.1
Upper Humber	Reach3	402.412 08.10.24	2-year	2.62	259.2	259.74		259.75	0.000563	0.45	5.88	12.55	0.21
Upper Humber	Reach3	402.412 08.10.24	5-year	5.42	259.2	259.96		259.98	0.000669	0.64	8.8	13.16	0.24
Upper Humber	Reach3	402.412 08.10.24	10-year	9.14	259.2	260.18		260.22	0.000772	0.82	11.74	13.92	0.27
Upper Humber	Reach3	402.412 08.10.24	25-year	9.14	259.2	260.18		260.22	0.000772	0.82	11.74	13.92	0.27
Upper Humber	Reach3	402.412 08.10.24	50-year	18.68	259.2	260.6		260.67	0.000892	1.13	19.26	24.06	0.31
Upper Humber	Reach3	402.412 08.10.24	100-year	23.69	259.2	260.75		260.83	0.000979	1.27	23.19	28.21	0.33
Upper Humber	Reach3	402.412 08.10.24	350-year	42.09	259.2	261.14		261.27	0.001286	1.69	36.79	39.28	0.39
Upper Humber	Reach3	402.412 08.10.24	500-year	62.95	259.2	261.43		261.62	0.001619	2.09	49.94	53.8	0.45
Upper Humber	Reach3	402.412 08.10.24	Regional	252.35	259.2	266.92		266.93	0.000036	0.72	1111.74	290	0.08
Upper Humber	Reach3	402.258 08.10.23	2-year	2.62	259.05	259.37	259.37	259.49	0.016223	1.51	1.78	8.16	1
Upper Humber	Reach3	402.258 08.10.23	5-year	5.42	259.05	259.53	259.53	259.7	0.012114	1.84	3.38	12.7	0.94
Upper Humber	Reach3	402.258 08.10.23	10-year	9.14	259.05	259.67	259.67	259.9	0.011069	2.17	5.33	14.16	0.94
Upper Humber	Reach3	402.258 08.10.23	25-year	9.14	259.05	259.67	259.67	259.9	0.011069	2.17	5.33	14.16	0.94
Upper Humber	Reach3	402.258 08.10.23	50-year	18.68	259.05	259.9	259.9	260.29	0.012585	2.93	8.82	18.4	1.07
Upper Humber	Reach3	402.258 08.10.23	100-year	23.69	259.05	260.07	259.89	260.45	0.009947	2.97	12.36	22.45	0.98
Upper Humber	Reach3	402.258 08.10.23	350-year	42.09	259.05	260.57	260.48	260.89	0.005386	2.91	27.77	44.35	0.78
Upper Humber	Reach3	402.258 08.10.23	500-year	62.95	259.05	260.97		261.25	0.003871	2.91	51.45	64.76	0.69
Upper Humber	Reach3	402.258 08.10.23	Regional	252.35	259.05	266.91		266.92	0.00007	1.02	887.31	257.39	0.12
Upper Humber	Reach3	402.107 08.10.22	2-year	2.62	258.6	259.06		259.07	0.000481	0.39	7.16	18.69	0.19
Upper Humber	Reach3	402.107 08.10.22	5-year	5.42	258.6	259.31		259.32	0.000436	0.5	11.89	19.59	0.19
Upper Humber	Reach3	402.107 08.10.22	10-year	9.14	258.6	259.54		259.56	0.000457	0.62	16.49	20.5	0.21
Upper Humber	Reach3	402.107 08.10.22	25-year	9.14	258.6	259.54		259.56	0.000457	0.62	16.49	20.5	0.21
Upper Humber	Reach3	402.107 08.10.22	50-year	18.68	258.6	259.93		259.97	0.000553	0.87	28.32	39.72	0.24
Upper Humber	Reach3	402.107 08.10.22	100-year	23.69	258.6	260.08		260.13	0.000575	0.96	34.51	40.91	0.25
Upper Humber	Reach3	402.107 08.10.22	350-year	42.09	258.6	260.54		260.61	0.000639	1.21	61.31	80.08	0.28
Upper Humber	Reach3	402.107 08.10.22	500-year	62.95	258.6	260.93		261	0.00062	1.35	98.39	109.42	0.28
Upper Humber	Reach3	402.107 08.10.22	Regional	252.35	258.6	266.91		266.92	0.00002	0.57	1214.16	228	0.06
Upper Humber	Reach3	401.959 08.10.21	2-year	2.62	258.39	258.97	258.63	258.98	0.000685	0.55	5.24	11.91	0.24
Upper Humber	Reach3	401.959 08.10.21	5-year	5.42	258.39	259.2	258.76	259.23	0.000853	0.77	8.69	18.8	0.28
Upper Humber	Reach3	401.959 08.10.21	10-year	9.14	258.39	259.41	258.9	259.46	0.00102	0.99	12.97	24.62	0.32
Upper Humber	Reach3	401.959 08.10.21	25-year	9.14	258.39	259.41	258.9	259.46	0.00102	0.99	12.97	24.62	0.32
Upper Humber	Reach3	401.959 08.10.21	50-year	18.68	258.39	259.77	259.23	259.84	0.001288	1.36	22.45	29.63	0.38
Upper Humber	Reach3	401.959 08.10.21	100-year	23.69	258.39	259.91	259.35	260	0.001385	1.51	26.72	31.36	0.4
Upper Humber	Reach3	401.959 08.10.21	350-year	42.09	258.39	260.33	259.71	260.46	0.001553	1.89	43.04	44.51	0.44
Upper Humber	Reach3	401.959 08.10.21	500-year	62.95	258.39	260.7	260.01	260.86	0.001612	2.16	61.09	53.44	0.46
Upper Humber	Reach3	401.959 08.10.21	Regional	252.35	258.39	266.91	261.75	266.91	0.00003	0.71	1213.41	330.39	0.08
Upper Humber	Reach3	401.8453 08.10.20	2-year	2.62	258.3	258.89		258.9	0.000814	0.53	4.97	12.33	0.25
Upper Humber	Reach3	401.8453 08.10.20	5-year	5.42	258.3	259.1		259.13	0.001004	0.72	8.56	19.6	0.29
Upper Humber	Reach3	401.8453 08.10.20	10-year	9.14	258.3	259.3		259.33	0.001125	0.88	12.93	25.58	0.32
Upper Humber	Reach3	401.8453 08.10.20	25-year	9.14	258.3	259.3		259.33	0.001125	0.88	12.93	25.58	0.32
Upper Humber	Reach3	401.8453 08.10.20	50-year	18.68	258.3	259.63		259.69	0.001333	1.19	22.84	35.05	0.36
Upper Humber	Reach3	401.8453 08.10.20	100-year	23.69	258.3	259.76		259.84	0.001338	1.29	27.74	35.93	0.37
Upper Humber	Reach3	401.8453 08.10.20	350-year	42.09	258.3	260.2		260.29	0.001262	1.53	47.35	52.66	0.38
Upper Humber	Reach3	401.8453 08.10.20	500-year	62.95	258.3	260.58		260.69	0.001219	1.72	68.3	58.39	0.38
Upper Humber	Reach3	401.8453 08.10.20	Regional	252.35	258.3	266.91		266.91	0.000013	0.46	1699.34	480.49	0.05
Upper Humber	Reach3	401.806 08.10.19	2-year	2.62	258.3	258.85	258.56	258.87	0.000842	0.57	5.25	16.89	0.26
Upper Humber	Reach3	401.806 08.10.19	5-year	5.42	258.3	259.06	258.68	259.09	0.00101	0.79	9.31	24.62	0.3
Upper Humber	Reach3	401.806 08.10.19	10-year	9.14	258.3	259.25	258.82	259.29	0.001139	0.98	14.57	29.21	0.33
Upper Humber	Reach3	401.806 08.10.19	25-year	9.14	258.3	259.25	258.82	259.29	0.001139	0.98	14.57	29.21	0.33
Upper Humber	Reach3	401.806 08.10.19	50-year	18.68	258.3	259.57	259.1	259.64	0.001383	1.32	25	38.22	0.38
Upper Humber	Reach3	401.806 08.10.19	100-year	23.69	258.3	259.7	259.23	259.78	0.001441	1.45	30.47	41.81	0.4
Upper Humber	Reach3	401.806 08.10.19	350-year	42.09	258.3	260.13	259.54	260.24	0.001427	1.73	50.13	49.8	0.41
Upper Humber	Reach3	401.806 08.10.19	500-year	62.95	258.3	260.48	259.81	260.63	0.00165	2.09	69.04	66.06	0.46
Upper Humber	Reach3	401.806 08.10.19	Regional	252.35	258.3	266.91	261.27	266.91	0.000021	0.59	1435.13	381	0.06
Upper Humber	Reach3	401.653 08.10.18	2-year	2.62	258.21	258.7	258.47	258.72	0.00118	0.56	4.81	14.14	0.29
Upper Humber	Reach3	401.653 08.10.18	5-year	5.42	258.21	258.88	258.58	258.91	0.001356	0.78	7.68	18.72	0.33
Upper Humber	Reach3	401.653 08.10.18	10-year	9.14	258.21	259.03	258.7	259.08	0.001598	0.99	10.97	22.28	0.38
Upper Humber	Reach3	401.653 08.10.18	25-year	9.14	258.21	259.03	258.7	259.08	0.001598	0.99	10.97	22.28	0.38
Upper Humber	Reach3	401.653 08.10.18	50-year	18.68	258.21	259.2	258.95	259.32	0.003072	1.59	15.32	28.13	0.54
Upper Humber	Reach3	401.653 08.10.18	100-year	23.69	258.21	259.25	259.05	259.42	0.004046	1.89	16.69	28.73	0.63
Upper Humber	Reach3	401.653 08.10.18	350-year	42.09	258.21	259.35	259.35	259.76	0.008682	2.97	19.68	30.45	0.93
Upper Humber	Reach3	401.653 08.10.18	500-year	62.95	258.21	259.63	259.63	260.11	0.008015	3.33	28.71	35.55	0.93
Upper Humber	Reach3	401.653 08.10.18	Regional	252.35	258.21	266.9	261.09	266.91	0.000015	0.51	1342.49	253.15	0.06
Upper Humber	Reach3	401.5635 08.10.17	2-year	2.62	258.09	258.4	258.34	258.44	0.007401	0.96	3.22	17.1	0.66
Upper Humber	Reach3	401.5635 08.10.17	5-year	5.42	258.09	258.48	258.45	258.57	0.010418	1.4	4.92	27.51	0.83
Upper Humber	Reach3	401.5635 08.10.17	10-year	9.14	258.09	258.56	258.56	258.69	0.01104	1.71	8.94	75.4	0.89
Upper Humber	Reach3	401.5635 08.10.17	25-year	9.14	258.09	258.56	258.56	258.69	0.01104	1.71	8.94	75.4	0.89
Upper Humber	Reach3	401.5635 08.10.17	50-year	18.68	258.09	258.74	258.71	258.82	0.005879	1.62	32	153.67	0.69
Upper Humber	Reach3	401.5635 08.10.17	100-year	23.69	258.09	258.82	258.76	258.88	0.004242	1.51	46.18	184.24	0.6
Upper Humber	Reach3	401.5635 08.10.17	350-year	42.09	258.09	259.11	258.88	259.14	0.001611	1.19	102.43	201.99	0.39
Upper Humber	Reach3	401.5635 08.10.17	500-year	62.95	258.09	259.73	258.95	259.73	0.000308	0.73	228.96	209.5	0.19
Upper Humber	Reach3	401.5635 08.10.17	Regional	252.35	258.09	266.9	259.38	266.9	0.000004	0.26	2415.37	381.61	0.03
Upper Humber	Reach3	401.5301 08.10.16	2-year	2.62	258.06	258.31	258.3	258.36	0.011421	1.1	4.04	37.75	0.81
Upper Humber	Reach3	401.5301 08.10.16	5-year	5.42	258.06	258.37	258.37	258.45	0.015214	1.51	6.46	39.39	0.97
Upper Humber	Reach3	401.5301 08.10.16	10-year	9.14	258.06	258.45	258.45	258.55	0.0153	1.76	9.54	42.78	1.01
Upper Humber	Reach3	401.5301 08.10.16	25-year	9.14	258.06	258.45	258.45	258.55	0.0153	1.76	9.54	42.78	1.01
Upper Humber	Reach3	401.5301 08.10.16	50-year	18.68	258.06	258.69	258.59	258.75	0.006701	1.48	30.77	134.94	0.71
Upper Humber	Reach3	401.5301 08.10.16	100-year	23.69	258.06	258.79	258.66	258.84	0.004149	1.32	43.54	146.3	0.58
Upper Humber	Reach3	401.5301 08.10.16	350-year	42.09	258.06	259.09	258.78	259.12	0.001799	1.17	87.88	183.51	0.41
Upper Humber	Reach3	401.5301 08.10.16	500-year	62.95	258.06	259.72	258.88	259.73	0.000343	0.74	218.66	229.42	0.2
Upper Humber	Reach3	401.5301 08.10.16	Regional	252.35	258.06	266.9	259.39	266.9	0.000003	0.22	2678.88	425.96	0.02
Upper Humber	Reach3	401.5193 x-111 (08.10.15)		Culvert									
Upper Humber	Reach3	401.5072 08.10.14	2-year	2.62	257.61	258.11	257.94	258.15	0.002834	0.8	3.28	11.09	0.44
Upper Humber	Reach3	401.5072 08.10.14	5-year	5.42	257.61	258.31	258.09	258.35	0.002896	0.98	6.54	20.48	0.47
Upper Humber	Reach3	401.5072 08.10.14	10-year	9.14	257.61	258.45	258.26	258.52	0.003324	1.2	9.96	36.77	0.52
Upper Humber	Reach3	401.5072 08.10.14	25-year	9.14	257.61	258.45	258.26	258.52	0.003324	1.2	9.96	36.77	0.52
Upper Humber	Reach3	401.5072 08.10.14	50-year	18.68	257.61	258.65	258.54	258.75	0.003615	1.51	25.9	131.55	0.56
Upper Humber	Reach3	401.5072 08.10.14	100-year	23.69	257.61	258.75	258.63	258.83	0.003014	1.49	35.74	142.39	0.53
Upper Humber	Reach3	401.5072 08.10.14	350-year	42.09	257.61	259.05	258.81	259.11	0.001906	1.46	75.76	212.82	0.44
Upper Humber	Reach3	401.5072 08.10.14	500-year	62.95	257.61	259.71	258.91	259.72	0.000308	0.8	223.49	297.22	0.19
Upper Humber	Reach3	401.5072 08.10.14	Regional	252.35	257.61	266.9	259.55	266.9	0.000003	0.21	3010.77	452.83	0.02

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach3	401.4879 08.10.13	2-year	2.62	257.61	258.09	257.9	258.13	0.002279	0.79	3.41	12.17	0.4
Upper Humber	Reach3	401.4879 08.10.13	5-year	5.42	257.61	258.28	258.05	258.33	0.002468	1.01	7.9	47.7	0.44
Upper Humber	Reach3	401.4879 08.10.13	10-year	9.14	257.61	258.43	258.24	258.48	0.002566	1.17	14.82	114.86	0.46
Upper Humber	Reach3	401.4879 08.10.13	25-year	9.14	257.61	258.43	258.24	258.48	0.002566	1.17	14.82	114.86	0.46
Upper Humber	Reach3	401.4879 08.10.13	50-year	18.68	257.61	258.65	258.51	258.68	0.001463	1.07	58.78	230.08	0.37
Upper Humber	Reach3	401.4879 08.10.13	100-year	23.69	257.61	258.75	258.55	258.77	0.001084	0.99	82.46	244.92	0.32
Upper Humber	Reach3	401.4879 08.10.13	350-year	42.09	257.61	259.05	258.68	259.06	0.000552	0.85	163.44	279.91	0.24
Upper Humber	Reach3	401.4879 08.10.13	500-year	62.95	257.61	259.71	258.76	259.71	0.000117	0.52	360.01	318.46	0.12
Upper Humber	Reach3	401.4879 08.10.13	Regional	252.35	257.61	266.9	259.17	266.9	0.000002	0.19	3163.59	451.41	0.02
Upper Humber	Reach3	401.354 08.10.12	2-year	2.62	257.31	257.92	257.64	257.93	0.00086	0.57	6.99	28.8	0.26
Upper Humber	Reach3	401.354 08.10.12	5-year	5.42	257.31	258.13	257.79	258.15	0.000767	0.69	18.28	89.32	0.26
Upper Humber	Reach3	401.354 08.10.12	10-year	9.14	257.31	258.3	257.93	258.32	0.000635	0.72	37.56	133.85	0.25
Upper Humber	Reach3	401.354 08.10.12	25-year	9.14	257.31	258.3	257.93	258.32	0.000635	0.72	37.56	133.85	0.25
Upper Humber	Reach3	401.354 08.10.12	50-year	18.68	257.31	258.55	258.18	258.56	0.000556	0.8	76.82	200.2	0.24
Upper Humber	Reach3	401.354 08.10.12	100-year	23.69	257.31	258.66	258.27	258.67	0.00054	0.83	100.27	226.01	0.24
Upper Humber	Reach3	401.354 08.10.12	350-year	42.09	257.31	259	258.41	259.01	0.000353	0.79	181.08	248.93	0.2
Upper Humber	Reach3	401.354 08.10.12	500-year	62.95	257.31	259.7	258.52	259.7	0.000097	0.53	362.18	268.47	0.11
Upper Humber	Reach3	401.354 08.10.12	Regional	252.35	257.31	266.9	259.04	266.9	0.000002	0.22	2877.08	412.1	0.02
Upper Humber	Reach3	401.200 08.10.11	2-year	2.62	257.25	257.82	257.58	257.84	0.001501	0.68	4.59	20.26	0.33
Upper Humber	Reach3	401.200 08.10.11	5-year	5.42	257.25	258.04	257.74	258.06	0.001202	0.79	12.64	57.21	0.32
Upper Humber	Reach3	401.200 08.10.11	10-year	9.14	257.25	258.23	257.91	258.25	0.000876	0.8	28.1	95.19	0.28
Upper Humber	Reach3	401.200 08.10.11	25-year	9.14	257.25	258.23	257.91	258.25	0.000876	0.8	28.1	95.19	0.28
Upper Humber	Reach3	401.200 08.10.11	50-year	18.68	257.25	258.48	258.16	258.5	0.000881	0.96	53.53	111.51	0.3
Upper Humber	Reach3	401.200 08.10.11	100-year	23.69	257.25	258.59	258.21	258.61	0.000844	1.01	66.12	118.23	0.3
Upper Humber	Reach3	401.200 08.10.11	350-year	42.09	257.25	258.94	258.38	258.97	0.000684	1.08	109.37	144.78	0.28
Upper Humber	Reach3	401.200 08.10.11	500-year	62.95	257.25	259.68	258.53	259.69	0.000214	0.78	216.89	206.38	0.17
Upper Humber	Reach3	401.200 08.10.11	Regional	252.35	257.25	266.9	259.21	266.9	0.000001	0.17	2809.97	437.32	0.02
Upper Humber	Reach3	401.053 08.10.10	2-year	2.62	256.77	257.35	257.17	257.4	0.002932	1.08	3.24	8.35	0.48
Upper Humber	Reach3	401.053 08.10.10	5-year	5.42	256.77	257.58	257.35	257.67	0.003214	1.44	5.88	18.18	0.54
Upper Humber	Reach3	401.053 08.10.10	10-year	9.14	256.77	257.75	257.57	257.89	0.00402	1.86	11.18	42.72	0.62
Upper Humber	Reach3	401.053 08.10.10	25-year	9.14	256.77	257.75	257.57	257.89	0.00402	1.86	11.18	42.72	0.62
Upper Humber	Reach3	401.053 08.10.10	50-year	18.68	256.77	258.12	257.95	258.21	0.002378	1.79	28.79	53.52	0.51
Upper Humber	Reach3	401.053 08.10.10	100-year	23.69	256.77	258.24	258.02	258.33	0.002325	1.88	35.34	56.71	0.51
Upper Humber	Reach3	401.053 08.10.10	350-year	42.09	256.77	258.67	258.25	258.74	0.001692	1.92	60.52	61.37	0.45
Upper Humber	Reach3	401.053 08.10.10	500-year	62.95	256.77	259.59	258.43	259.62	0.000465	1.32	131.95	124.66	0.25
Upper Humber	Reach3	401.053 08.10.10	Regional	252.35	256.77	266.9	259.41	266.9	0.000004	0.27	2483.72	462.37	0.03
Upper Humber	Reach3	401.0192 08.10.09	2-year	2.62	256.71	257.29	257.04	257.32	0.001851	0.76	3.45	7.92	0.37
Upper Humber	Reach3	401.0192 08.10.09	5-year	5.42	256.71	257.53	257.21	257.57	0.001825	0.96	6.73	30.4	0.39
Upper Humber	Reach3	401.0192 08.10.09	10-year	9.14	256.71	257.75	257.37	257.79	0.00126	0.97	17.65	54	0.34
Upper Humber	Reach3	401.0192 08.10.09	25-year	9.14	256.71	257.75	257.37	257.79	0.00126	0.97	17.65	54	0.34
Upper Humber	Reach3	401.0192 08.10.09	50-year	18.68	256.71	258.11	257.73	258.14	0.000921	1.05	37.41	56.48	0.31
Upper Humber	Reach3	401.0192 08.10.09	100-year	23.69	256.71	258.22	257.8	258.26	0.000961	1.14	43.99	57.17	0.32
Upper Humber	Reach3	401.0192 08.10.09	350-year	42.09	256.71	258.65	258	258.69	0.000862	1.31	69.97	77.13	0.32
Upper Humber	Reach3	401.0192 08.10.09	500-year	62.95	256.71	259.59	258.17	259.61	0.000191	0.82	163.18	151.01	0.16
Upper Humber	Reach3	401.0192 08.10.09	Regional	252.35	256.71	266.9	259.17	266.9	0.000002	0.18	2889.82	741.43	0.02
Upper Humber	Reach3	400.903 08.10.08	2-year	2.62	256.5	257.04	256.84	257.08	0.002257	0.86	3.13	7.77	0.41
Upper Humber	Reach3	400.903 08.10.08	5-year	5.42	256.5	257.28	257	257.34	0.002294	1.15	5.08	8.85	0.45
Upper Humber	Reach3	400.903 08.10.08	10-year	9.14	256.5	257.49	257.17	257.6	0.002502	1.45	7.17	10.53	0.49
Upper Humber	Reach3	400.903 08.10.08	25-year	9.14	256.5	257.49	257.17	257.6	0.002502	1.45	7.17	10.53	0.49
Upper Humber	Reach3	400.903 08.10.08	50-year	18.68	256.5	257.93	257.51	258.02	0.001676	1.54	28.34	68.6	0.43
Upper Humber	Reach3	400.903 08.10.08	100-year	23.69	256.5	258.06	257.83	258.14	0.001579	1.59	37.38	71.83	0.42
Upper Humber	Reach3	400.903 08.10.08	350-year	42.09	256.5	258.55	258.07	258.61	0.000969	1.51	76.14	95.35	0.35
Upper Humber	Reach3	400.903 08.10.08	500-year	62.95	256.5	259.58	258.25	259.59	0.000178	0.86	196.75	166.91	0.16
Upper Humber	Reach3	400.903 08.10.08	Regional	252.35	256.5	266.9	259.14	266.9	0.000002	0.21	2874.73	503.51	0.02
Upper Humber	Reach3	400.752 08.10.07	2-year	2.62	256.32	256.87	256.56	256.88	0.000817	0.55	5.06	11.66	0.25
Upper Humber	Reach3	400.752 08.10.07	5-year	5.42	256.32	257.09	256.69	257.12	0.000945	0.76	8.24	17.64	0.29
Upper Humber	Reach3	400.752 08.10.07	10-year	9.14	256.32	257.31	256.83	257.35	0.001044	0.95	12.89	26.35	0.32
Upper Humber	Reach3	400.752 08.10.07	25-year	9.14	256.32	257.31	256.83	257.35	0.001044	0.95	12.89	26.35	0.32
Upper Humber	Reach3	400.752 08.10.07	50-year	18.68	256.32	257.87	257.11	257.9	0.000444	0.85	52.22	91.19	0.22
Upper Humber	Reach3	400.752 08.10.07	100-year	23.69	256.32	258	257.25	258.03	0.000449	0.91	64.96	102.89	0.23
Upper Humber	Reach3	400.752 08.10.07	350-year	42.09	256.32	258.52	257.66	258.54	0.000278	0.86	128.56	133.39	0.19
Upper Humber	Reach3	400.752 08.10.07	500-year	62.95	256.32	259.58	257.87	259.58	0.000069	0.56	288.39	209.84	0.1
Upper Humber	Reach3	400.752 08.10.07	Regional	252.35	256.32	266.9	258.68	266.9	0.000002	0.19	2680.41	412.59	0.02
Upper Humber	Reach3	400.602 08.10.06	2-year	2.62	256.17	256.6	256.42	256.63	0.002644	0.81	3.27	10.19	0.43
Upper Humber	Reach3	400.602 08.10.06	5-year	5.42	256.17	256.85	256.57	256.89	0.001922	0.93	6.92	22.21	0.39
Upper Humber	Reach3	400.602 08.10.06	10-year	9.14	256.17	257.14	256.73	257.17	0.000987	0.88	19.53	57.34	0.3
Upper Humber	Reach3	400.602 08.10.06	25-year	9.14	256.17	257.14	256.73	257.17	0.000987	0.88	19.53	57.34	0.3
Upper Humber	Reach3	400.602 08.10.06	50-year	18.68	256.17	257.83	257.05	257.84	0.000253	0.66	63.56	68.84	0.17
Upper Humber	Reach3	400.602 08.10.06	100-year	23.69	256.17	257.95	257.13	257.97	0.000288	0.74	72.25	70.58	0.18
Upper Humber	Reach3	400.602 08.10.06	350-year	42.09	256.17	258.48	257.36	258.5	0.000273	0.86	114.05	85.99	0.19
Upper Humber	Reach3	400.602 08.10.06	500-year	62.95	256.17	259.56	257.53	259.57	0.000093	0.66	242.15	166.73	0.12
Upper Humber	Reach3	400.602 08.10.06	Regional	252.35	256.17	266.9	258.54	266.9	0.000004	0.31	2008.81	330.03	0.03
Upper Humber	Reach3	400.451 08.10.05	2-year	2.62	255.9	256.5	256.14	256.51	0.000471	0.45	7.97	34.65	0.19
Upper Humber	Reach3	400.451 08.10.05	5-year	5.42	255.9	256.79	256.26	256.8	0.00033	0.5	19.23	40.46	0.17
Upper Humber	Reach3	400.451 08.10.05	10-year	9.14	255.9	257.1	256.4	257.11	0.000248	0.54	32.3	42.85	0.16
Upper Humber	Reach3	400.451 08.10.05	25-year	9.14	255.9	257.1	256.4	257.11	0.000248	0.54	32.3	42.85	0.16
Upper Humber	Reach3	400.451 08.10.05	50-year	18.68	255.9	257.81	256.67	257.82	0.000158	0.59	64.9	50.58	0.14
Upper Humber	Reach3	400.451 08.10.05	100-year	23.69	255.9	257.92	256.74	257.94	0.000198	0.69	71.28	56.65	0.16
Upper Humber	Reach3	400.451 08.10.05	350-year	42.09	255.9	258.44	256.97	258.47	0.000286	0.96	115.9	124.49	0.2
Upper Humber	Reach3	400.451 08.10.05	500-year	62.95	255.9	259.55	257.17	259.56	0.00008	0.65	274.67	150.53	0.11
Upper Humber	Reach3	400.451 08.10.05	Regional	252.35	255.9	266.9	258.77	266.9	0.000006	0.36	1776.9	250.69	0.04
Upper Humber	Reach3	400.301 08.10.04	2-year	2.62	255.81	256.43	256.07	256.44	0.000513	0.48	7.43	27.89	0.21
Upper Humber	Reach3	400.301 08.10.04	5-year	5.42	255.81	256.74	256.19	256.75	0.00033	0.52	22.66	73.58	0.18
Upper Humber	Reach3	400.301 08.10.04	10-year	9.14	255.81	257.08	256.34	257.08	0.00018	0.48	50.29	96.58	0.14
Upper Humber	Reach3	400.301 08.10.04	25-year	9.14	255.81	257.08	256.34	257.08	0.00018	0.48	50.29	96.58	0.14
Upper Humber	Reach3	400.301 08.10.04	50-year	18.68	255.81	257.8	256.65	257.8	0.000072	0.41	122.89	109.95	0.09
Upper Humber	Reach3	400.301 08.10.04	100-year	23.69	255.81	257.91	256.75	257.92	0.000091	0.48	136.5	123.7	0.11
Upper Humber	Reach3	400.301 08.10.04	350-year	42.09	255.81	258.43	256.95	258.44	0.0001	0.58	207.67	142.79	0.12
Upper Humber	Reach3	400.301 08.10.04	500-year	62.95	255.81	259.55	257.04	259.55	0.000041	0.48	378.44	161.68	0.08
Upper Humber	Reach3	400.301 08.10.04	Regional	252.35	255.81	266.9	257.88	266.9	0.000005	0.35	1886.39	290.02	0.03
Upper Humber	Reach3	400.150 08.10.03	2-year	2.62	255.6	256.35	255.94	256.36	0.000542	0.54	7.41	44.16	0.21
Upper Humber	Reach3	400.150 08.10.03	5-year	5.42	255.6	256.68	256.13	256.7	0.000455	0.65	16.12	72.97	0.21
Upper Humber	Reach3	400.150 08.10.03	10-year	9.14	255.6	257.03	256.29	257.05	0.000318	0.67	28.58	76.08	0.19
Upper Humber	Reach3	400.150 08.10.03	25-year	9.14	255.6	257.03	256.29	257.05	0.000318	0.67	28.58	76.08	0.19
Upper Humber	Reach3	400.150 08.10.03	50-year	18.68	255.6	257.77	256.56	257.78	0.000209	0.73	61.14	92.91	0.16
Upper Humber	Reach3	400.150 08.10.03	100-year	23.69	255.6	257.88	256.73	257.9	0.000268	0.85	66.69	94.35	0.18
Upper Humber	Reach3	400.150 08.10.03	350-year	42.09	255.6	258.37	256.99	258.41	0.000408	1.21	104.24	139.69	0.24
Upper Humber	Reach3	400.150 08.10.03	500-year	62.95	255.6	259.53	257.22	259.54	0.000123	0.84	220.09	151.91	0.14
Upper Humber	Reach3	400.150 08.10.03	Regional	252.35	255.6	266.89	258.8	266.9	0.000005	0.34	2103.79	327.37	0.03
Upper Humber	Reach3	400.0705 08.10.02	2-year	2.62	255.6	256.32	255.89	256.32	0.000207	0.3	8.99	30.06	0.13
Upper Humber	Reach3	400.0705 08.10.02	5-year	5.42	255.6	256.66	255.99	256.67	0.000159	0.36	18.76	43.84	0.12
Upper Humber	Reach3	400.0705 08.10.02	10-year	9.14	255.6	257.02	256.09	257.03	0.000126	0.41	32.44	53.36	0.12
Upper Humber	Reach3	400.0705 08.10.02	25-year	9.14	255.6	257.02	256.09	257.03	0.000126	0.41	32.44	53.36	0.12
Upper Humber	Reach3	400.0705 08.10.02	50-year	18.68	255.6	257.76	256.29	257.77	0.000089	0.47	72.29	97.43	0.11
Upper Humber	Reach3	400.0705 08.10.02	100-year	23.69	255.6	257.87	256.4	257.88	0.000116	0.55	79.75	104.12	0.12
Upper Humber	Reach3	400.0705 08.10.02	350-year	42.09	255.6	258.37	256.69	258.38	0.000145	0.71	120.6	121.37	0.14
Upper Humber	Reach3	400.0705 08.10.02	500-year	62.95	255.6	259.52	256.94	259.53	0.000068	0.62	236.8	163.13	0.1

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Upper Humber	Reach3	400.0705 08.10.02	Regional	252.35	255.6	266.89	258.32	266.9	0.000003	0.29	2439.81	392.79	0.03
Upper Humber	Reach3	400.0388 08.10.01	2-year	2.62	255.6	256.31	255.88	256.32	0.000282	0.38	7.78	15.59	0.15
Upper Humber	Reach3	400.0388 08.10.01	5-year	5.42	255.6	256.65	256	256.66	0.000261	0.49	13.05	19.38	0.16
Upper Humber	Reach3	400.0388 08.10.01	10-year	9.14	255.6	257	256.11	257.02	0.000245	0.58	18.94	28.11	0.16
Upper Humber	Reach3	400.0388 08.10.01	25-year	9.14	255.6	257	256.11	257.02	0.000245	0.58	18.94	28.11	0.16
Upper Humber	Reach3	400.0388 08.10.01	50-year	18.68	255.6	257.75	256.36	257.76	0.00017	0.66	50.68	58.07	0.15
Upper Humber	Reach3	400.0388 08.10.01	100-year	23.69	255.6	257.85	256.46	257.87	0.000222	0.77	55.41	61.72	0.17
Upper Humber	Reach3	400.0388 08.10.01	350-year	42.09	255.6	258.34	256.8	258.37	0.000281	1	85.19	77.64	0.2
Upper Humber	Reach3	400.0388 08.10.01	500-year	62.95	255.6	259.51	257.11	259.53	0.000118	0.83	180.67	107.49	0.14
Upper Humber	Reach3	400.0388 08.10.01	Regional	252.35	255.6	266.89	258.67	266.9	0.000005	0.34	2264.58	394.86	0.03
Upper Humber	Reach3	400.02 x-110 (07.01.03)		Culvert									
Upper Humber	Reach3	400.000 07.01.02	2-year	2.62	255.18	255.6	255.47	255.64	0.003525	0.83	3.16	10.64	0.48
Upper Humber	Reach3	400.000 07.01.02	5-year	5.42	255.18	255.84	255.6	255.89	0.002173	0.92	6.02	14.66	0.41
Upper Humber	Reach3	400.000 07.01.02	10-year	9.14	255.18	256.1	255.73	256.15	0.00153	1.02	9.63	32.26	0.37
Upper Humber	Reach3	400.000 07.01.02	25-year	9.14	255.18	256.1	255.73	256.15	0.00153	1.02	9.63	32.26	0.37
Upper Humber	Reach3	400.000 07.01.02	50-year	18.68	255.18	256.61	255.98	256.68	0.001118	1.22	17.47	125.59	0.35
Upper Humber	Reach3	400.000 07.01.02	100-year	23.69	255.18	256.88	256.1	256.96	0.000902	1.25	21.93	156.72	0.32
Upper Humber	Reach3	400.000 07.01.02	350-year	42.09	255.18	258.17	256.44	258.17	0.000064	0.5	216.46	177.9	0.09
Upper Humber	Reach3	400.000 07.01.02	500-year	62.95	255.18	259.52	256.75	259.52	0.000022	0.38	456.98	217.22	0.06
Upper Humber	Reach3	400.000 07.01.02	Regional	252.35	255.18	266.89	257.64	266.89	0.000002	0.22	2874.18	389.67	0.02
Upper Humber	Reach3	399.9675 07.01.01	2-year	2.62	255.09	255.6	255.31	255.61	0.000742	0.47	5.64	14.29	0.23
Upper Humber	Reach3	399.9675 07.01.01	5-year	5.42	255.09	255.84	255.42	255.86	0.000707	0.6	9.65	20.93	0.24
Upper Humber	Reach3	399.9675 07.01.01	10-year	9.14	255.09	256.1	255.54	256.12	0.000577	0.67	20.1	64.64	0.23
Upper Humber	Reach3	399.9675 07.01.01	25-year	9.14	255.09	256.1	255.54	256.12	0.000577	0.67	20.1	64.64	0.23
Upper Humber	Reach3	399.9675 07.01.01	50-year	18.68	255.09	256.61	255.78	256.62	0.000211	0.55	90.01	170.13	0.15
Upper Humber	Reach3	399.9675 07.01.01	100-year	23.69	255.09	256.9	255.89	256.9	0.000116	0.47	138.42	173.38	0.12
Upper Humber	Reach3	399.9675 07.01.01	350-year	42.09	255.09	258.17	256.26	258.17	0.000022	0.3	364.35	184.05	0.06
Upper Humber	Reach3	399.9675 07.01.01	500-year	62.95	255.09	259.52	256.45	259.52	0.000011	0.27	637.92	243.24	0.04
Upper Humber	Reach3	399.9675 07.01.01	Regional	252.35	255.09	266.89	257.08	266.89	0.000001	0.19	3141.32	405.91	0.02
Coffey Creek	Reach1	605.657 05.04.19	2-year	0.22	298.05	298.12	298.12	298.13	0.018514	0.61	0.35	6.57	0.83
Coffey Creek	Reach1	605.657 05.04.19	5-year	0.62	298.05	298.16	298.16	298.2	0.02136	0.91	0.68	7.57	0.97
Coffey Creek	Reach1	605.657 05.04.19	10-year	1.27	298.05	298.23	298.21	298.28	0.01548	1.04	1.22	8.82	0.89
Coffey Creek	Reach1	605.657 05.04.19	25-year	1.27	298.05	298.23	298.21	298.28	0.01548	1.04	1.22	8.82	0.89
Coffey Creek	Reach1	605.657 05.04.19	50-year	3.29	298.05	298.37	298.33	298.45	0.011166	1.28	2.57	10.58	0.83
Coffey Creek	Reach1	605.657 05.04.19	100-year	4.41	298.05	298.45	298.39	298.53	0.008086	1.26	3.51	11.67	0.73
Coffey Creek	Reach1	605.657 05.04.19	350-year	8.19	298.05	298.53	298.53	298.7	0.014633	1.86	4.41	12.73	1.01
Coffey Creek	Reach1	605.657 05.04.19	500-year	12.35	298.05	298.65	298.65	298.86	0.013911	2.01	6.16	15.22	1.01
Coffey Creek	Reach1	605.657 05.04.19	Regional	48.6	298.05	301.19		301.2	0.000109	0.67	146.36	75.8	0.12
Coffey Creek	Reach1	605.4805 05.04.18	2-year	0.22	296.82	296.95	296.89	296.96	0.002976	0.4	0.53	4.61	0.38
Coffey Creek	Reach1	605.4805 05.04.18	5-year	0.62	296.82	297.06	296.96	297.07	0.003021	0.58	1.06	5.31	0.42
Coffey Creek	Reach1	605.4805 05.04.18	10-year	1.27	296.82	297.17	297.03	297.2	0.003246	0.74	1.72	6.33	0.45
Coffey Creek	Reach1	605.4805 05.04.18	25-year	1.27	296.82	297.17	297.03	297.2	0.003246	0.74	1.72	6.33	0.45
Coffey Creek	Reach1	605.4805 05.04.18	50-year	3.29	296.82	297.39	297.2	297.44	0.003409	0.98	3.36	8.34	0.49
Coffey Creek	Reach1	605.4805 05.04.18	100-year	4.41	296.82	297.53	297.27	297.57	0.003858	0.91	4.85	14.97	0.51
Coffey Creek	Reach1	605.4805 05.04.18	350-year	8.19	296.82	297.85	297.5	297.86	0.001231	0.55	14.93	41.99	0.29
Coffey Creek	Reach1	605.4805 05.04.18	500-year	12.35	296.82	298.2	297.66	298.2	0.000379	0.35	35.67	82.76	0.17
Coffey Creek	Reach1	605.4805 05.04.18	Regional	48.6	296.82	301.19	298.05	301.19	0.000005	0.15	348.64	118.94	0.03
Coffey Creek	Reach1	605.4582 05.04.17	2-year	0.22	296.76	296.91	296.85	296.92	0.003314	0.44	0.49	4.05	0.4
Coffey Creek	Reach1	605.4582 05.04.17	5-year	0.62	296.76	297	296.92	297.03	0.003949	0.67	0.92	4.54	0.48
Coffey Creek	Reach1	605.4582 05.04.17	10-year	1.27	296.76	297.1	297	297.14	0.005053	0.93	1.37	4.95	0.56
Coffey Creek	Reach1	605.4582 05.04.17	25-year	1.27	296.76	297.1	297	297.14	0.005053	0.93	1.37	4.95	0.56
Coffey Creek	Reach1	605.4582 05.04.17	50-year	3.29	296.76	297.26	297.19	297.37	0.008239	1.49	2.22	6.03	0.76
Coffey Creek	Reach1	605.4582 05.04.17	100-year	4.41	296.76	297.39	297.26	297.5	0.005693	1.46	3.19	10.08	0.66
Coffey Creek	Reach1	605.4582 05.04.17	350-year	8.19	296.76	297.78	297.54	297.84	0.001938	1.2	13.02	38.25	0.42
Coffey Creek	Reach1	605.4582 05.04.17	500-year	12.35	296.76	298.16	297.68	298.19	0.000727	0.95	31.79	61.4	0.27
Coffey Creek	Reach1	605.4582 05.04.17	Regional	48.6	296.76	301.19	298.32	301.19	0.000026	0.41	336.6	134.6	0.06
Coffey Creek	Reach1	605.455 05.04.16	2-year	0.22	296.73	296.83	296.83	296.87	0.026866	0.89	0.24	3.3	1.05
Coffey Creek	Reach1	605.455 05.04.16	5-year	0.62	296.73	296.91	296.91	296.98	0.020214	1.13	0.55	4.26	1
Coffey Creek	Reach1	605.455 05.04.16	10-year	1.27	296.73	297	297	297.09	0.017165	1.32	0.96	5.23	0.98
Coffey Creek	Reach1	605.455 05.04.16	25-year	1.27	296.73	297	297	297.09	0.017165	1.32	0.96	5.23	0.98
Coffey Creek	Reach1	605.455 05.04.16	50-year	3.29	296.73	297.23	297.17	297.33	0.008351	1.35	2.44	7.37	0.75
Coffey Creek	Reach1	605.455 05.04.16	100-year	4.41	296.73	297.38	297.23	297.46	0.005095	1.21	3.63	8.9	0.61
Coffey Creek	Reach1	605.455 05.04.16	350-year	8.19	296.73	297.77	297.43	297.83	0.001782	1.06	7.98	31.81	0.4
Coffey Creek	Reach1	605.455 05.04.16	500-year	12.35	296.73	298.11	297.57	298.17	0.00111	1.08	11.92	46.78	0.33
Coffey Creek	Reach1	605.455 05.04.16	Regional	48.6	296.73	301.1	298.32	301.16	0.000199	1.11	46.22	108.87	0.18
Coffey Creek	Reach1	605.4416 x-113 (05.04.15)		Culvert									
Coffey Creek	Reach1	605.4291 05.04.14	2-year	0.22	296.31	296.45	296.42	296.46	0.006818	0.55	0.39	4.01	0.56
Coffey Creek	Reach1	605.4291 05.04.14	5-year	0.62	296.31	296.55	296.48	296.57	0.005974	0.73	0.84	4.94	0.57
Coffey Creek	Reach1	605.4291 05.04.14	10-year	1.27	296.31	296.66	296.56	296.7	0.004837	0.87	1.45	5.63	0.55
Coffey Creek	Reach1	605.4291 05.04.14	25-year	1.27	296.31	296.66	296.56	296.7	0.004837	0.87	1.45	5.63	0.55
Coffey Creek	Reach1	605.4291 05.04.14	50-year	3.29	296.31	296.91	296.74	296.97	0.004044	1.09	3.02	7.24	0.54
Coffey Creek	Reach1	605.4291 05.04.14	100-year	4.41	296.31	297.02	296.81	297.09	0.003705	1.13	3.91	8.36	0.53
Coffey Creek	Reach1	605.4291 05.04.14	350-year	8.19	296.31	297.34	297.02	297.41	0.002348	1.18	7.02	19.54	0.45
Coffey Creek	Reach1	605.4291 05.04.14	500-year	12.35	296.31	297.56	297.18	297.66	0.002102	1.34	9.49	27.65	0.44
Coffey Creek	Reach1	605.4291 05.04.14	Regional	48.6	296.31	297.98	297.98	298.63	0.009181	3.59	14.29	42.39	0.99
Coffey Creek	Reach1	605.3933 05.04.13	2-year	0.22	296.25	296.34	296.34	296.37	0.017745	0.76	0.28	3.63	0.87
Coffey Creek	Reach1	605.3933 05.04.13	5-year	0.62	296.25	296.41	296.41	296.48	0.018814	1.13	0.55	4.02	0.97
Coffey Creek	Reach1	605.3933 05.04.13	10-year	1.27	296.25	296.49	296.49	296.6	0.018468	1.44	0.88	4.41	1.03
Coffey Creek	Reach1	605.3933 05.04.13	25-year	1.27	296.25	296.49	296.49	296.6	0.018468	1.44	0.88	4.41	1.03
Coffey Creek	Reach1	605.3933 05.04.13	50-year	3.29	296.25	296.68	296.68	296.85	0.014884	1.82	1.81	5.33	1
Coffey Creek	Reach1	605.3933 05.04.13	100-year	4.41	296.25	296.76	296.76	296.96	0.014264	1.98	2.23	5.99	1
Coffey Creek	Reach1	605.3933 05.04.13	350-year	8.19	296.25	296.97	296.97	297.25	0.011568	2.37	3.76	8.23	0.97
Coffey Creek	Reach1	605.3933 05.04.13	500-year	12.35	296.25	297.21	297.21	297.51	0.008047	2.47	6.69	17.59	0.85
Coffey Creek	Reach1	605.3933 05.04.13	Regional	48.6	296.25	297.95	297.95	298.27	0.00598	3.22	40.07	63.03	0.82
Coffey Creek	Reach1	605.251 05.04.12	2-year	0.22	295.11	295.23		295.25	0.005084	0.48	0.49	6.43	0.48
Coffey Creek	Reach1	605.251 05.04.12	5-year	0.62	295.11	295.33		295.35	0.004419	0.63	1.22	9.17	0.49
Coffey Creek	Reach1	605.251 05.04.12	10-year	1.27	295.11	295.42		295.44	0.004377	0.8	2.1	11.18	0.52
Coffey Creek	Reach1	605.251 05.04.12	25-year	1.27	295.11	295.42		295.44	0.004377	0.8	2.1	11.18	0.52
Coffey Creek	Reach1	605.251 05.04.12	50-year	3.29	295.11	295.59	295.47	295.64	0.004252	1.13	4.45	15.94	0.56
Coffey Creek	Reach1	605.251 05.04.12	100-year	4.41	295.11	295.65		295.72	0.004396	1.26	5.54	17.24	0.58
Coffey Creek	Reach1	605.251 05.04.12	350-year	8.19	295.11	295.84	295.66	295.94	0.004617	1.61	9.6	26.72	0.63
Coffey Creek	Reach1	605.251 05.04.12	500-year	12.35	295.11	295.89	295.86	296.07	0.007638	2.17	11.01	28.06	0.82
Coffey Creek	Reach1	605.251 05.04.12	Regional	48.6	295.11	296.47	296.32	296.78	0.008269	3.36	43.11	85.92	0.94
Coffey Creek	Reach1	605.050 05.04.11	2-year	0.22	293.1	293.31	293.29	293.35	0.013222	0.85	0.25	2.14	0.79
Coffey Creek	Reach1	605.050 05.04.11	5-year	0.62	293.1	293.41	293.4	293.49	0.015707	1.2	0.52	2.98	0.92
Coffey Creek	Reach1	605.050 05.04.11	10-year	1.27	293.1	293.53	293.52	293.63	0.015269	1.4	0.91	4.05	0.94
Coffey Creek	Reach1	605.050 05.04.11	25-year	1.27	293.1	293.53	293.52	293.63	0.015269	1.4	0.91	4.05	0.94
Coffey Creek	Reach1	605.050 05.04.11	50-year	3.29	293.1	293.71	293.71	293.88	0.014608	1.78	1.9	7.35	0.99
Coffey Creek	Reach1	605.050 05.04.11	100-year	4.41	293.1	293.79	293.79	293.97	0.013188	1.93	2.49	8.82	0.97
Coffey Creek	Reach1	605.050 05.04.11	350-year	8.19	293.1	293.98	293.98	294.23	0.011276	2.31	4.55	12.56	0.96
Coffey Creek	Reach1	605.050 05.04.11	500-year	12.35	293.1	294.23	294.23	294.41	0.005993	2.12	11.29	36.46	0.74
Coffey Creek	Reach1	605.050 05.04.11	Regional	48.6	293.1	294.82	294.82	295.07	0.005914	3.02	47.23	81.6	0.8
Coffey Creek	Reach1	604.848 05.04.10	2-year	0.22	291.03	291.13	291.11	291.15	0.009596	0.57	0.37	4.59	0.64
Coffey Creek	Reach1	604.848 05.04.10	5-year	0.62	291.03	291.21		291.24	0.008615	0.81	0.76	5.16	0.67
Coffey Creek	Reach1	604.848 05.04.10	10-year	1.27	291.03	291.29	291.25	291.35	0.009078	1.05	1.21	5.74	0.73

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	604.848 05.04.10	25-year	1.27	291.03	291.29	291.25	291.35	0.009078	1.05	1.21	5.74	0.73
Coffey Creek	Reach1	604.848 05.04.10	50-year	3.29	291.03	291.46		291.57	0.009268	1.44	2.29	6.81	0.79
Coffey Creek	Reach1	604.848 05.04.10	100-year	4.41	291.03	291.55	291.48	291.67	0.00871	1.53	2.88	7.42	0.78
Coffey Creek	Reach1	604.848 05.04.10	350-year	8.19	291.03	291.75	291.66	291.92	0.007297	1.81	4.97	16.19	0.77
Coffey Creek	Reach1	604.848 05.04.10	500-year	12.35	291.03	291.92	291.92	292.1	0.006181	1.97	10.1	47.15	0.73
Coffey Creek	Reach1	604.848 05.04.10	Regional	48.6	291.03	292.4	292.4	292.7	0.007438	3.03	37.65	62.59	0.88
Coffey Creek	Reach1	604.646 05.04.09	2-year	0.22	289.41	289.54	289.5	289.55	0.006619	0.48	0.44	5.33	0.54
Coffey Creek	Reach1	604.646 05.04.09	5-year	0.62	289.41	289.61		289.63	0.007322	0.69	0.89	6.68	0.61
Coffey Creek	Reach1	604.646 05.04.09	10-year	1.27	289.41	289.69	289.63	289.73	0.006991	0.87	1.47	9.23	0.63
Coffey Creek	Reach1	604.646 05.04.09	25-year	1.27	289.41	289.69	289.63	289.73	0.006991	0.87	1.47	9.23	0.63
Coffey Creek	Reach1	604.646 05.04.09	50-year	3.29	289.41	289.83	289.78	289.9	0.007299	1.22	3.46	18.38	0.7
Coffey Creek	Reach1	604.646 05.04.09	100-year	4.41	289.41	289.87	289.84	289.96	0.008003	1.37	4.33	19.44	0.74
Coffey Creek	Reach1	604.646 05.04.09	350-year	8.19	289.41	289.97	289.97	290.12	0.010932	1.87	6.41	25.64	0.9
Coffey Creek	Reach1	604.646 05.04.09	500-year	12.35	289.41	290.09	290.09	290.26	0.009265	2.02	10.7	46.01	0.87
Coffey Creek	Reach1	604.646 05.04.09	Regional	48.6	289.41	290.55	290.55	290.82	0.009438	3.05	36.46	61.57	0.97
Coffey Creek	Reach1	604.444 05.04.08	2-year	0.22	287.4	287.48		287.5	0.017268	0.56	0.38	7.63	0.8
Coffey Creek	Reach1	604.444 05.04.08	5-year	0.62	287.4	287.53		287.56	0.015325	0.79	0.78	8.31	0.83
Coffey Creek	Reach1	604.444 05.04.08	10-year	1.27	287.4	287.58	287.57	287.64	0.01659	1.06	1.19	8.77	0.92
Coffey Creek	Reach1	604.444 05.04.08	25-year	1.27	287.4	287.58	287.57	287.64	0.01659	1.06	1.19	8.77	0.92
Coffey Creek	Reach1	604.444 05.04.08	50-year	3.29	287.4	287.69	287.69	287.8	0.015989	1.51	2.24	11.23	0.99
Coffey Creek	Reach1	604.444 05.04.08	100-year	4.41	287.4	287.74	287.74	287.88	0.014143	1.63	2.91	12.98	0.96
Coffey Creek	Reach1	604.444 05.04.08	350-year	8.19	287.4	287.92	287.92	288.05	0.008578	1.74	7.26	36.99	0.81
Coffey Creek	Reach1	604.444 05.04.08	500-year	12.35	287.4	288.02	288.02	288.17	0.00815	1.93	11.46	47.93	0.82
Coffey Creek	Reach1	604.444 05.04.08	Regional	48.6	287.4	288.45	288.45	288.71	0.008908	2.95	38.63	69.72	0.94
Coffey Creek	Reach1	604.242 05.04.07	2-year	0.22	285.12	285.22		285.23	0.008172	0.51	0.43	5.62	0.59
Coffey Creek	Reach1	604.242 05.04.07	5-year	0.62	285.12	285.28		285.31	0.008874	0.75	0.82	6.41	0.67
Coffey Creek	Reach1	604.242 05.04.07	10-year	1.27	285.12	285.36		285.41	0.008173	0.91	1.39	7.49	0.68
Coffey Creek	Reach1	604.242 05.04.07	25-year	1.27	285.12	285.36		285.41	0.008173	0.91	1.39	7.49	0.68
Coffey Creek	Reach1	604.242 05.04.07	50-year	3.29	285.12	285.51		285.6	0.00804	1.27	2.59	8.57	0.73
Coffey Creek	Reach1	604.242 05.04.07	100-year	4.41	285.12	285.57		285.68	0.008295	1.43	3.1	9.31	0.76
Coffey Creek	Reach1	604.242 05.04.07	350-year	8.19	285.12	285.71	285.67	285.89	0.009654	1.87	4.64	11.59	0.86
Coffey Creek	Reach1	604.242 05.04.07	500-year	12.35	285.12	285.83	285.83	286.08	0.010614	2.24	6.29	20.89	0.93
Coffey Creek	Reach1	604.242 05.04.07	Regional	48.6	285.12	286.44	286.44	286.76	0.007395	3	33.94	54.76	0.88
Coffey Creek	Reach1	604.040 05.04.06	2-year	0.22	282.9	282.99	282.97	283.01	0.015676	0.7	0.31	4.1	0.81
Coffey Creek	Reach1	604.040 05.04.06	5-year	0.62	282.9	283.07	283.05	283.11	0.01384	0.94	0.66	5.11	0.83
Coffey Creek	Reach1	604.040 05.04.06	10-year	1.27	282.9	283.13	283.12	283.21	0.015195	1.23	1.03	5.65	0.92
Coffey Creek	Reach1	604.040 05.04.06	25-year	1.27	282.9	283.13	283.12	283.21	0.015195	1.23	1.03	5.65	0.92
Coffey Creek	Reach1	604.040 05.04.06	50-year	3.29	282.9	283.29	283.29	283.43	0.015109	1.67	1.98	6.84	0.99
Coffey Creek	Reach1	604.040 05.04.06	100-year	4.41	282.9	283.35	283.35	283.52	0.014282	1.82	2.44	7.67	0.99
Coffey Creek	Reach1	604.040 05.04.06	350-year	8.19	282.9	283.53	283.53	283.76	0.011624	2.15	4.25	11.01	0.95
Coffey Creek	Reach1	604.040 05.04.06	500-year	12.35	282.9	283.7	283.7	283.98	0.009885	2.39	6.29	14.09	0.92
Coffey Creek	Reach1	604.040 05.04.06	Regional	48.6	282.9	284.54	284.54	284.87	0.005544	3.05	36.68	63.23	0.79
Coffey Creek	Reach1	603.838 05.04.05	2-year	0.22	281.73	281.85	281.8	281.86	0.0044	0.4	0.53	6.17	0.44
Coffey Creek	Reach1	603.838 05.04.05	5-year	0.62	281.73	281.93	281.87	281.95	0.004788	0.6	1.03	7.01	0.5
Coffey Creek	Reach1	603.838 05.04.05	10-year	1.27	281.73	282.02	281.93	282.05	0.004476	0.75	1.69	7.81	0.51
Coffey Creek	Reach1	603.838 05.04.05	25-year	1.27	281.73	282.02	281.93	282.05	0.004476	0.75	1.69	7.81	0.51
Coffey Creek	Reach1	603.838 05.04.05	50-year	3.29	281.73	282.23	282.07	282.28	0.003315	0.95	3.46	8.84	0.49
Coffey Creek	Reach1	603.838 05.04.05	100-year	4.41	281.73	282.33	282.12	282.38	0.002899	1.01	4.38	9.29	0.47
Coffey Creek	Reach1	603.838 05.04.05	350-year	8.19	281.73	282.51	282.28	282.6	0.003599	1.33	6.16	10.01	0.54
Coffey Creek	Reach1	603.838 05.04.05	500-year	12.35	281.73	282.65	282.43	282.79	0.004427	1.63	7.58	10.68	0.61
Coffey Creek	Reach1	603.838 05.04.05	Regional	48.6	281.73	283.45	283.27	283.86	0.00526	2.91	20.35	23.15	0.76
Coffey Creek	Reach1	603.636 05.04.04	2-year	0.22	280.83	281.02		281.03	0.004684	0.49	0.45	5.85	0.47
Coffey Creek	Reach1	603.636 05.04.04	5-year	0.62	280.83	281.12	281.05	281.14	0.004093	0.61	1.33	10.8	0.47
Coffey Creek	Reach1	603.636 05.04.04	10-year	1.27	280.83	281.21		281.23	0.004282	0.74	2.42	14.84	0.5
Coffey Creek	Reach1	603.636 05.04.04	25-year	1.27	280.83	281.21		281.23	0.004282	0.74	2.42	14.84	0.5
Coffey Creek	Reach1	603.636 05.04.04	50-year	3.29	280.83	281.3	281.25	281.36	0.008097	1.23	4.05	19.09	0.73
Coffey Creek	Reach1	603.636 05.04.04	100-year	4.41	280.83	281.32	281.3	281.42	0.011998	1.55	4.36	19.64	0.89
Coffey Creek	Reach1	603.636 05.04.04	350-year	8.19	280.83	281.48	281.44	281.59	0.009215	1.75	7.93	24.05	0.83
Coffey Creek	Reach1	603.636 05.04.04	500-year	12.35	280.83	281.63	281.5	281.75	0.007261	1.85	11.92	28.15	0.77
Coffey Creek	Reach1	603.636 05.04.04	Regional	48.6	280.83	282.12	282.11	282.49	0.011103	3.43	28.42	38.57	1.05
Coffey Creek	Reach1	603.434 05.04.03	2-year	0.22	279.15	279.26	279.25	279.28	0.016422	0.72	0.3	3.94	0.83
Coffey Creek	Reach1	603.434 05.04.03	5-year	0.62	279.15	279.32	279.32	279.38	0.022309	1.05	0.59	5.44	1.03
Coffey Creek	Reach1	603.434 05.04.03	10-year	1.27	279.15	279.4	279.4	279.46	0.020102	1.15	1.1	8.35	1.01
Coffey Creek	Reach1	603.434 05.04.03	25-year	1.27	279.15	279.4	279.4	279.46	0.020102	1.15	1.1	8.35	1.01
Coffey Creek	Reach1	603.434 05.04.03	50-year	3.29	279.15	279.56	279.53	279.63	0.007734	1.19	4.1	33.32	0.71
Coffey Creek	Reach1	603.434 05.04.03	100-year	4.41	279.15	279.63	279.59	279.69	0.0055	1.16	6.65	39.94	0.62
Coffey Creek	Reach1	603.434 05.04.03	350-year	8.19	279.15	279.72	279.69	279.8	0.007163	1.53	10.32	43.45	0.73
Coffey Creek	Reach1	603.434 05.04.03	500-year	12.35	279.15	279.77	279.77	279.9	0.009845	1.93	12.64	44.22	0.88
Coffey Creek	Reach1	603.434 05.04.03	Regional	48.6	279.15	280.3	280.18	280.51	0.007226	2.7	38.45	52.05	0.85
Coffey Creek	Reach1	603.232 05.04.02	2-year	0.22	277.53	277.66		277.67	0.005995	0.51	0.42	4.38	0.52
Coffey Creek	Reach1	603.232 05.04.02	5-year	0.62	277.53	277.76		277.78	0.004603	0.68	0.91	4.91	0.51
Coffey Creek	Reach1	603.232 05.04.02	10-year	1.27	277.53	277.87		277.91	0.004344	0.85	1.49	5.48	0.52
Coffey Creek	Reach1	603.232 05.04.02	25-year	1.27	277.53	277.87		277.91	0.004344	0.85	1.49	5.48	0.52
Coffey Creek	Reach1	603.232 05.04.02	50-year	3.29	277.53	277.99		278.11	0.010143	1.5	2.2	6.51	0.82
Coffey Creek	Reach1	603.232 05.04.02	100-year	4.41	277.53	278.01	278.01	278.19	0.015043	1.87	2.36	6.72	1.01
Coffey Creek	Reach1	603.232 05.04.02	350-year	8.19	277.53	278.28	278.21	278.45	0.008417	1.82	4.5	8.84	0.8
Coffey Creek	Reach1	603.232 05.04.02	500-year	12.35	277.53	278.51	278.37	278.67	0.005332	1.82	9.33	38.26	0.68
Coffey Creek	Reach1	603.232 05.04.02	Regional	48.6	277.53	279.03	279.03	279.31	0.006611	2.89	38.61	67.66	0.82
Coffey Creek	Reach1	603.030 05.04.01	2-year	0.22	276.18	276.3	276.26	276.31	0.006056	0.52	0.42	4.24	0.53
Coffey Creek	Reach1	603.030 05.04.01	5-year	0.62	276.18	276.37	276.32	276.4	0.008436	0.81	0.76	4.97	0.67
Coffey Creek	Reach1	603.030 05.04.01	10-year	1.27	276.18	276.45	276.41	276.51	0.009345	1.07	1.19	5.59	0.74
Coffey Creek	Reach1	603.030 05.04.01	25-year	1.27	276.18	276.45	276.41	276.51	0.009345	1.07	1.19	5.59	0.74
Coffey Creek	Reach1	603.030 05.04.01	50-year	3.29	276.18	276.74	276.58	276.79	0.003679	1.07	3.25	11.45	0.52
Coffey Creek	Reach1	603.030 05.04.01	100-year	4.41	276.18	276.85	276.64	276.91	0.002813	1.1	5.09	20.63	0.47
Coffey Creek	Reach1	603.030 05.04.01	350-year	8.19	276.18	276.97	276.83	277.08	0.004511	1.58	7.69	27.82	0.62
Coffey Creek	Reach1	603.030 05.04.01	500-year	12.35	276.18	277.01	277.01	277.22	0.007797	2.17	9.05	34.15	0.82
Coffey Creek	Reach1	603.030 05.04.01	Regional	48.6	276.18	278.78	277.55	278.79	0.000146	0.69	206.38	136.98	0.14
Coffey Creek	Reach1	602.9023 05.01.30	2-year	0.28	275.28	275.44	275.41	275.46	0.006801	0.58	0.48	4.48	0.57
Coffey Creek	Reach1	602.9023 05.01.30	5-year	0.83	275.28	275.57	275.49	275.6	0.004946	0.76	1.09	5.3	0.53
Coffey Creek	Reach1	602.9023 05.01.30	10-year	1.73	275.28	275.7	275.59	275.75	0.004248	0.93	1.85	5.81	0.53
Coffey Creek	Reach1	602.9023 05.01.30	25-year	1.73	275.28	275.7	275.59	275.75	0.004248	0.93	1.85	5.81	0.53
Coffey Creek	Reach1	602.9023 05.01.30	50-year	4.53	275.28	275.84	275.78	275.99	0.009769	1.7	2.68	6.85	0.84
Coffey Creek	Reach1	602.9023 05.01.30	100-year	6.09	275.28	275.88	275.88	276.1	0.013731	2.1	2.94	7.32	1
Coffey Creek	Reach1	602.9023 05.01.30	350-year	11.42	275.28	276.26	276.17	276.41	0.005375	1.85	9.88	34.94	0.68
Coffey Creek	Reach1	602.9023 05.01.30	500-year	17.31	275.28	276.75	276.36	276.79	0.001032	1.13	38.2	68.73	0.32
Coffey Creek	Reach1	602.9023 05.01.30	Regional	68.43	275.28	278.75	276.94	278.77	0.000181	0.89	190.04	82.93	0.16
Coffey Creek	Reach1	602.8092 05.01.29	2-year	0.28	274.8	274.98	274.91	275	0.002973	0.47	0.6	4.1	0.39
Coffey Creek	Reach1	602.8092 05.01.29	5-year	0.83	274.8	275.11	275	275.14	0.003779	0.68	1.22	5.67	0.47
Coffey Creek	Reach1	602.8092 05.01.29	10-year	1.73	274.8	275.22	275.1	275.26	0.004711	0.92	1.92	8.91	0.55
Coffey Creek	Reach1	602.8092 05.01.29	25-year	1.73	274.8	275.22	275.1	275.26	0.004711	0.92	1.92	8.91	0.55
Coffey Creek	Reach1	602.8092 05.01.29	50-year	4.53	274.8	275.55	275.32	275.58	0.001729	0.89	7.97	25.29	0.37
Coffey Creek	Reach1	602.8092 05.01.29	100-year	6.09	274.8	275.73	275.4	275.76	0.00104	0.83	13.08	31.06	0.3
Coffey Creek	Reach1	602.8092 05.01.29	350-year	11.42	274.8	276.24	275.58	276.26	0.000401	0.73	33.43	43.49	0.21
Coffey Creek	Reach1	602.8092 05.01.29	500-year	17.31	274.8	276.72	275.7	276.73	0.000237	0.69	56.21	49.77	0.17
Coffey Creek	Reach1	602.8092 05.01.29	Regional	68.43	274.8	278.76	276.43	278.76	0.00002	0.33	619.99	251.13	0.05
Coffey Creek	Reach1	602.7863 05.01.28	2-year	0.28	274.77	274.87	274.87	274.91	0.02134	0.88	0.31	3.68	0.96
Coffey Creek	Reach1	602.7863 05.01.28	5-year	0.83	274.77	274.96	274.96	275.04	0.018857	1.2	0.69	4.62	0.99

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	602.7863 05.01.28	10-year	1.73	274.77	275.1	275.06	275.18	0.010877	1.24	1.39	5.85	0.81
Coffey Creek	Reach1	602.7863 05.01.28	25-year	1.73	274.77	275.1	275.06	275.18	0.010877	1.24	1.39	5.85	0.81
Coffey Creek	Reach1	602.7863 05.01.28	50-year	4.53	274.77	275.48	275.26	275.55	0.002844	1.13	3.99	15.29	0.48
Coffey Creek	Reach1	602.7863 05.01.28	100-year	6.09	274.77	275.64	275.34	275.72	0.002221	1.19	5.14	19.41	0.44
Coffey Creek	Reach1	602.7863 05.01.28	350-year	11.42	274.77	276.12	275.56	276.21	0.001485	1.35	8.45	25.6	0.39
Coffey Creek	Reach1	602.7863 05.01.28	500-year	17.31	274.77	276.55	275.76	276.67	0.001224	1.51	11.5	37.46	0.38
Coffey Creek	Reach1	602.7863 05.01.28	Regional	68.43	274.77	277.04	277.04	278.11	0.00804	4.59	14.92	46.41	1
Coffey Creek	Reach1	602.7761 x-114 (05.01.27)		Culvert									
Coffey Creek	Reach1	602.7625 05.01.26	2-year	0.28	274.59	274.7	274.67	274.72	0.007012	0.55	0.51	5.66	0.56
Coffey Creek	Reach1	602.7625 05.01.26	5-year	0.83	274.59	274.77	274.75	274.82	0.011104	0.94	0.88	6.21	0.77
Coffey Creek	Reach1	602.7625 05.01.26	10-year	1.73	274.59	274.84	274.83	274.93	0.014984	1.36	1.27	6.78	0.94
Coffey Creek	Reach1	602.7625 05.01.26	25-year	1.73	274.59	274.84	274.83	274.93	0.014984	1.36	1.27	6.78	0.94
Coffey Creek	Reach1	602.7625 05.01.26	50-year	4.53	274.59	275.01	275.01	275.2	0.014554	1.91	2.37	8.1	1.01
Coffey Creek	Reach1	602.7625 05.01.26	100-year	6.09	274.59	275.1	275.1	275.32	0.013452	2.07	2.95	8.61	1
Coffey Creek	Reach1	602.7625 05.01.26	350-year	11.42	274.59	275.33	275.33	275.65	0.0118	2.52	4.53	9.93	1
Coffey Creek	Reach1	602.7625 05.01.26	500-year	17.31	274.59	275.54	275.54	275.96	0.010646	2.89	5.99	11.65	1
Coffey Creek	Reach1	602.7625 05.01.26	Regional	68.43	274.59	276	276	276.03	0.001193	1.29	111.59	185.52	0.36
Coffey Creek	Reach1	602.7381 05.01.25	2-year	0.28	274.5	274.58	274.58	274.6	0.019399	0.64	0.53	11.22	0.86
Coffey Creek	Reach1	602.7381 05.01.25	5-year	0.83	274.5	274.63	274.63	274.67	0.017943	0.92	1.26	18.03	0.91
Coffey Creek	Reach1	602.7381 05.01.25	10-year	1.73	274.5	274.69	274.69	274.74	0.016006	1.13	2.5	26.88	0.92
Coffey Creek	Reach1	602.7381 05.01.25	25-year	1.73	274.5	274.69	274.69	274.74	0.016006	1.13	2.5	26.88	0.92
Coffey Creek	Reach1	602.7381 05.01.25	50-year	4.53	274.5	274.79	274.79	274.87	0.014083	1.48	5.94	38.47	0.94
Coffey Creek	Reach1	602.7381 05.01.25	100-year	6.09	274.5	274.83	274.83	274.92	0.014547	1.63	7.38	40.04	0.97
Coffey Creek	Reach1	602.7381 05.01.25	350-year	11.42	274.5	274.97	274.93	275.06	0.010501	1.73	14.35	69.79	0.87
Coffey Creek	Reach1	602.7381 05.01.25	500-year	17.31	274.5	275.14	275.04	275.19	0.004774	1.42	29.47	97.32	0.62
Coffey Creek	Reach1	602.7381 05.01.25	Regional	68.43	274.5	275.63		275.69	0.003587	1.89	100.16	176.23	0.6
Coffey Creek	Reach1	602.626 05.01.24	2-year	0.28	273.3	273.48	273.42	273.49	0.002828	0.39	0.71	6.19	0.37
Coffey Creek	Reach1	602.626 05.01.24	5-year	0.83	273.3	273.59	273.48	273.61	0.002838	0.55	1.51	7.94	0.4
Coffey Creek	Reach1	602.626 05.01.24	10-year	1.73	273.3	273.7	273.57	273.73	0.002936	0.7	2.45	9.05	0.43
Coffey Creek	Reach1	602.626 05.01.24	25-year	1.73	273.3	273.7	273.57	273.73	0.002936	0.7	2.45	9.05	0.43
Coffey Creek	Reach1	602.626 05.01.24	50-year	4.53	273.3	273.91	273.72	273.96	0.002901	1	4.84	14.39	0.47
Coffey Creek	Reach1	602.626 05.01.24	100-year	6.09	273.3	274	273.79	274.06	0.002849	1.12	6.18	15.93	0.48
Coffey Creek	Reach1	602.626 05.01.24	350-year	11.42	273.3	274.25	273.98	274.34	0.00259	1.37	10.88	26.12	0.49
Coffey Creek	Reach1	602.626 05.01.24	500-year	17.31	273.3	274.33	274.15	274.5	0.004182	1.85	14.27	56.2	0.63
Coffey Creek	Reach1	602.626 05.01.24	Regional	68.43	273.3	274.95	274.84	275.12	0.003705	2.48	67.27	98.9	0.65
Coffey Creek	Reach1	602.424 05.01.23	2-year	0.28	272.31	272.42	272.42	272.45	0.019961	0.8	0.35	4.43	0.92
Coffey Creek	Reach1	602.424 05.01.23	5-year	0.83	272.31	272.5	272.5	272.57	0.019989	1.2	0.69	4.84	1.01
Coffey Creek	Reach1	602.424 05.01.23	10-year	1.73	272.31	272.59	272.59	272.7	0.017359	1.48	1.17	5.34	1.01
Coffey Creek	Reach1	602.424 05.01.23	25-year	1.73	272.31	272.59	272.59	272.7	0.017359	1.48	1.17	5.34	1.01
Coffey Creek	Reach1	602.424 05.01.23	50-year	4.53	272.31	272.79	272.79	272.99	0.014727	1.97	2.3	5.9	1.01
Coffey Creek	Reach1	602.424 05.01.23	100-year	6.09	272.31	272.88	272.88	273.11	0.014036	2.14	2.84	6.16	1.01
Coffey Creek	Reach1	602.424 05.01.23	350-year	11.42	272.31	273.13	273.13	273.46	0.012697	2.55	4.49	6.86	1
Coffey Creek	Reach1	602.424 05.01.23	500-year	17.31	272.31	273.5	273.5	273.7	0.005112	2.15	15	53.49	0.68
Coffey Creek	Reach1	602.424 05.01.23	Regional	68.43	272.31	274.25		274.46	0.00406	2.78	60.07	63.09	0.67
Coffey Creek	Reach1	602.222 05.01.22	2-year	0.28	271.17	271.29		271.3	0.002645	0.35	0.8	7.94	0.35
Coffey Creek	Reach1	602.222 05.01.22	5-year	0.83	271.17	271.4		271.41	0.002205	0.5	1.66	8.3	0.36
Coffey Creek	Reach1	602.222 05.01.22	10-year	1.73	271.17	271.52		271.54	0.002065	0.64	2.69	8.72	0.37
Coffey Creek	Reach1	602.222 05.01.22	25-year	1.73	271.17	271.52		271.54	0.002065	0.64	2.69	8.72	0.37
Coffey Creek	Reach1	602.222 05.01.22	50-year	4.53	271.17	271.78		271.82	0.001817	0.91	5.09	9.64	0.38
Coffey Creek	Reach1	602.222 05.01.22	100-year	6.09	271.17	271.91		271.96	0.001658	0.99	6.37	10.13	0.38
Coffey Creek	Reach1	602.222 05.01.22	350-year	11.42	271.17	272.18		272.27	0.001901	1.32	9.29	11.39	0.43
Coffey Creek	Reach1	602.222 05.01.22	500-year	17.31	271.17	272.31		272.47	0.002878	1.77	11.1	17.77	0.54
Coffey Creek	Reach1	602.222 05.01.22	Regional	68.43	271.17	273.01	273.01	273.49	0.00561	3.43	41.44	69.59	0.82
Coffey Creek	Reach1	602.020 05.01.21	2-year	0.28	270.3	270.52		270.54	0.005755	0.59	0.47	3.76	0.53
Coffey Creek	Reach1	602.020 05.01.21	5-year	0.83	270.3	270.62		270.67	0.00687	0.95	0.9	4.46	0.64
Coffey Creek	Reach1	602.020 05.01.21	10-year	1.73	270.3	270.74		270.82	0.007171	1.28	1.46	5.21	0.7
Coffey Creek	Reach1	602.020 05.01.21	25-year	1.73	270.3	270.74		270.82	0.007171	1.28	1.46	5.21	0.7
Coffey Creek	Reach1	602.020 05.01.21	50-year	4.53	270.3	270.99	270.91	271.16	0.007386	1.87	2.92	6.48	0.78
Coffey Creek	Reach1	602.020 05.01.21	100-year	6.09	270.3	271.08	271.02	271.3	0.007954	2.14	3.56	7.14	0.83
Coffey Creek	Reach1	602.020 05.01.21	350-year	11.42	270.3	271.37	271.37	271.62	0.006369	2.43	10.51	47.93	0.79
Coffey Creek	Reach1	602.020 05.01.21	500-year	17.31	270.3	271.57	271.56	271.75	0.004605	2.34	22.31	64.73	0.69
Coffey Creek	Reach1	602.020 05.01.21	Regional	68.43	270.3	272.45		272.54	0.002273	2.38	90.57	85.83	0.53
Coffey Creek	Reach1	601.818 05.01.20	2-year	0.28	269.4	269.68		269.69	0.003231	0.52	0.54	3.33	0.41
Coffey Creek	Reach1	601.818 05.01.20	5-year	0.83	269.4	269.86		269.89	0.002475	0.67	1.24	4.28	0.4
Coffey Creek	Reach1	601.818 05.01.20	10-year	1.73	269.4	270.07		270.1	0.002087	0.77	2.24	7.06	0.38
Coffey Creek	Reach1	601.818 05.01.20	25-year	1.73	269.4	270.07		270.1	0.002087	0.77	2.24	7.06	0.38
Coffey Creek	Reach1	601.818 05.01.20	50-year	4.53	269.4	270.35		270.4	0.002126	1.1	5.95	17.24	0.42
Coffey Creek	Reach1	601.818 05.01.20	100-year	6.09	269.4	270.45		270.52	0.002145	1.22	7.86	18.62	0.43
Coffey Creek	Reach1	601.818 05.01.20	350-year	11.42	269.4	270.74	270.43	270.83	0.002122	1.48	14	24.18	0.45
Coffey Creek	Reach1	601.818 05.01.20	500-year	17.31	269.4	270.86	270.6	271.01	0.003138	1.94	17.25	27.96	0.56
Coffey Creek	Reach1	601.818 05.01.20	Regional	68.43	269.4	271.71	271.6	271.97	0.003998	3.11	64.56	81.25	0.69
Coffey Creek	Reach1	601.616 05.01.19	2-year	0.28	268.68	268.92	268.85	268.94	0.004363	0.6	0.46	2.88	0.48
Coffey Creek	Reach1	601.616 05.01.19	5-year	0.83	268.68	269.04	268.97	269.09	0.007499	1.01	0.82	3.47	0.67
Coffey Creek	Reach1	601.616 05.01.19	10-year	1.73	268.68	269.12	269.1	269.24	0.012967	1.52	1.13	3.92	0.9
Coffey Creek	Reach1	601.616 05.01.19	25-year	1.73	268.68	269.12	269.1	269.24	0.012967	1.52	1.13	3.92	0.9
Coffey Creek	Reach1	601.616 05.01.19	50-year	4.53	268.68	269.37	269.37	269.57	0.011201	1.97	2.65	8.87	0.91
Coffey Creek	Reach1	601.616 05.01.19	100-year	6.09	268.68	269.47	269.47	269.69	0.01063	2.14	3.54	11	0.91
Coffey Creek	Reach1	601.616 05.01.19	350-year	11.42	268.68	269.69	269.69	270	0.010689	2.66	6.93	24.58	0.96
Coffey Creek	Reach1	601.616 05.01.19	500-year	17.31	268.68	269.95	269.95	270.16	0.006108	2.43	16.29	41.37	0.76
Coffey Creek	Reach1	601.616 05.01.19	Regional	68.43	268.68	270.57	270.57	270.9	0.0078	3.76	50.98	64.22	0.93
Coffey Creek	Reach1	601.414 05.01.18	2-year	0.28	267.69	267.79		267.81	0.007161	0.54	0.52	5.66	0.57
Coffey Creek	Reach1	601.414 05.01.18	5-year	0.83	267.69	267.91		267.93	0.004335	0.66	1.25	6.78	0.49
Coffey Creek	Reach1	601.414 05.01.18	10-year	1.73	267.69	268.05		268.08	0.00309	0.77	2.25	8.06	0.45
Coffey Creek	Reach1	601.414 05.01.18	25-year	1.73	267.69	268.05		268.08	0.00309	0.77	2.25	8.06	0.45
Coffey Creek	Reach1	601.414 05.01.18	50-year	4.53	267.69	268.32		268.38	0.002233	1.02	5.26	16.96	0.43
Coffey Creek	Reach1	601.414 05.01.18	100-year	6.09	267.69	268.42		268.49	0.002227	1.13	7.68	33.66	0.44
Coffey Creek	Reach1	601.414 05.01.18	350-year	11.42	267.69	268.68		268.74	0.001787	1.25	18.71	47.7	0.41
Coffey Creek	Reach1	601.414 05.01.18	500-year	17.31	267.69	268.89		268.95	0.001502	1.32	29.8	55.02	0.39
Coffey Creek	Reach1	601.414 05.01.18	Regional	68.43	267.69	269.69		269.81	0.002016	2.17	81.21	75.89	0.5
Coffey Creek	Reach1	601.212 05.01.17	2-year	0.28	267	267.21		267.22	0.001619	0.38	0.72	4.21	0.3
Coffey Creek	Reach1	601.212 05.01.17	5-year	0.83	267	267.36		267.38	0.001983	0.6	1.39	4.81	0.36
Coffey Creek	Reach1	601.212 05.01.17	10-year	1.73	267	267.51		267.54	0.002393	0.8	2.14	5.43	0.41
Coffey Creek	Reach1	601.212 05.01.17	25-year	1.73	267	267.51		267.54	0.002393	0.8	2.14	5.43	0.41
Coffey Creek	Reach1	601.212 05.01.17	50-year	4.53	267	267.75		267.83	0.003437	1.28	3.92	13.84	0.52
Coffey Creek	Reach1	601.212 05.01.17	100-year	6.09	267	267.84		267.94	0.003529	1.43	5.51	16.97	0.55
Coffey Creek	Reach1	601.212 05.01.17	350-year	11.42	267	268.03	267.92	268.2	0.004924	1.97	8.99	23.88	0.67
Coffey Creek	Reach1	601.212 05.01.17	500-year	17.31	267	268.16	268.05	268.42	0.00652	2.49	13.43	43.7	0.79
Coffey Creek	Reach1	601.212 05.01.17	Regional	68.43	267	268.81	268.81	269.19	0.007394	3.69	47.51	57.46	0.91
Coffey Creek	Reach1	601.010 05.01.16	2-year	0.28	266.49	266.69	266.63	266.71	0.004123	0.52	0.54	4.03	0.46
Coffey Creek	Reach1	601.010 05.01.16	5-year	0.83	266.49	266.85	266.73	266.87	0.003097	0.65	1.27	5.44	0.43
Coffey Creek	Reach1	601.010 05.01.16	10-year	1.73	266.49	267.01	266.83	267.04	0.002512	0.76	2.3	8.36	0.41
Coffey Creek	Reach1	601.010 05.01.16	25-year	1.73	266.49	267.01	266.83	267.04	0.002512	0.76	2.3	8.36	0.41
Coffey Creek	Reach1	601.010 05.01.16	50-year	4.53	266.49	267.27	267.04	267.31	0.001924	0.97	9.01	51.08	0.4
Coffey Creek	Reach1	601.010 05.01.16	100-year	6.09	266.49	267.32	267.14	267.37	0.002338	1.12	11.81	64.21	0.45
Coffey Creek	Reach1	601.010 05.01.16	350-year	11.42	266.49	267.47	267.37	267.53	0.002407	1.31	23.93	84.57	0.47
Coffey Creek	Reach1	601.010 05.01.16	500-year	17.31	266.49	267.59	267.47	267.64	0.002507	1.46	33.67	87.72	0.49
Coffey Creek	Reach1	601.010 05.01.16	Regional	68.43	266.49	268.58	267.84	268.6	0.000657	1.22	172.3	166.04	0.28

DRAFT

Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	600.808 05.01.15	2-year	0.28	265.86	266.02	265.95	266.03	0.002827	0.44	0.64	4.66	0.38
Coffey Creek	Reach1	600.808 05.01.15	5-year	0.83	265.86	266.13	266.04	266.15	0.004014	0.72	1.15	5.2	0.49
Coffey Creek	Reach1	600.808 05.01.15	10-year	1.73	265.86	266.21	266.13	266.27	0.006497	1.09	1.59	5.67	0.65
Coffey Creek	Reach1	600.808 05.01.15	25-year	1.73	265.86	266.21	266.13	266.27	0.006497	1.09	1.59	5.67	0.65
Coffey Creek	Reach1	600.808 05.01.15	50-year	4.53	265.86	266.36	266.36	266.53	0.012334	1.82	2.67	12.45	0.94
Coffey Creek	Reach1	600.808 05.01.15	100-year	6.09	265.86	266.48	266.48	266.62	0.007635	1.71	5.57	33.2	0.77
Coffey Creek	Reach1	600.808 05.01.15	350-year	11.42	265.86	266.64	266.64	266.8	0.007486	2.02	11.87	46.19	0.8
Coffey Creek	Reach1	600.808 05.01.15	500-year	17.31	265.86	266.76	266.76	266.93	0.007296	2.23	17.82	51.37	0.81
Coffey Creek	Reach1	600.808 05.01.15	Regional	68.43	265.86	268.45	267.26	268.49	0.000649	1.44	120.67	72.02	0.29
Coffey Creek	Reach1	600.6965 05.01.14	2-year	0.28	265.17	265.23	265.23	265.26	0.034009	0.78	0.35	7.04	1.12
Coffey Creek	Reach1	600.6965 05.01.14	5-year	0.83	265.17	265.3	265.29	265.34	0.017076	0.87	0.95	9.61	0.89
Coffey Creek	Reach1	600.6965 05.01.14	10-year	1.73	265.17	265.4	265.36	265.44	0.008423	0.83	2.08	13.34	0.67
Coffey Creek	Reach1	600.6965 05.01.14	25-year	1.73	265.17	265.4	265.36	265.44	0.008423	0.83	2.08	13.34	0.67
Coffey Creek	Reach1	600.6965 05.01.14	50-year	4.53	265.17	265.59	265.48	265.63	0.003825	0.9	5.57	23.8	0.51
Coffey Creek	Reach1	600.6965 05.01.14	100-year	6.09	265.17	265.68	265.52	265.72	0.003002	0.93	7.63	24.78	0.47
Coffey Creek	Reach1	600.6965 05.01.14	350-year	11.42	265.17	265.9	265.66	265.95	0.002279	1.08	14.2	38.99	0.44
Coffey Creek	Reach1	600.6965 05.01.14	500-year	17.31	265.17	266.03	265.77	266.1	0.002571	1.31	19.82	49.87	0.48
Coffey Creek	Reach1	600.6965 05.01.14	Regional	68.43	265.17	268.46	266.42	268.46	0.00008	0.6	271.03	129.39	0.11
Coffey Creek	Reach1	600.606 05.01.13	2-year	0.28	264.48	264.72	264.61	264.72	0.001691	0.38	0.74	4.55	0.3
Coffey Creek	Reach1	600.606 05.01.13	5-year	0.83	264.48	264.84	264.7	264.86	0.002479	0.61	1.36	5.42	0.39
Coffey Creek	Reach1	600.606 05.01.13	10-year	1.73	264.48	264.96	264.81	265	0.003155	0.83	2.07	6.16	0.46
Coffey Creek	Reach1	600.606 05.01.13	25-year	1.73	264.48	264.96	264.81	265	0.003155	0.83	2.07	6.16	0.46
Coffey Creek	Reach1	600.606 05.01.13	50-year	4.53	264.48	265.2	265.02	265.28	0.004176	1.22	3.71	7.72	0.56
Coffey Creek	Reach1	600.606 05.01.13	100-year	6.09	264.48	265.29	265.11	265.39	0.004551	1.37	4.49	10.36	0.6
Coffey Creek	Reach1	600.606 05.01.13	350-year	11.42	264.48	265.51	265.35	265.65	0.004963	1.74	9.22	55.91	0.65
Coffey Creek	Reach1	600.606 05.01.13	500-year	17.31	264.48	265.65	265.65	265.79	0.004579	1.88	20.21	89.86	0.65
Coffey Creek	Reach1	600.606 05.01.13	Regional	68.43	264.48	268.45	266.06	268.46	0.00005	0.51	361.65	142.15	0.09
Coffey Creek	Reach1	600.404 05.01.12	2-year	0.28	263.88	263.98	263.97	264	0.025142	0.68	0.41	7.94	0.96
Coffey Creek	Reach1	600.404 05.01.12	5-year	0.83	263.88	264.05	264.03	264.09	0.011079	0.8	1.04	8.65	0.74
Coffey Creek	Reach1	600.404 05.01.12	10-year	1.73	263.88	264.14	264.09	264.19	0.007908	0.95	1.82	9.1	0.68
Coffey Creek	Reach1	600.404 05.01.12	25-year	1.73	263.88	264.14	264.09	264.19	0.007908	0.95	1.82	9.1	0.68
Coffey Creek	Reach1	600.404 05.01.12	50-year	4.53	263.88	264.33	264.24	264.41	0.00614	1.25	3.63	9.95	0.66
Coffey Creek	Reach1	600.404 05.01.12	100-year	6.09	263.88	264.42	264.3	264.51	0.005736	1.37	4.48	10.29	0.65
Coffey Creek	Reach1	600.404 05.01.12	350-year	11.42	263.88	264.65	264.48	264.79	0.005188	1.64	7.33	25.09	0.66
Coffey Creek	Reach1	600.404 05.01.12	500-year	17.31	263.88	264.84	264.73	264.99	0.004238	1.76	14.92	46.37	0.62
Coffey Creek	Reach1	600.404 05.01.12	Regional	68.43	263.88	268.44	265.32	268.45	0.000041	0.54	308.01	103.31	0.08
Coffey Creek	Reach1	600.2568 05.01.11	2-year	0.28	262.74	262.96	262.87	262.97	0.002186	0.44	0.63	3.8	0.34
Coffey Creek	Reach1	600.2568 05.01.11	5-year	0.83	262.74	263.11	262.97	263.13	0.002714	0.65	1.27	4.86	0.41
Coffey Creek	Reach1	600.2568 05.01.11	10-year	1.73	262.74	263.26	263.07	263.3	0.002884	0.82	2.09	5.92	0.44
Coffey Creek	Reach1	600.2568 05.01.11	25-year	1.73	262.74	263.26	263.07	263.3	0.002884	0.82	2.09	5.92	0.44
Coffey Creek	Reach1	600.2568 05.01.11	50-year	4.53	262.74	263.55	263.3	263.61	0.002874	1.15	3.99	7.67	0.48
Coffey Creek	Reach1	600.2568 05.01.11	100-year	6.09	262.74	263.67	263.39	263.75	0.00275	1.28	5.04	9.69	0.48
Coffey Creek	Reach1	600.2568 05.01.11	350-year	11.42	262.74	264.01	263.64	264.13	0.002349	1.54	9.89	19.24	0.48
Coffey Creek	Reach1	600.2568 05.01.11	500-year	17.31	262.74	264.33	263.88	264.44	0.00191	1.65	17.02	26.71	0.45
Coffey Creek	Reach1	600.2568 05.01.11	Regional	68.43	262.74	268.44	264.93	268.44	0.000019	0.41	520.32	171.38	0.06
Coffey Creek	Reach1	600.2281 05.01.10	2-year	0.28	262.74	262.95	262.85	262.95	0.001793	0.37	0.76	5.11	0.31
Coffey Creek	Reach1	600.2281 05.01.10	5-year	0.83	262.74	263.1	262.94	263.11	0.001671	0.52	1.6	6.09	0.32
Coffey Creek	Reach1	600.2281 05.01.10	10-year	1.73	262.74	263.25	263.03	263.27	0.001732	0.67	2.58	6.87	0.35
Coffey Creek	Reach1	600.2281 05.01.10	25-year	1.73	262.74	263.25	263.03	263.27	0.001732	0.67	2.58	6.87	0.35
Coffey Creek	Reach1	600.2281 05.01.10	50-year	4.53	262.74	263.53	263.22	263.58	0.002059	0.96	4.74	8.27	0.4
Coffey Creek	Reach1	600.2281 05.01.10	100-year	6.09	262.74	263.66	263.31	263.71	0.002053	1.05	5.79	8.88	0.41
Coffey Creek	Reach1	600.2281 05.01.10	350-year	11.42	262.74	264	263.53	264.08	0.001887	1.27	9.04	18.54	0.42
Coffey Creek	Reach1	600.2281 05.01.10	500-year	17.31	262.74	264.31	263.73	264.42	0.00166	1.44	12.16	34.41	0.41
Coffey Creek	Reach1	600.2281 05.01.10	Regional	68.43	262.74	268.3	264.79	268.39	0.000216	1.35	52.01	180.21	0.19
Coffey Creek	Reach1	600.2056 x-112 (05.01.09)		Culvert									
Coffey Creek	Reach1	600.182 05.01.08	2-year	0.28	262.68	262.94	262.77	262.94	0.000347	0.21	1.35	6.35	0.14
Coffey Creek	Reach1	600.182 05.01.08	5-year	0.83	262.68	263.08	262.84	263.09	0.000605	0.36	2.3	7.01	0.2
Coffey Creek	Reach1	600.182 05.01.08	10-year	1.73	262.68	263.23	262.92	263.24	0.000874	0.51	3.36	7.89	0.25
Coffey Creek	Reach1	600.182 05.01.08	25-year	1.73	262.68	263.23	262.92	263.24	0.000874	0.51	3.36	7.89	0.25
Coffey Creek	Reach1	600.182 05.01.08	50-year	4.53	262.68	263.48	263.1	263.52	0.00141	0.8	5.66	16.21	0.34
Coffey Creek	Reach1	600.182 05.01.08	100-year	6.09	262.68	263.59	263.18	263.63	0.001525	0.92	6.65	20.86	0.36
Coffey Creek	Reach1	600.182 05.01.08	350-year	11.42	262.68	263.86	263.43	263.94	0.001712	1.21	9.4	50.31	0.4
Coffey Creek	Reach1	600.182 05.01.08	500-year	17.31	262.68	264.09	263.6	264.2	0.001903	1.48	11.69	51.97	0.44
Coffey Creek	Reach1	600.182 05.01.08	Regional	68.43	262.68	266.94	264.6	267.09	0.000485	1.7	40.18	94.07	0.27
Coffey Creek	Reach1	600.1341 05.01.07	2-year	0.28	262.68	262.94	262.78	262.94	0.000493	0.23	1.18	5.94	0.17
Coffey Creek	Reach1	600.1341 05.01.07	5-year	0.83	262.68	263.08	262.86	263.08	0.000828	0.4	2.07	6.8	0.23
Coffey Creek	Reach1	600.1341 05.01.07	10-year	1.73	262.68	263.22	262.94	263.23	0.001008	0.56	3.28	12.77	0.27
Coffey Creek	Reach1	600.1341 05.01.07	25-year	1.73	262.68	263.22	262.94	263.23	0.001008	0.56	3.28	12.77	0.27
Coffey Creek	Reach1	600.1341 05.01.07	50-year	4.53	262.68	263.48	263.13	263.51	0.001186	0.83	8.36	26.72	0.32
Coffey Creek	Reach1	600.1341 05.01.07	100-year	6.09	262.68	263.58	263.22	263.61	0.001218	0.93	11.36	31.74	0.33
Coffey Creek	Reach1	600.1341 05.01.07	350-year	11.42	262.68	263.86	263.45	263.9	0.001098	1.07	22.34	45.34	0.33
Coffey Creek	Reach1	600.1341 05.01.07	500-year	17.31	262.68	264.09	263.63	264.14	0.000971	1.15	33.3	47.4	0.32
Coffey Creek	Reach1	600.1341 05.01.07	Regional	68.43	262.68	266.96	264.28	266.97	0.000083	0.73	271.95	132.51	0.11
Coffey Creek	Reach1	600.1301 05.01.06	2-year	0.28	262.56	262.93	262.67	262.93	0.000187	0.17	1.62	6.34	0.11
Coffey Creek	Reach1	600.1301 05.01.06	5-year	0.83	262.56	263.05	262.76	263.06	0.00049	0.33	2.5	7.69	0.18
Coffey Creek	Reach1	600.1301 05.01.06	10-year	1.73	262.56	263.19	262.86	263.2	0.00065	0.47	5.25	38.53	0.22
Coffey Creek	Reach1	600.1301 05.01.06	25-year	1.73	262.56	263.19	262.86	263.2	0.00065	0.47	5.25	38.53	0.22
Coffey Creek	Reach1	600.1301 05.01.06	50-year	4.53	262.56	263.46	263.05	263.47	0.00048	0.53	18.8	72.98	0.2
Coffey Creek	Reach1	600.1301 05.01.06	100-year	6.09	262.56	263.57	263.2	263.58	0.000417	0.55	28.73	107.85	0.19
Coffey Creek	Reach1	600.1301 05.01.06	350-year	11.42	262.56	263.86	263.35	263.87	0.000253	0.52	65.24	132.51	0.16
Coffey Creek	Reach1	600.1301 05.01.06	500-year	17.31	262.56	264.11	263.45	264.11	0.000198	0.53	98.24	142.55	0.15
Coffey Creek	Reach1	600.1301 05.01.06	Regional	68.43	262.56	266.97	263.85	266.97	0.000016	0.32	561.07	194.8	0.05
Coffey Creek	Reach1	600.1245 05.01.05	2-year	0.28	262.56	262.93	262.71	262.93	0.000183	0.17	1.8	31.77	0.11
Coffey Creek	Reach1	600.1245 05.01.05	5-year	0.83	262.56	263.05	262.79	263.06	0.000422	0.32	2.83	47.38	0.17
Coffey Creek	Reach1	600.1245 05.01.05	10-year	1.73	262.56	263.18	262.87	263.19	0.000651	0.48	4.01	51.29	0.22
Coffey Creek	Reach1	600.1245 05.01.05	25-year	1.73	262.56	263.18	262.87	263.19	0.000651	0.48	4.01	51.29	0.22
Coffey Creek	Reach1	600.1245 05.01.05	50-year	4.53	262.56	263.43	263.04	263.46	0.001119	0.81	6.38	77.06	0.31
Coffey Creek	Reach1	600.1245 05.01.05	100-year	6.09	262.56	263.52	263.11	263.56	0.001341	0.96	7.3	85.14	0.35
Coffey Creek	Reach1	600.1245 05.01.05	350-year	11.42	262.56	263.75	263.32	263.84	0.001898	1.36	10.46	112.4	0.43
Coffey Creek	Reach1	600.1245 05.01.05	500-year	17.31	262.56	263.93	263.51	264.07	0.002434	1.71	13.7	122.34	0.5
Coffey Creek	Reach1	600.1245 05.01.05	Regional	68.43	262.56	266.97	264.39	266.97	0.000013	0.29	604.77	221.43	0.05
Coffey Creek	Reach1	600.1142 x-143 (05.01.04)		Bridge									
Coffey Creek	Reach1	600.1062 05.01.03	2-year	0.28	262.74	262.85	262.85	262.89	0.022063	0.81	0.34	42.03	0.96
Coffey Creek	Reach1	600.1062 05.01.03	5-year	0.83	262.74	262.92	262.92	263	0.021327	1.19	0.7	49.79	1.04
Coffey Creek	Reach1	600.1062 05.01.03	10-year	1.73	262.74	263.01	263.01	263.12	0.018115	1.44	1.2	57.95	1.02
Coffey Creek	Reach1	600.1062 05.01.03	25-year	1.73	262.74	263.01	263.01	263.12	0.018115	1.44	1.2	57.95	1.02
Coffey Creek	Reach1	600.1062 05.01.03	50-year	4.53	262.74	263.21	263.21	263.37	0.015543	1.77	2.56	76.15	1.02
Coffey Creek	Reach1	600.1062 05.01.03	100-year	6.09	262.74	263.29	263.29	263.47	0.01424	1.87	3.27	91.05	1
Coffey Creek	Reach1	600.1062 05.01.03	350-year	11.42	262.74	263.49	263.49	263.74	0.012202	2.22	5.26	117.22	0.98
Coffey Creek	Reach1	600.1062 05.01.03	500-year	17.31	262.74	263.67	263.67	263.96	0.009577	2.42	8.37	154.56	0.92
Coffey Creek	Reach1	600.1062 05.01.03	Regional	68.43	262.74	266.97	264.4	266.97	0.000008	0.22	716.45	235.45	0.04
Coffey Creek	Reach1	600.1004 05.01.02	2-year	0.28	262.53	262.11	261.88	262.11	0.000958		2.12	11.95	0
Coffey Creek	Reach1	600.1004 05.01.02	5-year	0.83	262.53	262.28	261.97	262.28	0.001141		4.88	20.9	0
Coffey Creek	Reach1	600.1004 05.01.02	10-year	1.73	262.53	262.42	262.05	262.42	0.001277		8.46	28.64	0
Coffey Creek	Reach1	600.1004 05.01.02	25-year	1.73	262.53	262.42	262.05	262.42	0.001277		8.46	28.64	0

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Project Name: Patterson Sideroad Bridges #1 & #2 and Duffy's Lane Bridge
Project No.: 300051839.7/8000
Watershed: Upper Humber River and Coffey Creek
River: Varies
Reach: Varies

BURNSIDE
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Proposed Condition HEC-RAS Hydraulic Output Summary

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Coffey Creek	Reach1	600.1004 05.01.02	50-year	4.53	262.53	262.68	262.18	262.68	0.001417	0.26	17.91	51.69	0.26
Coffey Creek	Reach1	600.1004 05.01.02	100-year	6.09	262.53	262.76	262.25	262.76	0.00137	0.33	22.77	63.73	0.27
Coffey Creek	Reach1	600.1004 05.01.02	350-year	11.42	262.53	262.99	262.37	263	0.001062	0.48	40.58	88.08	0.27
Coffey Creek	Reach1	600.1004 05.01.02	500-year	17.31	262.53	263.18	262.46	263.18	0.001039	0.62	60.01	118.4	0.28
Coffey Creek	Reach1	600.1004 05.01.02	Regional	68.43	262.53	266.97	262.91	266.97	0.000007	0.22	752.14	225.67	0.03
Coffey Creek	Reach1	600.000 05.01.01	2-year	0.28	261.75	261.89	261.86	261.9	0.007614	0.53	0.52	6.06	0.58
Coffey Creek	Reach1	600.000 05.01.01	5-year	0.83	261.75	261.94	261.93	261.99	0.015989	0.99	0.83	6.58	0.89
Coffey Creek	Reach1	600.000 05.01.01	10-year	1.73	261.75	262	262	262.1	0.018249	1.34	1.29	7.19	1.01
Coffey Creek	Reach1	600.000 05.01.01	25-year	1.73	261.75	262	262	262.1	0.018249	1.34	1.29	7.19	1.01
Coffey Creek	Reach1	600.000 05.01.01	50-year	4.53	261.75	262.17	262.17	262.33	0.015019	1.76	2.59	8.52	1
Coffey Creek	Reach1	600.000 05.01.01	100-year	6.09	261.75	262.24	262.24	262.43	0.013533	1.9	3.25	8.99	0.98
Coffey Creek	Reach1	600.000 05.01.01	350-year	11.42	261.75	262.44	262.44	262.71	0.012606	2.31	5.12	10.28	1
Coffey Creek	Reach1	600.000 05.01.01	500-year	17.31	261.75	262.69	262.69	262.93	0.00814	2.25	10.61	43.66	0.85
Coffey Creek	Reach1	600.000 05.01.01	Regional	68.43	261.75	266.97	263.27	266.97	0.000012	0.31	534.62	179.97	0.04
Coffey Creek	Reach1	599.9592 08.01.38	2-year	0.28	261.18	261.31	261.31	261.35	0.025212	0.88	0.32	4.19	1.03
Coffey Creek	Reach1	599.9592 08.01.38	5-year	0.83	261.18	261.43	261.39	261.47	0.009085	0.86	0.96	6.15	0.7
Coffey Creek	Reach1	599.9592 08.01.38	10-year	1.73	261.18	261.58	261.48	261.62	0.00434	0.87	1.99	7.21	0.53
Coffey Creek	Reach1	599.9592 08.01.38	25-year	1.73	261.18	261.58	261.48	261.62	0.00434	0.87	1.99	7.21	0.53
Coffey Creek	Reach1	599.9592 08.01.38	50-year	4.53	261.18	261.93	261.65	261.97	0.002176	0.93	4.85	9.24	0.41
Coffey Creek	Reach1	599.9592 08.01.38	100-year	6.09	261.18	262.07	261.73	262.12	0.001952	0.98	6.21	10.13	0.4
Coffey Creek	Reach1	599.9592 08.01.38	350-year	11.42	261.18	262.47	261.95	262.51	0.001134	0.96	19.76	79.42	0.32
Coffey Creek	Reach1	599.9592 08.01.38	500-year	17.31	261.18	262.73	262.13	262.76	0.000681	0.89	46.62	114.56	0.26
Coffey Creek	Reach1	599.9592 08.01.38	Regional	68.43	261.18	266.97	262.88	266.97	0.000005	0.21	784.5	219.07	0.03
Coffey Creek	Reach1	599.9497 08.01.37	2-year	0.28	261.12	261.28	261.22	261.29	0.002654	0.39	0.71	5.85	0.36
Coffey Creek	Reach1	599.9497 08.01.37	5-year	0.83	261.12	261.42	261.29	261.43	0.002155	0.53	1.55	6.86	0.36
Coffey Creek	Reach1	599.9497 08.01.37	10-year	1.73	261.12	261.58	261.37	261.6	0.001697	0.64	2.71	7.71	0.34
Coffey Creek	Reach1	599.9497 08.01.37	25-year	1.73	261.12	261.58	261.37	261.6	0.001697	0.64	2.71	7.71	0.34
Coffey Creek	Reach1	599.9497 08.01.37	50-year	4.53	261.12	261.93	261.55	261.96	0.001239	0.78	5.91	10.7	0.32
Coffey Creek	Reach1	599.9497 08.01.37	100-year	6.09	261.12	262.07	261.62	262.1	0.001101	0.83	7.5	11.56	0.31
Coffey Creek	Reach1	599.9497 08.01.37	350-year	11.42	261.12	262.48	261.85	262.49	0.000366	0.64	27.33	98.85	0.19
Coffey Creek	Reach1	599.9497 08.01.37	500-year	17.31	261.12	262.74	262.03	262.75	0.000147	0.47	56.73	134.68	0.13
Coffey Creek	Reach1	599.9497 08.01.37	Regional	68.43	261.12	266.97	262.64	266.97	0.000001	0.07	1069.59	274.99	0.01
Coffey Creek	Reach1	599.9415 x-115 (08.01.36)		Bridge									
Coffey Creek	Reach1	599.9346 08.01.35	2-year	0.28	261.06	261.21	261.18	261.23	0.008356	0.63	0.44	4.23	0.62
Coffey Creek	Reach1	599.9346 08.01.35	5-year	0.83	261.06	261.37	261.26	261.39	0.003275	0.64	1.33	7.37	0.44
Coffey Creek	Reach1	599.9346 08.01.35	10-year	1.73	261.06	261.55	261.36	261.57	0.001784	0.69	3	17.4	0.36
Coffey Creek	Reach1	599.9346 08.01.35	25-year	1.73	261.06	261.55	261.36	261.57	0.001784	0.69	3	17.4	0.36
Coffey Creek	Reach1	599.9346 08.01.35	50-year	4.53	261.06	261.91	261.54	261.93	0.001015	0.81	8.19	122.69	0.3
Coffey Creek	Reach1	599.9346 08.01.35	100-year	6.09	261.06	262.05	261.63	262.08	0.000949	0.88	10.6	147.27	0.3
Coffey Creek	Reach1	599.9346 08.01.35	350-year	11.42	261.06	262.42	261.82	262.42	0.000137	0.42	75.65	165.42	0.12
Coffey Creek	Reach1	599.9346 08.01.35	500-year	17.31	261.06	262.68	262	262.69	0.00011	0.43	115.28	167.25	0.11
Coffey Creek	Reach1	599.9346 08.01.35	Regional	68.43	261.06	266.97	262.41	266.97	0.000001	0.12	1318.94	307.43	0.02
Coffey Creek	Reach1	599.9304 08.01.34	2-year	0.28	261.06	261.21	261.1	261.21	0.000168	0.11	5.99	54.09	0.09
Coffey Creek	Reach1	599.9304 08.01.34	5-year	0.83	261.06	261.38	261.13	261.38	0.000077	0.12	15.65	62.06	0.07
Coffey Creek	Reach1	599.9304 08.01.34	10-year	1.73	261.06	261.56	261.15	261.56	0.000063	0.15	28.72	84	0.07
Coffey Creek	Reach1	599.9304 08.01.34	25-year	1.73	261.06	261.56	261.15	261.56	0.000063	0.15	28.72	84	0.07
Coffey Creek	Reach1	599.9304 08.01.34	50-year	4.53	261.06	261.92	261.22	261.92	0.000046	0.19	71.6	156.73	0.07
Coffey Creek	Reach1	599.9304 08.01.34	100-year	6.09	261.06	262.06	261.25	262.06	0.000042	0.2	95.27	172.97	0.06
Coffey Creek	Reach1	599.9304 08.01.34	350-year	11.42	261.06	262.42	261.32	262.42	0.000032	0.21	160.13	185.32	0.06
Coffey Creek	Reach1	599.9304 08.01.34	500-year	17.31	261.06	262.68	261.38	262.68	0.000032	0.24	209.14	188.5	0.06
Coffey Creek	Reach1	599.9304 08.01.34	Regional	68.43	261.06	266.97	261.76	266.97	0.000001	0.11	1460.7	329.81	0.01

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Appendix B

Digital Modelling Files

DRAFT

CULTURAL HERITAGE EVALUATION REPORT

PATTERSON SIDE ROAD BRIDGE NUMBER 1 (STRUCTURE ID B22162016) AND PATTERSON SIDE ROAD BRIDGE NUMBER 2 (STRUCTURE ID B22164017) PATTERSON SIDE ROAD OVER THE HUMBER RIVER

AND

DUFFY'S LANE BRIDGE (STRUCTURE ID B22072010) DUFFY'S LANE OVER THE HUMBER RIVER

TOWN OF CALEDON
REGION OF PEEL, ONTARIO

FINAL REPORT

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ASI File: 20CH-115

January 2021 (Revised February 2021)

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CULTURAL HERITAGE EVALUATION REPORT

PATTERSON SIDE ROAD BRIDGE NUMBER 1 (STRUCTURE ID B22162016) AND
PATTERSON SIDE ROAD BRIDGE NUMBER 2 (STRUCTURE ID B22164017)
PATTERSON SIDE ROAD OVER THE HUMBER RIVER
AND
DUFFY'S LANE BRIDGE (STRUCTURE ID B22072010)
DUFFY'S LANE OVER THE HUMBER RIVER

TOWN OF CALEDON
REGION OF PEEL, ONTARIO

EXECUTIVE SUMMARY

ASI was contracted by R.J. Burnside & Associates Limited, on behalf of the Town of Caledon, to prepare a Cultural Heritage Evaluation Report (CHER) for three bridges located at the intersection of Patterson Side Road and Duffy's Lane as part of multiple Municipal Class Environmental Assessments followed by Detailed Design for the Town's bridges and culverts. The Town of Caledon is undertaking a comprehensive assessment of all asset categories so as to formulate an Asset Management Strategy to manage the wide range of assets that need repair and rehabilitation. One key category is the Town's inventory of 139 bridges and culverts. Three bridges are evaluated in this report: Patterson Side Road Bridge Number 1, Structure ID B22162016 (Bridge No. 1); Patterson Side Road Bridge Number 2, Structure ID B22162016 (Bridge No. 2); and Duffy's Lane Bridge, Structure ID B22072010.

Bridge No. 1 is a single span cast-in-place concrete slab structure supported by concrete beams, built in 1950, that is located approximately 0.1 km west of Duffy's Lane; Bridge No. 2 is a single span cast-in-place rigid frame concrete structure, built in 1956, that is located approximately 0.03 km east of Duffy's Lane; and the Duffy's Lane Bridge is a single span cast-in-place rigid frame concrete structure, built in 1957, that is located 0.03 km south of the intersection with Patterson Side Road. All three of the subject bridges carry their respective roadways over the Humber River in the Town of Caledon, Ontario. The subject bridges are not identified as a heritage structures by the Town of Caledon and thus are not designated under Part IV of the *Ontario Heritage Act,* and are not currently on the *Ontario Heritage Bridge List*. The Humber River is a Canadian Heritage River System. This CHER is intended to evaluate the cultural heritage value of the subject bridges based on the evaluation criteria set under Ontario Regulation (O. Reg.) 9/06 of the *Ontario Heritage Act*.

This report includes an evaluation of the cultural heritage value of each bridge as determined by the criteria in O. Reg. 9/06. This evaluation determined that Bridge No. 1 and Bridge No. 2 did not meet the criteria outlined in O. Reg. 9/06. The evaluation for Duffy's Lane Bridge determined that the structure has design and physical value as well as contextual value.

The following recommendations are proposed for all three bridges:

1. This report should be submitted by the proponent to heritage staff at the Town of Caledon and with the Ministry of Heritage, Tourism, Sport and Cultural Industries for review.

The following recommendations are proposed for the Duffy's Lane Bridge:

1. A Heritage Impact Assessment should be completed for the Duffy's Lane Bridge prior to construction, as early as possible during detailed design. This assessment should be completed by a qualified person who has relevant and recent experience in the conservation of road bridges (see Section 3.0 of the Standards and Guidelines for Conservation of Provincial Heritage Properties [MHSTCI 2014] as a guide for best practice) and submitted to heritage staff at the Town of Caledon for review and approval.

PROJECT PERSONNEL

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1.0 INTRODUCTION

ASI was contracted by R.J. Burnside & Associates Limited, on behalf of the Town of Caledon, to prepare a Cultural Heritage Evaluation Report (CHER) for three bridges located at the intersection of Patterson Side Road and Duffy's Lane as part of multiple Municipal Class Environmental Assessments followed by Detailed Design for the Town's bridges and culverts. The Town of Caledon is undertaking a comprehensive assessment of all asset categories so as to formulate an Asset Management Strategy to manage the wide range of assets that need repair and rehabilitation. One key category is the Town's inventory of 139 bridges and culverts. Three bridges are evaluated in this report: Patterson Side Road Bridge Number 1, Structure ID B22162016 (Bridge No. 1); Patterson Side Road Bridge Number 2, Structure ID B22162016 (Bridge No. 2); and Duffy's Lane Bridge, Structure ID B22072010. Bridge No. 1 is located approximately 0.1 km west of Duffy's Lane, Bridge No. 2 is located approximately 0.03 km east of Duffy's Lane, and the Duffy's Lane Bridge is located 0.03 km south of the intersection with Patterson Side Road. All three of the subject bridges carry their respective roadways over the Humber River in the Town of Caledon, Ontario. The subject bridges are not identified as a heritage structures by the Town of Caledon and thus are not designated under Part IV of the *Ontario Heritage Act,* and are not currently on the *Ontario Heritage Bridge List*. This CHER is intended to evaluate the cultural heritage value of the subject bridges based on the evaluation criteria set under Ontario Regulation (O. Reg.) 9/06 of the *Ontario Heritage Act*.

The Bridge No. 1 is a single span cast-in-place concrete slab structure supported by concrete beams with a northeast-southwest orientation that carries two lanes of vehicular traffic over a small branch of the Humber River. Bridge No. 1 is located approximately 0.1 km west of the intersection of Patterson Side Road and Duffy's Lane. According to Ontario Structure Inspection Manual (OSIM) report, this bridge was constructed in 1950. The bridge measures 7.15 m long and has an overall width of 7.34 m (Town of Caledon 2019a). The structure was built following undated designs drawn by J. H. Beatty, an engineer based in Orangeville. The bridge has not been identified as a heritage bridge in the Ontario Heritage Bridge inventory and does not currently have any status under the *Ontario Heritage Act*.

The Bridge No. 2 is a single span cast-in-place rigid frame concrete structure with a northeast-southwest orientation that carries two lanes of vehicular traffic over a branch of the Humber River. Bridge No. 2 is located to the east of Bridge No. 1. Constructed in 1956 by Lloyd P. Finnegan Construction Co. based on designs by Duncan Hopper & Associates, Consulting Engineers, the bridge measures 14.51 m long and has an overall width of 8.47 m (Town of Caledon 2019b). The bridge has not been identified as a heritage bridge in the Ontario Heritage Bridge inventory and does not currently have any status under the *Ontario Heritage Act*.

The Duffy's Lane Bridge is a single span cast-in-place rigid frame concrete structure with a northwest-southeast orientation that carries carries two lanes of vehicular traffic over a branch of the Humber River. Duffy's Lane Bridge is located along Duffy's Lane to the south of Patterson Side Road. The OSIM report notes that the bridge was consturcted in 1950 however an examination of original bridge drawings and Town records revealed the structure to have been constructed in 1957 by J. M. Fuller Ltd. based on designs by Duncan Hopper & Associates, Consulting Engineers. The bridge measures 10.6 m long and has an overall width of 8.9 m (Town of Caledon 2019c). The bridge has not been identified as a heritage bridge in the Ontario Heritage Bridge inventory and does not currently have any status under the *Ontario Heritage Act*.



Figure 1: Location of the study area

Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)

As these structures were constructed prior to 1956 and/or span a Canadian Heritage River Watershed, a CHER is required to determine if the bridges retain cultural heritage value (Municipal Engineers Association 2014). Research was completed to investigate, document, and evaluate the cultural heritage value of the subject bridges. The CHER was conducted by Johanna Kelly, with field work completed by Meredith Stewart, under the senior project management of Annie Veilleux, all of ASI.

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;
- Provide detailed research outlining a historical overview of the design and construction of the bridge within the broader context of the surrounding township and bridge construction generally; and
- Evaluate the bridge using *O. Reg. 9/06*, *Criteria for Determining Cultural Heritage Value or Interest*, of the *Ontario Heritage Act* and the Ontario Heritage Bridge Guidelines and draw conclusions about the cultural heritage value or interest of the structure.

The information contained in this report is organized in such a way to inform the evaluation of the subject bridge against criteria outlined in *O. Reg. 9/06*. These criteria are divided into three sections: Historical and Associative Value, Design and Physical Value, and Contextual Value.

1.1 Location and Study Area Description

A field review was undertaken by Meredith Stewart, Cultural Heritage Technician, ASI, on October 22, 2020 to conduct photographic documentation of the Patterson Side Road bridge crossings from the existing right-of-way and to collect data relevant for completing a heritage evaluation of the structure. A second field visit was conducted by Meredith Stewart on November 24, 2020 to photograph the Duffy's Lane Bridge. Photographic plates illustrating the conditions of each bridge are available in Appendix A (Bridge No. 1), Appendix B (Bridge No. 2), and Appendix C (Duffy's Lane Bridge).

Bridge No. 1 and Bridge No. 2 are located approximately 150 m from each other, on Patterson Side Road, on either side of Duffy's Lane. The Duffy's Lane bridge is located just southeast of this intersection (Figure 2). The bridges are surrounded by natural vegetation. All three bridges are currently owned and maintained by the Town of Caledon. The Toronto Region Conservation Authority (TRCA) property at 16500 Highway 50 is Listed on the Town of Caledon's Heritage Register and is adjacent to Bridge No. 1 and Duffy's Lane Bridge, located in part at the south corner of Patterson Side Road and Duffy's Lane. It was noted that because of the expansive nature of this property its cultural heritage resources and/or attributes are not in the vicinity of Patterson Side Road (S. Drummond, email communication, 28 October 2020). Worthy of note are the stone culvert located to the northwest of Bridge No. 1 along the Caledon Trailway Path, designated under Part IV of the *Ontario Heritage Act* (By-law 96-31) and the bridge carrying the Caledon Trailway Path over Duffy's Lane to the northwest of the intersection of Patterson Side Road and Duffy's Lane, which is Listed on the Town of Caledon's Heritage Register (S. Drummond, email communication, 28 October 2020). While both structures are in close proximity to all three subject bridges, neither are directly adjacent. All three bridges cross branches of the Humber River, which is designated as a Canadian Heritage River System (Canadian Heritage Rivers System n.d.).

According to the 2019 inspection report, Bridge No. 1 carries two lanes of motor traffic across a total deck length of 7.15 m (Town of Caledon 2019a). The deck has a travel width of 6.29 m with an overall structure width of 7.34 m. The OSIM report indicates the posted speed limit is 60 km/hr (Town of Caledon 2019a). Bridge No. 2 carries two lanes of motor traffic across a total deck length of 14.51 m (Town of Caledon 2019b). The deck has a travel width of 7.83 m with an overall structure width of 8.47 m. The OSIM report indicates the posted speed limit is 60 km/hr (Town of Caledon 2019b). The Duffy's Lane Bridge carries two lanes of motor traffic across a total deck length of 10.6 m (Town of Caledon 2019c). The deck has a travel width of 7.4 m with an overall structure width of 8.9 m. The OSIM report indicates that the posted speed limit is 60 km/hr (Town of Caledon 2019c).



Figure 2: Aerial photo. The subject bridges are depicted in red

Base Map: Google

The superstructure of Bridge No. 1 consists of a single-span cast-in-place concrete T-beam and slab (Figure 3). The deck structure consists of a cast-in-place concrete slab with an asphalt wearing surface. The deck slab is integrated with and supported by longitudinal concrete T-beams, reinforced with twisted steel rods. The abutments and wingwalls are cast-in-place concrete. The bridge includes a barrier system consisting of wooden posts with steel jackets and flexbeam guard railings. The east and west approaches consist of cast-in-place concrete slabs, an asphalt wearing surface, with galvanized steel posts and flexbeam guiderails.



Figure 3: Patterson Side Road Bridge No. 1 (ASI 2020)

The superstructure of Bridge No. 2 consists of a single-span cast-in-place concrete rigid frame structure (Figure 4). The deck structure consists of a reinforced cast-in-place concrete deck with an asphalt wearing surface. The abutments and wingwalls are cast-in-place concrete and form the legs of the deck system. The bridge includes a concrete and steel barrier system consisting of cast-in-place concrete parapet walls with steel hand railings. The east and west approaches consist of cast-in-place concrete slabs, an asphalt wearing surface, with galvanized steel posts and flexbeam guiderails.



Figure 4: Patterson Side Road Bridge No. 2 (ASI 2020)

The superstructure of Duffy's Lane Bridge a single-span cast-in-place concrete rigid frame structure (Figure 5). The deck structure consists of a reinforced cast-in-place concrete deck with an asphalt wearing surface. The abutments and wingwalls are cast-in-place concrete and form the legs of the deck system. The bridge includes a concrete and steel barrier system consisting of cast-in-place concrete posts with a welded steel barrier consisting of top and bottom rails with diagonal balusters welded between, in a zig-zag pattern. The west approach consists of cast-in-place concrete slabs, an asphalt wearing surface, with galvanized steel posts and flexbeam guiderails. The railing at the northeast corner of the intersection of Duffy's Lane and Patterson Side Road connects the approach guardrail for Duffy's Lane Bridge and Bridge No. 2. The east approach consists of an asphalt wearing surface with no barrier system.



Figure 5: Duffy's Lane Bridge (ASI 2020)

1.2 Policy Framework

The authority to request this CHER arises from the *Ontario Heritage Act* (1990), *Environmental Assessment Act* (1990), the Town of Caledon Official Plan (2018a), and the Region of Peel Official Plan (2018).

The following resources were among those reviewed in the preparation of this CHER:

- *Environmental Assessment Act* (Ministry of the Environment 1990)
    - *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (MHSTCI 1992)
    - *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (MHSTCI 1980)
    - *Municipal Heritage Bridges: Cultural, Heritage and Archaeological Resources Assessment Checklist* (Municipal Engineers Association 2014)
- *Ontario Heritage Act* (MHSTCI 1990) and the following documents prepared by the Ministry of Tourism and Culture (MTC), now administered by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI):
    - The *Ontario Heritage Toolkit* (MHSTCI 2006) provides a guide on how to evaluate heritage properties that are subject to or are being considered for municipal designation and/or listing under sections 27, 29, or 41 of the *Ontario Heritage Act*
    - *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (MHSTCI 2016)
- Ministry of Transportation's (MTO) *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges* (2008)

1.3 Cultural Heritage Evaluation Process

The purpose of the CHER is to examine a property as whole, its relationship to surrounding landscapes, and its individual elements. Conducting archival research and site visits inform such an examination. Background information is gathered from heritage stakeholders where available, local archives, land registry offices, local history collections at public libraries, and the MHSTCI when appropriate. Once background data collection is complete, a site visit is carried out to conduct photographic documentation and site analysis. These components provide a means to soundly establish the resource's cultural heritage value.

The scope of a CHER is guided by the *Ontario Heritage Toolkit* (Ministry of Tourism, Culture and Sport 2006, now administered by the Ministry of Heritage, Sport, Tourism and Culture Industries). Generally, CHERs include the following components:

- A general description of the history of a 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 structure, and character-defining details;
- A cultural heritage resource evaluation guided by the *Ontario Heritage Act* criteria;
- A summary of heritage attributes;
- Historical mapping and photographs; and
- A location plan.

Using background information and data collected during the site visit, the property is evaluated using criteria contained within O. Reg. 9/06 of the *Ontario Heritage Act*. The criteria are 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 structure meet one or more of the above-mentioned criteria, a Heritage Impact Assessment (HIA) is required.

When evaluating the cultural heritage significance of the subject bridge, the *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges* (OHGB) (Ministry of Culture and Ministry of Transportation, Ontario (MTO) 2008) and the *Ontario Heritage Bridge Program* (MHSTCI 1991) were consulted as points of reference.

The OHBG provides rationale for the protection and preservation of heritage bridges and is described as follows (MTO 2008:5-6):

> Bridges are important parts of our engineering and architectural heritage. Perhaps more than any other type of structure built by man, they exhibit major historical change and innovation in the development and use of materials, in design, and in construction

> methods. They can be viewed as important elements and make a positive contribution to their surroundings. In some cases, they are rare survivors of an important bridge type or are revered because of their age, historical associations or other publicly perceived values.

Additionally, during the site visit and as part of the evaluation process, attention is paid to surrounding cultural heritage resources that are situated in close proximity to the bridge. The identification of cultural heritage resources within the study area is based on the following definitions and concepts:

> *Built heritage resources* mean one or more buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic, or military history, identified as being important to a community, or reflective of contextual values.
>
> *Cultural heritage landscapes* mean a defined geographical area of heritage significance that has been modified by human activities. Such an area is valued by a community and is of significance to the understanding of the history of a people or place.

The term "significant" in the context of cultural heritage and archaeology resources refers to those that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people.

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.

1.4 Project Consultation

The following organizations, websites, online heritage documents, and online heritage mapping tools were consulted to confirm the existing or potential cultural heritage value of the subject bridges and to request additional information generally:[1]

- Caledon Heritage Register (Town of Caledon 2019d);
- The Town of Caledon Cultural Heritage Landscape Inventory (Scheinman 2009);
- The *Ontario Heritage Act Register* (Ontario Heritage Trust n.d.);
- The inventory of Ontario Heritage Trust easements (Ontario Heritage Trust n.d.);
- The *Places of Worship Inventory* (Ontario Heritage Trust n.d.);
- The Ontario Heritage Trust's *Ontario Heritage Plaque Database* (Ontario Heritage Trust n.d.);
- *Ontario's Historical Plaques* website (Brown 2019);
- Database of known cemeteries/burial sites curated by the Ontario Genealogical Society (Ontario Genealogical Society n.d.);
- Parks Canada's *Canada's Historic Places* website (Parks Canada n.d.);
- Parks Canada's *Directory of Federal Heritage Designations* (Parks Canada n.d.);

[1] Reviewed 15 October 2020 and 1 December 2020

- Canadian Heritage River System (Canadian Heritage Rivers Board and Technical Planning Committee n.d.);
- United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites (UNESCO World Heritage Centre n.d.).

The following stakeholders and archives were contacted with inquiries regarding the heritage status and for information concerning all three bridges and any additional adjacent cultural heritage resources (Table 1).

Table 1: Results of Stakeholder Consultation

Contact	Organization	Date(s) of Communications	Description of Information Received
Sally Drummond, Heritage Resource Officer	Town of Caledon	21, 28, and 30 October and 9 December 2020	A response confirmed the non-heritage status of the Patterson Side Road bridges and provided information on adjacent TRCA Albion Hills Conservation Area, culverts along the former railway to the northwest, and the historical community of Palgrave. No response was received specifically regarding the heritage status Duffy's Lane Bridge however it was noted in earlier correspondence that the Duffy's Lane Bridge is the most striking of the three.
Karla Barboza, (A) Team Lead, Heritage	Ministry of Heritage, Sport, Tourism, and Culture Industries	21 and 28 October 2020	Response received. Confirmed that there are no properties designated by the Minister and no provincial heritage properties adjacent to the bridges. No concerns regarding the bridges were noted.
Kevin DeMille, Natural Heritage Coordinator	Ontario Heritage Trust	21 October and 4 November 2020	A response confirmed that the Ontario Heritage Trust does not have any conservation easements relating to the bridges and there are no Trust-owned properties adjacent.
Kyle Neill, Senior Archivist	Peel Art Galley, Museum + Archives (PAMA)	21-23, 26, 30 October and 9 and 10 December 2020	Provided digital copies of archival materials relating to the bridges and history of Palgrave.
Reference inbox	Archives of Ontario	21 October and 4 November 2020	A response indicated that any archival material that is not digitized is unavailable.

2.0 HISTORICAL AND ASSOCIATIVE RESEARCH

A review of available primary and secondary source material was undertaken to produce a historical overview of the study area, including a general description of Indigenous and Euro-Canadian settlement and land-use and transportation history. In addition, a review of the contractors and engineers involved in the construction of the subject bridges is also presented in this section. The following section provides the results of this research.

2.1 Overview of Indigenous Land Use

Southern Ontario has a cultural history that begins approximately 11,000 years ago. The land now encompassed by the Town of Caledon has a cultural history which begins approximately 10,000 years ago and continues to the present. Table 2 provides a general summary of the history of Indigenous land use and settlement of the area.[2]

Table 2: Outline of Southern Ontario Indigenous History and Lifeways

Period	Archaeological/ Material Culture	Date Range	Lifeways/ Attributes
PALEO-INDIAN PERIOD			
Early	Gainey, Barnes, Crowfield	9000-8500 BCE	Big game hunters
Late	Holcombe, Hi-Lo, lanceolate	8500-7500 BCE	Small nomadic groups
ARCHAIC			
Early	Nettling, Bifurcate-base	7800-6000 BCE	Nomadic hunters and gatherers
Middle	Kirk, Stanley, Brewerton, Laurentian	6000-2000 BCE	Transition to territorial settlements
Late	Lamoka, Genesee, Crawford Knoll, Innes	2500-500 BCE	Polished/ground stone tools (small stemmed)
WOODLAND PERIOD			
Early	Meadowood	800-400 BCE	Introduction of pottery
Middle	Point Peninsula, Saugeen	400 BCE-CE 800	Incipient horticulture
Late	Algonkian, Iroquoian	CE 800-1300	Transition to village life and agriculture
	Algonkian, Iroquoian	CE 1300-1400	Establishment of large palisaded villages
	Algonkian, Iroquoian	CE 1400-1600	Tribal differentiation and warfare
POST-CONTACT PERIOD			
Early	Huron, Neutral, Petun, Odawa, Ojibwa	CE 1600-1650	Tribal displacements
Late	Six Nations Iroquois, Ojibwa	CE 1650-1800's	
	Euro-Canadian	CE 1800-present	European settlement

The subject bridges are located within Treaty 19, the Ajetance Purchase, signed in 1818 between the Crown and the Mississaugas (Crown-Indigenous Relations and Northern Affairs 2016).
The Ajetance purchase, or Treaty #19, included 648,000 acres of land occupying portions of present-day Halton and Peel Region as well as Dufferin and Wellington County. This area was the last large tract of land ceded by the Mississaugas of the Credit First Nation, following the settlement of the Head of the Lake purchase (Treaty #14) in 1806, and is also surrounded by Treaty #3 (1784/1792) to the west, Treaty #13 (1788/1805) to the east, and Treaty #18 (1818) to the north (Government of Canada 2016). By 1818, the Mississaugas were experiencing a rapid decline in population due to increased encroachment by settlers, and declining resources and the area to the north had just been ceded by Chippewa nations (Mississaugas of the Credit First Nation 2017a).

[2] While many types of information can inform the precontact settlement of Town of Caledon, this summary table provides information drawn from archaeological research conducted in southern Ontario over the last century. As such, the terminology used in this review related to standard archaeological terminology for the province rather than relating to specific historical events within the region. The chronological ordering of this summary is made with respect to two temporal referents: BCE – before Common Era and CE – Common Era.

On October 23, 1818, Deputy Superintendent William Claus met with Chief Ajetance and other delegates of the Missisaugas of the Credit First Nation to negotiate the sale of this tract of land. The payment offered for this land consisted of the yearly sum of £522 and 10 shillings in goods annually. By 1820, the Mississaugas of the Credit negotiated the sale of the remainder of their lands except for a 200-acre parcel near the mouth of the Credit River (Surtees 1984; Mississaugas of the Credit First Nation 2017b).

The Ajetance Purchase is also significant due to its relationship to the Haldimand Tract. On October 25, 1784, the Governor of Quebec Sir Frederick Haldimand signed a proclamation that allotted land six miles (10 km) on either side of the Grand River to the Six Nations People for their assistance during the American revolutionary war (Filice 2018; Surtees 1984). Upon review of the Haldimand Proclamation, however, politician and Indian Department official Sir John Johnson noted an error involving the location of the northern boundary of the tract. Governor Haldimand had mistakenly assumed in 1784 that the headwaters of the Grand River resided within the area negotiated under Treaty #3. However, the headwaters of the Grand River extend to the present-day community of Dundalk, Ontario, in Grey County, which was not negotiated until 1818 under Treaty #18. Additionally, the northern reach of the Grand River crosses through the northwestern corner of the Ajetance Purchase lands in Dufferin and Wellington County (Crown-Indigenous Relations and Northern Affairs 2016; Surtees 1984; Filice 2018). Due to this inconsistency, the northern boundaries of the Haldimand Tract were redefined in 1793 under Treaty #4 to end at Jones Base Line in Fergus, Ontario – at the boundary of Treaty #3 and Treaty #19. This decision to end the Haldimand tract within Treaty #3 lands rather than continuing the tract up to the headwaters of the Grand River is still disputed by Six Nations of the Grand River and the community continues to contest the redefined territory with the Government of Canada (Filice 2018).

2.2 Township and Settlement History

Historically, the subject bridges are located in the former Township of Albion, Regional Municipality of Peel. Bridge No. 1 is located on the border between Lots 25 and 26 in Concession 5, Bridge No. 2 is located at the intersection of Lots 25 and 26, Concession 5 and 6, and Duffy's Lane Bridge is located on the border between Lots 25, Concession 5 and 6. The bridges are located to the southwest of the historical Village of Palgrave and to the east of the former Hamilton and Northwestern Railway line.

2.2.1 Township of Albion

In 1788, the County of Peel was part of the extensive district known as the "Nassau District". Later called the "Home District", its administrative centre was located in Newark, now called Niagara. After the province of Quebec was divided into Upper and Lower Canada in 1792, the Province was separated into nineteen counties, and by 1852, the entire institution of districts was abolished and the late Home Districts were represented by the Counties of York, Ontario and Peel. Shortly after, the County of Ontario became a separate county, and the question of separation became popular in Peel. A vote for independence was taken in 1866, and in 1867 the village of Brampton was chosen as the capital of the new county.

The land within Albion Township was acquired by the British from the Mississaugas in 1818. The first township survey was undertaken in 1819, by surveyor James G. Chewett, and the first legal settlers

occupied their land holdings in the same year. Eleven concessions comprised the township and were laid out west to east. Early settlement and development in the area is attributed to the emergence of water-power mill sites located near the Humber River, which ran through the whole length of the township. Albion was initially settled by the children of Loyalists, soldiers who had served during the War of 1812, and by immigrants from England, Scotland and Ireland. In 1821 the population of the entire township totalled 110 and by 1848, the population had increased to 3,567. By the 1840s, the township was noted for its good farms. The census of 1871 records that the population of the Township of Albion had reached 4,857 (Smith 1846; Armstrong 1985; Rayburn 1997; Pope 1877).

The Township of Albion remained a part of the County of Peel until 1973. In 1974, the Township of Albion became a part of the Town of Caledon (Ministry of Municipal Affairs and Housing 2018).

2.2.2 Village of Palgrave

Access to the northeastern portion of Albion Township was difficult during the years soon after it was surveyed, with access made difficult by the hilly terrain and dense forestation. Palgrave is one of the last villages to develop as a settlement centre in Albion for these reasons. Originally known as 'Buckstown, after 'Buck' Dolan, the inn keeper of a log hotel built in 1846 by John Boyle, the postal authorities named the village Palgrave in 1869. Two sources of this name are put forth, suggesting the village was possibly named for Francis Turner Palgrave, an English poet and professor, or possibly after Sir Robert Palgrave, a prominent English politician at the time (Morrison 2011; McLean and Mundy 2005).

The Hamilton and Northwestern Railway was extended through the area in 1877 and quickly contributed to the economic growth of Palgrave. The population doubled a year after the railways arrival. Businesses opened around this time include a new hotel, stores, a grain elevator, stockyard, and potato grading station. Lumbering was a key driver of the local economy in the late 1800s in thanks to the densely forested land and the operation of the mill and railway. Palgrave Station became a trans-shipment point for farmers shipping grain to markets in Hamilton and Toronto (Morrison 2011). The Hamilton and Northwestern Railway Company was absorbed by the Grand Trunk Railway in 1888 and later absorbed by the Canadian National Railway. Today the former rail corridor serves residents as the Caledon Trailway Path (Ontario Trails Council 2020).

Renowned Canadian landscape painter, David B. Milne (1882-1953), resided in the Village between 1929 and 1932 and depicted Palgrave in much of his work (Morrison 2011; N.A. 2020). With a population of 190 in 1971, Palgrave was one of the larger centres in Albion Township well into the late twentieth century (Roulston 1978).

Patterson Side Road was named after a longstanding local family from the north half of Albion Township (S. Drummond, email communication, 28 October 2020).

2.2.3 The Hamilton and North Western Railway

The Hamilton and North Western Railway (H&NW) was formed in 1872. Construction began in 1877 and by late that year had reached Barrie and by mid-1879, Collingwood. Due to economic recession and railway politics, the H&NW merged with the Northern Railway of Canada to form the Northern &

Northwestern Railway. The Northern & Northwestern Railway was acquired by the Grand Trunk Railway in 1888, which eventually became part of the Canadian National Railway in 1923 (Cooper 2001). The rails adjacent to the subject bridges were removed in 1986 and the Town purchased the line in 1989.

The Caledon Trailway Path was constructed in 1994, after being purchased by the Town of Caledon to convert a 35 kilometre section of the former H&NW corridor into a gravel multi-use trailway from Winston Churchill Boulevard north of King Street in Terra Cotta, through Caledon East, to Mill Street west of Queen Street in Tottenham. The Caledon Trailway became the first designated portion of the Trans Canada Trail, re-named to the Great Trail (Town of Caledon 2018b).

2.2.4 Review of Nineteenth and Twentieth-Century Mapping

Historically, the subject bridges are located in the former Township of Albion, Regional Municipality of Peel. Bridge No. 1 is located on the border between Lots 25 and 26 in Concession 5, Bridge No. 2 is located at the intersection of Lots 25 and 26, Concession 5 and 6, and Duffy's Lane Bridge is located on the border between Lots 25, Concession 5 and 6.

The 1877 *Illustrated Historical Atlas of the County of Peel* (Walker and Miles 1877) was examined to determine the presence of historical features within the study area during the nineteenth century (Figure 6).

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases. For instance, they were often financed by subscription limiting the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases. The use of historical map sources to reconstruct or predict the location of former features within the modern landscape generally begins by using common reference points between the various sources. The historical maps are geo-referenced to provide the most accurate determination of the location of any property on a modern map. The results of this exercise can be often imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including differences of scale and resolution, and distortions introduced by reproduction of the sources.

Nineteenth century mapping indicates that Patterson Side Road and Duffy's Lane were present, in their current alignment, by the late nineteenth-century (Figure 6). The two branches of the Humber River are also illustrated, suggesting that bridges would have been present at this time to carry the roadways over the watercourses, though none are shown specifically. The Hamilton and Northwestern Railway is illustrated extending in an approximately north-south orientation to the north and west of the subject bridges. Farmsteads are illustrated on surrounding properties, suggesting that much of the land around the bridges are agricultural in nature.

In addition to nineteenth-century mapping, historical topographic mapping and aerial photographs from the twentieth century were examined. This report presents maps and aerial photographs from 1926, 1954, 1968, and 1994 (Figure 7 to Figure 10). These do not represent the full range of maps consulted for the purpose of this study but were judged to cover the full range of land uses that occurred in the area during this period.

Early twentieth century mapping suggest the area surrounding the bridges remained rural and agricultural in nature into the twentieth century. Farmsteads, orchards, and natural waterway vegetation is illustrated around the intersection of Patterson Side Road and Duffy's Lane (Figure 7). Both Patterson Side Road and Duffy's Lane are shown to be unmetalled (unpaved) roads in 1926. Bridges are depicted carrying Patterson Side Road and Duffy's Lane over the Humber River tributaries in the locations of the subject bridges but are unlabelled as to type or material. The rail corridor located to the north and west of the subject bridges is operated by the Canadian National Railways as the Hamilton, Beeton, and Allandale Branch at this time. Few changes are seen through the twentieth century. Aerial photography from the mid-twentieth century shows the bridges in much the same context, surrounded by agricultural and natural lands (Figure 8). Natural vegetation can be seen following the river courses. Detail of the bridges themselves are not visible. Topographic mapping from 1968 show Patterson Side Road and Duffy's Lane are both indicated as "loose surface, dry weather roads consisting of 2 lanes or more" (Figure 9). The surrounding context continues to be mostly agricultural and natural. The bridges are not labelled as to material or type. Topographic mapping from 1994 shows the boundary of Albion Hills Conservation Area along Patterson Side Road to the southeast of the subject bridges (Figure 10). Patterson Side Road is illustrated as a hard surface road consisting of 2 or more lanes. The subject bridges are illustrated but unlabelled as to type or material.

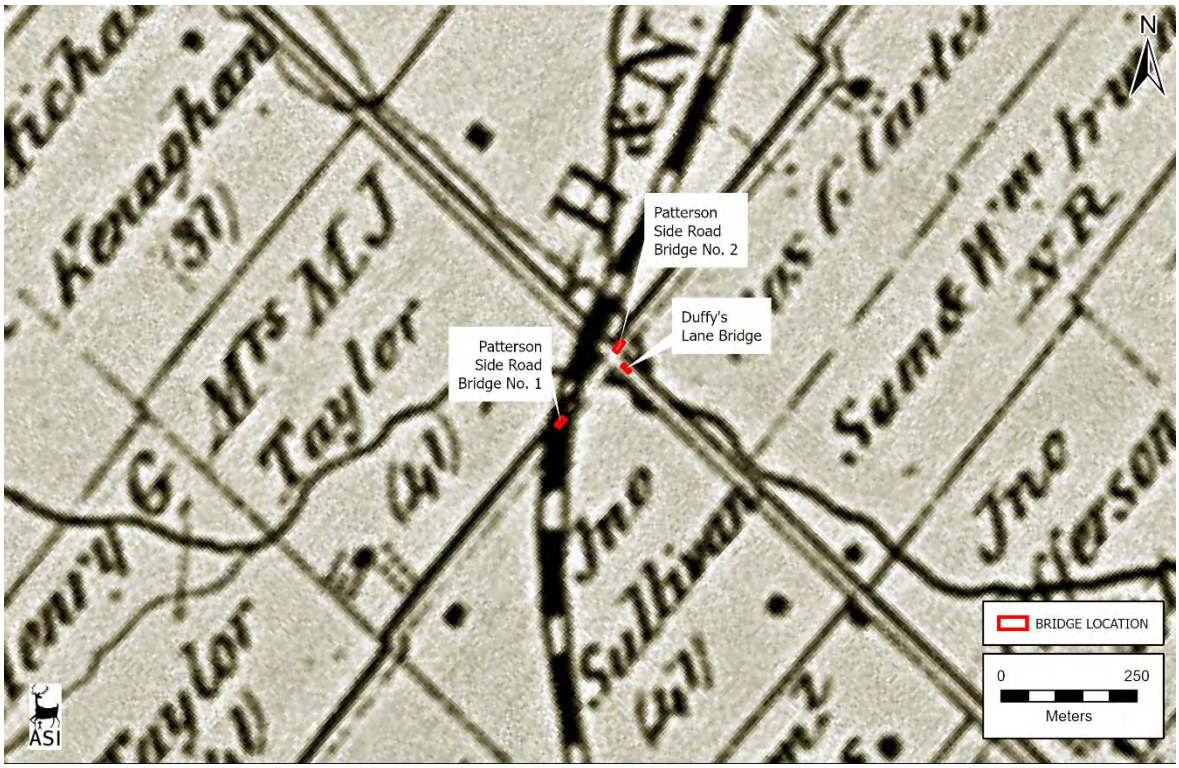


Figure 6: The study area overlaid on the 1877 Historical Atlas of the County of Peel
Base Map: (Walker and Miles 1877)

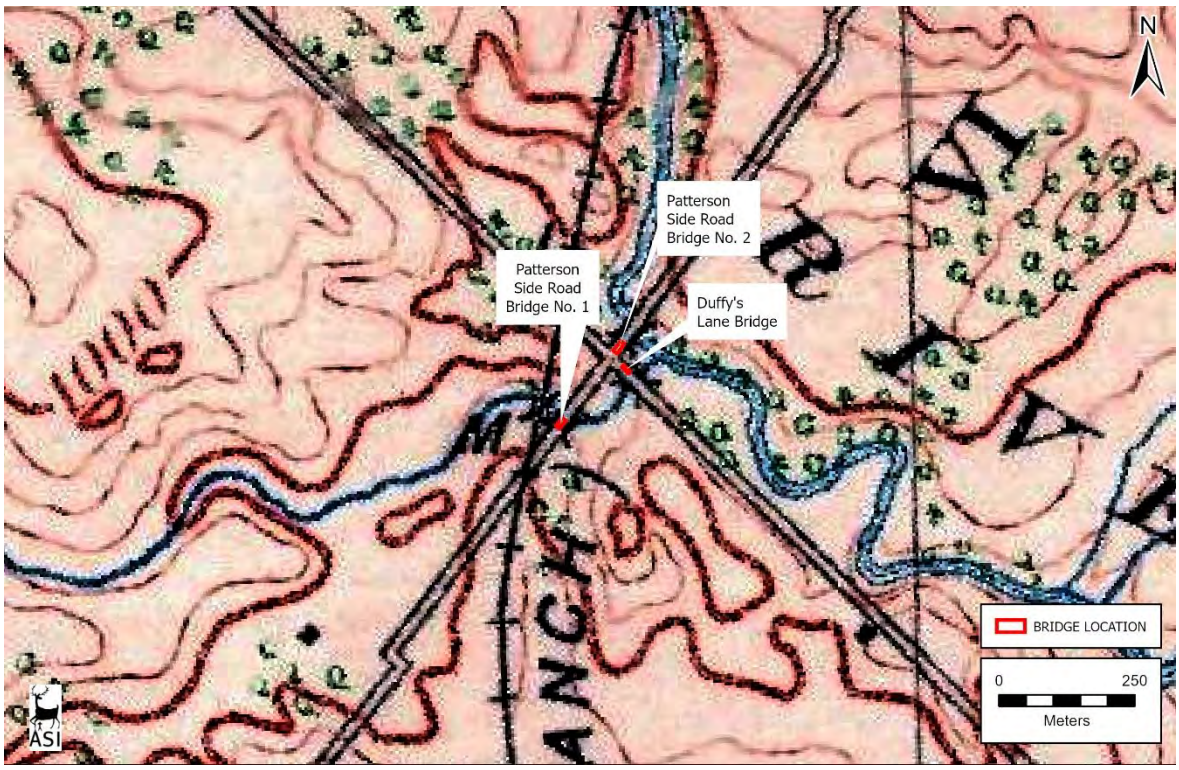


Figure 7: The study area overlaid on the 1926 topographic map of the area
Base Map: (Department of National Defence 1926)

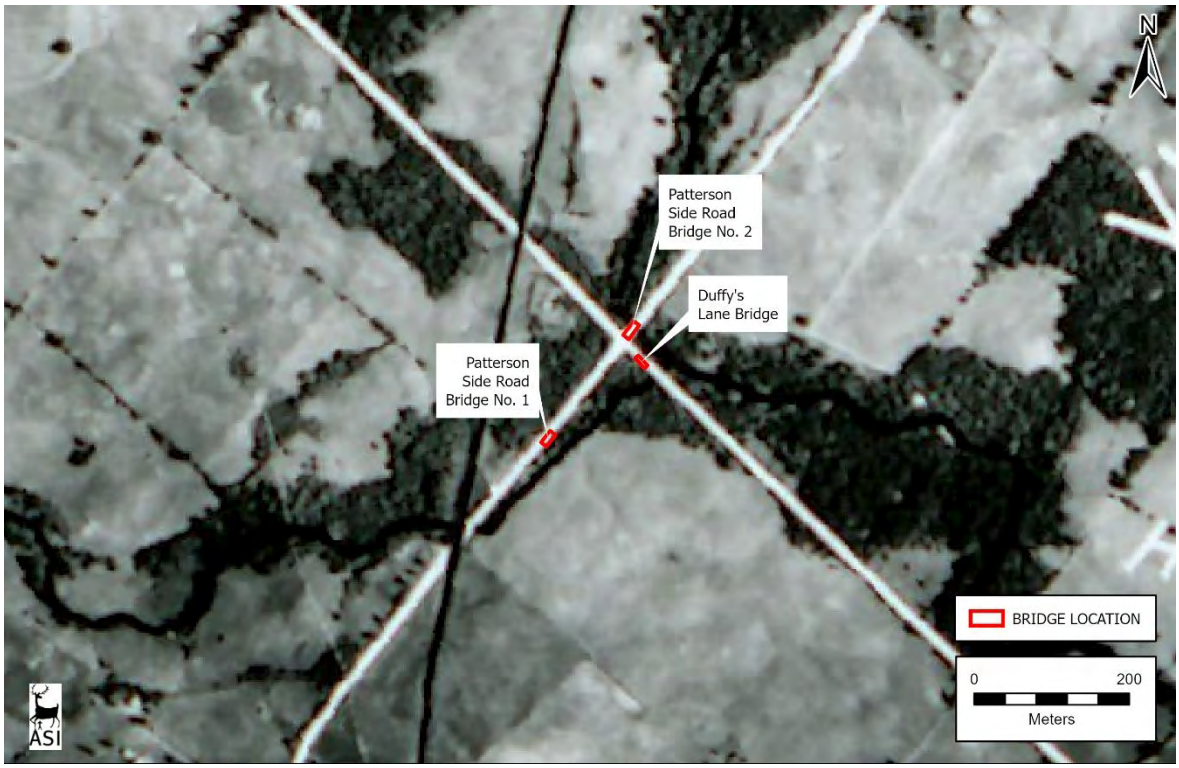


Figure 8: The study area overlaid on the 1954 aerial photograph of the area
Base Map: (Hunting Survey Corporation Limited 1954:438.794)

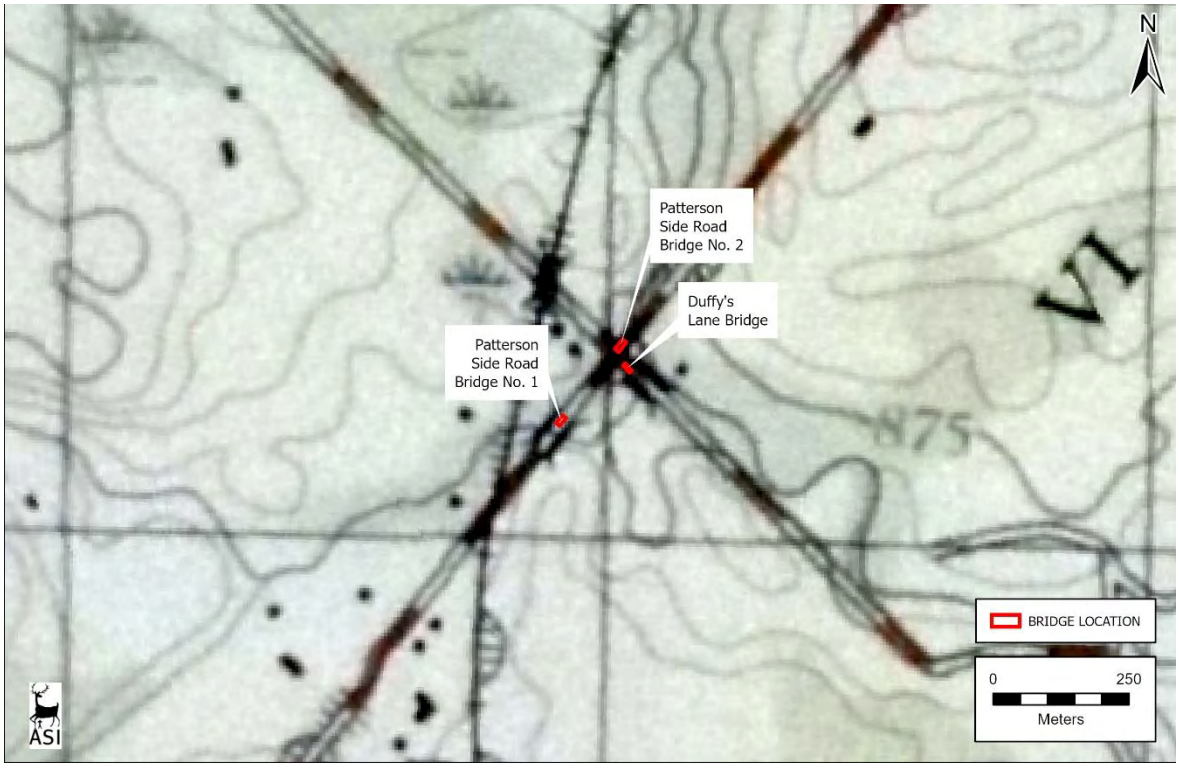


Figure 9: The study area overlaid on the 1968 topographic map of the area
Base Map: (Department of National Defence 1968)

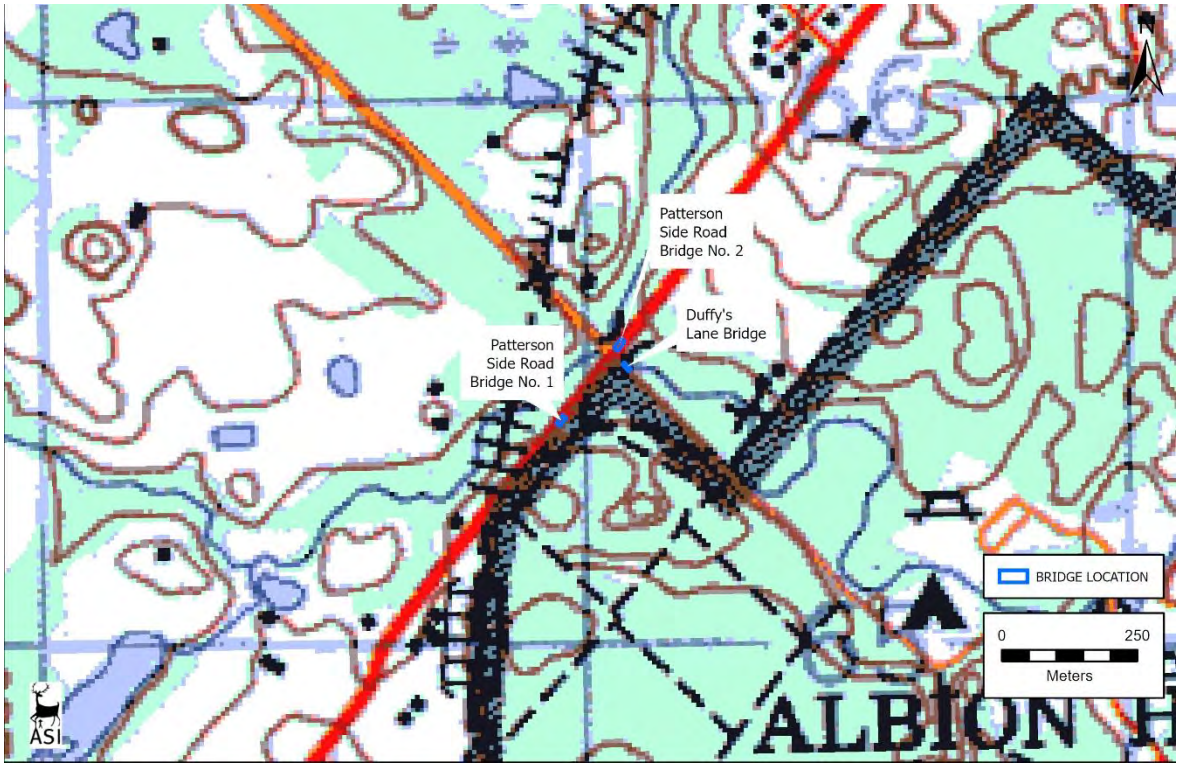


Figure 10: The study area overlaid on the 1994 NTS map of the area
Base Map: (Department of Energy, Mines and Resources, Canada 1994)

2.3 Transportation History

2.3.1 Previous Bridges

The 1926 topographic map (Figure 7) and 1940 topographic map (Department of National Defence 1940) indicate that a bridge was present in the same location as each subject bridge, carrying Patterson Side Road and Duffy's Lane over the Humber River and its tributaries, prior to the construction of the subject bridges, but these are not identified as to type or material.

Council minutes dated August 30, 1956, indicate that the previous bridge which was replaced by Bridge No. 2 had collapsed on August 29 of that year (Township of Albion 1956). Township records do not indicate the style or material of this previous structure.

Council minutes dated October 17, 1957 indicate that the bridge predating the current Duffy's Lane bridge was damaged by a truck on October 15, 1957 (Township of Albion 1957a). Township records do not indicate the style or material of this previous structure however remnants of wooden piles present beneath the standing structure in the riverbed suggest that at least one earlier structure was likely wooden.

No information was found regarding bridges predating Bridge No. 1.

2.3.2 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).

Factors impacting bridge design included increasing road allowances and clearance requirements, heavier traffic, higher speeds, safety standards, and most importantly, cost limitations (Cuming 1983). 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 stronger concrete bridges constructed in the 1930s formed part of the "Depression Era" Public Works Program that created work for the unemployed (Region of Waterloo: Planning, Housing, and Community Services (PHCS)) 2007). 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). The rigid frame, hollow concrete box beam and post-tensioned voided slab are some of the bridge types to develop during this period.

2.3.3 T-Beam Concrete Bridge Construction

Bridge No. 1 was constructed in 1950 and is a single-span concrete slab over concrete T-beam structure. In North America, the first reference to a T-beam bridge in the early twentieth century is attributed to Henry Grattan Tyrrell, a graduate of the University of Toronto, in his book Concrete Bridges and Culverts (Tyrrell 1909). Reinforced concrete T-beam construction was in widespread use across the United States by 1920 and was a recommended standard design by the United States Bureau of Public Roads at that time (Ketchum 1920). The construction of reinforced concrete T-beam bridges tapered off in the early 1960s. Reinforcing concrete was typically introduced by laying steel rods or mesh in the formwork before pouring the wet concrete, creating a tension frame with the concrete to eliminate fractures (Chase 2015). This type appeared at the same time as flat slab span but was more economical for longer lengths. The top of the T-beam constitutes the slab, the bottom of the T-beam (the stem) appears like a girder when viewed from the side elevation. A review of the provincial bridge inventory maintained by the MTO confirms that T-Beam bridges began to appear on Ontario roads prior to 1920 as well.

2.3.4 Rigid Concrete Frame Bridge Construction

Bridge No. 2 and Duffy's Lane Bridge are two single-span cast-in-place concrete rigid frame structures, constructed in 1956 and 1957 respectively. The rigid frame bridge design was first pioneered by German engineers and the Brazilian Emilia Baumgart and then introduced to the United States by engineer Arthur G. Hayden in the early 1920s (Troyano 2003). Hayden is credited with developing the rigid frame design for the construction of the Bronx River Parkway. In 1921, he presented the rigid frame design, distinguished by its monolithic construction technique with a rigid connection between vertical posts and horizontal beams. It would become the bridge of choice on parkways and highways. In Canada during the 1920s, the rigid frame design had not yet been widely adopted, as it employed "a complex design that was beyond the resources, or inclination of many engineers" (Andreae 1997). By the 1930s, a Canadian engineer, Hardy Cross, standardized the rigid frame design, then becoming widely used, as it provided several financial and engineering advantages. Rigid frame bridges were first constructed in Canada in 1931 by the DHO (Historica Research Limited and Archaeologix Inc. 2005). This type of bridge quickly gained popularity through the 1930s.

Introduction of the rigid frame bridge allowed for the construction of a thinner, lower deck, and required less earth piling to build up the embankments. Unlike truss style bridges, this type of bridge presented a flexible construction design that could be widened with comparative ease. The rigid frame design presented a cost-effective yet attractive bridge design that would be able to respond to the new designs and demands of highway construction throughout the 1920s and 1930s in North America. The hollow concrete box beam form became a popular choice for rigid frame bridges with longer spans and was introduced in the late 1940s and early 1950s (Ministry of Culture and Ministry of Transportation, Ontario (MTO) 2008).

2.4 Relevant People and Organizations

2.4.1 Patterson Side Road Bridge No. 1 (B22162016)

J. H. Beatty, Engineer

No information could be found about the engineer of Bridge No. 1.

2.4.2 Patterson Side Road Bridge No. 2 (B22164017)

Duncan Hopper & Associates

The engineering firm, operated by Mr. Duncan and Mr. Hopper, collected engineering fees from the Township for many projects in the middle of the twentieth century. Council Minutes indicate that in addition to the designs for Bridge No. 2 and the Duffy's Lane Bridge, the firm was responsible for various township projects involving a municipal garage, machine shed, culvert, and subdivision road construction (Township of Albion 1956; Township of Albion 1957b).

Department of Highways Ontario

The Department of Highways Ontario (DHO) and Arthur Sedgwick, DHO Chief Engineer from 1929-1954, are credited with introducing the concrete rigid frame to Canada in the 1930s (Unterman McPhail Associates 2012). Sedgwick is also known for his involvement in the construction of the Spandrel Arch bridges along the Queen Elizabeth Way (St. Catharines Museum 2016). Prior to his role as DHO Chief Engineer, Sedgwick was recognized as an authority on culvert construction in Ontario. He presented at conferences and was published in the *Canadian Engineer* where he discussed culverts along with appropriate construction methods, materials, and dimensions of culverts used along roadways. He also discussed how the shape of a culvert is an important consideration to ensure proper waterflow (Sedgwick 1917). During his time as DHO Chief Engineer Arthur Sedgwick reviewed and approved the designs of many bridges and culverts within Ontario.

2.4.3 Duffy's Lane Bridge (B22072010)

See Section 2.4.2 for a discussion of the engineering firm of Duncan Hopper & Associates and the DHO.

3.0 DESIGN AND PHYSICAL VALUE RESEARCH

The following documents relating to Bridge No. 1 were reviewed as part of this assessment:

- Original structural drawings (Beatty n.d.),
- Rehabilitation drawings (Paul Theil Associates Ltd. 2001),
- Detailed Condition Survey Report (DCSR) (Bridge Check Canada Ltd 2019a), and

- 2019 OSIM report (Town of Caledon 2019a).

The following documents relating to Bridge No. 2 were reviewed as part of this assessment:

- Original structural drawings (Duncan Hopper & Associates 1956),
- DCSR (Bridge Check Canada Ltd 2019b),[3] and
- 2019 OSIM report (Town of Caledon 2019b).

The following documents relating to Duffy's Lane Bridge were reviewed as part of this assessment:

- Original structural drawings (Duncan Hopper & Associates 1957),
- Rehabilitation Drawings (Paul Theil Associates Ltd. 2000), and
- 2019 OSIM report (Town of Caledon 2019c).

A field review was undertaken by Meredith Stewart, Cultural Heritage Assistant, ASI, on October 22, 2020 to conduct photographic documentation of Bridge No. 1 and 2 and to collect data relevant for completing a heritage evaluation of the structures. A field visit for Duffy's Lane Bridge was conducted on November 24, 2020. The following description of the construction, including the dates of the interventions, and existing conditions is based on a combination of the results of the field review and historical background research on the subject bridges. Photographic plates documenting the existing conditions of the subject bridges are available in the Appendices A to C (Bridge No. 1, Appendix A; Bridge No. 2, Appendix B; Duffy's Lane Bridge, Appendix C). A selection of available original structural and rehabilitation drawings for the bridges are provided in Appendices D (Bridge No. 1), E (Bridge No. 2), and F (Duffy's Lane Bridge).

3.1 Patterson Side Road Bridge No. 1 (B22162016)

3.1.1 Construction and Integrity of the Subject Bridge

To construct this bridge, concrete was poured into wooden formwork around reinforcing steel to give the girders their characteristic T-shape. After casting, the formwork was removed and the T-beams were joined to form the deck (Region of Waterloo 2004). This style of bridge is described as representing "the next evolution in bridge technology" (Region of Waterloo 2004:1.79 and 1.23).

Original bridge drawings are undated and prepared by J. H. Beatty, Engineer, Orangeville, Ontario (Beatty n.d.). The 2019 OSIM report states that the bridge was constructed in 1950. A review of council minutes from the same year did not reveal any bridge construction projects awarded or completed and so independent confirmation of this construction date was not possible. Despite a review of Council Minutes, county and township histories, and sundry available archival documents, no further information could be gleaned about the construction of the structure.

[3] The DCSR for Bridge No. 2 notes that evidence of rehabilitation work was present however rehabilitation drawings were unavailable for review.

Observations based on visual inspection and comparison to the original structural drawings reveal alterations to the original structure. The barrier and railings illustrated in the 1956 structural drawings consist of a concrete post and steel pipe and welded lattice barrier system, which has since been replaced with the current cast-in-place concrete parapet walls with steel hand railings.

Rehabilitation work on the bridge took place in 2001, including: asphalt and granular fill replacement and concrete deck patch repairs (Paul Theil Associates Ltd. 2001; Bridge Check Canada Ltd 2019a). General arrangement drawings from 2001 indicate that rehabilitation work at the time included plans to widen the bridge, install new concrete parapet walls, and place new waterproofing on deck, however, the 2019 DCSR notes no evidence of this work having taken place and these improvements were similarly noted to be absent during the 2020 field visit for this evaluation (Paul Theil Associates Ltd. 2001; Bridge Check Canada Ltd 2019a). The 2019 OSIM report notes that the railings were replaced in 2018 (Town of Caledon 2019a).

The 2019 OSIM Inspection Form recommended rehabilitation and presented the following recommendations for bridge elements in need of repairs (Town of Caledon 2019a):

- Deck top – patch and waterproof;
- Abutment walls – patch repairs;
- Abutment wingwalls – patch repairs and repair broken sections;
- Soffit, thick slab, interior – patch repairs;
- Soffit, thick slab, exterior – patch repair;
- Girders – patch repairs; and
- Embankments – restore embankment at approach.

3.1.2 Comparative Analysis

Bridge No. 1 is a single span cast-in-place concrete slab bridge supported by cast-in-place reinforced concrete beams with a northeast-southwest orientation that carries two lanes of vehicular traffic across a small branch of the Humber River. This bridge is presumed to have been constructed in 1950, and measures 7.15 m in overall length with a width of 7.34 m.

The overall structure was compared with similar structures found in the Town of Caledon's OSIM Inventory, MTO's Bridge Inventory for the Central Region, the Ontario Heritage Bridge List, and the historical bridge inventory on *Historicbridges.org*. According to this comparative sample, there are 31 known cast-in-place concrete beam structures in the Southern Ontario (this list of comparative bridges is contained in Appendix G). Of these Bridge No. 1 is one of seven known structures of this type in the Town of Caledon. The closest structures from a geographic and temporal perspective include:

- Duffy's Lane Bridge (Structure ID B22068009), constructed in 1950 with a length of 14.1 m over a single span, carries Duffy's Lane over a waterway, approximately 1.3 km north of Castlederg Sideroad in the Town of Caledon (See Appendix C for images).
- Quarry Road Bridge (Structure ID B26222058), constructed in 1950 with a length of 12.9 m over a single span, carries Quarry Road over a rail corridor, approximately 0.7 km west of McLaughlan Road in the Town of Caledon.

- McLaughlin Road Bridge (Structure ID B26046055), constructed in 1960 with a length of 34 m across three spans, carries McLaughlin Road over a waterway, approximately 0.3 km north of Old Base Line in the Town of Caledon.

Glass's Bridge (Plate 11) in the Town of Innisfil is the earliest example of a cast-in-place concrete beam bridge in the comparative sample. It was built in 1913, predating the subject bridge by more than 35 years. Of the bridges in the comparative sample within the Town of Caledon, Bridge No. 1 is one of three bridges built in 1950, the oldest in the comparative sample (Plate 12). Of the 29 bridges in the comparative sample with a known construction date, 11 (or approximately 38%) were constructed in 1942 or earlier, prior to the subject bridge. Bridge No. 1 could be considered significant in terms of age within the Town of Caledon but considering the replacement of original elements, such as the barrier system, there are likely better maintained examples from the same time period in the township.

Bridge No. 1, measuring 7.2 m in overall length, is the shortest of the 10 single span bridges in this comparative sample. The Boston Mills Road Bridge (Structure ID B20104036) in the Town of Caledon, with a total length of 30 m, is the longest of the single span beam bridges. The Highway 401/Lakeridge Road Underpass is the longest bridge in the comparative sample, with a length of 118 m over seven spans. The subject bridge is not significant in terms of the overall length or number of spans.

Based on the review and comparison of the available bridges in this comparative sample, the subject bridge is not considered to be significant in terms of age, overall length, and overall number of spans.

Images are included to provide a comparison between Bridge No. 1 and other concrete beam bridge structures in Southern Ontario in Appendix A (Plate 11).

3.2 Patterson Side Road Bridge No. 2 (B22164017)

3.2.1 Construction and Integrity of the Subject Bridge

Original bridge drawings are dated between September 3-5, 1956, prepared by unknown engineers (initials H. K., and J. L. H., checked by A. O. D.) at Duncan Hopper & Associates, Consulting Engineers, and approved on September 15, 1956 by A. (Arthur) Sedgwick, Chief Bridge Engineer for the Department of Highways Ontario (Duncan Hopper & Associates 1956). This structure is identified as the Humber Bridge. Township records indicate that tenders were requested on September 4, 1956, with the contract to construct the bridge awarded to Lloyd P. Finnegan Construction Co. on October 1 for a cost of $22,200 (Township of Albion 1956). An interim payment was made in November 1956, indicating construction was underway for Bridge No. 2 at this point. Despite a review of Council Minutes, county and township histories, and sundry available archival documents, no further information could be gleaned about the construction of the structure.

No drawings were available beyond 1956 for the bridge but observations based on visual inspection and comparison to the original structural drawings reveal alterations to the original structure. The barrier and railings illustrated in the 1956 structural drawings consist of a concrete post and steel pipe barrier system, which has since been replaced with the current cast-in-place concrete parapet walls with steel hand railings. The DCSR notes that in addition to the replacement of the barrier walls, patching of the

concrete deck occurred at some point, indicating rehabilitation work had taken place prior to the condition survey in 2019 (Bridge Check Canada Ltd 2019b).

The 2019 OSIM Inspection Form recommended rehabilitation and presented the following recommendations for bridge elements in need of repairs (Town of Caledon 2019b):

- Deck top – patch, waterproof, and pave deck;
- Soffit, thick slab, interior – patch repairs;
- Soffit, thick slab, exterior – patch repair;
- Deck drainage – replace deck drain;
- Abutment walls – patch repair; and
- Abutment wingwalls – patch repair.

3.2.2 Comparative Analysis

Bridge No. 2 is a single span cast-in-place rigid frame concrete bridge with a northeast-southwest orientation that carries two lanes of vehicular traffic across a branch of the Humber River. This subject bridge was constructed in 1956, and measures 14.51 m in overall length with a width of 8.47 m.

The overall structure was compared with similar structures found in the Town of Caledon's OSIM Inventory, MTO's Bridge Inventory for the Central Region, the Ontario Heritage Bridge List, and the historical bridge inventory on *Historicbridges.org*. According to this comparative sample, there are 215 known cast-in-place rigid frame structures in Southern Ontario (this list of comparative bridges is contained in Appendix H). Of these, Bridge No. 2 is one of 16 structures constructed in the 1950s of this type in the Town of Caledon.[4] The closest structures from a geographic and temporal perspective are the following bridges constructed in the 1950s in the Town of Caledon:

- Centreville Creek Road Bridge, constructed in 1950 with a length of 5.3 m across a single span, carries Centreville Creek Road over a waterway approximately 0.2 km south of Highway 9.
- Caledon King Townline Bridge, constructed in 1950 with a length of 9.2 m across a single span, carries Caledon King Townline over a waterway approximately 0.86 km north of King Street East.
- Caledon King Townline Bridge, constructed in 1950 with a length of 7.5 m across a single span, carries Caledon King Townline over a waterway approximately 0.7 km north of King Street East.
- Caledon King Townline Bridge, constructed in 1950 with a length of 9.5 m across a single span, carries Caledon King Townline over a waterway approximately 0.6 km north of King Street East.
- Columbia Way (10th Sideroad) Bridge, constructed in 1950 with a length of 10.6 m across a single span, carries Columbia Way (10th Sideroad) over a waterway approximately 0.48 km west of Caledon King Townline South.
- Duffy's Lane Bridge, constructed in 1957 with a length of 10.6 m across a single span, carries Duffy's Lane over an unnamed tributary of the Humber River approximately 0.03 km south of Patterson Side Road.

[4] The Town of Caledon's OSIM Inventory lists 15 rigid frame bridges as being built in 1950, including Bridge No. 2. Archival research indicates that Bridge No. 2 was constructed in 1956. It is possible that any of the 14 other bridges have a construction date that is not 1950 exactly, but rather within this decade, as is the case with Bridge No. 2.

The Kennedy Road Bridge (Plate 23) in the Town of Caledon is the earliest example of a cast-in-place concrete rigid frame structure in the comparative sample. It was built in 1915, predating the subject bridge by more than 40 years. This bridge is a considerable outlier as an early example of a concrete rigid frame structure in the Town, predating the second oldest bridge, built in 1950, by 35 years. The decade between 1950 and 1960 saw a significant rise in popularity of this type of structure, with 16 rigid concrete frame bridges built in the 1950s. Nine additional rigid frame bridges were built in the following decade, between 1960 and 1969. Of the 212 total bridges in the comparative sample with a known construction date, 87 (or approximately 41%) were constructed in 1955 or earlier, prior to the subject bridge. Bridge No. 2 is not considered significant in terms of age.

The subject bridge, measuring 14.2 metres in overall length, is longer than 77 of the 162 single span bridges in this comparative sample. The Mill Street Underpass in the Municipality of Clarington, with a total length of 40.6 m, is the longest of the single span rigid frame bridges. The Highway 404/401 N-W HOV Ramp Tunnel is the longest bridge in the comparative sample, with a length of 90 m. The Bloor Street underpass at Highway 401 is the longest bridge in the comparative sample with a recorded span, measuring 44.9 m in length across two spans. Bridge No. 2 is not significant in terms of the overall length or number of spans.

Based on the review and comparison of the available bridges in this comparative sample, the subject bridge is not considered to be significant in terms of age, overall length, and overall number of spans.

Images are included to provide a comparison between Bridge No. 2 and other concrete rigid frame structures in Southern Ontario in Appendix B (Plate 23).

3.3 Duffy's Lane Bridge (B22072010)

3.3.1 Construction and Integrity of the Subject Bridge

Original bridge drawings are dated October 29, 1957, prepared by Duncan Hopper & Associates Ltd. (Duncan Hopper & Associates 1957). Township records indicate that the bridge on Duffy's Lane (6th Line) at 25 Sideroad (Patterson Side Road) had been "broken by a truck on October 15 1957 belonging to H. M. Young of Alliston" (Township of Albion 1957a). The Township hired the firm of Duncan & Hopper to prepare plans and estimates for the bridge. Required specifications included that the structure be of "concrete construction" and "steel re-inforced" (Township of Albion 1957c). Tenders were requested on October 21, 1967, with the contract to construct the bridge awarded to J. M. Fuller Ltd. (also recorded in Township records as J. M. Fuller & Co.) on November 18 for a cost of $14,808.40 (Township of Albion 1957d). Despite a review of Council Minutes, county and township histories, and sundry available archival documents, no further information could be gleaned about the construction of the structure.

Rehabilitation drawings are dated 2000. General arrangement drawings indicate that the rehabilitation work included plans to replace the asphalt and gravel deck surface as well as the existing handrails, including concrete posts (Paul Theil Associates Ltd. 2000). Drawings indicate that additional repairs included: concrete patches on the deck, modification of existing deck drains, installation of new concrete posts (requiring installation of dowels on deck and wingwalls), as well as repairs to the deck underside and surfaces of abutments and wingwalls (Paul Theil Associates Ltd. 2000). The rehabilitation

drawings note that the galvanized railing elements shall be reused and they are present in the same arrangement as the original 1957 drawings.

Worthy of note are the unique railings associated with the Duffy's Lane Bridge. This barrier, consisting of top and bottom rails with diagonal balusters welded between, in a zig-zag pattern, is in contrast to 'typical' barrier systems encountered for rigid concrete frame structures. Most often this type of structure exhibits solid concrete barriers or a cast in place concrete post and railing system. The reuse of this unique railing system in 2000 during rehabilitation work is notable as it represents a sympathetic upgrade to the structure.

The 2019 OSIM Inspection Form recommended rehabilitation and presented the following recommendations for bridge elements in need of repairs (Town of Caledon 2019c):

- Abutment walls – patch repairs;
- Abutment wingwalls – patch repairs;
- Deck top – patch, waterproof, and pave;
- Soffit, thick slab, interior – patch repairs;
- Soffit, thick slab, exterior – patch repairs; and
- Curbs – patch repairs.

3.3.2 Comparative Analysis

Duffy's Lane Bridge is a single span cast-in-place rigid frame concrete bridge with a northwest-southeast orientation that carries two lanes of vehicular traffic over a small branch of the Humber River. The bridge was constructed in 1957, and measures 10.6 m in overall length and 8.9 m wide (Town of Caledon 2019c).

The overall structure was compared with similar structures found in the Town of Caledon's OSIM Inventory, MTO's Bridge Inventory for the Central Region, the Ontario Heritage Bridge List, and the historical bridge inventory on *Historicbridges.org*. According to this comparative sample, there are 215 known cast-in-place rigid frame structures in Southern Ontario (this list of comparative bridges is contained in Appendix H). Of these, the Duffy's Lane Bridge is one of 16 structures constructed in the 1950s of this type in the Town of Caledon. The closest structures from a geographic and temporal perspective are the following bridges constructed in the 1950s in the Town of Caledon:

- Centreville Creek Road Bridge, constructed in 1950 with a length of 5.3 m across a single span, carries Centreville Creek Road over a waterway approximately 0.2 km south of Highway 9.
- Caledon King Townline Bridge, constructed in 1950 with a length of 9.2 m across a single span, carries Caledon King Townline over a waterway approximately 0.86 km north of King Street East.
- Caledon King Townline Bridge, constructed in 1950 with a length of 7.5 m across a single span, carries Caledon King Townline over a waterway approximately 0.7 km north of King Street East.
- Caledon King Townline Bridge, constructed in 1950 with a length of 9.5 m across a single span, carries Caledon King Townline over a waterway approximately 0.6 km north of King Street East.
- Columbia Way (10th Sideroad) Bridge, constructed in 1950 with a length of 10.6 m across a single span, carries Columbia Way (10th Sideroad) over a waterway approximately 0.48 km west of Caledon King Townline South.

- Patterson Side Road (Bridge No. 2), constructed in 1956 with a length of 14.5 m across a single span, carries Patterson Side Road over an unnamed tributary of the Humber River approximately 0.03 km east of Duffy's Lane.

The Kennedy Road Bridge (Plate 23) in the Town of Caledon is the earliest example of a cast-in-place concrete rigid frame structure in the comparative sample. It was built in 1915, predating the subject bridge by more than 40 years. This bridge is a considerable outlier as an early example of a concrete rigid frame structure in the Town, predating the second oldest bridge, built in 1950, by 35 years. The decade between 1950 and 1960 saw a significant rise in popularity of rigid concrete frame types of bridges, with 16 of these structures built in the 1950s. In other words, 50% of the 33 rigid concrete frame bridges in the Town of Caledon's inventory with a known construction date were built between 1950 and 1959. A visual review of Google Streetview photos of these bridges shows that only one other structure from this decade retains its original barrier system. The Highpoint Sideroad bridge, located east of Shaws Creek Road, features a concrete post and railing system that appears to be original to the structure and indicative of the kind of barrier system more typically seen associated with concrete rigid frame structures (Plate 36). Nine additional rigid frame bridges were built in the following decade, between 1960 and 1969. Added together with the previous decade, these bridges comprise 76% of the total rigid concrete frame bridges in the Town of Caledon's inventory. Of the 212 total bridges in the comparative sample with a known construction date, 95 (or approximately 45%) were constructed in 1956 or earlier, prior to the subject bridge. The Duffy's Lane Bridge is not considered significant in terms of age as the earliest example of concrete rigid frame construction in the Town of Caledon. However, if consideration is given to the intact nature of the bridge relative to contemporaneous structures with less sympathetic upgrades, it can be considered significant as a representation of a surge in popularity of this type of structure during the mid-twentieth century in the municipality.

The subject bridge, measuring 10.6 m in overall length, is longer than 19 of the 162 single span bridges in this comparative sample. The Mill Street Underpass in the Municipality of Clarington, with a total length of 40.6 m, is the longest of the single span rigid frame bridges. The Highway 404/401 N-W HOV Ramp Tunnel is the longest bridge in the comparative sample, with a length of 90 m. The Bloor Street underpass at Highway 401 is the longest bridge in the comparative sample with a recorded span, measuring 44.9 m in length across two spans. The Duffy's Lane Bridge is not significant in terms of the overall length or number of spans.

Based on the review and comparison of the available bridges in this comparative sample, the subject bridge is considered to be a representative example of this bridge type built in the 1950s, and was built during a period of significant popularity of this type of bridge construction in the Town of Caledon.

Images are included to provide a comparison between the Duffy's Lane Bridge and other concrete rigid frame structures in Southern Ontario in Appendix B (Plate 23).

4.0 CONTEXTUAL RESEARCH

4.1 Setting and Character

Bridge No. 1, Bridge No. 2, and Duffy's Lane Bridge are all located around the intersection of Patterson Side Road and Duffy's Lane, crossing branches of the Humber River in the Town of Caledon. Each

structure carries two lanes of vehicular traffic across the Humber River tributaries. The Humber River, designated as a Canadian Heritage River System, is recognized for its historical and contextual value as a significant waterway that connects Lake Ontario to the upper Great Lakes which has been settled by people for almost 10,000 years (Canadian Heritage Rivers System n.d.).The bridges are surrounded by greenspace and residential land, with dense wooded land prominently surrounding the intersection and bridges. The Caledon Trailway Path is located close by to the north, with a number of heritage structures located along its length including: a stone culvert, designated under Part IV of the *Ontario Heritage Act* (By-law 96-31), located approximately 80 m to the west of Bridge No. 1 (Appendix A, Plate 13); and a trailway bridge, listed on the Town of Caledon's Heritage Register, located approximately 180 m northwest of Bridge No. 2 and 200 m northwest of Duffy's Lane Bridge (Appendix B, Plate 24). Located to the south of Patterson Side Road and Duffy's Lane is the Albion Hills Conservation Area (16500 Highway 50), a Toronto Region Conservation Authority property that includes a historical log cabin built by the Jefferson family in 1833 and is listed on the Town of Caledon's Heritage Register (Figure 11).[5]

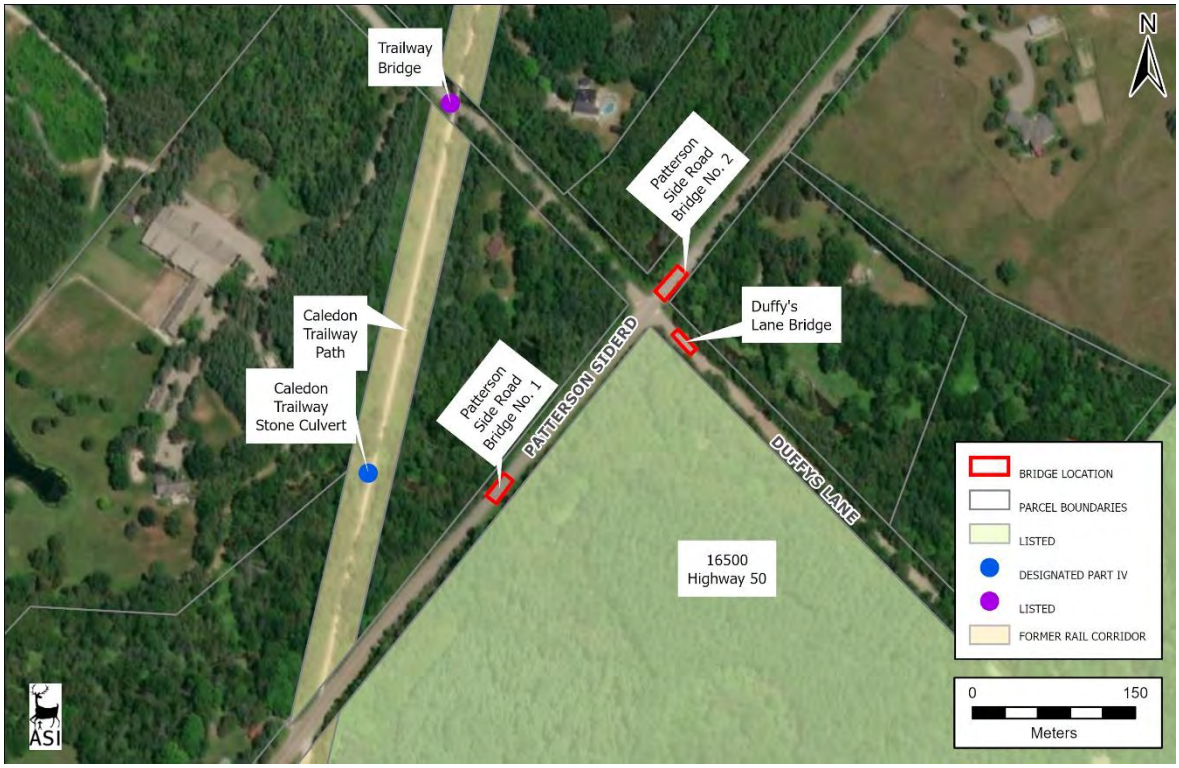


Figure 11: Heritage properties surrounding the three subject bridges.

Bridge No. 1 is one of several concrete T-beam bridges in the Town of Caledon. Concrete T-beam bridges were commonly constructed to carry roadways due to their low cost, ease of construction, and readily-available construction materials. Popular in the early to mid-twentieth century they were commonly used to replace aging nineteenth-century structures. As such, concrete slab and girder type bridges are a ubiquitous part of rural road networks, and their physical and functional connection to the roadway is not regarded as an exceptional contributor to their contextual value.

[5] Because of the expansive nature of this property its cultural heritage resources and/or attributes are not in the vicinity of Patterson Side Road

Bridge No. 2 and Duffy's Lane Bridge are two concrete rigid frame structures in the Town of Caledon. Similarly ubiquitous in Ontario from the 1930s onward due to their cost effective and attractive bridge design. Concrete rigid frame structures saw a surge of popularity in the Town of Caledon during the 1950s, the subject bridges are two of a total of 17 such structures constructed during this decade. Concrete rigid frame structures are a widespread part of rural road networks, and their physical and functional connection to the roadway is not regarded as an exceptional contributor to their contextual value.

4.2 Community Landmark

The three subject bridges are located within a rural setting along roadways extending through wooded corridors. Patterson Side Road and Duffy's Lane are not considered to be high-traffic thoroughfares and the bridges are obscured from most vantage points throughout the area. The bridges are not considered to be gateway features or to act as a significant physical or contextual division between neighbourhoods or streetscapes. Bridge No. 1 and Bridge No. 2 are not likely to be considered significant landmarks to the local community. As such, Bridge No. 1 and Bridge No. 2 are not considered to be significant community landmarks.

The Duffy's Lane Bridge is a prominent feature of the intersection of Patterson Side Road and Duffy's Lane due to the unique arrangement of the railings. This would have been even more striking before the replacement of the original railings of Bridge No. 2 as the drawings indicate these would have matched those on Duffy's Lane. Given the prominence of the railings, the Duffy's Lane Bridge could be considered to be a significant landmark.

5.0 CULTURAL HERITAGE VALUE

5.1 Patterson Road Bridge No. 1 (B22162016)

5.1.1 Ontario Regulation 9/06 Evaluation

Table 3 contains the evaluation of Bridge No. 1 within the framework set out in O. Reg. 9/06. Within the Municipal EA process, O. Reg. 9/06 is the prevailing evaluation tool when determining if a heritage resource, in this case a bridge, has cultural heritage value.

Table 3: Evaluation of Patterson Road Bridge No. 1 (B22162016) 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 subject bridge does not meet this criterion. While Bridge No. 1 is one of three bridges listed on the Town of Caledon's inventory built in 1950, the relative condition of the bridge and the replacement of the original elements, such as the barrier system, diminish the bridge as a candidate for an early and intact example of a single-span cast-in-place concrete slab and beam structure.

ii. displays a high degree of craftsmanship or artistic merit, or;	The subject bridge does not meet this criterion. This bridge exhibits a low degree of craftsmanship or artistic merit as it is a standard example of a single-span cast-in-place concrete slab and beam structure.
iii. demonstrates a high degree of technical or scientific achievement.	The subject bridge does not meet this criterion. This bridge exhibits a low degree of technical achievement given its short span, easy access, and gentle water flow in the tributary below.
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 subject bridge does not meet this criterion. The structure was constructed in 1950 in a rural agricultural area that maintained its rural character into the twenty-first century. Though the structure maintains a direct connection with Patterson Side Road, an historically surveyed road, the bridge is not an original crossing and therefore not associated with settlement, growth, and/or development in the region.
ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or;	The subject bridge does not meet this criterion. This criterion is not satisfied given that the structure does not contribute to an understanding of a community or culture.
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 does not meet this criterion. No information could be found about J. H. Beatty, the engineer named on the original bridge drawings, to demonstrate this individuals local contribution to bridge design or construction in the community.
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 does not meet this criterion. The subject bridge carries Patterson Side Road over a tributary of the Humber River in a rural area in the Town of Caledon. The subject structure is not original to the crossing and is a replacement to an earlier bridge of unknown type. The subject bridge is not considered to define or maintain the rural character of the area.
ii. is physically, functionally, visually or historically linked to its surroundings, or;	The subject bridge does not meet this criterion. The location of the subject bridge has served as an historical bridging point for vehicles over the Humber River tributary and is physically associated with Patterson Side Road. However, the

	subject bridge is not original to the crossing, and replaced an earlier, unknown structure.
iii. is a landmark.	The subject bridge does not meet this criterion. The subject structure is not considered to be an important landmark or gateway structure within the Town of Caledon and is not considered to meet this criterion.

As the subject bridge was determined not to meet the criteria outlined in O. Reg. 9/06 following an evaluation, a Statement of Cultural Heritage Value was not prepared.

5.2 Patterson Road Bridge No. 2 (B22164017)

5.2.1 Ontario Regulation 9/06 Evaluation

Table 4 contains the evaluation of Bridge No. 2 within the framework set out in O. Reg. 9/06. Within the Municipal EA process, O. Reg. 9/06 is the prevailing evaluation tool when determining if a heritage resource, in this case a bridge, has cultural heritage value.

Table 4: Evaluation of Patterson Side Road Bridge No. 2 (B22164017) 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 subject bridge does not meet this criterion. There are 15 other bridges of this type built within the 1950s in the Town of Caledon. Bridge No. 2's construction and build date are common within the Town of Caledon. The original railing system would have matched that of the Duffy's Lane Bridge at the same intersection and the two would have stood out as a matching pair. The relative condition of the bridge and the replacement of the original elements, such as the barrier system, diminish the bridge as a candidate for an early and intact example of a single-span cast-in-place concrete rigid frame structure.
ii. displays a high degree of craftsmanship or artistic merit, or;	The subject bridge does not meet this criterion. This bridge exhibits a low degree of craftsmanship or artistic merit as it is a standard example of a single-span cast-in-place rigid frame structure.
iii. demonstrates a high degree of technical or scientific achievement.	The subject bridge does not meet this criterion. This bridge exhibits a low degree of technical achievement given its short span, easy access, and gentle water flow in the tributary below.

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 subject bridge does not meet this criterion. The structure was constructed in 1956 in a rural agricultural area that maintained its rural character into the twenty-first century. Though the structure maintains a direct connection with Patterson Side Road, an historically surveyed road, the bridge is not an original crossing and therefore not associated with settlement, growth, and/or development in the region.
ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or;	The subject bridge does not meet this criterion. This criterion is not satisfied given that the structure does not contribute to an understanding of a community or culture.
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 does not meet this criterion. The engineering firm of Duncan, Hopper & Associates was responsible for numerous bridge and culvert projects in addition to other municipal projects in the Town of Caledon however there is no evidence that this firm was significant to the community.
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 does not meet this criterion. The subject bridge carries Patterson Side Road over a tributary of the Humber River in a rural area in the Town of Caledon. The subject structure is not original to the crossing and is a replacement to an earlier bridge of unknown type. The subject bridge is not considered to define or maintain the rural character of the area.
ii. is physically, functionally, visually or historically linked to its surroundings, or;	The subject bridge does not meet this criterion. The location of the subject bridge has served as an historical bridging point for vehicles over the Humber River tributary and is physically associated with Patterson Side Road. However, the subject bridge is not original to the crossing, and replaced an earlier, unknown structure.
iii. is a landmark.	The subject bridge does not meet this criterion. The subject structure is not considered to be an important landmark or gateway structure within the Town of Caledon and is not considered to meet this criterion.

As the subject bridge was determined not to meet the criteria outlined in O. Reg. 9/06 following an evaluation, a Statement of Cultural Heritage Value was not prepared.

5.3 Duffy's Lane Bridge (B22072010)

5.3.1 Ontario Regulation 9/06 Evaluation

Table 5 contains the evaluation of the Duffy's Lane Bridge within the framework set out in O. Reg. 9/06. Within the Municipal EA process, O. Reg. 9/06 is the prevailing evaluation tool when determining if a heritage resource, in this case a bridge, has cultural heritage value.

Table 5: Evaluation of Duffy's Lane Bridge (B22072010) 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 subject bridge meets this criterion. The Duffy's Lane Bridge was constructed during a surge of concrete rigid frame structures in the 1950s in the Town of Caledon. The bridge is unique within the Town of Caledon in that rehabilitation work in 2000 succeeded in reusing the original galvanized railing elements and reinstalled them in their original arrangement, thus maintaining the original appearance of the bridge. The bridge can be considered a good representative example of a concrete rigid frame structure, a popular type in the 1950s in the Town of Caledon.
ii. displays a high degree of craftsmanship or artistic merit, or;	The subject bridge does not meet this criterion. This bridge exhibits a low degree of craftsmanship or artistic merit as it is a standard example of a single-span cast-in-place rigid frame structure.
iii. demonstrates a high degree of technical or scientific achievement.	The subject bridge does not meet this criterion. This bridge exhibits a low degree of technical achievement given its short span, easy access, and gentle water flow in the tributary below.
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 subject bridge does not meet this criterion. The structure was constructed in 1957 in a rural agricultural area that maintained its rural character into the twenty-first century. Though the structure maintains a direct connection with Duffy's Lane, an historically surveyed road, the bridge is not an original crossing and therefore not associated with settlement, growth, and/or development in the region.

ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or;	The subject bridge does not meet this criterion. This criterion is not satisfied given that the structure does not contribute to an understanding of a community or culture.
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 does not meet this criterion. The engineering firm of Duncan, Hopper & Associates was responsible for numerous bridge and culvert projects in addition to other municipal projects in the Town of Caledon however there is no evidence that this firm was significant to the community.
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 does not meet this criterion. The subject bridge carries Duffy's Lane over a tributary of the Humber River in a rural area in the Town of Caledon. The subject structure is not original to the crossing and is a replacement to an earlier bridge of unknown type. The subject bridge is not considered to define or maintain the rural character of the area.
ii. is physically, functionally, visually or historically linked to its surroundings, or;	The subject bridge does not meet this criterion. The location of the subject bridge has served as an historical bridging point for vehicles over the Humber River tributary and is physically associated with Duffy's Lane. However, the subject bridge is not original to the crossing, and replaced an earlier, unknown structure.
iii. is a landmark.	The subject bridge meets this criterion. The Duffy's Lane structure is a prominent feature of the intersection of Patterson Side Road and Duffy's Lane. The original and unique arrangement of the railing system stands out in contrast to the modern steel post and flexbeam guard rails of the surrounding bridges.

The above evaluation confirms that the Duffy's Lane Bridge meets at least one of the criteria set out in O. Reg. 9/06 of the *Ontario Heritage Act.* In particular, it is determined that the bridge is a representative example of an intact cast-in-place concrete rigid frame structure constructed during a significant surge in construction of this bridge type, which occurred in the 1950s in the Town of Caledon. Additionally, the subject bridge is a landmark, as the unique barrier system is a prominent feature of the intersection of Patterson Side Road and Duffy's Lane. Given that the subject bridge meets at least one of the criteria contained in O. Reg. 9/06, this structure is considered to be a cultural heritage resource and is eligible for designation under the *Ontario Heritage Act.*

5.3.2 Proposed Statement of Significance

Description of Property

The Duffy's Lane Bridge is located on Duffy's Lane, immediately to the south of the intersection with Patterson Side Road, in the Town of Caledon. Constructed in 1957 by J. M. Fuller Ltd. based on designs by Duncan Hopper & Associates, Consulting Engineers, the bridge is a single span cast-in-place rigid frame concrete structure measuring 10.6 m long and with an overall width of 8.9 m.

The bridge carries Duffy's Lane across a smaller branch of the Humber River, a Canadian Heritage River.

Draft Statement of Significance

The Duffy's Lane Bridge is valued for physical and contextual reasons.

Duffy's Lane Bridge was built in 1957 and is one of 16 cast-in-place reinforced concrete rigid frame structures built between 1950 and 1960 in the Town of Caledon. A single bridge of this type is listed on the Town of Caledon's bridge inventory as being constructed prior to this time, in 1915, indicating a significant surge in popularity of this bridge type in Caledon during the mid-twentieth century. Rehabilitation work to many of these bridges have included unsympathetic barrier systems, making the Duffy's Lane Bridge a uniquely representative example of bridges built during this mid-century surge in concrete rigid frame construction, as the structure retains much of its original form and appearance.

The bridge is a prominent feature of the intersection of Patterson Side Road and Duffy's Lane. The structures unique railing arrangement stands in contrast to the modern steel post and flexbeam guard rails of the surrounding bridges, a common modern upgrade to aging bridge barrier systems.

Description of Heritage Attributes:

Heritage attributes associated with Duffy's Lane Bridge include but are not limited to:

- Rehabilitated concrete and steel barrier system which reuses galvanized railing elements from the original system, in the same arrangement as the original 1957 drawings; and
- cast-in-place concrete rigid frame construction.

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Patterson Road Bridge No. 1 (B22162016)

Bridge No. 1 is a single span cast-in-place concrete slab structure supported by concrete beams located on Patterson Side Road in the Town of Caledon. Located approximately 0.1 km west of the intersection of Patterson Side Road and Duffy's Lane, the bridge carries two lanes of vehicular traffic over a small branch of the Humber River. Original bridge drawings are undated however the OSIM report indicates that this bridge was constructed in 1950. The bridge was constructed based on designs drawn by J. H.

Beatty, an engineer based in Orangeville. Rehabiliation work was planned for 2001 however no improvements were noted during the site visit for this evaluation. The bridge measures 7.15 m long and has an overall width of 7.34 m.

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and application of O. Reg. 9/06 of the *Ontario Heritage Act*, Bridge No. 1 was determined not to have cultural heritage value.

The following recommendations are proposed for Bridge No. 1:

1. This report should be submitted by the proponent to heritage staff at the Town of Caledon and with the Ministry of Heritage, Tourism, Sport and Cultural Industries for review.

6.2 Patterson Road Bridge No. 2 (B22164017)

Bridge No. 2 is a single span cast-in-place rigid frame concrete structure located on Patterson Side Road in the Town of Caledon. Located approximately 150 m to the east of Bridge No. 1, the bridge carries two lanes of vehicular traffic over a branch of the Humber River. Constructed in 1956 by Lloyd P. Finnegan Construction Co. based on designs by Duncan Hopper & Associates, Consulting Engineers, the bridge was rehabilitated at some point prior to 2019. Rehabilitation work included replacement of the original barrier system, which would have matched the original railings for the Duffy's Lane Bridge. The bridge measures 14.51 m long and has an overall width of 8.47 m.

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and application of O. Reg. 9/06 of the *Ontario Heritage Act*, Bridge No. 2 was determined not to have cultural heritage value.

The following recommendations are proposed for Bridge No. 2:

1. This report should be submitted by the proponent to heritage staff at the Town of Caledon and with the Ministry of Heritage, Tourism, Sport and Cultural Industries for review.

6.3 Duffy's Lane Bridge (B22072010)

Duffy's Lane Bridge is a single span cast-in-place rigid frame concrete structure with a northwest-southeast orientation that carries two lanes of vehicular traffic over a small branch of the Humber River. The bridge is located immediately south of Patterson Side Road, on Duffy's Lane, in the Town of Caledon. The Duffy's Lane bridge was designed by Duncan Hopper & Associates Ltd., consulting engineers for the Town, and constructed by J. M. Fuller Ltd. In November of 1957. It was rehabilitated in 2000. The structure measures 10.6 m in overall length and 8.9 m in overall width.

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and application of O. Reg. 9/06 of the *Ontario Heritage Act*, the Duffy's Lane Bridge was determined to have cultural heritage value for physical and contextual reasons. The bridge is considered an intact and representative example of a concrete rigid frame structure, a type which saw a surge of

popularity during the 1950s in the Town of Caledon. The bridge is also a prominent feature of the intersection of Patterson Side Road and Duffy's lane due to the unique arrangement of the railing system.

Given the identified cultural heritage value of the Duffy's Lane Bridge, the following recommendations should be considered:

1. A Heritage Impact Assessment should be completed for the Duffy's Lane Bridge prior to construction, as early as possible during detailed design. This assessment should be completed by a qualified person who has relevant and recent experience in the conservation of road bridges (see Section 3.0 of the Standards and Guidelines for Conservation of Provincial Heritage Properties [MHSTCI 2014] as a guide for best practice) and submitted to heritage staff at the Town of Caledon for review and approval.

2. This report should be submitted by the proponent to heritage staff at the Town of Caledon and with the Ministry of Heritage, Tourism, Sport and Cultural Industries for review.

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APPENDIX A: PHOTOGRAPHIC PLATES, PATTERSON SIDE ROAD BRIDGE NO. 1 (B22162016)



Plate 1: Southern approach towards Bridge No. 1, looking northeast along Patterson Side Road.



Plate 2: Northern approach towards Bridge No. 1, looking southwest.



Plate 3: Bridge No. 1 flexbeam guiderails with galvanized steel posts lining the approach and wooden posts on the bridge.



Plate 4: Oblique view of northwest elevation of Bridge No. 1, showing concrete slab and updated barrier system.



Plate 5: Northwest elevation of Bridge No. 1, concrete slab is clearly visible sandwiched between asphalt deck and concrete support beams.



Plate 6: North abutment of Bridge No. 1.



Plate 7: South abutment of Bridge No. 1.



Plate 8: South abutment of Bridge No. 1 and view of concrete T-Beams



Plate 9: Cast-in-place concrete beams supporting the superstructure of Bridge No. 1.



Plate 10: View southeast beneath the bridge structure, along the waterway



Plate 11: Glass' Bridge, photographed in 2015, in the Town of Innisfil (Bevers 2020)



Plate 12: Duffy's Lane Bridge, constructed in 1950, located 1.7 km north of Castlederg Side Road (Google Street View 2016).



Plate 13: Caledon Trailway Stone Culvert, Designated Part IV (By-law 96-31) (Holth 2020)

APPENDIX B: PHOTOGRAPHIC PLATES, PATTERSON SIDE ROAD BRIDGE NO. 2 (B22164017)



Plate 14: Northeastern approach, looking southwest towards Bridge No. 2.



Plate 15: View northeast across the intersection of Patterson Side Road and Duffy's Lane, towards Bridge No. 2.



Plate 16: Southeast elevation of Bridge No. 2



Plate 17: Oblique view of northwest elevation of Bridge No. 2, south end.



Plate 18: Northwest elevation of Bridge No. 2, north end.



Plate 19: Detail of guard rail, as well as concrete parapet and steel rail barrier system.



Plate 20: View west, of the southeast elevation of the south abutment.



Plate 21: South abutment and underside of the superstructure. The seams indicating the location of formwork used to create the cast-in-place concrete is visible.



Plate 22: Underside of superstructure and north abutment



Plate 23: Kennedy Road Bridge, Town of Caledon (Google Maps, 2015)



Plate 24: Caledon Trailway Bridge over Duffy's Lane, located approximately 180 m northwest of Bridge No. 2 (Google Maps, 2015)

APPENDIX C: PHOTOGRAPHIC PLATES, DUFFY'S LANE BRIDGE (B22072010)



Plate 25: Southeastern approach, looking northwest towards Duffy's Lane Bridge



Plate 26: View southeast along western approach, from the intersection of Patterson Side Road and Duffy's Lane, towards Duffy's Lane Bridge.



Plate 27: Oblique view of northeast elevation of Duffy's Lane Bridge.



Plate 28: Oblique view of southwest elevation of Duffy's Lane Bridge.



Plate 29: Southwest elevation of the east abutment of Duffy's Lane Bridge.



Plate 30: Northeast elevation of the east abutment of Duffy's Lane Bridge.



Plate 31: Detail of guard rail, as well as cement post and steel rail barrier system.



Plate 32: Detail of cement post and steel barrier system, rehabilitated in 2000 using recycled material and designs from original 1957 structure.



Plate 33: Oblique view of cement post and steel barrier system.



Plate 34: East abutment and underside of the superstructure. Wooden piles from a previous structure are visible within the waterway.

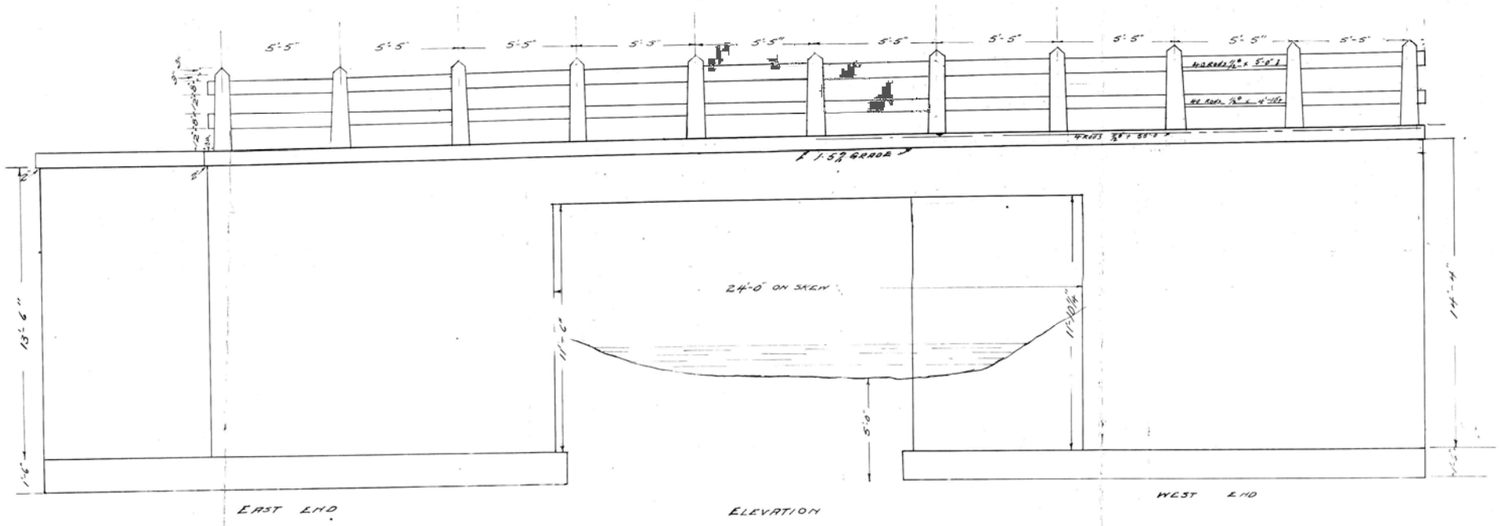


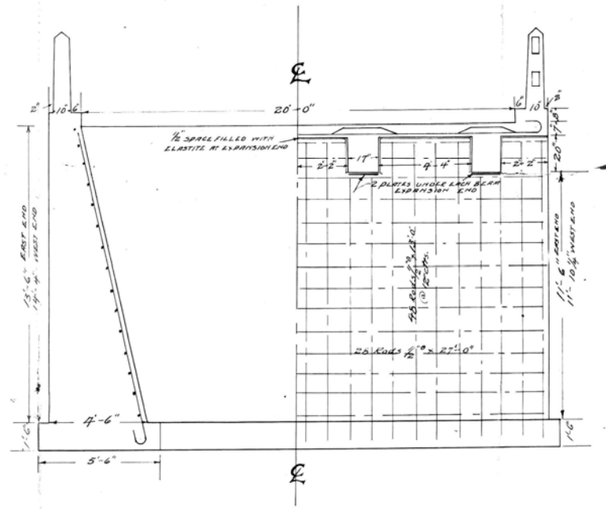
Plate 35: Underside of superstructure and west abutment



Plate 36: Highpoint Sideroad Bridge, located 0.02 km east of Shaws Creek Road (Google Earth 2016)

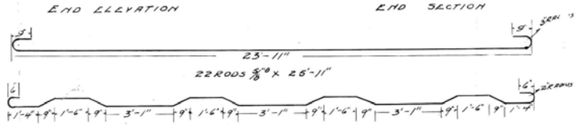
APPENDIX D: SELECT STRUCTURAL DRAWINGS FOR PATTERSON SIDE ROAD BRIDGE NO. 1 (B22162016)



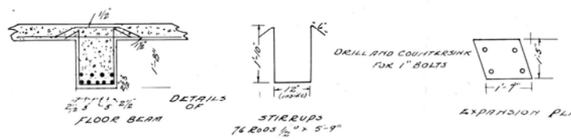


END ELEVATION

END SECTION



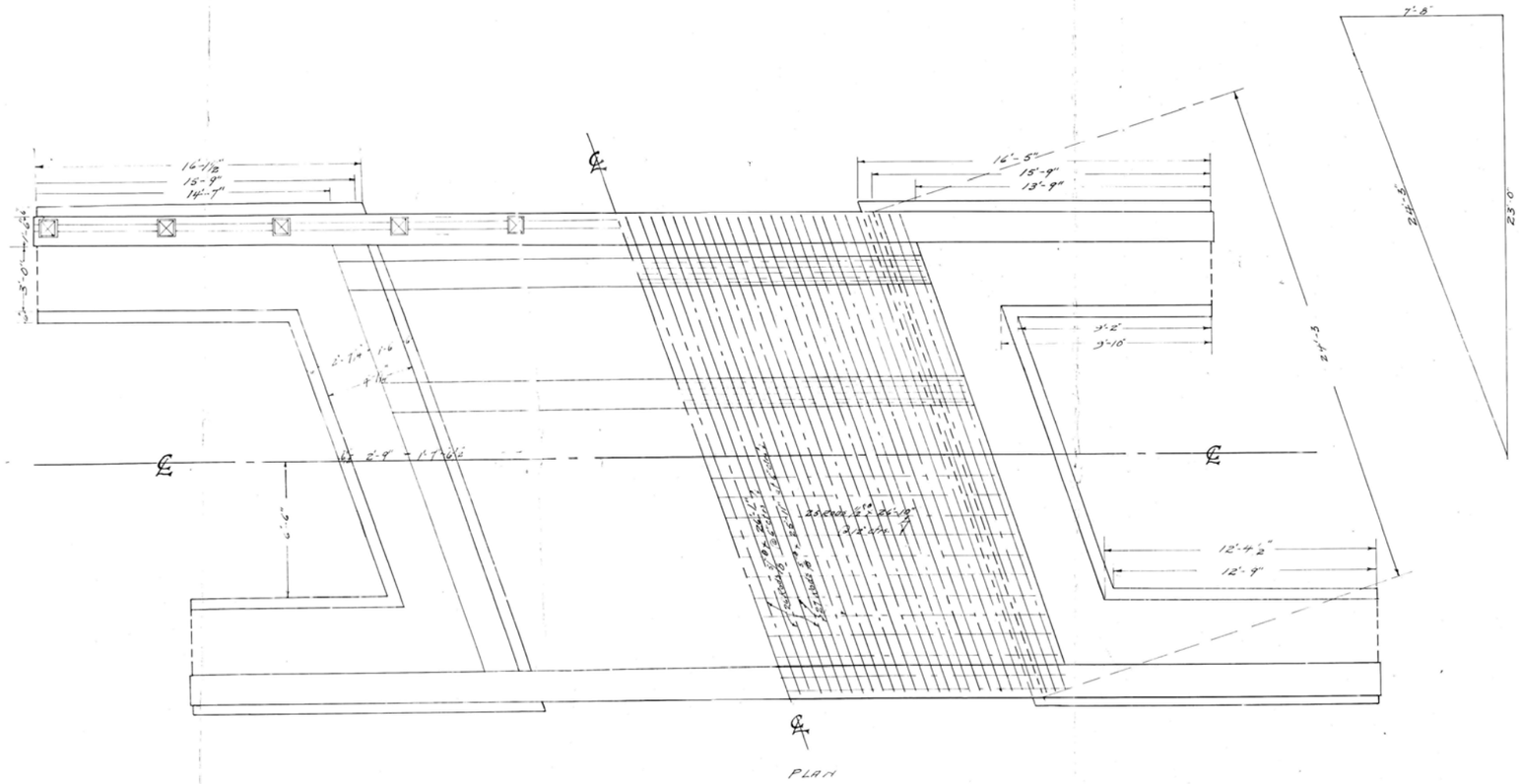
DETAILS OF FLOOR RODS

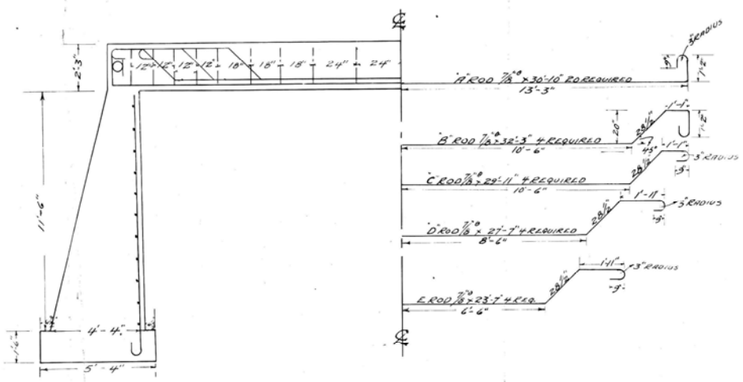


DETAILS OF FLOOR BEAM

STIRRUPS
76 RODS ½" x 5'-9"

EXPANSION PLATE



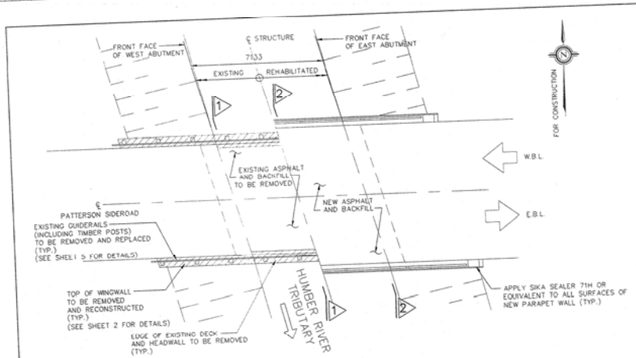


PLAN OF THE TAYLOR BRIDGE ON THE ROAD BETWEEN LOTS 25 AND 26 OPPOSITE CONCESSION 5 TOWNSHIP OF ALBION

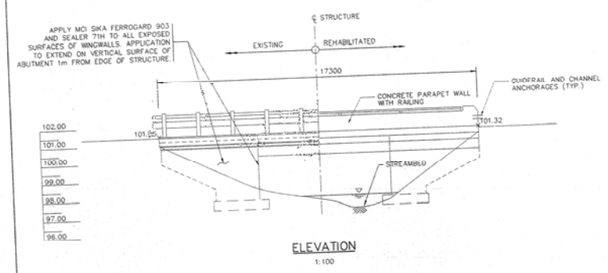
SCALE ⅜" = 1 FOOT

J. HARRITY, ENGINEER, ORANGEVILLE, ONT.

A353-1



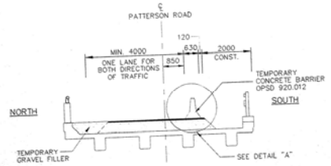
PLAN
1:100



ELEVATION
1:100



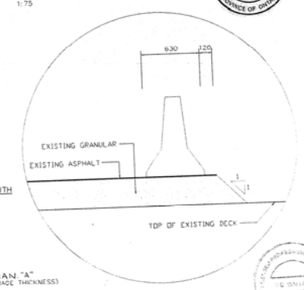
STAGE 1



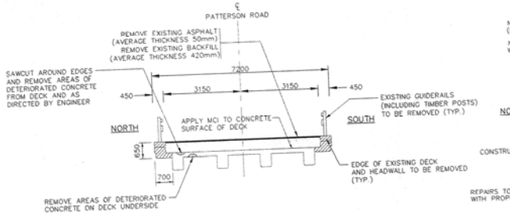
STAGE 2

TRAFFIC & CONSTRUCTION STAGING
1:75

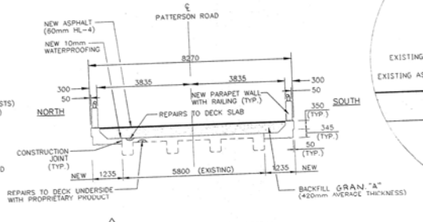
KEYPLAN
N.T.S.



DETAIL "A"
N.T.S.



1 EXISTING SECTION
1:75



2 REHABILITATED SECTION
1:75

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

CONT No 01-02
WP No

TOWN OF CALEDON
PATTERSON SIDEROAD (25TH S.R.)
WEST OF DUFFY'S LANE
BRIDGE REHABILITATION
GENERAL ARRANGEMENT

SHEET 1

paul theil associates limited
consulting engineers
131 Betta Park Blvd., Brampton, Ontario

GENERAL NOTES:

1. CLASS OF CONCRETE - 30 MPa
2. REINFORCING STEEL SHALL BE GRADE 400 PREFIX "E" DENOTES COATED BARS
3. ALL DESIGN REQUIREMENTS SHALL BE IN ACCORDANCE WITH ONTARIO HIGHWAY BRIDGE DESIGN CODE, 3RD EDITION, 1991
4. UNLESS SHOWN OTHERWISE, TENSION LAP LENGTHS NOT INDICATED ON THE CONTRACT DRAWINGS SHALL BE CLASS B.
5. BAR HOOKS SHALL BE MINIMUM LENGTH UNLESS INDICATED OTHERWISE.
6. CLEAR COVER TO REINFORCING STEEL 70±20 UNLESS OTHERWISE NOTED
7. SAWCUTS IN CONCRETE SHALL BE 25mm DEEP OR TO FIRST LAYER OF REINFORCING STEEL WHICHEVER IS LESS
8. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS OF THE EXISTING WORK AND ALL DETAILS ON SITE AND REPORT DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

NOTES ON VERTICAL CONTROLS

1. EXISTING VERTICAL PROFILE OF THE ROAD TO BE MAINTAINED.

APPLICABLE STANDARD DRAWINGS

OPSD-3904.04 DRIP DETAIL
OPSD-3906.02 BRIDGE DECK WATERPROOFING
OPSD-3906.03 BRIDGE DECK WATERPROOFING DETAILS
OPSD-4010.00 GUIDE RAIL & CHANNEL ANCHORAGE
OPSD-4870.00 TYPICAL JOINT DETAILS

LIST OF DRAWINGS

SHEET 1 GENERAL ARRANGEMENT
SHEET 2 REMOVALS AND RECONSTRUCTION DETAILS
SHEET 3 PARAPET WALL WITH RAILING-PERFORMANCE LEVEL 2
SHEET 4 RAILING FOR BARRIER WALL
SHEET 5 BRIDGE ROADSIDE SAFETY LAYOUT
SHEET 6 ROAD WORKS

SCOPE & SUGGESTED SEQUENCE OF WORK IN DECK

STAGE 1

1. PLACE TRAFFIC CONTROLS FOR STAGE 1 CONSTRUCTION.
2. REMOVE EXISTING ASPHALT AND BACKFILL FROM DECK IN CONSTRUCTION AREA
3. REMOVE EXISTING GUARDRAILS, INCLUDING TIMBER POSTS
4. SAWCUT AND REMOVE EDGE OF EXISTING DECK AND TOP OF WINGWALLS.
5. INSTALL DOWELS ON DECK AND WINGWALLS AND CONSTRUCT NEW BRIDGE WIDENING.
6. INSTALL NEW CONCRETE PARAPET WALL.

STAGE 2

1. MOVE TRAFFIC CONTROLS FOR STAGE 2 CONSTRUCTION.
2. REPEAT STEPS 2 TO 6 FROM STAGE 1 CONSTRUCTION.

STAGE 3

1. CLOSE STRUCTURE TO TRAFFIC AND REMOVE TEMPORARY BARRIERS
2. REMOVE EXISTING ASPHALT AND BACKFILL FROM DECK.
3. REMOVE ALL LOOSE AND DETERIORATED CONCRETE IN DECK.
4. APPLY MCI TO CONCRETE SURFACE OF DECK.
5. MAKE REPAIRS ON DECK WITH PROPRIETARY PRODUCT.
6. PLACE NEW WATERPROOFING ON DECK BACKFILL AND ASPHALT (HL-4) ON DECK AND APPROACHES.
7. RESTORE TRAFFIC TO ENTIRE STRUCTURE.

OTHER COMPONENTS

1. MAKE REPAIRS TO DECK UNDERSIDE, SURFACES OF ABUTMENTS AND WINGWALLS.
2. APPLY MCI AND SEALER TO SURFACES OF ABUTMENTS AND WINGWALLS.

PROFESSIONAL ENGINEER PROVINCE OF ONTARIO
M. ROBIELA

PRINTED
JAN 10 2001
PAUL THEIL ASSOCIATES LIMITED

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

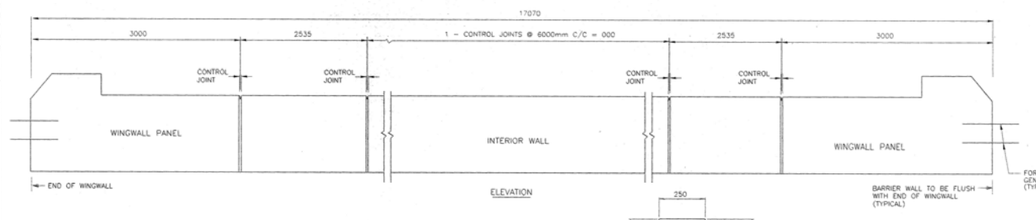
METRIC

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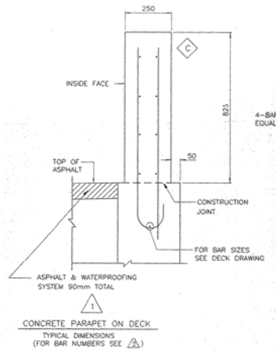
CONT No 01-02
WP No

TOWN OF CALEDON
PATTERSON SIDEROAD (25TH S.R.)
WEST OF DUFFY'S LANE
PARAPET WALL WITH RAILING
PERFORMANCE LEVEL 2

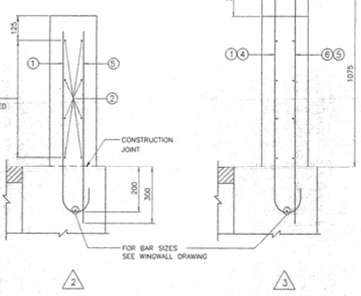
SHEET 3



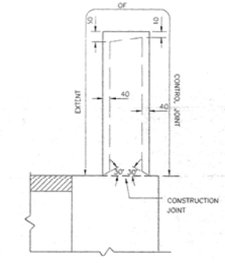
ELEVATION



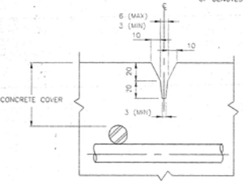
CONCRETE PARAPET ON DECK
TYPICAL DIMENSIONS
(FOR BAR NUMBERS SEE ⚠1)



CONCRETE PARAPET ON WINGWALL
TYPICAL REINFORCEMENT



EXTENT OF CONTROL JOINT IN PARAPET WALL

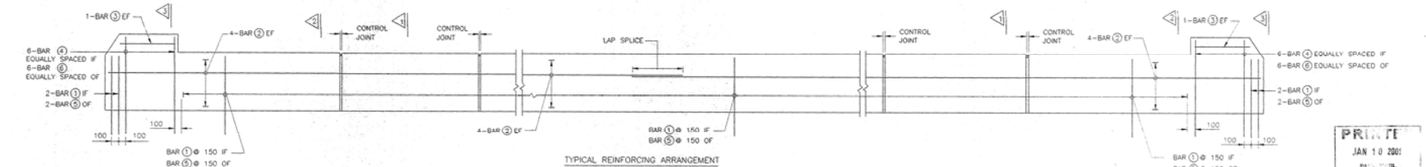


CONTROL JOINT DETAIL

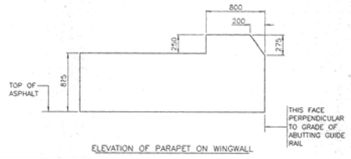
NOTES:

1. CHASE REQUIRED ON HIGH AND LOW SIDE OF CROSSFALL
2. CONCRETE COVER TO REINFORCING STEEL 70 ±20mm.
3. BAR LAP SPLICE FOR HORIZONTAL REINFORCEMENT MUST NOT LAP THROUGH CONTROL JOINT.
4. MINIMUM BAR LAP SPLICE TO BE 550mm.
5. LENGTH OF HORIZONTAL BAR TO SUIT CONTRACTOR'S OPERATIONS. BAR LENGTHS NEED NOT MATCH DISTANCE BETWEEN CONTROL JOINTS
6. CONTROL JOINT TO BE FORMED.
7. SAWCUTS NOT PERMITTED.
8. CONTROL JOINT FORM HARDWARE NOT TO BE LEFT IN PLACE
9. OPTIONAL CONSTRUCTION JOINTS TO BE LOCATED WITHIN LIMITS OF CONCRETE DAMS ON DECK OR BALLAST WALL
10. LEGEND
    EF DENOTES EACH FACE
    IF DENOTES INSIDE FACE
    OF DENOTES OUTSIDE FACE

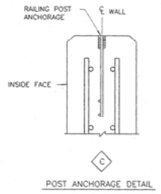
BAR MARK	SIZE	SHAPE
1	15M	160 – 65 / L – C / T – 675
2	15M	STRAIGHT
3	15M	STRAIGHT
4	15M	160 – 65 / L – C / T – 125
5	15M	STRAIGHT
6	15M	STRAIGHT



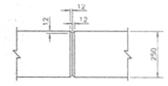
TYPICAL REINFORCING ARRANGEMENT



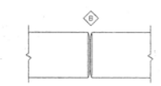
ELEVATION OF PARAPET ON WINGWALL



POST ANCHORAGE DETAIL



TYPICAL CONSTRUCTION JOINT



TYPICAL CONTROL JOINT

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

APPLICABLE STANDARD DRAWINGS

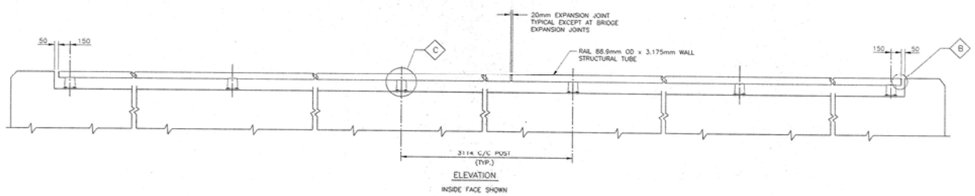
SS110-21 RAILING FOR BARRIER/PARAPET WALL
(MODIFIED)

STANDARD DRAWING MARCH 1997	SS110-53
PARAPET WALL WITH S/W & RAILING PERFORMANCE LEVEL 2	

PRIVATE
JAN 10 2001

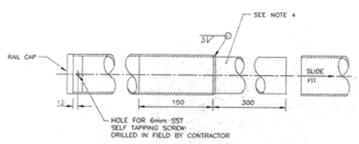
REVISIONS		
DATE	BY	DESCRIPTION

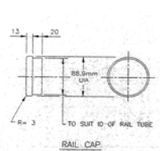
DESIGN STD	CHK	CODE OHBDC'91	LOAD	DATE JAN. 2001
DRAWN KG	CHK MK	SITE 34-102		DWG 3



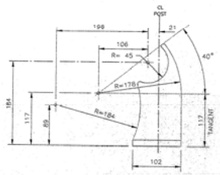
ELEVATION

INSIDE FACE SHOWN

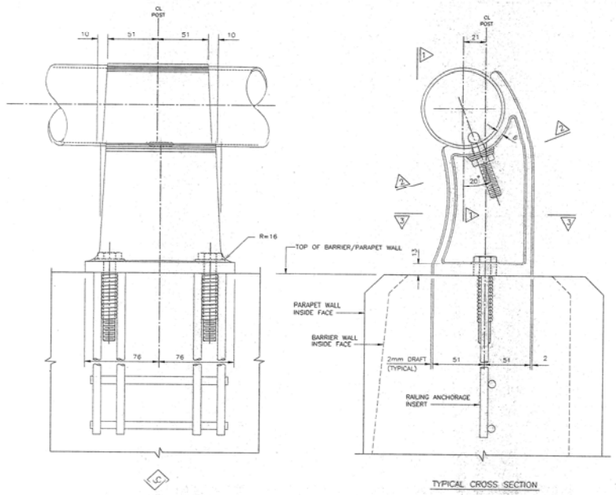




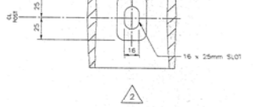
RAIL CAP



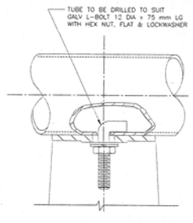
POST DETAILS

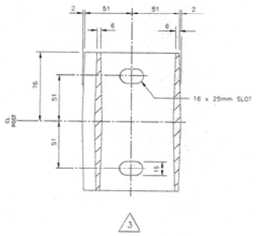


TYPICAL CROSS SECTION



L-BOLT NOT SHOWN





DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

CONT No 01-02
WP No

TOWN OF CALEDON
PATTERSON SIDEROAD (25TH S.R.)
WEST OF DUFFY'S LANE

RAILING FOR BARRIER / PARAPET WALL

SHEET 4

NOTES:

1. RAIL ELEMENTS SHALL BE STRUCTURAL TUBING SUPPLIED IN ACCORDANCE WITH CSA G40.21-M92 GRADE 350.
2. STEEL IN POSTS SHALL BE CAST STEEL SUPPLIED IN ACCORDANCE WITH ASTM A27-60 GRADE 65-35.
3. RAIL SHALL BE SUPPLIED WITH SPLICE IN LENGTHS OF 6980mm (EXCLUDING SPLICE) EXCEPT AS NOTED.
4. GALVANIZED RAIL TUBING MATING SURFACES TO HAVE A 2 ± 0.5mm GAP ALL AROUND TO ENSURE A SLIDE FIT.
5. POSTS AND RAILS SHALL BE GALVANIZED IN ACCORDANCE WITH CSA G164-M. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION.
6. ELECTRODES SHALL BE A LOW HYDROGEN SPECIFICATION E7015, E7016 OR E7018.
7. POST AND ANCHORAGE TO INCLUDE ALL BOLTS AND WASHERS.
8. END CAP TO INCLUDE SST SELF TAPPING FASTENERS.
9. L-BOLT, NUT AND WASHERS FOR FASTENING STEEL TUBING TO POSTS SHALL BE GALVANIZED (CSA G164-M).
10. ALTERNATE RAIL CAPS MAY BE USED WITH APPROVAL OF ENGINEER.
11. RAIL SHALL BE PREBENT TO FOLLOW ROAD CURVATURE WHERE RADIUS IS LESS THAN 150m.
12. RAIL POSTS SHALL BE SET PERPENDICULAR TO GRADE.
13. WHERE LAYOUT OF POSTS IS NOT SHOWN, POST LOCATION SHALL BE DETERMINED BY THE CONTRACTOR.
14. RAIL MAY BE CUT AS REQUIRED IN FIELD WITH PIPE CUTTERS. CUT TO BE SURFACE TREATED WITH ZINC RICH PAINT.
15. WHEN CONNECTING TO EXISTING RAILING, RAIL MUST BE MADE CONTINUOUS AND POST SPACING DETERMINED WITH REFERENCE TO EXISTING POSTS.
16. ALTERNATIVE ALUMINUM RAIL AND POST DESIGNS WILL BE PERMITTED SUBJECT TO PRIOR APPROVAL BY MTO. THE RAIL SHALL BE 6061 ALLOY T-6 HEAT TREATED. WHEN AN EXTRUDED POST IS USED, THE ALLOY AND HEAT TREATMENT SHALL BE THE SAME AS SPECIFIED FOR THE RAIL. ALUMINUM DESIGNS SHALL BE EQUIVALENT IN STRENGTH TO THE DESIGN SHOWN ON THIS DRAWING, WITH A CONFIGURATION TO PERMIT COMPLETE INTERCHANGEABILITY WITH GALVANIZED STEEL POSTS AND RAILS.
17. LENGTH FOR 88.9 mm OD PIPE WITH SPLICE GIVEN IN TABLE DOES NOT INCLUDE 300 mm PROTRUSION OF SPLICE TUBE.
18. SPLICING OF RAIL TUBES MAY BE DONE BY WELDING ON OF SPLICE PIECE OR BY SWEDGING OF RAIL END.
19. RAILING ANCHORAGE INSERT TO BE PLACED PRIOR TO CONCRETING.

POST SPACING	
MINIMUM mm	MAXIMUM mm
2 500	3 500

PRINTED
JAN 10 2001
PAUL THEIL
ASSOCIATES LIMITED

ITEM	NO. REQ'D	LINEAR mm	BENDING RADIUS	LOCATION
POST AND ANCHORAGE	6 6	----	----	NORTH SIDE SOUTH SIDE
END CAP	4	----	----	2 EACH SIDE
88.9 OD PIPE WITH SPLICE (6980mm LG)	1 1	7000 7000	----	NORTH SIDE SOUTH SIDE
88.9 OD PIPE WITHOUT SPLICE (4425mm LG)	1 1	4425 4425	----	NORTH SIDE SOUTH SIDE
88.9 OD PIPE WITH SPLICE (4425 mm LG)	1 1	4445 4445	----	NORTH SIDE SOUTH SIDE

APPLICABLE STANDARD DRAWINGS

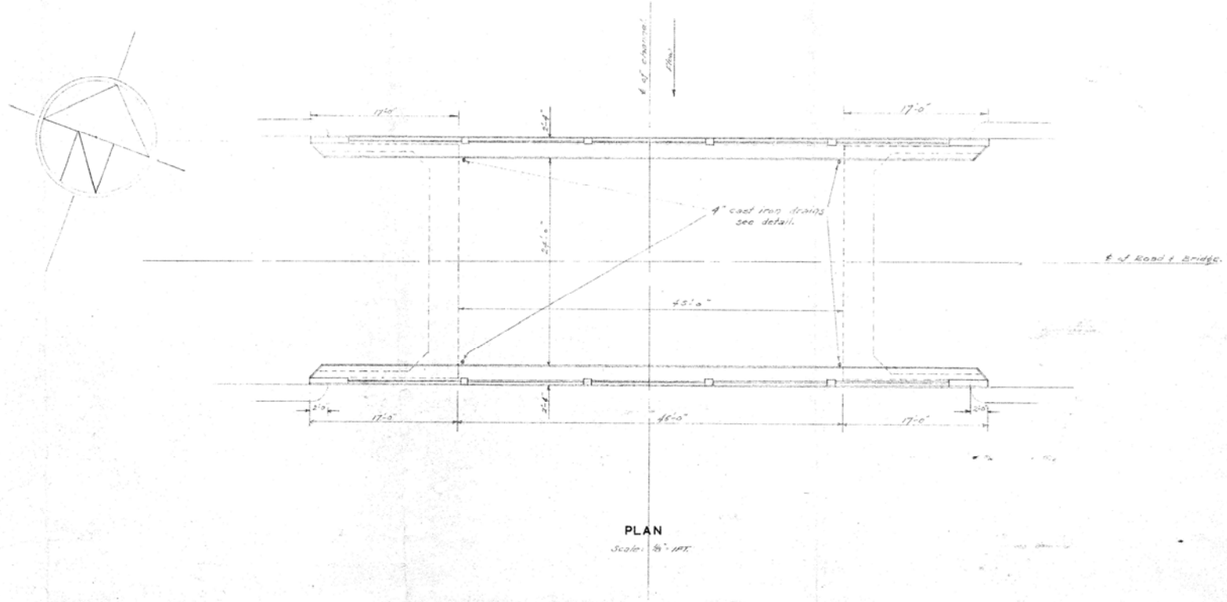
OPSD-4019.000 SINGLE RAIL ANCHORAGE INSERTS

(MODIFIED)

STANDARD DRAWING MARCH 1997	SS110-21
RAILING FOR BARRIER/PARAPET WALL	

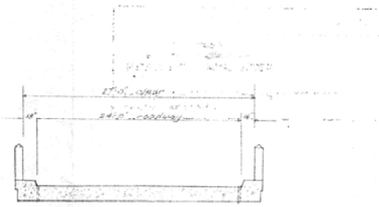
REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN STD	CHK	CODE CHBDC '91	LOAD
DRAWN KS	CHK MR	SITE	DATE JAN. 2001
			DWG 4

APPENDIX E: SELECT STRUCTURAL DRAWINGS FOR PATTERSON SIDE ROAD BRIDGE NO. 2 (B22164017)



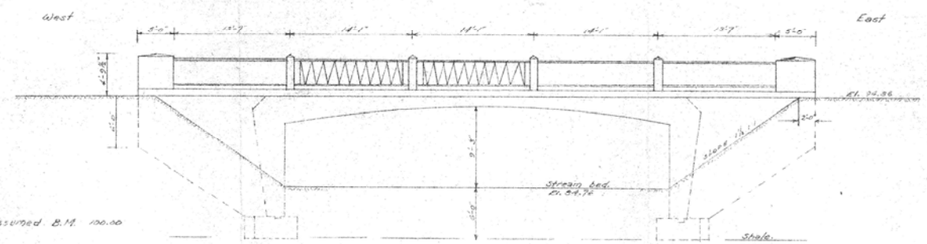
PLAN

Scale: 3/64" = 1FT.



SECTION AT CROWN OF ARCH

Scale: 1/8" = 1FT.



DOWNSTREAM ELEVATION

Scale: 1/8" = 1FT.



SITE PLAN

24-34

Examined and approved
for design this ..... day of .....
DEPARTMENT OF HIGHWAYS
Parliament Buildings
TORONTO
Approved Sept 15/54
A Sedgwick
CHIEF BRIDGE ENGINEER

DATE	REVISIONS	BY

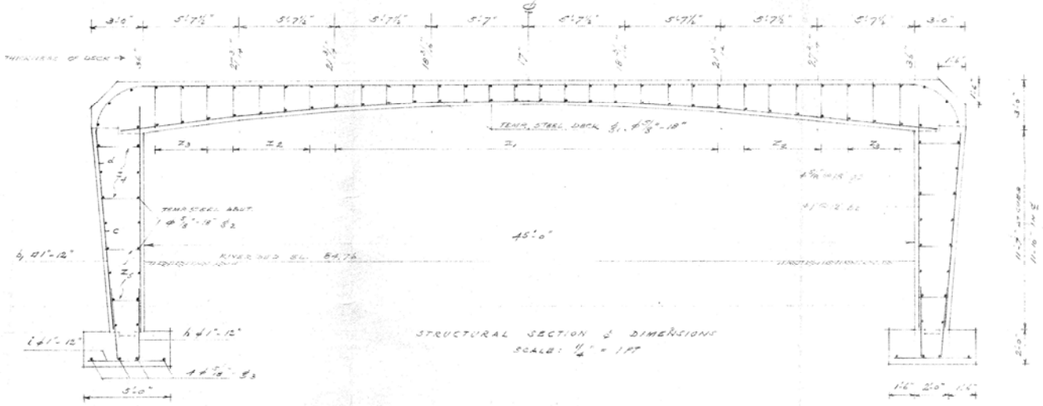
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK.

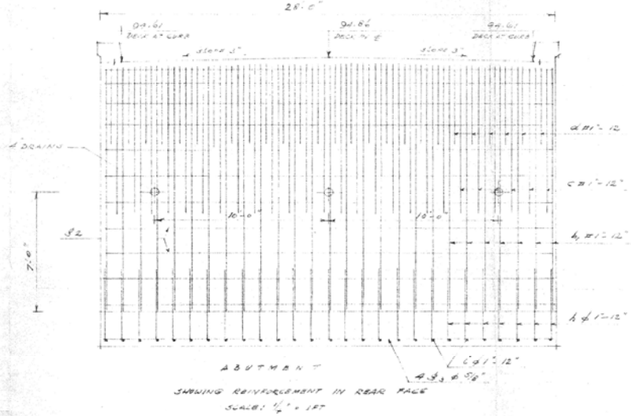
GENERAL ARRANGEMENT

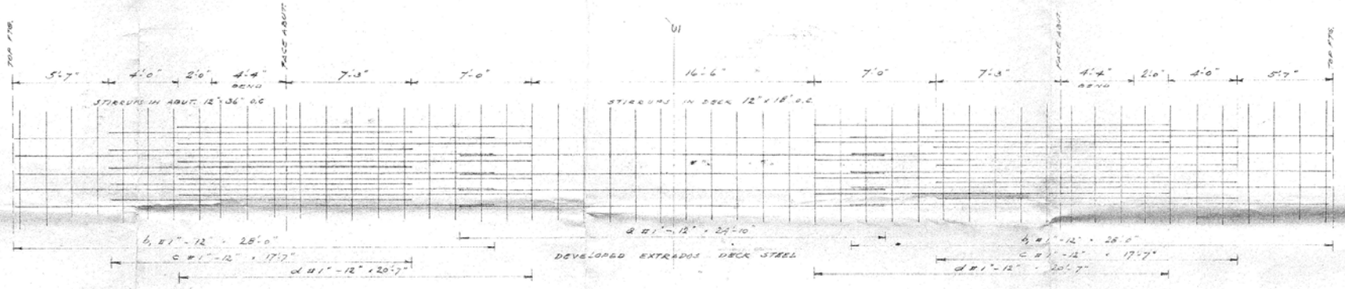
DRAWN BY: M.C.	HUMBER BRIDGE	JOB NO. 5650
CHECKED BY: M.D.D.	TOWNSHIP OF ALBION LOTS 25 & 26. CON. 6.	PLAN NO. 5650-1
SCALE: AS SHOWN		DATE: Sept. 54

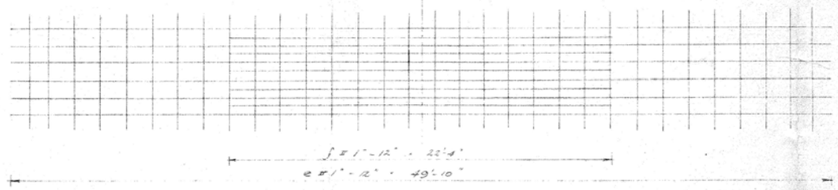
DUNCAN HOPPER & ASSOCIATES
CONSULTING ENGINEERS
TORONTO CANADA

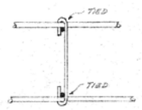
PLAN No. 1 of 8196-1











STIRRUP DETAIL

STIRRUP SIZE: Z_1 4 3/16"
$Z_2 \cdot Z_3 \cdot Z_4 \cdot Z_5$ 4 1/2"

24-34

Examined and approved
for design this ... day of ...
DEPARTMENT OF HIGHWAYS, ONTARIO
Parliament Buildings
TORONTO
Approved Sept 15/56
CHIEF BRIDGE ENGINEER

DATE	REVISIONS	BY

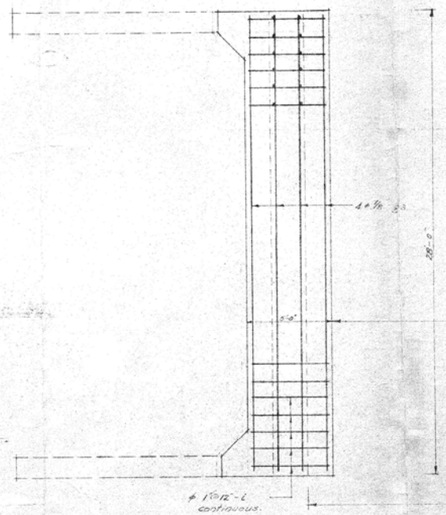
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK.

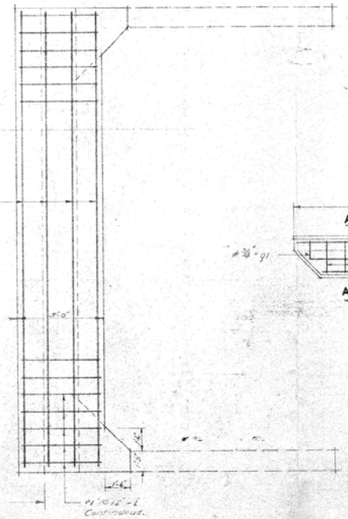
FRAME DETAILS

DRAWN BY J.L.H.	HUMBER BRIDGE	JOB No. 5650
CHECKED BY A.A.S.	TOWNSHIP OF ALBION	PLAN No. 58-520
SCALE 1/4"=1FT	LOTS 25&26 CON. 6.	DATE 1956

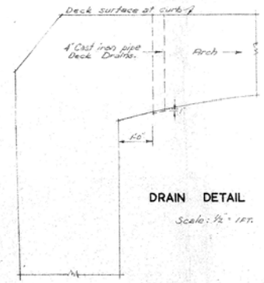
DUNCAN HOPPER & ASSOCIATES
CONSULTING ENGINEERS
TORONTO CANADA

PLAN No. 8196-2

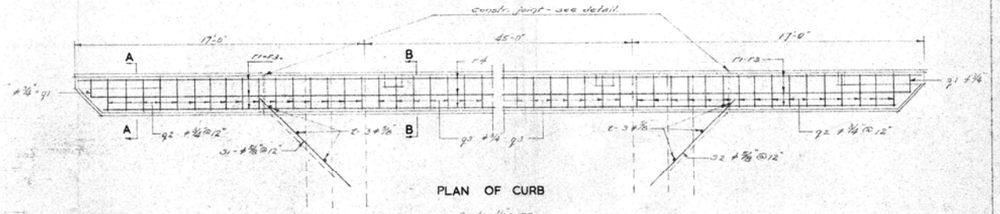




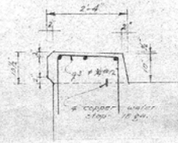
FOUNDATION PLAN
SHOWING REINFORCEMENT
Scale: ⅛" = 1FT.



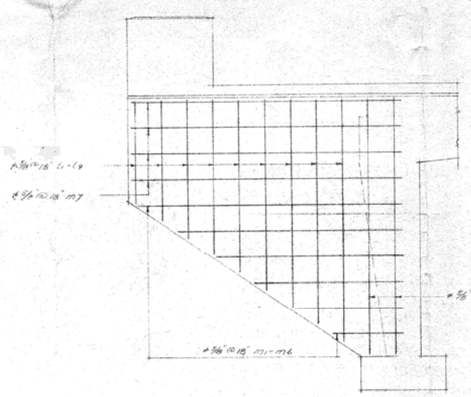
DRAIN DETAIL
Scale: ½" = 1FT.



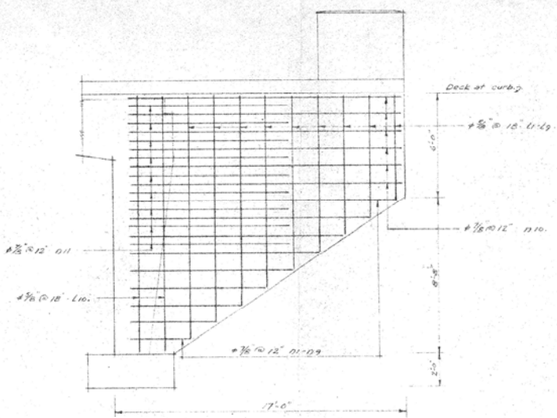
PLAN OF CURB
Scale: ¼" = 1FT.



SECTION B-B
Scale: ½" = 1FT.

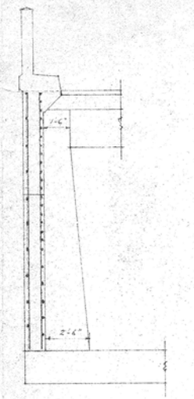


REINFORCEMENT IN OUTSIDE FACE.

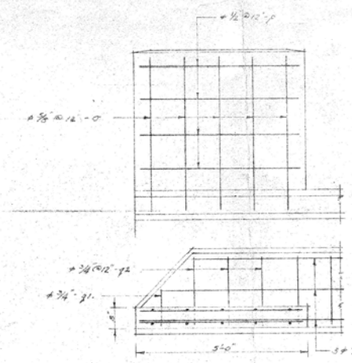


WINGWALL
Scale: ¼" = 1FT.

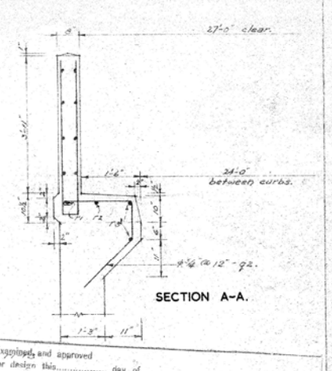
REINFORCEMENT IN INSIDE FACE.



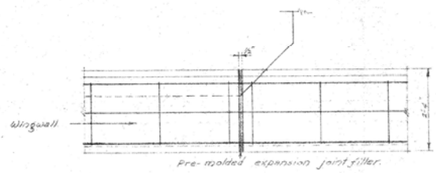
REAR VIEW OF WINGWALL
SHOWING REINFORCEMENT.
Scale: ½" = 1FT.



CONCRETE END POST DETAIL
Scale: ½" = 1FT.

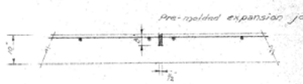


SECTION A-A.



PLAN

CURB EXPANSION JOINT
Scale: ½" = 1FT.



ELEVATION

Examined and approved
for design this ..... day of .....
DEPARTMENT OF HIGHWAYS, Approved Sept 15/51
Parliament Buildings
TORONTO H Redpath
CHIEF BRIDGE ENGINEER

24-34

DATE	REVISIONS	BY

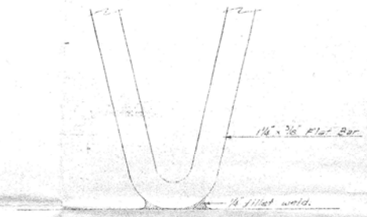
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK.

FOUNDATION, WINGWALLS,& DETAILS.

DRAWN BY RC	HUMBER BRIDGE	JOB No. 56.50
CHECKED BY D.D.H.	TOWNSHIP OF ALBION	PLAN No. 56.50 -3
SCALE ½" = 1FT.	LOTS 25&26. CON. 6.	DATE Sept. 4, '51

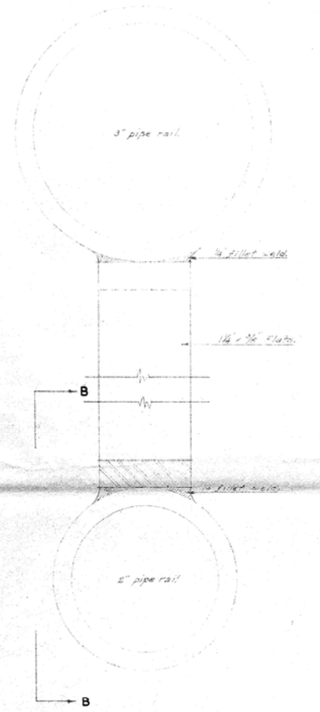
DUNCAN HOPPER & ASSOCIATES
CONSULTING ENGINEERS
TORONTO CANADA

PLAN No 8196-3



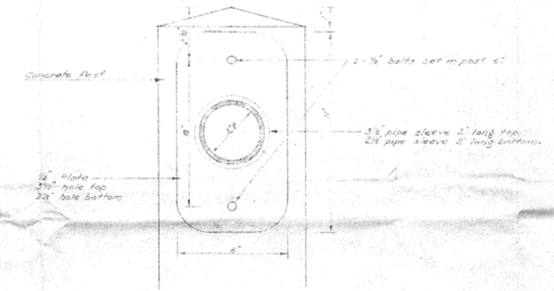
SECTION B-B

Scale: Full Size.



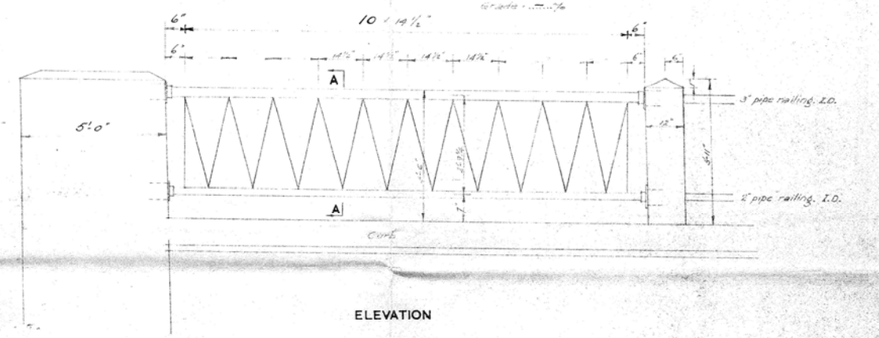
SECTION A-A

Scale: Full Size.



POST CONNECTION

Scale: 3" = 1 FT.



ELEVATION

N.T.S.

24-34

Examined and approved
for design this ... day of ...
DEPARTMENT OF HIGHWAYS
Parliament Buildings
TORONTO
Approved Sept 15/56
A Sedgwick
CHIEF BRIDGE ENGINEER

DATE	REVISIONS

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK

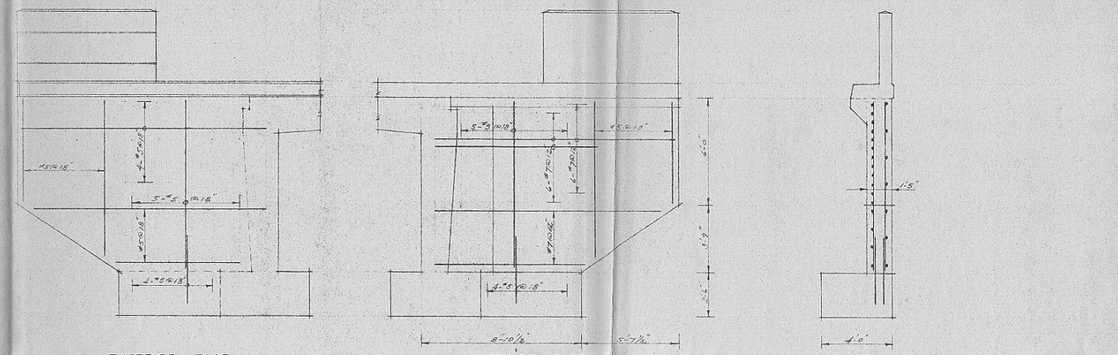
HANDRAIL DETAILS

DRAWN BY H.K.	HUMBER BRIDGE	JOB No. 5630
DESIGNED BY A.D.D.	TWP OF ALBION	PLAN No. 5630 5
SCALE AS SHOWN		DATE SEPT 1956

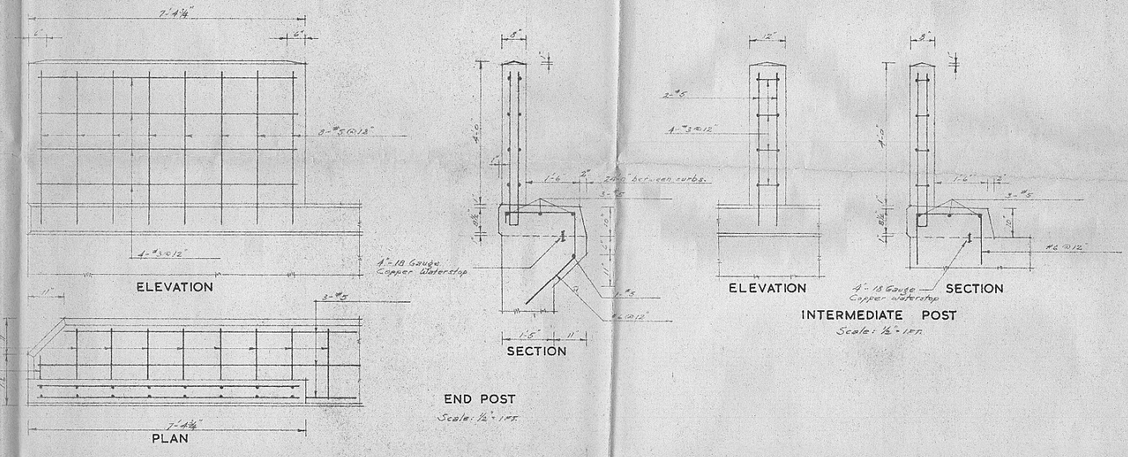
DUNCAN HOPPER & ASSOCIATES
CONSULTING ENGINEERS
TORONTO CANADA

PLAN No 8196-5

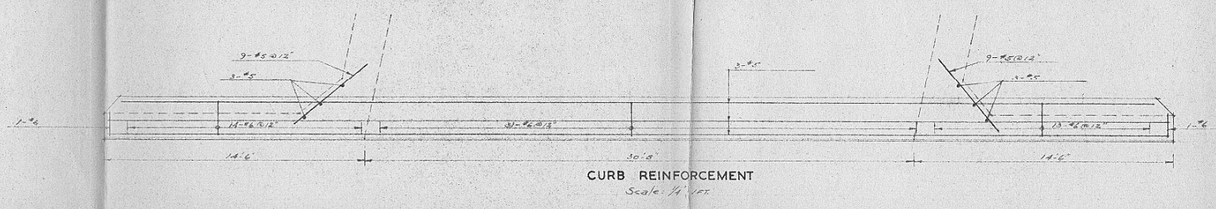
APPENDIX F: SELECT STRUCTURAL DRAWINGS FOR DUFFY'S LANE BRIDGE (B22162016)



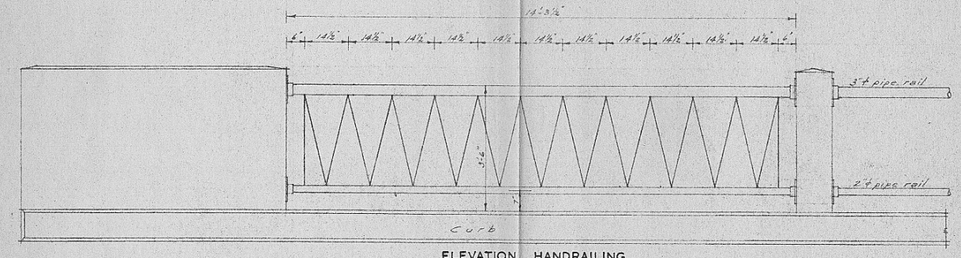
WINGWALL REINFORCEMENT
Scale: 1/4" 1FT.



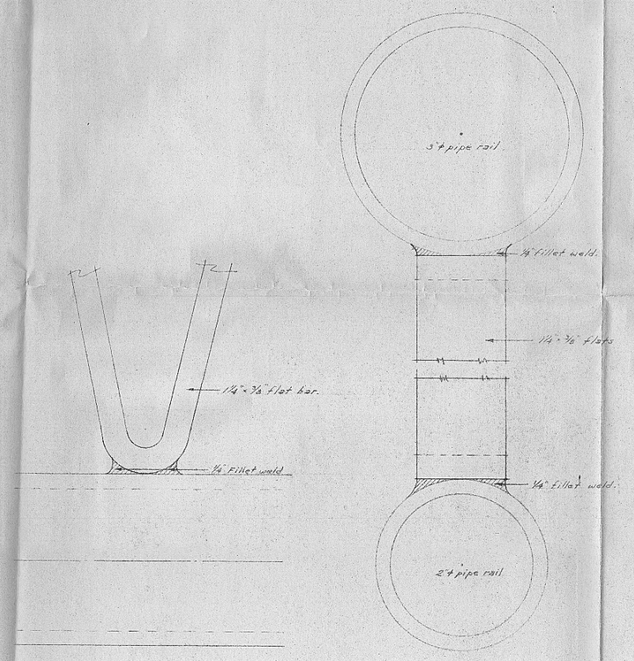
Scale: 1/2" 1FT.



Scale: 1/4" 1FT.

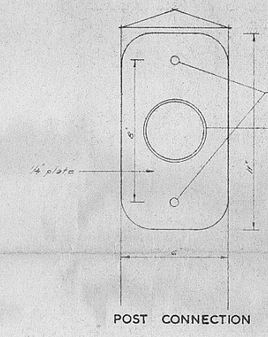


ELEVATION HANDRAILING
Scale: 1/2" 1FT.



HANDRAIL DETAIL.
Scale: Actual size.

Note: Handrailing.
All pipe to be standard strength.
All components except bolts to receive one shop coat of red lead primer. Bridge Contractor to apply two field coats of paint. (First light grey. Second dark green.)



POST CONNECTION
Scale: 3" 1FT.

2435 #8784-4

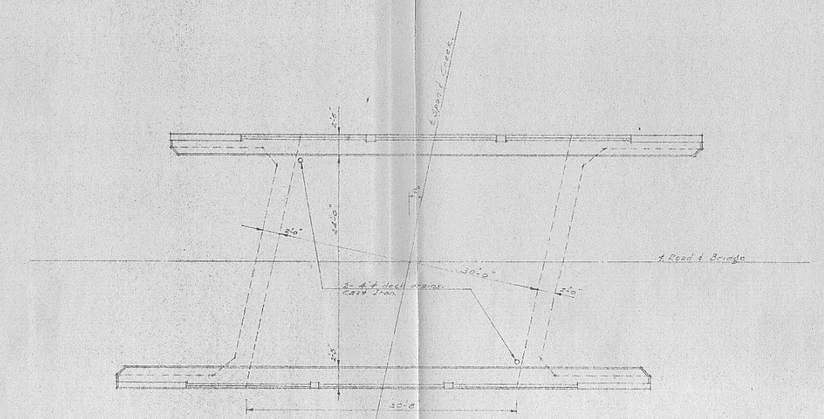
DATE	REVISIONS	BY

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK.

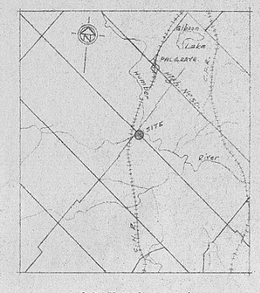
DETAILS

DRAWN BY		JOB No.
H.	BRIDGE	5783
CHECKED BY	LOT 25 CON 5&6. TOWNSHIP OF ALBION.	PLAN No. 5783 -5
SCALE: As shown		DATE: Oct 24, 57

DUNCAN, MUPPER & ASSOCIATES, LIMITED
CONSULTING ENGINEERS
TORONTO CANADA

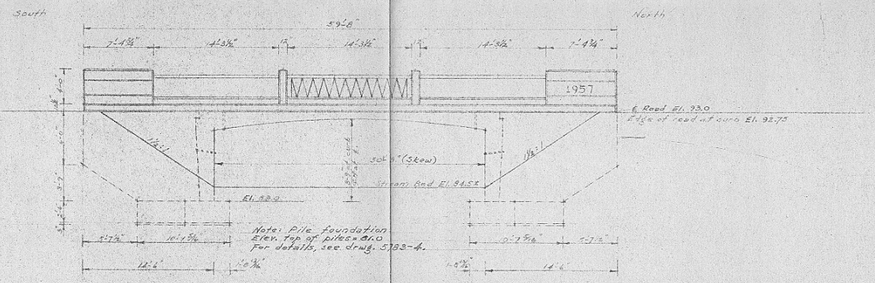


PLAN VIEW

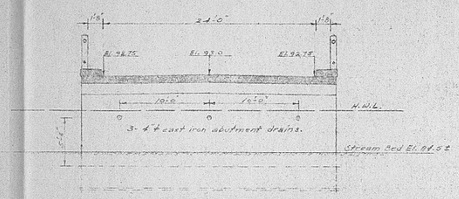


LOCATION PLAN

Scale: 1" = 1 mile.



ELEVATION



SECTION THROUGH ℄ SPAN

Examined and approved
for design this 12 day of Nov. 57
DEPARTMENT OF HIGHWAYS, ONTARIO
Parliament Buildings
TORONTO
CHIEF BRIDGE ENGINEER

24-35 #8784-1

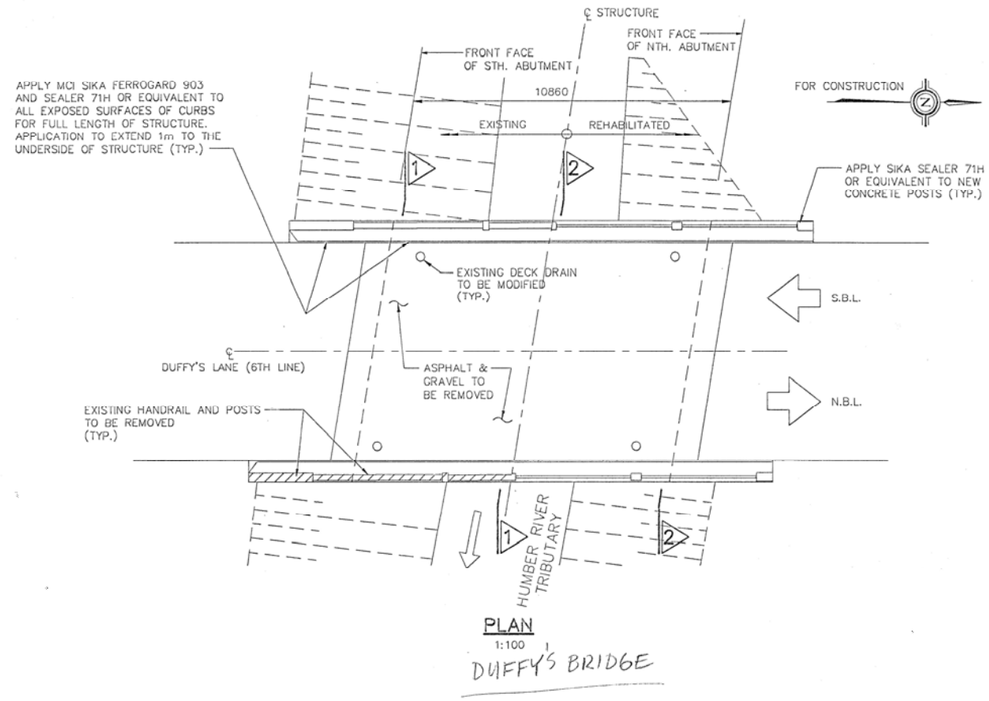
DATE	REVISIONS	BY

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO ENGINEERS BEFORE PROCEEDING WITH THE WORK.

GENERAL ARRANGEMENT PLAN

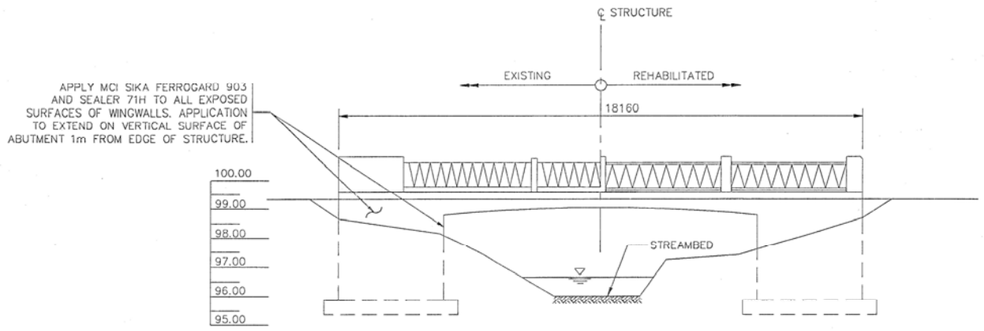
DRAWN BY H.	BRIDGE	DRG. NO. 5783
CHECKED BY	LOT 25 CON. 5 & 6 TOWNSHIP OF ALBION	PLAN NO. 8783 -2
SCALE As shown		DATE Oct. 24/57

DUNCAN HOPPER & ASSOCIATES, LIMITED
CONSULTING ENGINEERS
TORONTO CANADA

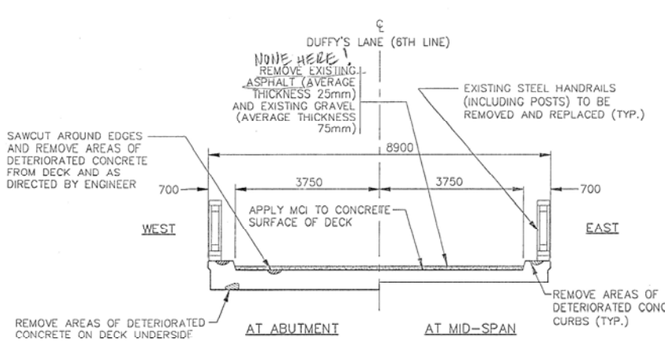


PLAN
1:100

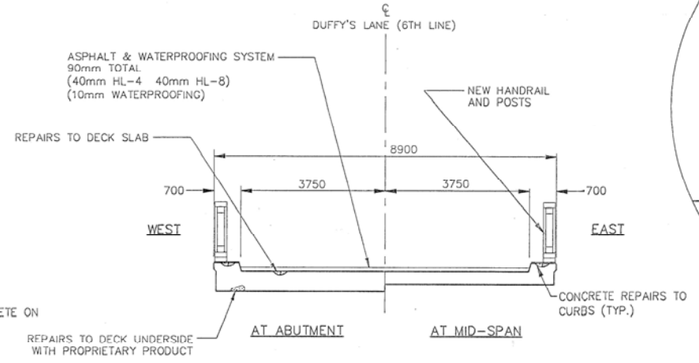
DUFFY'S BRIDGE



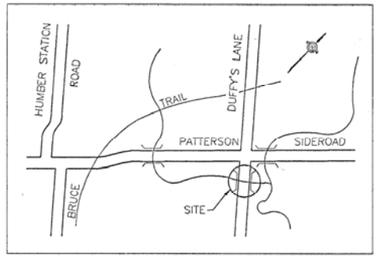
ELEVATION
1:100



1 EXISTING SECTION
1:75

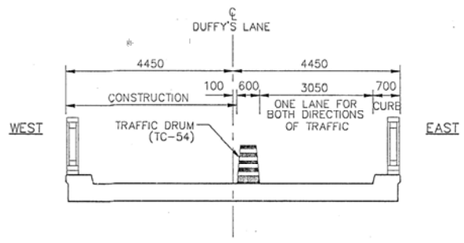


2 REHABILITATED SECTION
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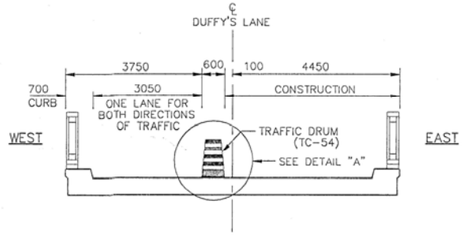


KEYPLAN
N.T.S.

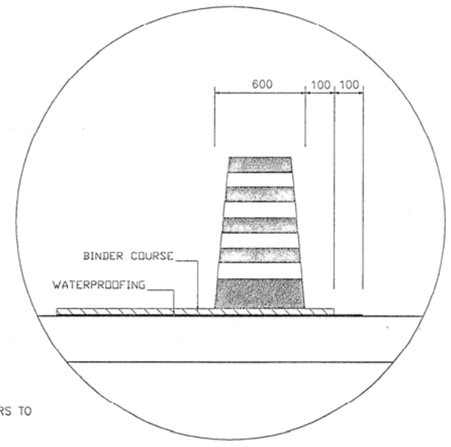
Duffy's lane bridge
1957
Patterson



STAGE 1
TRAFFIC & CONSTRUCTION STAGING
1:75



STAGE 2
TRAFFIC & CONSTRUCTION STAGING
1:75



DETAIL "A"
N.T.S.

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

CONT No
WP No

TOWN OF CALEDON
DUFFY'S LANE (6TH LINE) SOUTH OF PATTERSON SIDEROAD
BRIDGE REHABILITATION
GENERAL ARRANGEMENT

SHEET 1

paul theil associates limited
consulting engineers
131 Delta Park Blvd. , Brampton, Ontario

GENERAL NOTES:

1. CLASS OF CONCRETE
   – 30 MPa
2. REINFORCING STEEL SHALL BE GRADE 400. PREFIX "C" DENOTES COATED BARS.
3. ALL DESIGN REQUIREMENTS SHALL BE IN ACCORDANCE WITH ONTARIO HIGHWAY BRIDGE DESIGN CODE, 3RD EDITION, 1991
4. UNLESS SHOWN OTHERWISE, TENSION LAP LENGTHS NOT INDICATED ON THE CONTRACT DRAWINGS SHALL BE CLASS B.
5. BAR HOOKS SHALL BE MINIMUM LENGTH UNLESS INDICATED OTHERWISE.
6. CLEAR COVER TO REINFORCING STEEL 70±20 UNLESS OTHERWISE NOTED.
7. SAWCUTS IN CONCRETE SHALL BE 25mm DEEP OR TO FIRST LAYER OF REINFORCING STEEL, WHICHEVER IS LESS.
8. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS OF THE EXISTING WORK AND ALL DETAILS ON SITE AND REPORT DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

NOTES ON VERTICAL CONTROLS

1. EXISTING VERTICAL PROFILE OF THE ROAD TO BE MAINTAINED.

APPLICABLE STANDARD DRAWINGS

OPSD-3901.01 MODIFICATION OF ROUND, VERTICAL DECK DRAIN
OPSD-3906.02 BRIDGE DECK WATERPROOFING
OPSD-3906.03 BRIDGE DECK WATERPROOFING DETAILS
OPSD-4010.00 GUIDE RAIL & CHANNEL ANCHORAGE
OPSD-4670.00 TYPICAL JOINT DETAILS

LIST OF DRAWINGS

SHEET 1 GENERAL ARRANGEMENT
SHEET 2 REMOVALS
SHEET 3 BARRIER AND RAILING RECONSTRUCTION
SHEET 4 STANDARD AND MISCELLANEOUS DETAILS

SCOPE & SUGGESTED SEQUENCE OF WORK IN DECK

STAGE 1

1. PLACE TRAFFIC CONTROLS FOR STAGE 1 CONSTRUCTION.
2. REMOVE EXISTING ASPHALT AND GRAVEL FROM DECK.
3. REMOVE EXISTING HANDRAILS, INCLUDING CONCRETE POSTS.
4. REMOVE ALL LOOSE AND DETERIORATED CONCRETE IN DECK.
5. APPLY MCI TO CONCRETE SURFACE OF DECK, APPLY MCI AND SEALER TO CONCRETE SURFACES OF DECK UNDERSIDE.
6. MAKE REPAIRS ON DECK WITH CONCRETE PATCHES. MODIFY EXISTING DECK DRAINS.
7. INSTALL DOWELS ON DECK AND WINGWALLS FOR NEW CONCRETE POSTS.
8. INSTALL NEW CONCRETE POSTS.
9. PLACE NEW ASPHALT (BINDER COURSE – HL-8) AND WATERPROOFING SYSTEM ON DECK.

STAGE 2

1. MOVE TRAFFIC CONTROLS FOR STAGE 2 CONSTRUCTION.
2. REPEAT STEPS 2 TO 9 FROM STAGE 1 CONSTRUCTION.
3. REMOVE TEMPORARY BARRIER AND PLACE NEW SURFACE COURSE (HL-4) ASPHALT ON DECK AND APPROACHES.
4. RESTORE TRAFFIC TO ENTIRE STRUCTURE.

OTHER COMPONENTS

1. MAKE REPAIRS TO DECK UNDERSIDE, SURFACES OF ABUTMENTS AND WINGWALLS.
2. APPLY MCI AND SEALER TO SURFACES OF ABUTMENTS, WINGWALLS AND DECK UNDERSIDE.

P1

FOR TENDER PURPOSES

REVISIONS		
DATE	BY	DESCRIPTION

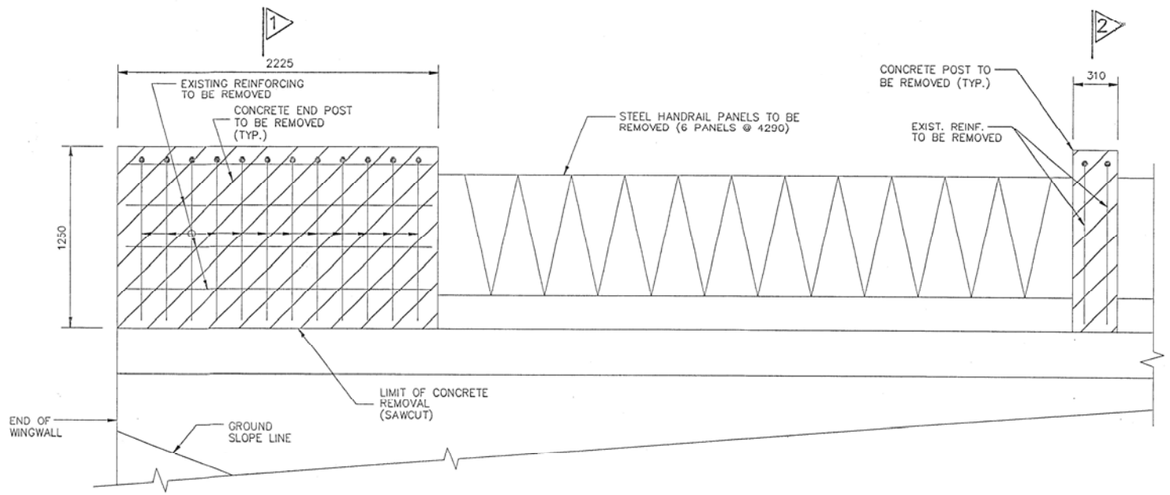
DESIGN MK	CHK MW	CODE		LOAD CL-A	
DRAWN KS	CHK MK	SITE		STRUCT	SC

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

CONT No WP No	
TOWN OF CALEDON DUFFY'S LANE (6TH LINE) SOUTH OF PATTERSON SIDEROAD REMOVALS	SHEET 2

paul theil associates limited
consulting engineers
131 Delta Park Blvd. , Brampton, Ontario

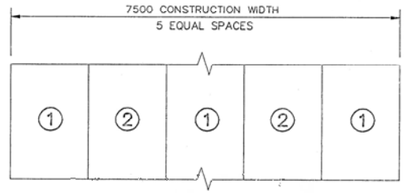


ELEVATION

1:20

LEGEND

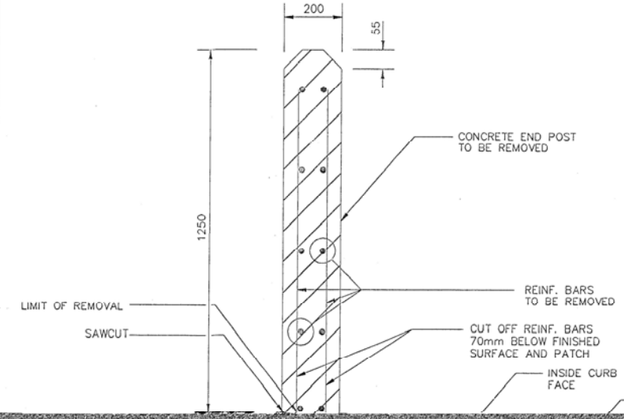
CONCRETE REMOVAL AREAS

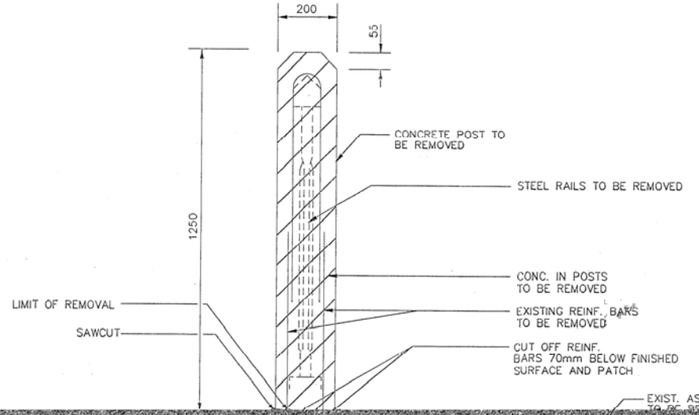


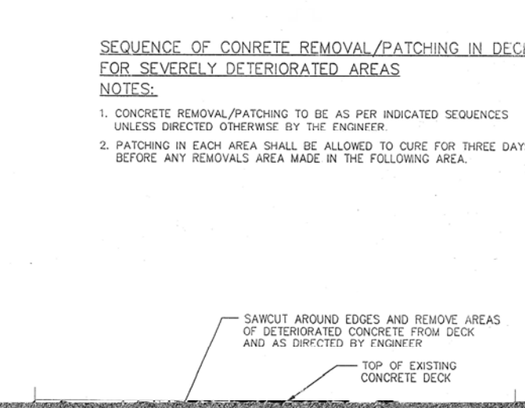
SEQUENCE OF CONRETE REMOVAL/PATCHING IN DECK FOR SEVERELY DETERIORATED AREAS

NOTES:

1. CONCRETE REMOVAL/PATCHING TO BE AS PER INDICATED SEQUENCES UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
2. PATCHING IN EACH AREA SHALL BE ALLOWED TO CURE FOR THREE DAYS BEFORE ANY REMOVALS AREA MADE IN THE FOLLOWING AREA.







APPENDIX G: COMPARATIVE CAST-IN-PLACE CONCRETE BEAM TYPE BRIDGES

Compiled by ASI from the Town of Caledon's OSIM Inventory (Town of Caledon 2020), the Ontario Heritage Bridge List (Ministry of Transportation 2008), MTO Central Region Structural Inventory (Ministry of Transportation n.d.), and information available at Historicbridges.org

Table 6: Comparative Cast-in-Place Reinforced Concrete Slab on I-Girders Bridges in the Town of Caledon OSIM Inventory

No.	Name	Roadway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
B22068009	Duffy's Lane, 1.3 km North of Castlederg Sideroad	Duffy's Lane	1950	1	14.1	5.9
B22162016	Patterson Side Road (Bridge No. 1), 0.1 km West of Duffy's Lane	Patterson Side Road	1950	1	7.2	7.3
B26222058	Quarry Road, 0.7 km West of McLaren Road	Quarry Road	1950	1	12.9	7.0
B26046055	McLaughlin Road, 0.3 km North of Old Base Line	McLaughlin Road	1960	3	34.0	11.7
B20104036	Boston Mills Road, 0.02 km West of Chinguacousy Road	Boston Mills Road	1964	1	30.0	12.2
B22136014	Castlederg Sideroad, 0.8 km East of Humber Station Road	Castlederg Sideroad	1981	1	17.3	9.5
B22062008	Humber Grove Structure, Duffy's Lane, 1.2 km North of Glasgow Road	Duffy's Lane	1985	1	16.8	10.5

Table 7: Comparative Cast-In-Place Concrete T-Beam Bridges in the MTO Central Region Structural Inventory

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
1109262	Glass's Bridge	89	1913	1	8.7	10.7
1231790	Lyons Creek - SBL	1	1941	3	30.2	12.36
1231936	Tee Creek Bridge NBL	1	1941	3	30.2	13.89
1231675	Lyons Creek Bridge (NBL)	1	1941	3	30.2	14.4
1627112	Black Creek Bridge, WBL	1	1942	3	30.2	14.48
1626827	Black Creek Bridge, EBL	1	1942	3	30.2	14
1230839	Dixie Road Underpass. At Q.E.W	1	1953	3	61.6	18
1609100	6th Line West Underpass	401	1958		62.8	10.5
1311631	Esquesing Twp Br No 5	401	1960	2	43	17.28
1212776	Hwy. 401/Lakeridge Road Underpass	401	1961	7	118	10.36
1200150	Hwy 405 - Mewburn Rd. Underpass (Formerly GRAVEL RD. BR.)	405	1962	4	64.5	10.5

1312017	Hwy 405/NIAGARA TWP. QEW. INT.O/P	405	1962	3	116	11.03
1150530	Flamborough E. Br. #12 U/P	403	1962	4	72.2	17.98
1311818	King's Rd. U'pass	403	1962	4	75.3	10.36
1635099	Bayview Ave O/P EB Coll	401	1966	2	31	21.33
1635460	Bayview Avenue O/P WB Coll	401	1967	2	31	21.33

Table 8: Comparative Concrete T-Beam Bridges in the Heritage Bridge List

Bridge List No.	Bridge Name	Roadway	Location	Bridge Type	Length (m)	No. Spans	Year Constructed	Ownership	MTO Region	Heritage Recognition
105	Englehart River Bridge (East) Site No. 47-30	Hwy 573	Charlton and Dack (Timiskaming)	Concrete T Beam	n/a	3	1927	Province	Central	Ontario Heritage Bridge List
110	QEW Overpass at Black Creek Site No. 34-128	QEW	Fort Erie (Niagara Falls)	Single span variable depth T-beam, cantilevered end spans	30.2	3	1941	Province	Central	Ontario Heritage Bridge List

Table 9: Comparative Concrete T-Beam Bridges in Ontario found in Historic Bridges.org.

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
Base Line Road Bridge	Over Local Creek/Drain in Rural Algoma District	n/a	1	n/a	n/a	This bridge is an example of small scale bridge construction in Ontario
Euphrasia St. Vincent Townline Bridge	Over Grier Creek in Meaford and Grey Highlands	n/a	1	n/a	n/a	This is a small unaltered concrete bridge on a dead end road.
Inholmes Bridge	Broadbent Road over Manitouwabing River in Inholmes, Township of Mckeller	1920s	1	24.99	n/a	This bridge is an early and unaltered surviving example of a concrete t-beam in Ontario of decent span length for this type of bridge. The bridge stands out as locally significant.

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
Madawaska KH-60 Bridge	Over Madawaska River in Madawaska, Nippising District	1942	3	48 Main Span: 17.9	n/a	Although altered and not visually remarkable, this t-beam design is uncommon in Ontario.
McDougal Line Bridge	Over Government Drain Number 1 in Chatham-Kent Region	1940	2	22.01 Main Span: 10.49	7.19	An interesting bridge with good structural integrity and attractive railings.
Queen Street Bridge	Over Teeswater River in Paisley, Bruce County	1935	3	n/a	n/a	This is a rare example of a curved t-beam in Ontario.

APPENDIX H: COMPARATIVE CAST-IN-PLACE CONCRETE SLAB ON RIGID FRAME TYPE BRIDGES

Compiled by ASI from the Town of Caledon's OSIM Inventory (Town of Caledon 2020), the Ontario Heritage Bridge List (Ministry of Transportation 2008), MTO Central Region Structural Inventory (Ministry of Transportation n.d.), and information available at Historicbridges.org

Table 10: Comparative Cast-in-Place Reinforced Concrete Rigid Frame Bridges in the Town of Caledon OSIM Inventory

No.	Name	Roadway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
B26064020	Kennedy Road, 1.4 km North of Old Base Line	Kennedy Road	1915	1	13.4	5.4
B20036035	Black Creek Bridge, McLaughlin Road, 1.38 km South of Old School Road	McLaughlin Road	1950	1	10.4	8.4
B20072328	Old School Road, 0.18 km West of Heritage Road	Old School Road	1950	1	3.6	12.0
B20094245	Old School Road, 0.2 km West of Airport Road	Old School Road	1950	1	14.6	6.5
B22034035	Centreville Creek Road, 0.2 km South of Highway 9	Centreville Creek Road	1950	1	5.3	7.3
B22110003	Caledon King Townline, 0.86 km North of King Street East	Caledon King Townline	1950	1	9.2	12.9
B22110004	Caledon King Townline, 0.7 km North of King Street East	Caledon King Townline	1950	1	7.5	12.6
B22110005	Caledon King Townline, 0.6 km North of King Street East	Caledon King Townline	1950	1	9.5	14.5
B22198001	Columbia Way (10th Sideroad), 0.48 km West of Caledon King Townline South	Columbia Way (10th Sideroad)	1950	1	10.6	9.2
B26060021	Willoughby Road, 0.14 km North of Highpoint Sideroad	Willoughby Road	1950	1	9.5	8.4
B26180048	Beechgrove Sideroad, 1.0 km East of Main Street	Beechgrove Sideroad	1950	3	20.9	10.5
B26202049	Highpoint Sideroad, 0.02 km East of Shaws Creek Road	Highpoint Sideroad	1950	1	10.6	10.0
B26218346	East Garafraxa/Caledon Townline, 0.31 km East of Shaws Creek Road	East Garafraxa/Caledon Townline	1950	1	6.0	10.9
B26220347	East Garafraxa/Caledon Townline, 1.7 km East of Shaws Creek Road	East Garafraxa/Caledon Townline	1950	1	6.3	11.0
B20092243	Old School Road, 0.45 km West of Torbram Road	Old School Road	1955	1	5.8	13.4

No.	Name	Roadway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
B22164017	Patterson Side Road (Bridge No. 2), 0.03 km East of Duffy's Lane	Patterson Side Road	1956[6]	1	14.5	8.5
B22072010	Duffy's Lane, 0.03 km South of Patterson Side Road	Duffy's Lane	1957	1	10.6	8.9
B22180018	Finnerty Sideroad Bridge, 0.35 km West of Highway 50	Finnerty Sideroad	1960	1	17.4	8.7
B22302015	Mill Lane, 1.0 km East of The Gore Road	Mill Lane	1960	1	10.0	8.9
B25016043	Hickman Street Structure, 0.2 km West of Queen Street North	Hickman Street	1960	1	20.0	11.0
B26016029	Shaws Creek Road, 0.13 km North of Highpoint Sideroad	Shaws Creek Road	1960	1	6.7	10.4
B26050022	McLaughlin Road, 1.0 km North of The Grange Sideroad	McLaughlin Road	1960	1	10.9	10.4
B26146032	Grange Side Road, 0.4 km East of McLaughlin Road	The Grange Side Road	1960	1	18.6	7.7
B27326026	Dominion Street, 0.03 km North of Forks of the Credit Road	Dominion Street	1960	1	14.0	6.2
B27634041	Amelia Street, 0.03 km North of Queen Street West	Amelia Street	1960	1	10.7	10.4
B26030042	Main Street, 0.02 km North of Queen Street	Main Street	1969	1	10.5	10.9
B26024028	Mississauga Road, 0.48 km North of Queen Street	Mississauga Road	1970	1	12.4	9.9
B26050023	McLaughlin Road, 0.75 km North of the Grange Sideroad	McLaughlin Road	1980	1	16.6	8.6
B22110006	Caledon Townline South, 0.1 km North of King Road	Caledon Townline South	1982	1	12.0	17.7
B26146031	The Grange Sideroad, 0.8 km West of Hurontario Street	The Grange Sideroad	1983	1	12.2	9.4
B22002037	Innis Lake Road over West Humber River, 1.8 km South of King Street	Innis Lake Road	2012	1	6.7	17.5
B27082236	Kennedy Road, 0.4 km North of Charleston Sideroad	Kennedy Road	2016	1	8.4	11.8
B26012324	Shaws Creek Road, 0.45 km North of Charleston Sideroad	Shaws Creek Road	2017	1	6.5	13.0

Table 11: Comparative Single Span Cast-in-Place Concrete Slab Rigid Frame Bridges in the MTO Structural Inventory

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
52767365	Cubert Street Overpass, Hwy 401 Westbound	401	1940	1	13.8	17.1
52767358	Cubert Street Overpass, Hwy 401 Eastbound	401	1940	1	13.9	17.1
52767371	Ritson Road Overpass Eastbound Lane	401	1941	1	14.5	20.8

[6] The date for this bridge is 1950 in the Town of Caldeon's OSIM Inventory. As the bridge drawings were dated 1956, this date has been used for the comparative analysis for the purposes of this assessment.

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
52767377	Ritson Road Overpass Westbound Lane	401	1941	1	14.5	20.8
52767257	Liberty Street Overpass - Eastbound	401	1950	1	13.1	24
52767263	Liberty Street Overpass - Westbound	401	1950	1	13.1	24
52772204	INNISFIL BEACH ROAD OVERPASS - N.B.L.	400	1950	1	16.1	17.43
52772210	INNISFIL BEACH ROAD OVERPASS - S.B.L.	400	1950	1	16.1	17.48
1312944	HUMBER R BR AT BALLYCROY	9	1951	1	13.5	24
52772079	HIGHWAY #93 OVERPASS - N.B.L.	11	1951	1	17.5	17.42
52772115	TIFFIN STREET OVERPASS - N.B.L.	400	1951	1	18.8	15.34
52772121	TIFFIN STREET OVERPASS - S.B.L.	400	1951	1	18.8	15.34
52772103	DUCKWORTH STREET OVERPASS - E.B.L.	400	1951	1	14.1	21.03
52772109	DUCKWORTH STREET OVERPASS - W.B.L.	400	1951	1	14.1	21.03
52772232	WEST GUILLIMBURY 9TH LINE OVERPASS - N.B.L.	400	1951	1	13.1	15.3
52772238	WEST GUILLIMBURY 9TH LINE OVERPASS - S.B.L.	400	1951	1	13.1	15.3
52772216	INNISFIL 6TH LINE OVERPASS - N.B.L.	400	1951	1	13	15.34
52772222	INNISFIL 6TH LINE OVERPASS - S.B.L.	400	1951	1	13	15.34
52772085	HIGHWAY #93 OVERPASS - S.B.L.	11	1951	1	17.5	15.29
52772141	C.N.R. OVERHEAD AT BARRIE - N.B.L.	400	1951	1	11.7	15.35
52772147	C.N.R. OVERHEAD AT BARRIE - S.B.L.	400	1951	1	11.7	15.35
52767228	BOWMANVILLE CR.BR. WIDENING	401	1951	1	20.7	41.14
52767251	BOWMANVILLE CR.BR. WIDENING	401	1951	1	20.7	41.14
52767274	Soper Creek Bridge - Westbound	401	1952	1	20.7	21.1
52767269	Soper Creek Bridge - Eastbound	401	1952	1	20.7	20.6
52772041	C.N.R. OVERHEAD AT ORILLIA - N.B.L.	11	1954	1	21.2	11.05
52772047	C.N.R. OVERHEAD AT ORILLIA - S.B.L.	11	1954	1	21.2	11.05
1992651	Highway 35/CPR Overhead, Northbound Lane	35	1954	1	21.5	12.3
1218794	CNR O'HEAD EB & WB CORE	401	1954	1	13.6	18.9
57001738	CNR O'HEAD EB & WB CORE	401	1954	1	13.6	18.9
1992657	Highway 35/CPR Overhead, SBL	35	1954	1	22.6	13.05
52767389	Wilson Road Overpass Westbound Lane	401	1955	1	14.7	20.96
1992499	Hwy 401 Lynde Creek Bridge at Whitby, WBL	401	1955	1	17.3	19
1992493	Hwy 401 Lynde Creek Bridge at Whitby, EBL	401	1955	1	17.3	22.68
52772066	WILLOW CREEK (NORTH BRIDGE) - N.B.L.	11	1955	1	13.3	13.55

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
52772072	WILLOW CREEK (NORTH BRIDGE) - S.B.L.	11	1955	1	13.3	13.55
52767383	Wilson Road Overpass Eastbound Lane	401	1955	1	14.7	17.3
52767346	Park Road Overpass, Hwy 401 Eastbound	401	1955	1	14.9	20.42
52767352	Park Road Overpass, Hwy 401 Westbound	401	1955	1	14.9	20.42
1311694	QEW SB COLLECTOR - HWY 2 O'PASS	1	1956	1	22	15
1311702	QEW & HWY 2 BURLINGTON O'PASS	1	1956	1	21.1	32
1311686	QEW NB COLLECTOR - HWY 2 O'PASS	1	1956	1	22.9	15.9
52767040	QEW NB COLLECTOR - HWY 2 O'PASS	1	1956	1	22.9	15.9
52767046	QEW NB COLLECTOR - HWY 2 O'PASS	1	1956	1	22.9	15.9
52767412	'TORONTO TWP.'BR. #15 CPR.O/H	401	1957	1	12.6	37.24
52767418	'TORONTO TWP.'BR. #15 CPR.O/H	401	1957	1	12.6	37.24
52767282	Clarke Township Bridge #12 CPR. O/H - Eastbound Lane	401	1958	1	18	16.5
52767291	Clarke Township Bridge #12 CPR. O/H - Westbound Lane	401	1958	1	18	16.5
52767297	Newtonville Road Overpass - Eastbound Lane	401	1958	1	21	17.39
52766861	HWY 401 & OAKVILLE CK. - EBL	401	1958	1	26.5	20.4
52766867	HWY 401 & OAKVILLE CK. - WBL	401	1958	1	26.5	20.4
1992667	Highway 401/Wilmot Creek, Eastbound Lane	401	1958	1	17.5	14.33
1992673	Highway 401/Wilmot Creek Bridge, Westbound Lane	401	1958	1	17.5	14.33
1179016	OAKVILLE CREEK/16th Mile Creek ,NASSAGAWEYA TOWN SHIP - EBL	401	1958	1	19.2	16.84
1179116	OAKVILLE CR/16th Mile Creek,NASSAGAWEYA TWP,WBL	401	1958	1	19.2	16.84
52767303	Newtonville Road Overpass - Westbound Lane	401	1958	1	21	17.4
52766849	TRAFALGAR TWP BR #10 - EBL	401	1958	1	12.8	18.8
52766855	TRAFALGAR TWP BR #10 - WBL	401	1958	1	12.8	18.8
1312936	CREDIT RIVER-SOUTH BRANCH	10	1958	1	14	28.26
1613430	MILL STREET UNDERPASS	401	1958	1	40.6	16.15
52766524	HIGHWAY 401 CROSSING AT GUELPH JUNCTION EXPRESS OVERPASS-EBL	401	1959	1	19.3	16.76
52766546	HIGHWAY 401 CROSSING AT GUELPH JUNCTION EXPRESS OVERPASS-WBL	401	1959	1	19.3	16.76
1311597	CAMPBELLVILLE ROAD BRIDGE, EBL	401	1959	1	13.7	16.9
1311605	CAMPBELLVILLE ROAD BRIDGE, WBL	401	1959	1	13.7	16.9
52767004	TRAFALGAR TWP. BR. #7 EBL	401	1959	1	16.5	18.95
52767010	TRAFALGAR TWP. BR. #7 WBL	401	1959	1	16.5	18.95
52766584	NASSAGAWEYA TWP. BR. #5 O/P	401	1959	1	12.2	33.52

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
52766761	NASSAGAWEYA TWP. BR. #5 O/P	401	1959	1	12.2	33.52
52772192	INNISFIL TOWNSHIP C.N.R. OVERHEAD - N.B.L.	400	1960	1	12.8	15.24
52772198	INNISFIL TOWNSHIP C.N.R. OVERHEAD - S.B.L.	400	1960	1	12.8	15.24
52772029	SUNDIAL DRIVE OVERPASS - N.B.L.	11	1960	1	20.7	11.09
52772035	SUNDIAL DRIVE OVERPASS - S.B.L.	11	1960	1	20.7	11.09
1239180	O/P AT GUELPH RD., C.A.H., TWIN - EBL	403	1961	1	14.9	15.84
1313786	YORK BLVD/CHEDOKE BR #12	6	1961	1	12.2	20.72
1239208	O/P AT GUELPH RD., C.A.H., TWIN - WBL	403	1961	1	14.9	23.16
1158043	DESJARDINS CANAL BRIDGE, E.B.L.	403	1962	1	11.9	33.5
1313828	DESJARDINS CANAL BRIDGE, W.B.L.		1962	1	11.9	33.5
52772244	WEST GUILLIMBURY 13TH LINE OVERPASS - N.B.L.	400	1963	1	11.7	19.35
52772250	WEST GUILLIMBURY 13TH LINE OVERPASS - S.B.L.	400	1963	1	11.7	19.35
1650552	HWY #401 OPASS/RAMP W-N WB CORE	401	1965	1	17.1	20.4
1314802	YONGE ST BR #4	401	1965	1	21.6	12
1650268	HWY #401 O'PASS/RAMP W-N EB COL	401	1965	1	17.1	14.3
1208614	E.B.CORE TO DON VALLEY S.B OVERPASS	401	1965	1	11.1	68.87
1650386	HWY #401 O'PASS/RAMP W-N WB COL	401	1965	1	17.1	14.3
1650491	HWY #401 OPASS/RAMP W-N EB CORE	401	1965	1	17.1	27.9
1217410	CPR O/H, EASTBOUND COLLECTORS	401	1969	1	30.8	25.45
1312952	LITTLE CREDIT R. BR.	10	1969	1	10.4	29.68
1657921	BR. 2 HWY 427 NB OVER HWY 27 SB	427	1970	1	15.2	74.6
1261151	CONCESSION ROAD OVERPASS WBL	1	1972	1	29	24.93
1260639	THOMPSON ROAD OVERPASS EBL.....	1	1972	1	24.7	19.2
1260796	THOMPSON ROAD OVERPASS WBL.....	1	1972	1	24.7	19.2
1311580	CREDIT R. BR.	7	1973	1	36.5	12.2
6298221	SHAFT ROAD OVERPASS BRIDGE #11-WBL	409	1974	1	16.9	18.29
1315088	CNR OVERHEAD (MOUNT ALBERT)	48	1974	1	18.8	64.34
1199116	SHAFT ROAD OVERPASS BRIDGE #11 EBL	409	1974	1	16.8	36.57
52767400	Farwell Creek - Hwy 401- Eastbound Lane	401	1976	1	14	17.2
52767406	Farewell Creek - Hwy 401 - Westbound	401	1976	1	14	17.2
1197991	HIGHWAY 427 OVERPASS AT CAMPUS ROAD SOUTH BOUND LANE	427	1976	1	15.8	24
1197787	HIGHWAY 427 OVERPASS AT CAMPUS ROAD NORTH BOUND LANES	427	1976	1	15.8	21

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
1154571	RAMP E-S OVER DIXIE ROAD	401	1977	1	14.6	89.61
1224475	N-W RAMP OVER JOSHUA CREEK	1	1979	1	19.1	10.67
1224531	W-N.S Ramp over Joshua Creek	1	1979	1	19.1	8.23
1237889	Hwy 12/Vrooman Creek Bridge	12	1979	1	9.9	18.53
1237787	Vrooman Creek Bridge	12	1979	1	9.8	14.6
52766780	CNR OVERHEAD WIDENING AT HIGHWAY 401 (North Structure) WBL	401	1981	1	15.9	16.46
52766774	CNR OVEHEAD WIDENING AT HIGHWAY 401 (South Structure) EBL	401	1981	1	15.9	19.94
52767321	Fourth Line Overpass - Northbound Lane	35	1984	1	14.2	14.5
52767327	Fourth Line Overpass - Southbound Lane	35	1984	1	14.2	14.5
52767309	Third Line Overpass Hwy 35/115 - Northbound Lane	35	1984	1	13.8	14.8
52767315	Third Line Overpass Hwy 35/115 - South	35	1984	1	13.8	12
52767334	Regional Road. 4 Overpass - Northbound Lane	35	1985	1	27.1	19.3
1940634	Hwy 401 TIS Ramp Bridge	401	1985	1	12.9	44
52767340	Regional Road 4 Overpass - Southbound Lane	35	1985	1	20.3	10.8
1118377	FESSERTON ROAD OVERPASS NORTH BOUND LANE	400	1988	1	12.2	11.9
1118536	FESSERTON ROAD OVERPASS SOUTH BOUND LANE	400	1990	1	12.2	11.9
1126437	SEVERN RIVER BRIDGE PORT SEVERN SOUTH BOUND LANE	400	1991	1	30.1	11.98
2674696	Ramp FGGE E- Brown's Line S Bridge #4	1	2001	1	18.2	31.8
1313180	CNR OVERHEAD BRIDGE #3	1	2002	1	18.4	31.4
2674544	Guelph Line over NSR	1	2003	1	22.7	34.46
57050322	Caledon Creek Bridge	10	2009	1	13.9	28.5
1238386	Albert Street Underpass	401	1939	2	30.4	13.36
1238509	CNR SUBWAY AT HWY 401, OSHAWA	401	1940	2	31.3	18.3
1312904	HENRY ST -KINGSTON RD U'PASS	401	1940	2	36.5	11.67
1171201	Simcoe Street Underpass	401	1941	2	30.8	16.56
1627998	BOWEN ROAD UNDERPASS	1	1942	2	44.7	11.06
1107748	10th LINE STROUD SIDEROAD UNDERPASS	400	1947	2	32.8	10.95
1623104	BLOOR STREET U'PASS AT HWY 401	401	1952	2	44.9	12.19
52772000	SEVERN RIVER BRIDGE-WEST BRANCH - N.B.L.	11	1954	3	32	11.28
52772008	SEVERN RIVER BRIDGE-WEST BRANCH - S.B.L.	11	1954	3	32	11.28
1311589	NASSAWAGEYA TWP. #9 INT.	401	1959	2	44	11.27
1112116	ANNE STREET UNDERPASS	400	1959	2	39.3	17.07

Structure OID	Name	Highway	Year Constructed	No. Spans	Deck Length (m)	Deck Width (m)
1231200	HWY #20 UNDERPASS - LUNDY'S LANE	1	1963	2	34.7	27.12
52767028	N-W RAMP OVER JOSHUA CREEK	1	1979	2	19.1	10.67
52767034	N-W RAMP OVER JOSHUA CREEK	1	1979	2	19.1	10.67
1228481	Welland Vale Road Underpass	406	1981	2	32.6	43.7
2670160	Hwy 404/401 N-W HOV Ramp Tunnel	401	2003	n/a	90	15.4
1237694	Beaverton River Bridge	12	2007	3	37	28.49
1237514	White's Creek Bridge	12	2007	3	33	25.64

Table 12: Comparative Concrete Rigid Frame Bridges in the Heritage Bridge List

Bridge List No.	Bridge Name	Roadway	Location	Bridge Type	Length (m)	No. Spans	Year Constructed	Ownership	MTO Region	Heritage Recognition
104	Albert Street Site No. 22-177	Hwy 401	Oshawa (Durham)	Solid Slab/rigid frame, 2 span	n/a	2	1939	Province	Central	Ontario Heritage Bridge List
39	Henry Street	Henry Street	Whitby	Concrete rigid frame, double span design	n/a	2	1940	Province	Central	Ontario Heritage Bridge List
103	Simcoe Street Site No. 22-176	Hwy 401	Oshawa (Durham)	Solid Slab/rigid frame, 2 span	29	2	1941	Province	Central	Ontario Heritage Bridge List
107	Brock Street Underpass Site No. 22-151	Hwy 401	Toronto	Rigid Frame, slab 2 span	n/a	2	1942	Province	Central	Ontario Heritage Bridge List
99	400 Underpass at 89	Hwy 89 (Hwy 400)	Innisfil (Simcoe)	Concrete Rigid Frame, single span	33	1	1949	Province	Central	Ontario Heritage Bridge List

Bridge List No.	Bridge Name	Roadway	Location	Bridge Type	Length (m)	No. Spans	Year Constructed	Ownership	MTO Region	Heritage Recognition
102	400 Underpass at 88 Site No. 30-309	Hwy 88 (Hwy 400)	Innisfil (Simcoe)	Concrete Rigid Frame, single span	n/a	1	1949	Province	Central	Ontario Heritage Bridge List
101	400 Underpass at Aurora Sideroad	Aurora Sideroad (Hwy 400)	King (York)	Concrete Rigid Frame, single span	37	1	1950	Province	Central	Ontario Heritage Bridge List
100	400 Underpass at 5th Line (Pennville Road)	5th Line (Hwy 400)	W. Gwillumbury (York)	Concrete Rigid Frame, single span	29	1	1950[7]	Province	Central	Ontario Heritage Bridge List

Table 13: Comparative Concrete Rigid Frame Bridges in Ontario found in Historic Bridges.org.

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
1st Line Bridge	Over KH 401, Halton Region	1959	2	36	10.4	One of a couple overpasses on this section of the 401 that offer a double-span configuration instead of the single span design.
6th Concession Dougall Parkway Bridge	Over Dougall Parkway, Windsor, Essex County	1956	1	n/a	n/a	This attractive bridge is an excellent and locally rare example of a standard rigid-frame overpass in Ontario.
Allan Park Camp Creek Bridge	Over Camp Creek in West Grey, Grey County	1934	1	n/a	n/a	This bridge has railing post designs that are found on earlier 1930s rigid-frame bridges in Ontario.

[7] According to Historic Bridges.org this bridge no longer exists

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
Brimstone Bridge	Over Credit River, Caledon, Peel Region	n/a	1	14	n/a	This unaltered concrete rigid-frame bridge is noted for the concrete railing post details which differ from most rigid-frame bridges in Ontario.
Campbell Bridge	Over 20 Mile Creek, Lincoln, Niagara Region	1962	1	n/a	n/a	This is a locally noteworthy example of an unaltered standard Ontario rigid-frame bridge.
CR-109 East Bridge	Over Conestogo River, Wellington North, Wellington County	1931	1	16	11.49	One of several old and unaltered concrete bridges along this stretch of road that document a transition period in Ontario bridge design.
CR-109 Far East Bridge	Over Conestogo River, Wellington North, Wellington County	1934	1	14	11.4	One of several old and unaltered concrete bridges along this stretch of road that document a transition period in Ontario bridge design.
CR-109 West Bridge	Over Conestogo River, Wellington North, Wellington County	1931	1	19	11.58	One of several old and unaltered concrete bridges along this stretch of road that document a transition period in Ontario bridge design.
CR-74 Bridge	Over Hwy 401, Middlesex County	1956	1	n/a	n/a	One of a shrinking number of remaining attractive heritage overpass bridges crossing this highway with good historic integrity.
Domtar Line Bridge	Over South Branch of the Thames River, Oxford County	n/a	1	n/a	n/a	A relatively large single span concrete bridge.
Dorchaster Road Bridge	Over Hwy 401, Middlesex County	1955	1	n/a	n/a	One of a number of remaining similar structures, this bridge is both old and unusual as an attractive expressway overpass.
Glanworth Drive Bridge	Over Hwy 401, Tempo, Middlesex County	1958	1	n/a	n/a	This beautiful vintage overpass stands out among the few surviving bridges of this type because of its skew.

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
Glen Miller Road Bridge	Over Hwy 401, Hastings County	1957	1	n/a	n/a	An example of a less common Ontario rigid frame overpass design which visually has a smooth arch arch, but does not blend into the abutment like other rigid frame bridges.
Grand River Street Bridge	Over Nith River, Paris, Brant County	1932	2	n/a	n/a	This bridge is an early and well-decorated example of its type. Built y Keystone Contractors.
Harriston Road Bridge	Over Maitland River	n/a	3	n/a	n/a	Multi-span rigid-frame bridges like this one are less common than single span examples in Ontario.
KH-40 Bear Creek Bridge	Over Bear Creek, Chatham-Kent Region	1959	2	n/a	n/a	This bridge is larger and features slightly different design than other bridges on this stretch of road between Chatham and Wallaceburg.
KH-40 Big Creek Bridge #1	Over Big Creek, Chatham-Kent Region	1959	1	n/a	n/a	One of several nearby, nearly identical, KH-40 bridges; while individually undistinguished, together form a unique image of the past.
KH-40 Big Creek Bridge #2	Over Big Creek, Chatham-Kent Region	1959	1	n/a	n/a	One of several nearby, nearly identical, KH-40 bridges; while individually undistinguished, together form a unique image of the past.
KH-40 Big Creek Bridge #3	Over Big Creek, Chatham-Kent Region	1959	1	n/a	15.2	One of several nearby, nearly identical, KH-40 bridges; while individually undistinguished, together form a unique image of the past.
KH-40 Big Creek Bridge #4	Over Big Creek, Chatham-Kent Region	1959	1	n/a	n/a	One of several nearby, nearly identical, KH-40 bridges; while individually undistinguished, together form a unique image of the past.
KH-40 Big Creek Bridge #5	Over Big Creek, Chatham-Kent Region	1960	1	n/a	n/a	One of several nearby, nearly identical, KH-40 bridges; while

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
						individually undistinguished, together form a unique image of the past.
KH-89 Bridge	Over Hwy 400, Simcoe County	1950	1	n/a	n/a	One of a decreasing number of attractive overpass bridges on Highway 400.
Lloydtown-Aurora Road Bridge	Over Hwy 400, York Region	1950	1	n/a	n/a	One of a decreasing number of attractive overpass bridges on Highway 400.
Mill Street Bridge	Over Hwy 401, Newcastle, Durham Region	1958	1	n/a	n/a	This bridge displays an uncommon appearance among surviving rigid frame overpass bridges.
Morgans Corners Road Bridge	Over Hwy 401, Clarington, Durham Region	1958	1	n/a	n/a	An example of a less common Ontario rigid frame overpass design which visually has a smooth arch arch, but does not blend into the abutment like other rigid frame bridges.
Roy Bridge	Over Wolf Creek, City of Hamilton	1947	1	n/a	n/a	This rigid-frame bridge has unusual cable and concrete railings.
Royal Windsor Drive Rigid-Frame Overpass	Over Royal Windsor Drive, Oakville, Halton Region	1952	2	n/a	n/a	One of two parallel railway over highway overpasses of strongly different appearance and design, this one looks more like a highway bridge.
Simcoe Street Bridge	Over Hwy 401, Oshawa, Durham region	1941	2	29	n/a	This bridge is one of a few extremely early expressway overpass bridges in Oshawa, and is recognized as a heritage bridge.
St. Clair Parkway Bridge	Over Clay Creek, Lambton County	1965	1	n/a	n/a	This bridge is a good representation of Ontario's frequently built concrete rigid-frame bridge design.
Steele's Bridge	Over Ouse River, Peterborough County	1939	2	n/a	n/a	This is a fairly old, and multi-span example of a rigid-frame bridge in Ontario.

Name	Location	Year Constructed	No. Spans	Structure Length (m)	Structure Width (m)	Notes
Thousand Islands Bridge	Over St. Lawrence River, Leeds and Grenville United Counties, Canada, and Jefferson County, New York, United States	1938	1	31	9.14	This central portion of the Thousand Islands Bridge system is noted as one of the smallest international bridges.
Tobin Bridge	Over McGregor Creek, Chatham, Chatham-Kent Region	1957	1	26	7.01	This is a relatively large example of the rigid-frame bridge type that Ontario built so much of.
Victoria Avenue Bridge	Over Hwy 420 (Roberts Street), Niagara Falls, Niagara Region	1941	1	n/a	n/a	This beautiful overpass is the only known example of a stone faced rigid frame overpass in Ontario.
Watson Road Bridge	Over Hwy 401, Puslinch, Wellington County	1959	1	40	n/a	One of a couple overpasses on this section of the 401 that offer a double-span configuration instead of the single span design.
Webster's Falls Rigid-Frame Bridge	Residential access drive over Spencer Creek Trubutery, West Flamborough, City of Hamilton	1953	1	n/a	n/a	This is one of three old bridges to be found in the Webster's Falls Park area.
Whitebread Line Drain Bridge	Over Whitebread Drain, Lambdon County	1934	1	n/a	n/a	Appearing to be a very old unaltered example a bridge with this railing design, this is a small rigid-frame on a scenic route.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
CALEDON BRIDGE & CULVERT: PATTERSON SIDE ROAD BRIDGES
LOTS 25-26, CONCESSIONS 5-6
(FORMER TOWNSHIP OF ALBION, COUNTY OF PEEL)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL, ONTARIO

ORIGINAL REPORT

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Archaeological Licence #P1066 (Lytle)
Ministry of Heritage, Sport, Tourism and Culture Industries PIF# P1066-0160-2020
ASI File: 20EA-129

21 January 2021

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STAGE 1 ARCHAEOLOGICAL ASSESSMENT
CALEDON BRIDGE & CULVERT: PATTERSON SIDE ROAD BRIDGES
LOTS 25-26, CONCESSIONS 5-6
(FORMER TOWNSHIP OF ALBION, COUNTY OF PEEL)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL, ONTARIO

EXECUTIVE SUMMARY

ASI was contracted by R.J. Burnside & Associates Limited to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Bridge and Culvert Environmental Assessment and Detailed Design in the Town of Caledon. This Stage 1 Study Area includes the replacement of two bridges on Patterson Sideroad, and one bridge on Duffy's Lane.

The Stage 1 background study determined that two previously registered archaeological sites are located within one kilometre of the Study Area, neither of which is within 50 metres. The property inspection determined that parts of the Study Area exhibit archaeological potential and will require Stage 2 assessment, prior to any proposed construction activities.

In light of these results, the following recommendations are made:

1. The Study Area exhibits archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals prior to any proposed impacts to the property;

2. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, watercourses, or slopes in excess of 20 degrees. These lands do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

ASI

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1.0 PROJECT CONTEXT

Archaeological Services Inc. (ASI) was contracted by R.J. Burnside & Associates Limited to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Bridge and Culvert Environmental Assessment and Detailed Design in the Town of Caledon (Figure 1). This Stage 1 Study Area includes the replacement of two bridges on Patterson Sideroad and one bridge on Duffy's Lane.

All activities carried out during this assessment were completed in accordance with the *Ontario Heritage Act* (1990, as amended in 2018) and the 2011 *Standards and Guidelines for Consultant Archaeologists* (S & G), administered by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI 2011), formerly the Ministry of Tourism, Culture and Sport.

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act,* RSO (Ministry of the Environment 1990 as amended 2010) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted in accordance with the Municipal Engineers' Association document *Municipal Class Environmental Assessment* (2000 as amended in 2007, 2011 and 2015).

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted by R.J. Burnside & Associates Limited on September 8, 2020.

1.2 Historical Context

The purpose of this section, according to the S & G*,* Section 7.5.7, Standard 1, is to describe the past and present land use and the settlement history and any other relevant historical information pertaining to the Study Area. A summary is first presented of the current understanding of the Indigenous land use of the Study Area. This is then followed by a review of the historical Euro-Canadian settlement history.

1.2.1 Indigenous Land Use and Settlement

Southern Ontario has been occupied by human populations since the retreat of the Laurentide glacier approximately 13,000 years before present (BP) (Ferris 2013). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000 BP, the environment had progressively warmed (Edwards and Fritz 1988) and populations now occupied less extensive territories (Ellis and Deller 1990).

Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 BP; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest evidence for cemeteries

dates to approximately 4,500-3,000 BP and is indicative of increased social organization, investment of labour into social infrastructure, and the establishment of socially prescribed territories (Ellis et al. 1990; Ellis et al. 2009; Brown 1995:13).

Between 3,000-2,500 BP, populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 BP and exchange and interaction networks broaden at this time (Spence et al. 1990:136, 138) and by approximately 2,000 BP, evidence exists for small community camps, focusing on the seasonal harvesting of resources (Spence et al. 1990:155, 164). By 1,500 BP there is macro botanical evidence for maize in southern Ontario, and it is thought that maize only supplemented people's diet. There is earlier phytolithic evidence for maize in central New York State by 2,300 BP - it is likely that once similar analyses are conducted on Ontario ceramic vessels of the same period, the same evidence will be found (Birch and Williamson 2013:13–15). As is evident in detailed Anishinaabek ethnographies, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

From the beginning of the Late Woodland period at approximately 1,000 BP, lifeways became more similar to that described in early historical documents. Between approximately 1000-1300 Common Era (CE), the communal site is replaced by the village focused on horticulture. Seasonal disintegration of the community for the exploitation of a wider territory and more varied resource base was still practised (Williamson 1990:317). By 1300-1450 CE, this episodic community disintegration was no longer practised and populations now communally occupied sites throughout the year (Dodd et al. 1990:343). From 1450-1649 CE this process continued with the coalescence of these small villages into larger communities (Birch and Williamson 2013). Through this process, the socio-political organization of the First Nations, as described historically by the French and English explorers who first visited southern Ontario, was developed.

By 1600 CE, the communities within Simcoe County had formed the Confederation of Nations encountered by the first European explorers and missionaries. In the 1640s, the traditional enmity between the Haudenosaunee and the Huron-Wendat (and their Algonquian allies such as the Nippissing and Odawa) led to the dispersal of the Huron-Wendat. Shortly afterwards, the Haudenosaunee established a series of settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. By the 1690s however, the Anishinaabeg were the only communities with a permanent presence in southern Ontario. From the beginning of the eighteenth century to the assertion of British sovereignty in 1763, there was no interruption to Anishinaabeg control and use of southern Ontario.

The Humber River watershed exhibits two well documented ancestral Huron-Wendat settlement sequences, one in the middle Humber River area spanning the fifteenth century (eg. Black Creek site, Emerson 1954; and Parsons Site, Robertson and Williamson 1998) and one in the area of the Humber River headwaters spanning the late-fifteenth century (eg. Damiani Site, ASI 2012a) to late sixteenth century (eg. Skandatut Site, ASI 2012b). By the turn of the seventeenth century, the Humber River populations are believed to have relocated to join either the Huron-Wendat Nation or perhaps the Tionontaté (Petun) Nation (Williamson 2014).

1.2.2 Treaties

The Study Area is within Treaty 19, the Ajetance Purchase, signed in 1818 between the Crown and the Mississaugas (Crown-Indigenous Relations and Northern Affairs 2016). This treaty, however, excluded lands within one mile on either side of the Credit River, Twelve Mile Creek, and Sixteen Mile Creeks. In 1820, Treaties 22 and 23 were signed which acquired these remaining lands, except a 200 acre parcel along the Credit River (Heritage Mississauga 2012:18).

1.2.3 Euro-Canadian Land Use: Township Survey and Settlement

Historically, the Study Area is located in the Former Albion Township, County of Peel in Lots 25-26 & Concessions 5-6.

The S & G stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches, and early cemeteries are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those that are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be located in proximity to water. The development of the network of concession roads and railroads through the course of the nineteenth century frequently influenced the siting of farmsteads and businesses. Accordingly, undisturbed lands within 100 m of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes followed existing Indigenous trails, both along the lakeshore and adjacent to various creeks and rivers (ASI 2006).

Albion Township

The first township survey was undertaken in 1819, and the first legal settlers occupied their land holdings in the same year. The township was named by surveyor James G. Chewett after a poetic name for Britain. Eleven concessions comprised the township and were laid out west to east. Early settlement and development in the area is attributed to the emergence of water-power mill sites located near the Humber River, which ran through the whole length of the township. Albion was initially settled by the children of Loyalists, soldiers who had served during the War of 1812, and by immigrants from England, Scotland and Ireland. By the 1840s, the township was noted for its good farms (Armstrong 1985:141; Rayburn 1997:6; Smith 1846:2).

Hamilton & North Western Railway

The Hamilton & North Western Railway (H&NW) was formed in 1872. Construction began in 1877 and by late that year had reached Barrie and by mid-1879, Collingwood. Due to economic recession and railway politics, the H&NW merged with the Northern Railway of Canada to form the Northern & North Western Railway. The Northern & North Western Railway was acquired by the Grand Trunk Railway in 1888 (Cooper 2001).

The Caledon Trailway Path was constructed in 1994, after being purchased by the Town of Caledon in 1989 to convert a 35 kilometre section of the former H&NW corridor into a gravel multi-use trailway from Winston Churchill Boulevard north of King Street in Terra Cotta, through Caledon East, to Mill Street west of Queen Street in Tottenham. The Caledon Trailway became the first designated portion of the Trans Canada Trail, re-named to the Great Trail (Town of Caledon 2018).

1.2.4 Historical Map Review

The 1859 *Tremaine's Map of the County of Peel* (Tremaine 1859) and the 1877 *Illustrated Historical Atlas of the County of Peel* (Walker and Miles 1877) were examined to determine the presence of historic features within the Study Area during the nineteenth century (Table 1; Figures 2-3).

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.

Table 1: Nineteenth-century property owner(s) and historical features(s) within or adjacent to the Study Area

		1859		*1877*	
Con #	**Lot #**	**Property Owner(s)**	**Historical Feature(s)**	**Property Owner(s)**	**Historical Feature(s)**
5	25	John Penbellor	Humber River	Jno Sullivan	Railway, Humber River
5	26	William Gray	Humber River	Mrs MJ Taylor	Railway, Humber River
6	25	Michl Murphy	Humber River	Jas G. Carter	Humber River
6	26	Dr. Wm Adams	Humber River	None listed	Railway, Humber River

The 1859 and 1877 maps indicate historical road allowances in the alignments of present-day Patterson Side Road and Duffy's Lane. The Humber River is shown splitting into two branches south of the Study Area. These branches intersect the Study Area west and east of Duffy's Lane at Patterson Side Road. The 1877 map depicts the H&NW intersecting the Study Area west of Duffy's Lane, in the alignment of the present-day Caledon Trailway Path.

1.2.5 Twentieth-Century Mapping Review

The 1919 and 1994 National Topographic Series (NTS) Bolton Sheets (Department of Militia and Defence 1919; Department of Energy, Mines and Resources, Canada 1994), as well as the 1954 aerial photography (Hunting Survey Corporation Limited 1954) were examined to determine the extent and nature of development and land uses within the Study Area (Figures 4-6).

By 1919, the H&NW is illustrated as having been renamed the Grand Trunk Hamilton Beeton and Allandale Branch. Patterson Side Road east of Duffy's Lane is indicated to be a metalled road[1]. A bridge is shown where each branch of the Humber River meets Patterson Side Road, and a third masonry bridge is shown where the Humber River meets Duffy's Lane to the south. The Study Area is within an area of undulating topography along the main branches of the Humber River. The 1954 aerial photography shows treed areas along Patterson Side Road and Duffy's Lane, clustered around the two branches of the Humber River. The west and east ends of the Study Area are surrounded by open fields. The 1994 map shows the Study Area along the boundary of the Albion Hills Conservation Area.

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Study Area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research: the site record forms for registered sites available online from the MHSTCI through "Ontario's Past Portal"; published and unpublished documentary sources; and the files of ASI.

1.3.1 Current Land Use and Field Conditions

A review of available Google satellite imagery since 2004 shows that the Study Area has remained relatively unchanged.

A Stage 1 property inspection was conducted on October 27, 2020 that noted the Study Area is located along Patterson Side Road crossing the Humber River in two places, adjacent to a low-lying wetland, and along Duffy's Lane where it crosses the Humber River. The surrounding area is treed and the topography is undulating, generally sloping towards the river valleys.

The Patterson Side Road Bridge No. 1 is a single span cast-in-place concrete slab bridge supported by cast-in-place reinforced concrete beams with a northeast-southwest orientation that carries two lanes of

[1] Metalled roads were constructed from crushed stone bound by tar which was then compressed with a steam roller, also known as "tarmac" (Neill 2016)

vehicular traffic across a small branch of the Humber River. This bridge is presumed to have been constructed in 1950, and measures 7.15 metres in overall length with a width of 7.34 metres.

Patterson Side Road Bridge No. 2 is a single span cast-in-place rigid frame concrete bridge with a northeast-southwest orientation that carries two lanes of vehicular traffic across a branch of the Humber River. This subject bridge was constructed in 1956, and measures 14.51 metres in overall length with a width of 8.47 metres.

Duffy's Lane Bridge is a single span cast-in-place rigid frame concrete bridge with a northwest-southeast orientation that carries two lanes of vehicular traffic over a small branch of the Humber River. The bridge is presumed to have been constructed in 1957, and measures 10.6 metres in overall length and 8.9 metres wide.

1.3.2 Geography

In addition to the known archaeological sites, the state of the natural environment is a helpful indicator of archaeological potential. Accordingly, a description of the physiography and soils are briefly discussed for the Study Area.

The S & G stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario since 5,000 BP (Karrow and Warner 1990:Figure 2.16), proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

Other geographic characteristics that can indicate archaeological potential include: elevated topography (eskers, drumlins, large knolls, and plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential (S & G, Section 1.3.1).

The Study Area is located within the kame moraines of the Oak Ridges Moraine physiographic region of southern Ontario (Chapman and Putnam 1984). The Oak Ridges Moraine physiographic region of southern Ontario (Chapman and Putnam 1984:166-169) extends from the Niagara Escarpment to the Trent River forming the height of land separating the drainage basin of Lake Ontario from the drainage basins of Georgian Bay and the Trent. This physiographic region, covering approximately 1,300 square kilometres, is characterized by hilly, "knob and basin" topography of sandy or gravelly till. The Moraine

was created during the melting of the Laurentian Glaciers 13,000-12,000 B.P. The meltwater ran into present day Georgian Bay and Lake Simcoe areas, and into the Great Lakes, forming Lake Iroquois to the south (over present day Lake Ontario), and Lake Algonquin to the north (over present day Lake Huron, Georgian Bay and Lake Simcoe). On the moraine itself, glacial melting formed a series of kettle lakes (Bennett and Glasser 1996:262).

Figure 8 depicts surficial geology for the Study Area. The surficial geology mapping demonstrates that the Study Area is underlain by ice-contact stratified deposits of sand and gravel, minor silt, clay and till as well as modern alluvial deposits of clay, silt, sand, gravel, and may contain organic remains (Ontario Geological Survey 2010). Soils in the Study Area consist of Bottomland, an alluvial with variable drainage, and Pontypool sandy loam, a grey-brown podzolic with good drainage (Figure 9).

Two main branches of the Humber River intersect the Study Area, one approximately 150 metres west of Duffy's Lane at Patterson Side Road, and one within 20 metres east of Duffy's Lane. The Humber River watershed encompasses an area of approximately 911 square kilometers with a main, east and west branch, originating on the Niagara Escarpment and the Oak Ridges Moraine and flowing through York and Peel Regions into the City of Toronto where it drains into Lake Ontario (Toronto and Region Conservation Authority 2016). The Humber River was designated as a Canadian Heritage River System in 1999 for its Carolinian forests, farms and old mills, and because of its 10,000 year history of human settlement and significance as the Carrying Place Trail (Canadian Heritage Rivers System 2016).

1.3.3 Previous Archaeological Research

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MHSTCI. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The Study Area under review is located in Borden block *AlGx*.

According to the OASD, two previously registered archaeological sites are located within one kilometre of the Study Area, neither of which is within 50 metres (MHSTCI 2020). A summary of the sites is provided below.

Table 2: List of previously registered sites within one kilometre of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AlGx-2	Wharton	Archaic	Findspot	Latta 1979
AlGx-10	Matson	Woodland	Unknown	TRCA 1988

According to the background research, no previous reports detail fieldwork within 50 m of the Study Area.

2.0 FIELD METHODS: PROPERTY INSPECTION

A Stage 1 property inspection must adhere to the S & G, Section 1.2, Standards 1-6, which are discussed below. The entire property and its periphery must be inspected. The inspection may be either systematic or random. Coverage must be sufficient to identify the presence or absence of any features of archaeological potential. The inspection must be conducted when weather conditions permit good visibility of land features. Natural landforms and watercourses are to be confirmed if previously identified. Additional features such as elevated topography, relic water channels, glacial shorelines, well-drained soils within heavy soils and slightly elevated areas within low and wet areas should be identified and documented, if present. Features affecting assessment strategies should be identified and documented such as woodlots, bogs or other permanently wet areas, areas of steeper grade than indicated on topographic mapping, areas of overgrown vegetation, areas of heavy soil, and recent land disturbance such as grading, fill deposits and vegetation clearing. The inspection should also identify and document structures and built features that will affect assessment strategies, such as heritage structures or landscapes, cairns, monuments or plaques, and cemeteries.

The Stage 1 archaeological assessment property inspection was conducted under the field direction of Alexis Dunlop (P1146) of ASI, on October 27, 2020, in order to gain first-hand knowledge of the geography, topography, and current conditions and to evaluate and map archaeological potential of the Study Area. It was a systematic visual inspection of the entire study area from publicly accessible lands/public right-of-ways (ROWs) and did not include excavation or collection of archaeological resources.

Fieldwork was conducted when weather conditions were deemed clear with good visibility (partly cloudy with seasonal temperatures), as per S & G Section 1.2., Standard 2. Field observations are compiled onto the existing conditions of the Study Area in Section 7.0 (Figure 9) and associated photographic plates are presented in Section 8.0 (Plates 1-8).

3.0 ANALYSIS AND CONCLUSIONS

The historical and archaeological contexts have been analyzed to help determine the archaeological potential of the Study Area. Results of the analysis of the Study Area property inspection and background research are presented in Section 3.1.

3.1 Analysis of Archaeological Potential

The S & G, Section 1.3.1, lists criteria that are indicative of archaeological potential. The Study Area meets the following criteria indicative of archaeological potential:

- Previously identified archaeological sites (See Table #2);
- Water sources: primary, secondary, or past water source (Humber River);
- Early historic transportation routes (Patterson Side Road, Duffy's Lane); and
- Well-drained soils (Pontypool sandy loam)

According to the S & G, Section 1.4 Standard 1e, no areas within a property containing locations listed or designated by a municipality can be recommended for exemption from further assessment unless the area

can be documented as disturbed. The Municipal Heritage Register was consulted and no properties within the Study Area are Listed or Designated under the Ontario Heritage Act.

These criteria are indicative of potential for the identification of Indigenous and Euro-Canadian archaeological resources, depending on soil conditions and the degree to which soils have been subject to deep disturbance.

Parts of the Study Area exhibit archaeological potential beyond the bottom of the slope and outer edges of the ROW ditches. Stage 2 survey is recommended in these areas, if impacted by construction activities. According to the S & G Section 2.1.2, test pit survey is required on terrain where ploughing is not viable, such as wooded areas, properties where existing landscaping or infrastructure would be damaged, overgrown farmland with heavy brush or rocky pasture, and narrow linear corridors up to 10 metres wide (Figure 9: areas highlighted in green). Due to the complex nature of the topography, standard five metre survey intervals should be maintained where possible.

A combination of property inspection observations with a review of topographic mapping (ESRI 2020) indicates that some of lands within the Study Area are sloped in excess of 20 degrees, and according to the S & G Section 2.1 do not retain potential (Figure 9: area highlighted in pink).

A part of the Study Area is located within the Humber River main watercourses, and according to the S & G Section 2.1 does not retain potential (Plate 2, 4; Figure 9: areas highlighted in blue).

The remainder of the Study Area has been subjected to deep soil disturbance events due to construction of the existing structures and road ROW, as indicated in detailed topographic survey data provided for the project (see Figure 9), and according to the S & G Section 1.3.2 do not retain archaeological potential (Plates 1-8; Figure 9: areas highlighted in yellow). These areas do not require further survey.

3.2 Conclusions

The Stage 1 background study determined that two previously registered archaeological sites are located within one kilometre of the Study Area, neither of which is within 50 metres. The property inspection determined that parts of the Study Area exhibit archaeological potential and will require Stage 2 assessment, prior to any proposed construction activities.

4.0 RECOMMENDATIONS

In light of these results, the following recommendations are made:

1. The Study Area exhibits archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals prior to any proposed impacts to the property;

2. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, watercourses, or slopes in excess of 20 degrees. These lands do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

NOTWITHSTANDING the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the MHSTCI should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI also advises compliance with the following legislation:

- This report is submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, RSO 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 field work and report recommendations ensure the conservation, preservation and protection 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 Ministry of Heritage, Sport, Tourism and Culture Industries, 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.

- 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 field work 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.*

- 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 sec. 48 (1) of the *Ontario Heritage Act*.

- The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) 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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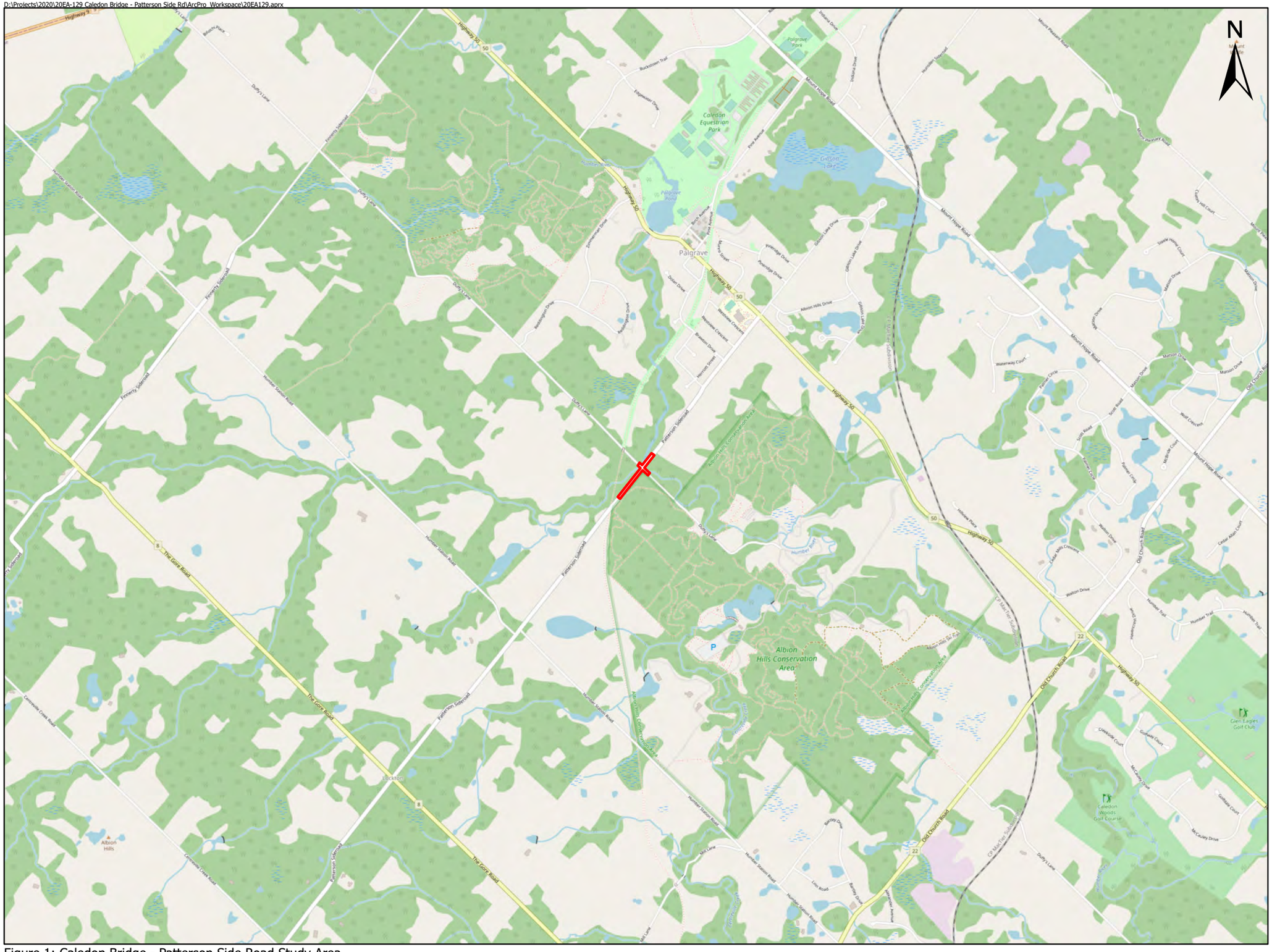
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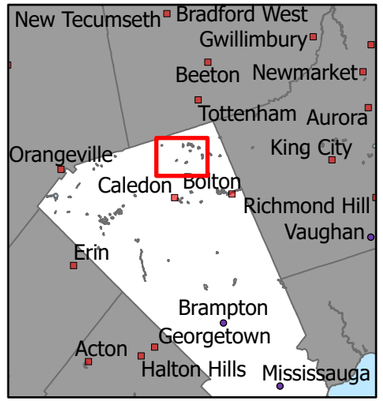
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7.0 MAPS

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STUDY AREA

Sources:© OpenStreetMap (and) contributors, CC-BY-SA

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ASI Project No: 20EA-129
Date: 2020-11-17 4:17 PM

Drawn By: cnettleton
File: Figure1

Providing Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T 416-966-1069 F 416-966-9723 asiheritage.ca

Figure 1: Caledon Bridge - Patterson Side Road Study Area

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Figure 2: Study Area (Approximate Location) Overlaid on the 1859 Tremaine Map of the County of Peel



Figure 3: Study Area (Approximate Location) Overlaid on the 1877 Illustrated Historical Atlas of the County of Peel

ASI

STUDY AREA

Sources: 1859 Tremaine Map of the County of Peel

1877 Illustrated Historical Atlas of the County of Peel

Projection: NAD 1983 CSRS UTM Zone 17N
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Figure 4: Study Area (Approximate Location) Overlaid on the 1919 NTS Bolton Sheet

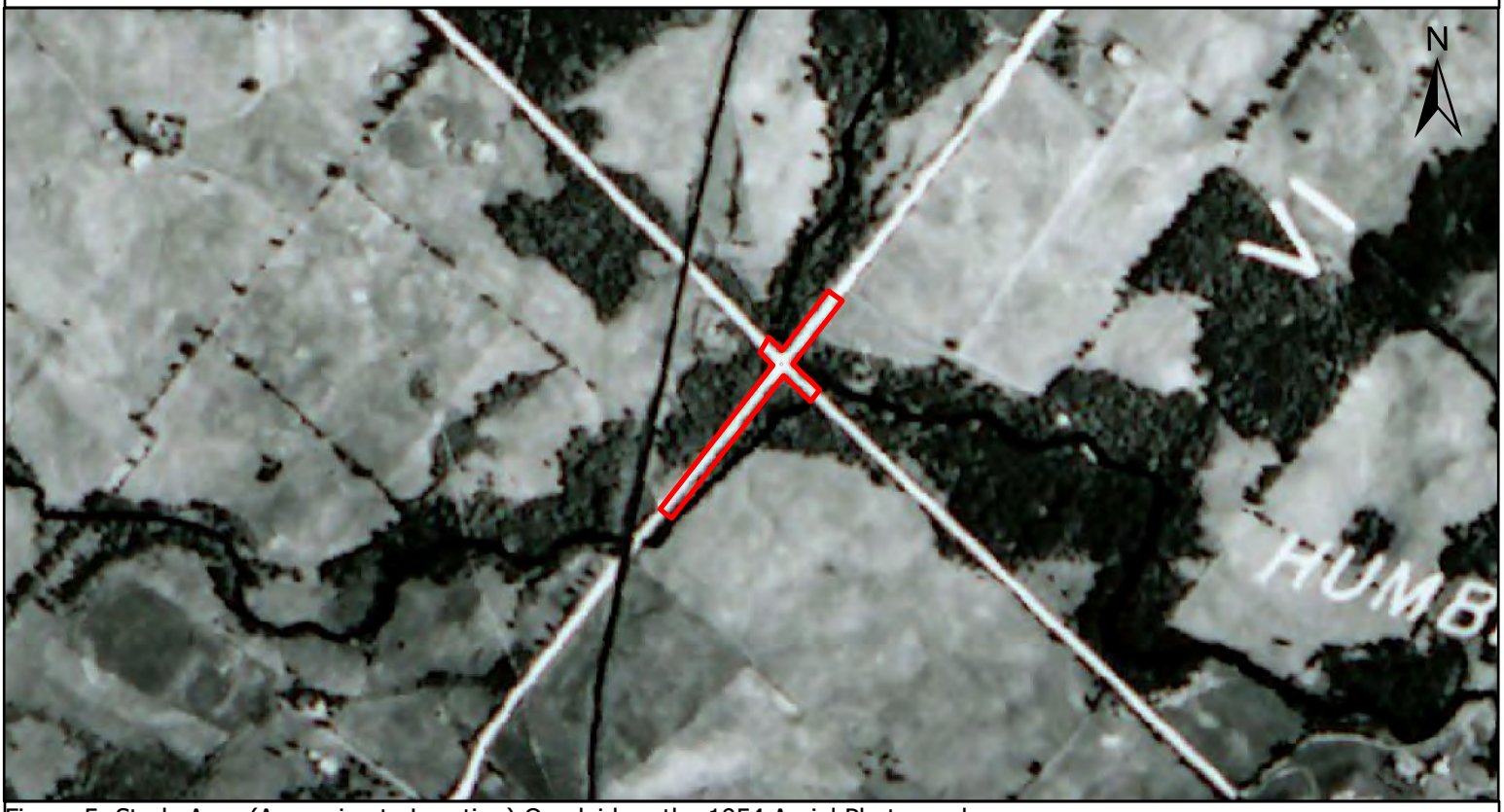


Figure 5: Study Area (Approximate Location) Overlaid on the 1954 Aerial Photography

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STUDY AREA

Sources: 1919 NTS Bolton Sheet

1954 Aerial Photography of Southern Ontario

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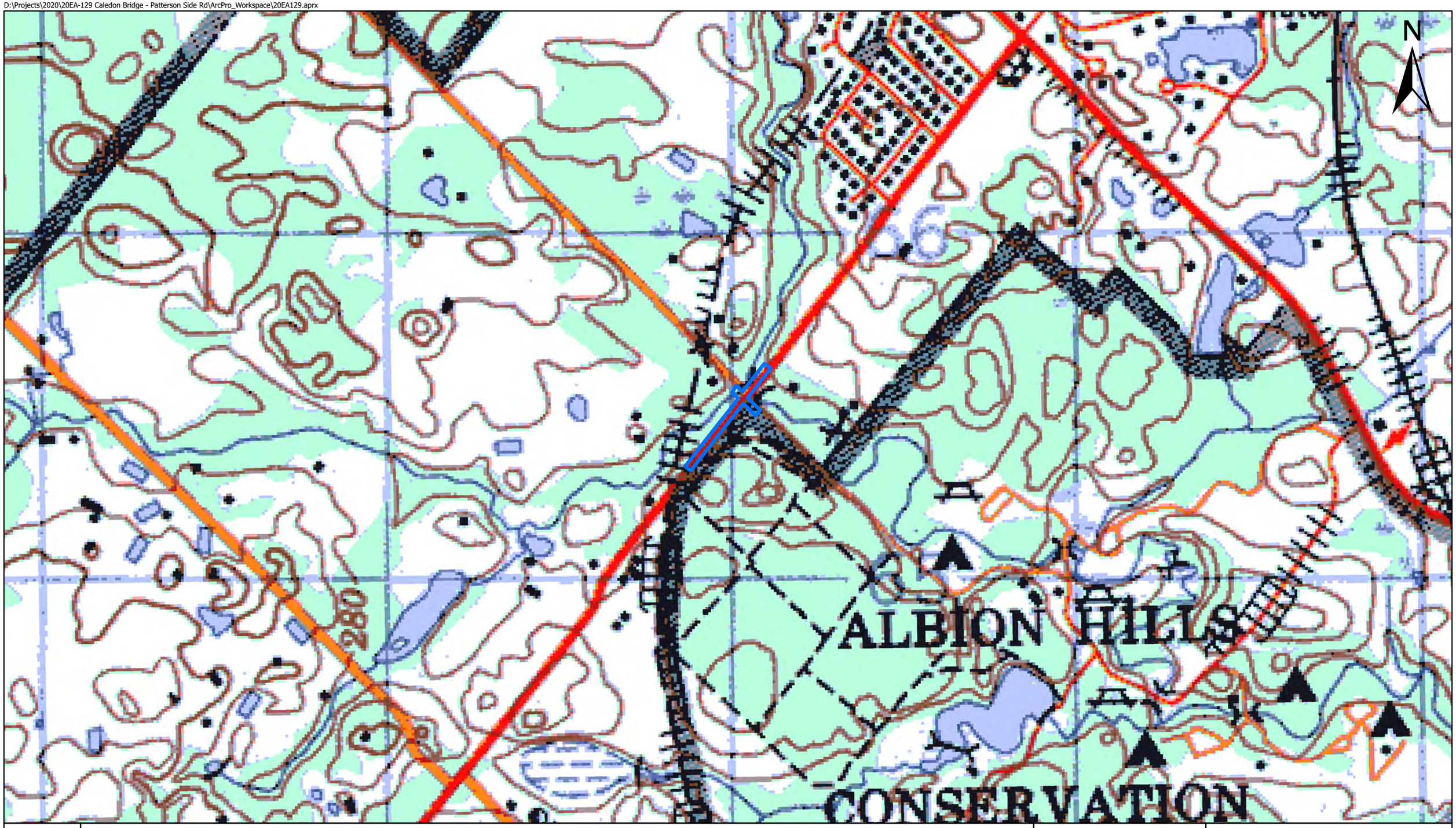
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STUDY AREA

Source: 1994 National Topographic System, Bolton Sheet

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Figure 6: Study Area (Approximate Location) Overlaid on the 1994 NTS Bolton Sheet

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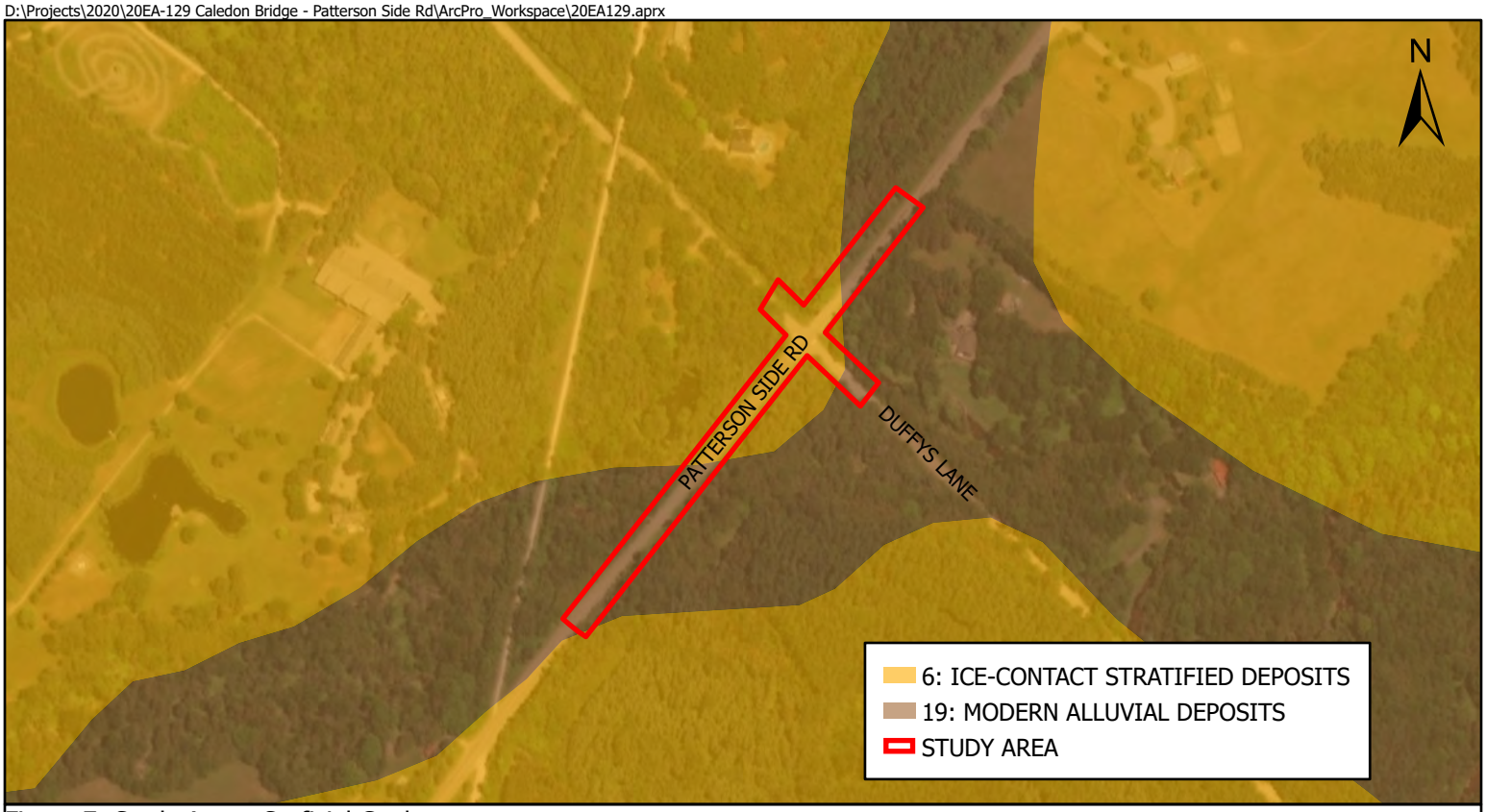


Figure 7: Study Area - Surficial Geology

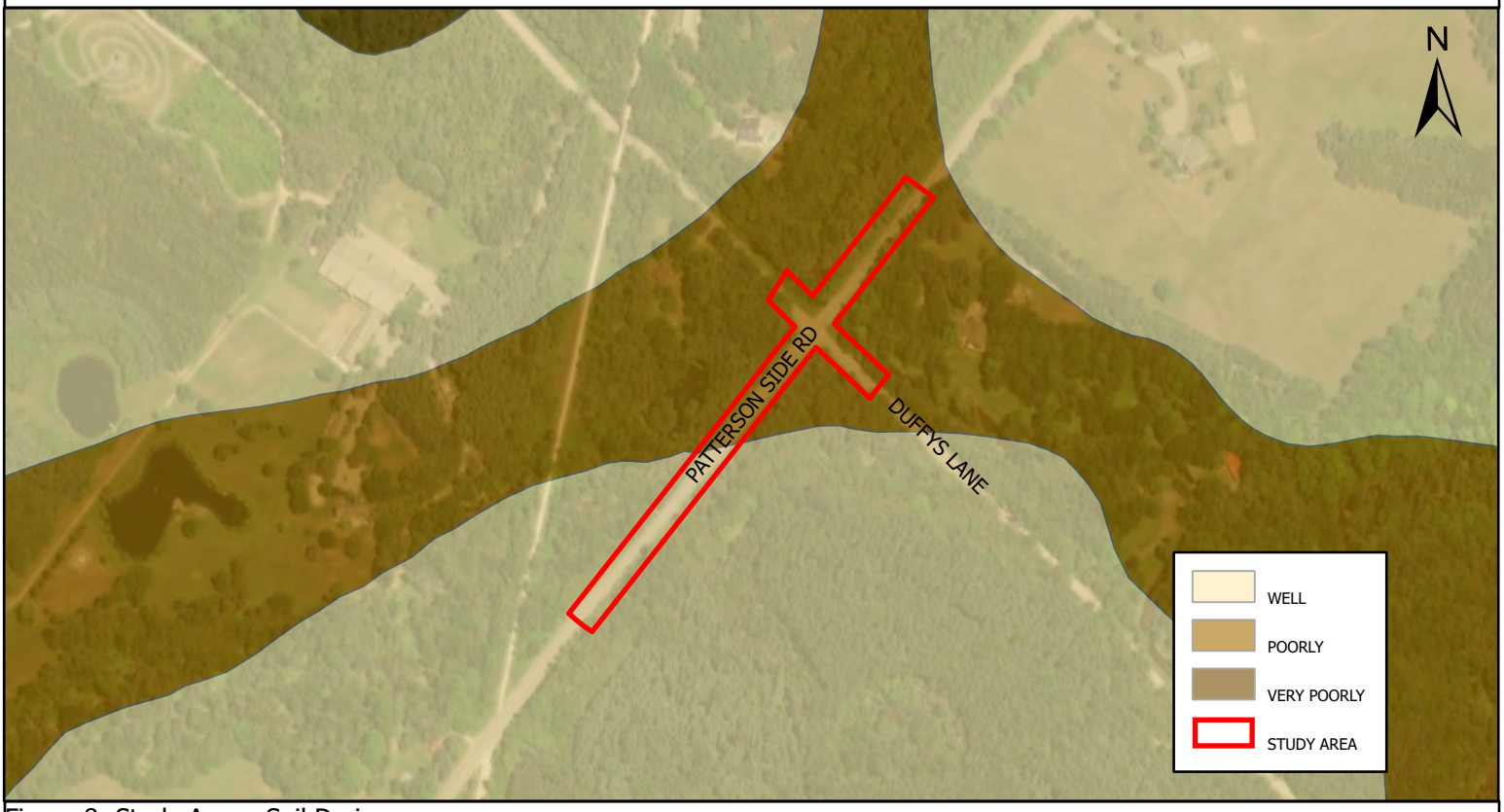


Figure 8: Study Area - Soil Drainage

ASI

Sources: USDA FSA, GeoEye, Maxar; Ontario Geological Survey, Ministry of Northern Development and Mines, © Queen's Printer for Ontario, 2003; Guelph Geomatics Services, Ontario Ministry of Agriculture and AgriFood.

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Projection: NAD 1983 CSRS UTM Zone 17N
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STUDY AREA
DISTURBED: NO POTENTIAL
SLOPED: NO POTENTIAL
TEST PIT SURVEY REQUIRED
WATERCOURSE: NO POTENTIAL
PHOTO LOCATION AND DIRECTION
X-BANK-TOP
X-ROAD-ASPHALT
X-WATER-EDGE
X-BANK-BOT
X-CL
X-DITCH

USDA FSA, GeoEye, Maxar

Projection: NAD 1983 CSRS UTM Zone 17N
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ASI Project No.: 20EA-129
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Drawn By: cnettleton
File: Figure 9

Figure 9: Caledon Bridge - Patterson Side Road - Results of Stage 1

8.0 IMAGES



Plate 1: View of Patterson Side Road; Road ROW is disturbed, no potential. Treed lands beyond ROW ditch require Stage 2 survey.



Plate 2: View of Patterson Side Road Bridge 1 over Humber River; Area is disturbed, no potential



Plate 3: View of Patterson Side Road Bridge 1 over Humber River; Area is disturbed, no potential



Plate 4: View of Patterson Side Road at Duffy's Lane; Road ROW is disturbed, no potential



Plate 5: View of Patterson Side Road Bridge 2 over the Humber River; Road ROW and bridge footings are disturbed, no potential



Plate 6: View of Duffy's Lane; Road and ditch is disturbed, no potential. Lands beyond ROW ditch require Stage 2 survey.



Plate 7: View from Patterson Side Road Bridge 2 over the Humber River



Plate 8: View of Patterson Side Road; Road is in fill and is disturbed, no potential. Lands beyond ROW require Stage 2 survey.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Evaluation of Alternatives

Evaluation Matrix B1
Cost Estimates B2

Patterson Road Bridge 1- Class Environmental Assessment

Evaluation of Alternatives

	Criteria for Evaluating	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
A	**Natural Environment**				
1	**Impact to Water Quality and Quantity**	Ongoing impacts to water quality from road salt/sediment run-off from bridge. Erosion and scour around abutments would continue.	Ongoing impacts to water quality from road salt/sediment run-off from bridge. Some erosion at abutments would be improved. .	Solid barriers and curb and gutter will reduce road salt/sediment from directly entering the watercourse over long term. Potential to mobilize sediment during instream work over short term. Erosion at abutments would be improved.	Solid barriers and curb and gutter will reduce road salt/sediment from directly entering the watercourse over long term. Potential mobilized sediment during instream work over short term. Opportunity to improve bridge alignment with stream morphology. Erosion at abutments would be improved.
	Rating	●	◕	◑	◔
2	**Impact to Aquatic Habitat**	Some impact to aquatic habitat from continued erosion. Channel alignment would continue to scour away from crossing, exacerbating alignment issues.	Improvement to erosion protection from abutment and embankment rehabilitation to minimize scour along embankments and abutments. Limited in-water work anticipated.	Improvement to erosion protection from abutment and embankment rehabilitation to minimize scour along embankments and abutments. Limited in-water work anticipated.	Watercourse alignment through structure improved to minimize adjacent scour along embankments and abutments. Direct impact to aquatic habitat from in-water works will be mitigated.
	Rating	◑	○	○	◔
3	**Impact to Vegetation and Terrestrial Habitat**	No impact over existing conditions.	Potential for minor loss of vegetation located within the existing Right-of-Way as a result of grading and construction. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).	Grading activities will result in loss of vegetation located within the Right-of-Way in some areas. Grading impact will encroach into natural vegetation communities beyond the Right-of-Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).	Grading activities will result in loss of vegetation located within the Right-of-Way in some areas. Grading impact will encroach into natural vegetation communities beyond the Right-of-Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).
	Rating	○	◔	◑	◑
4	**Impact to Designated Sites/Species at Risk/Rare Species**	No anticipated impacts above existing conditions.	In-water work is not anticipated. Possible minor impact to Special Concern species (Monarch) and potential Species at Risk turtle (Snapping Turtle) nesting habitat (road-side) during construction, grading and removal of vegetation.	Construction, grading and removal of vegetation within the road allowance may result in possible impact to potential habitat for Special Concern species (Monarch) and potential for SAR turtle nesting habitat (Snapping Turtle). Possible impact to SAR bat habitat with tree removal beyond the road allowance. In-water work may temporarily impact habitat for Specially Protected reptiles (Midland Painted Turtle).	Construction, grading and removal of vegetation within the road allowance may result in possible impact to potential habitat for Special Concern species (Monarch) and potential for SAR turtle nesting habitat. Possible impact to SAR bat habitat with tree removal beyond the road allowance. In-water work may temporarily impact habitat for Specially Protected reptiles (Midland Painted Turtle)
	Rating	○	◔	◑	◑
5	**Climate Change (greenhouse gas emissions, carbon storage)**	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (>500-year return period) and climate extremes Improvemements to accomodate active transportation have the potential to decrease vehicle traffic resulting in decreases in associated greenhouse gas emissions.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Improvemements to accomodate active transportation have the potential to decrease vehicle traffic resulting in decreases in associated greenhouse gas emissions. The replacement of the existing structure with one with a larger-span and increased vertical profile would allow for improved conveyance capacity below Patterson Road during periods of high flow, providing resilience under changing climatic conditions
	Rating	◑	◑	◔	○
	Summary Natural Environment	◑	◔	◔	◔

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
B	**Socio-Cultural Environment**				
1	**Conformity to Local Planning Provisions (planned road improvements, Active Transportation policy)**	Roadway currently narrows at the bridge. Not compatible with planned road widening improvements. Does not meet current road platform width Town standards. Does not accomodateTransportation Master Plan recommendation for Shared On-Road Cycling Route. Does not provide a road network that is efficient and accommodates future level of service.	Does not meet platform width Town standards and cannot accommodate the shared on-road bicycle lanes or provide the recommended side clearances. Would provide an improved road network that operates at an acceptable level of service without planned shared bicycle lane.	Provides a wider platform width that meets Town standards. Accomodates shared on-road bicylce lanes and recommeded side clearances. Provide a road network that is safe, efficient and operates at an acceptable level of service.	Provides a wider platform width to meet Town standards. Accomodates shared on-road bicylce lanes and recommeded side clearances. Provide a road network that is safe, efficient and operates at an acceptable level of service.
	Rating	●	◑	○	○
2	**Property Impacts (property acquisition)**	No impact over existing conditions.	No impact over existing conditions as the work will predominantly occur within the existing road allowance.	Easement or some property acquisition required for grading.	Easement or some property acquisition required for grading.
	Rating	○	○	◑	◑
3	**Impact to Archaeological Resources**	No impact over existing conditions.	Archaeological potential beyond the right-of-way ditches. Rehabilitation would be completed within the existing right of way. No impact to archaeological resources is anticipated.	Potential impact to archaeological resources within grading in areas located beyond the bottom of the slope and outer edges of the ROW ditches	Potential impact to archaeological resources within grading in areas located beyond the bottom of the slope and outer edges of the ROW ditches
	Rating	○	○	◑	◑
4	**Impact to Cultural Heritage Resources**	Does not merit designation for cultural heritage	Does not merit designation for cultural heritage	Does not merit designation for cultural heritage	Does not merit designation for cultural heritage
	Rating	○	○	○	○
	Summary Socio-Cultural Environment	◔	◔	◔	◔

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
D	**Financial Factors**				
1	**Capital Costs**	No immediate costs for demolition or construction. Service life of structure is 10 years +/-	Moderate construction costs associated with rehabilitation (~385K).	High construction costs associated with rehabilitation and widening (~1.2M).	Highest construction cost associated with a new bridge (~1.9M).
	Rating	○	◔	◕	●
2	**Operating and Maintenance**	Operating and maintenance costs for continued safety at the bridge. Will increase over time.	Moderate operating and maintenance costs as the structure will require continued and more frequent maintenance over time.	Low initial operating and maintenance costs, but will increase over time.	Low initial operating and maintenance costs, but will increase over time.
	Rating	●	◑	◔	◔
3	**Net Present Value**	No upfront cost, high replacement cost anticipated in short term of approximately 10 years.(NPV ~1.5M)	low cost upfront, high replacement cost deferred to medium term-25 years (NPV ~1.3M).	high cost upfront, replacement cost deferred to medium term - 25 years (NPV~2.1M).	highest cost upfront, replacement cost deferred to long term (75 years). maintenance and rehab cost in medium term (NPV ~2.1M).
	Rating	◔	○	◑	◕
	Summary Financial Factors	◑	◔	◑	◑

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
E	**Technical Factors**				
1	**Structural - Condition and Load Capacity**	Defects not addressed; Structure generally in fair condition with limited (10 years +/-) service life remaining; Alignment with watercourse not improved. No opportunity to improve capacity of the structure. May require load posting.	All defects can be addressed to extend the service life to 20-25 years. Alignment with watercourse not improved. Reinforced concrete deck overlay to replace granular fill and improve capacity.	All defects can be addressed to extend the service life to 20-25 years (limited by existing substructure); Alignment with watercourse not improved. Reinforced concrete deck overlay to replace granular fill and improve capacity.	A new structure will not have any defects and structural issues can be addressed; Service life of 75 years expected; Alignment with watercourse improved. A new bridge will not have any load restrictions.
	Rating	●	◔	◔	○
2	**Geometry - Road and Bridge Profile and Width**	No improvement to driving platform width. No opportunity to improve profile and sight lines. Design speed of less than 40 km/h.	No improvement to driving platform width. Opportunity for minor improvement to profile and sight lines (40 km/h design speed).	Structure can be widened as part of a major rehabilitation to meet desired platform width. Opportunity for minor improvement to profile and sight lines (40 km/h design speed).	A new structure can be constructed to the desired platform width. Sight distance can be improved to meet 60 km/h design speed.
	Rating	●	◕	◑	○
	Summary Technical Factors	●	◑	◔	○

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
F	**Problem Statement**				
1	**Addresses Problem Statement**	No	Partially	Yes	Yes
	Summary Problem Statement	**Not Preferred**	**Partially Preferred**	**Preferred**	**Preferred**

Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
Overall Summary	**Not Preferred**	**More Preferred**	**More Preferred**	**Most Preferred**

Order of Preference

Most Preferred ○

More Preferred ◔

Somewhat Preferred ◑

Less Preferred ◕

Least Preferred ●

Patterson Road Bridge 2- Class Environmental Assessment

Evaluation Of Alternatives

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
A	**Natural Environment**				
1	**Impact to Water Quality and Quantity**	Ongoing impacts to water quality from road salt/sediment run-off from bridge.	Ongoing impacts to water quality from road salt/sediment run-off from bridge.	Solid barriers and curb and gutter will reduce road salt/sediment from directly entering the watercourse over long term. Potential to mobilize sediment during instream work over short term.	Solid barriers and curb and gutter will reduce road salt/sediment from directly entering the watercourse over long term. Potential mobilized sediment during instream work over short term.
	Rating	●	◕	◑	◔
2	**Impact to Aquatic Habitat**	No in-water work anticipated.	Limited in-water work anticipated.	Limited in-water work anticipated.	Direct impact to aquatic habitat from in-water works will be mitigated.
	Rating	○	◔	◔	◑
3	**Impact to Vegetation and Terrestrial Habitat**	No impact over existing conditions.	Potential for minor loss of vegetation located within the existing Right-of-Way as a result of grading and construction. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).	Grading activities will result in loss of vegetation located within the Right-of-Way in some areas. Grading impact will encroach into natural vegetation communities beyond the Right-of-Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).	Grading activities will result in loss of vegetation located within the Right-of-Way in some areas. Grading impact will encroach into natural vegetation communities beyond the Right-of-Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance).
	Rating	○	◔	◑	◑
4	**Impact to Designated Sites/Species at Risk/Rare Species**	No anticipated impacts above existing conditions.	In-water work is not anticipated. Possible minor impact to Special Concern species (Monarch) and potential Species at Risk turtle (Snapping Turtle) nesting habitat (road-side) during construction, grading and removal of vegetation.	Construction, grading and removal of vegetation within the road allowance may result in possible impact to potential habitat for Special Concern species (Monarch) and potential for SAR turtle nesting habitat (Snapping Turtle). Possible impact to SAR bat habitat with tree removal beyond the road allowance. In-water work may temporarily impact habitat for Specially Protected reptiles (Midland Painted Turtle).	Construction, grading and removal of vegetation within the road allowance may result in possible impact to potential habitat for Special Concern species (Monarch) and potential for SAR turtle nesting habitat. Possible impact to SAR bat habitat with tree removal beyond the road allowance. In-water work may temporarily impact habitat for Specially Protected reptiles (Midland Painted Turtle)
	Rating	○	◔	◑	◑
5	**Climate Change (greenhouse gas emissions, carbon storage)**	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (>500-year return period) and climate extremes. Improvemements to accomodate active transportation have the potential to decrease vehicle traffic resulting in decreases in associated greenhouse gas emissions.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. Improvemements to accomodate active transportation have the potential to decrease vehicle traffic resulting in decreases in associated greenhouse gas emissions. The replacement of the existing structure with one with a larger-span and increased vertical profile would allow for improved conveyance capacity below Patterson Road during periods of high flow, providing resilience under changing climatic conditions
	Rating	◑	◑	◔	○
	Summary Natural Environment	◔	◑	◑	◔

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
B	**Socio-Cultural Environment**				
1	**Conformity to Local Planning Provisions (planned road improvements, Active Transportation policy)**	Roadway currently narrows at the bridges. Not compatible with planned road widening improvements. Does not meet current road platform width Town standards. Does not accomodateTransportation Master Plan recommendation for Shared On-Road Cycling Route. Does not provide a road network that is efficient and accomodates future level of service.	Does not meet platform width Town standards and cannot accommodate the shared on-road bicycle lanes or provide the recommended side clearances. Would provide an improved road network that operates at an acceptable level of service without planned shared bicycle lane.	Provides a wider platform width that meets Town standards. Accomodates shared on-road bicylce lanes and recommeded side clearances. Provide a road network that is safe, efficient and operates at an acceptable level of service.	Provides a wider platform width to meet Town standards. Accomodates shared on-road bicylce lanes and recommeded side clearances. Provide a road network that is safe, efficient and operates at an acceptable level of service.
	Rating	●	◑	○	○
2	**Property Impacts (property acquisition)**	No impact over existing conditions.	No impact over existing conditions as the work will predominantly occur within the existing road allowance.	Easement or some property acquisition required for grading, but no permenant infrastructure beyond road allowance.	Easement or some property acquisition required for grading, but no permenant infrastructure beyond road allowance.
	Rating	○	○	◑	◑
3	**Impact to Archaeological Resources**	No impact over existing conditions.	Archaeological potential beyond the right-of-way ditches. Rehabilitation would be completed within the existing right of way. No impact to archaeological resources is anticipated.	Potential impact to archaeological resources within grading in areas located beyond the bottom of the slope and outer edges of the ROW ditches.	Potential impact to archaeological resources within grading in areas located beyond the bottom of the slope and outer edges of the ROW ditches.
	Rating	○	○	◑	◑
4	**Impact to Cultural Heritage Resources**	Does not merit designation for cultural heritage.	Does not merit designation for cultural heritage.	Does not merit designation for cultural heritage.	Does not merit designation for cultural heritage.
	Rating	○	○	○	○
	Summary Socio-Cultural Environment	◔	○	◔	◔

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
D	**Financial Factors**				
1	**Capital Costs**	No immediate costs for demolition or construction. Service life of structure is >10 years	Moderate construction costs associated with rehabilitation (~675K).	High construction costs associated with rehabilitation and widening (~1.1M).	Highest construction cost associated with a new bridge (~2.2M).
	Rating	○	◔	◕	●
2	**Operating and Maintenance**	Operating and maintenance costs for continued safety at the bridge. Will increase over time.	Moderate operating and maintenance costs as the structure will require continued and more frequent maintenance over time.	Low initial operating and maintenance costs, but will increase over time.	Low initial operating and maintenance costs, but will increase over time.
	Rating	●	◑	◔	◔
3	**Net Present Value**	No upfront cost, high replacement cost anticipated in short term -10 years.(NPV ~1.75M)	Low cost upfront, high replacement cost deferred to medium term-25 years (NPV ~1.74M).	high cost upfront, replacement cost deferred to medium term - 25 years (NPV~2.2M).	highest cost upfront, replacement cost deferred to long term -75 years. maintenance and rehab cost in medium term (NPV ~2.5M).
	Rating	◔	○	◑	◕
	Summary Financial Factors	◑	◔	◑	◑

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
E	**Technical Factors**				
1	**Structural - Condition and Load Capacity**	Defects not addressed. Structure generally in fair condition with limited (10-15 years) service life remaining. No opportunity to improve capacity of the structure. May require load posting.	All defects can be addressed to extend the service life to 20-25 years. Opportunity to strengthen structure & provide minor capacity improvement with reinforced concrete deck overlay to replace granular fill.	All defects can be addressed to extend the service life to 20-25 years. Opportunity to strengthen structure & provide minor capacity improvement with reinforced concrete deck overlay to replace granular fill.	A new structure will not have any defects and structural issues can be addressed; Service life of 75 years expected. A new bridge will not have any load restrictions.
	Rating	●	◔	◔	○
2	**Geometry - Road and Bridge Profile and Width**	No improvement to driving platform width. No opportunity to improve profile and sight lines. Design speed of less than 40 km/h.	No improvement to driving platform width. Opportunity for minor improvement to profile and sight lines (40 km/h design speed).	Structure can be widened as part of a major rehabilitation to meet desired platform width. Opportunity for minor improvement to profile and sight lines (40 km/h design speed).	A new structure can be constructed to the desired platform width. Sight distance can be improved to meet 60 km/h design speed.
	Rating	●	◕	◑	○
	Summary Technical Factors	●	◑	◔	○

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
F	**Problem Statement**				
1	**Addresses Problem Statement**	No	Partially	Yes	Yes
	Summary Problem Statement	**Not Preferred**	**Partially Preferred**	**Preferred**	**Preferred**

Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Rehabilitate Structure	Alternative 3: Rehabilitate and Widen Structure	Alternative 4: Replace Structure
Overall Summary	**Not Preferred**	**More Preferred**	**Somewhat Preferred**	**Most Preferred**

Order of Preference

Most Preferred ○

More Preferred ◔

Somewhat Preferred ◑

Less Preferred ◕

Least Preferred ●

Duffys Lane Bridge - Class Environmental Assessment
Evaluation of Alternatives

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	Alternative 4: Replace Structure		
					4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
A	**Natural Environment**						
1	**Impact to Water Quality and Quantity**	Ongoing minor impacts to water quality from sediment and continued traffic	Reduced impact on water quality impacts from road salt and sediment. Minor potential for mobilized sediment during in-stream work to close bridge. Dewatering during bridge removal not anticipated. No impacts to groundwater are anticipated.	Ongoing minor impacts to water quality from sediment and continued traffic. Minor potential mobilized sediment during in-stream work. No impacts to groundwater are anticipated.	Ongoing minor impacts to water quality from sediment and continued traffic. Potential to mobilize sediment during in-stream work. Dewatering may be required during construction. Impacts can be mitigated.	Ongoing minor impacts to water quality from sediment and continued traffic. Limited potential to mobilize sediment during construction. In-stream work not anticipated. Dewatering not anticipated during construction. Impacts can be mitigated.	Ongoing minor impacts to water quality from sediment and continued traffic.Limited potential to mobilize sediment during construction. In-stream work not anticipated. Dewatering not anticipated during construction. Impacts can be mitigated.
	Rating	◔	◔	◔	◑	○	○
2	**Impact to Aquatic Habitat**	No in-water work anticipated in the short-term.	Limited in-water work will be mitigated.	Limited in-water work will be mitigated.	Direct impact to aquatic habitat from in-water works will be mitigated.	In-stream work not anticipated.	In-stream work not anticipated.
	Rating	◔	◔	◔	◑	○	○
3	**Impact to Vegetation and Terrestrial Habitat**	No impact above existing conditions.	Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during closure phase (i.e., noise disturbance), including Species at Risk (SAR).	Minor loss of vegetation. Grading impacts into natural vegetation communities located within the existing Right of Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance), including SAR.	Moderate loss of vegetation wth wider area of distrubance than Alternatives 3B and 3C. Grading impacts into natural vegetation communities located within the existing Right of Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance), including SAR.	Minor loss of vegetation. Grading impacts into natural vegetation communities located within the existing Right of Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance), including SAR.	Minor loss of vegetation. Grading impacts into natural vegetation communities located within the existing Right of Way. Temporary displacement of and disturbance to migratory breeding birds, wildlife and wildlife habitat during the construction phase (i.e., vegetation removals, noise disturbance), including SAR.
	Rating	◔	◔	◑	◕	◑	◑
4	**Impact to Designated Sites/Species at Risk**	No anticipated impacts.	Potential for minor impact to SAR reptiles (Midland Painted Turtle and Snapping Turtle) during construction, grading and removal of bridge.	Potential for minor impact to SAR reptiles (Midland Painted Turtle and Snapping Turtle) during construction, grading and removal of vegetation.	Potential for impact to SAR reptiles (Midland Painted Turtle and Snapping Turtle) during construction, grading and removal of vegetation.	Potential for impact to SAR reptiles (Midland Painted Turtle and Snapping Turtle) during construction, grading and removal of vegetation.	Potential for impact to SAR reptiles (Midland Painted Turtle and Snapping Turtle) during construction, grading and removal of vegetation.
	Rating	○	◔	◔	◑	◑	◑
5	**Climate Change (greenhouse gas emissions, carbon storage)**	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Removal of the existing structure would allow for improved conveyance capacity below Duffy's Lane during periods of high flow,	Vegetation maintenance is not anticipated to significantly impact the availablility of carbon sinks. Vertical profile of the existing bridge is vulnerable to potential flood conditions during periods of very high flow (> 500-year return period) and climate extremes.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. The replacement of the existing structure with one with an increased vertical profile would allow for improved conveyance capacity below Duffy's Lane during periods of high flow, providing resilience under changing climatic conditions.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. The replacement of the existing structure with one with an increased vertical profile would allow for improved conveyance capacity below Duffy's Lane during periods of high flow, providing resilience under changing climatic conditions.	Vegetation removal and maintenance is not anticipated to significantly impact the availablility of carbon sinks over existing conditions. The replacement of the existing structure with one with an increased vertical profile would allow for improved conveyance capacity below Duffy's Lane during periods of high flow, providing resilience under changing climatic conditions.
	Rating	◑	○	◑	○	○	○
	Summary Natural Environment	◔	◔	◔	◑	◔	◔

		Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	Alternative 4: Replace Structure		
	Criteria for Evaluating Alternatives				4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
B	**Socio-Cultural Environment**						
1	**Conformity to Local Planning Provisions**	Duffy's Lane is identified as a Rural Local Undivided road. No changes anticipated until bridge is closed in 5-10 yrs.	Duffy's Lane is identified as a Rural Local Undivided road. Without the bridge the road will no longer act as a local road.	Duffy's Lane is identified as a Rural Local Undivided road. No change to road use anticipated. Rehabilitated structure does not meet design standards for width.	Duffy's Lane is identified as a Rural Local Undivided road. No change to road use anticipated. Can be designed to meet standards for bridge width.	Duffy's Lane is identified as a Rural Local Undivided road. No change to road use anticipated. Can meet MTO design exception requirements for narrower bridges based on low volume of traffic. Minor impacts to traffic flow anticipated.	Duffy's Lane is identified as a Rural Local Undivided road. Without a vehicular bridge the road will no longer act as a local road.
	Rating	◑	●	◑	○	◑	●
2	**Property Impacts**	No property acquisition anticipated. No impact above existing conditions.	No property acquisition anticipated. Alternate roadway access for one residence and Conservation Park removed	No property acquisition anticipated.Vehicular and pedestrian access to one residence and Conservation Park remains.	No property acquisition anticipated.Vehicular and pedestrian access to one residence and Conservation Park remains.	No property acquisition anticipated.Vehicular and pedestrian access to one residence and Conservation Park remains. Reduced to single lane at bridge.	No property acquisition anticipated. Alternate roadway access to one residence and Conservation Park removed; Pedestrian access remains.
	Rating	○	◑	○	○	○	◔
3	**Impact to Access for Emergency Services**	Alternate access for Emergency Services to Conservation Park may be restricted in short term.	Alternate access for Emergency Services to Conservation Park removed.	No impact to Emergency Services.	No impact to Emergency Services.	No impact to Emergency Services.	Alternate access for Emergency Services to Conservation Park removed.
	Rating	◕	●	○	○	○	●
4	**Impact to Archaeological Resources**	No impact over existing conditions.	Minimal to no impact to archaeological resources is anticipated.	Archaeological potential beyond the bottom of the slope and outer edges of the ROW ditches. Improvements would be made within the existing right of way, which to the most part, has been previously disturbed. Minimal to no impact to archaeological resources is anticipated.	Archaeological potential beyond the bottom of the slope and outer edges of the ROW ditches. Improvements would be made within the existing right of way, which to the most part, has been previously disturbed. Minimal to no impact to archaeological resources is anticipated.	Archaeological potential beyond the bottom of the slope and outer edges of the ROW ditches. Improvements would be made within the existing right of way, which to the most part, has been previously disturbed. Minimal to no impact to archaeological resources is anticipated.	Archaeological potential beyond the bottom of the slope and outer edges of the ROW ditches. Improvements would be made within the existing right of way, which to the most part, has been previously disturbed. Minimal to no impact to archaeological resources is anticipated.
	Rating	○	◔	◔	◔	◔	◔
5	**Impact to Cultural Heritage Resources**	No impact over existing conditions.	Duffy's Lane Bridge was determined to have cultural heritage value for physical and contextual reasons. Impact to heritage structure with removal.	Duffy's Lane Bridge was determined to have cultural heritage value for physical and contextual reasons. Value added for the heritage structure rehabiliation.	High negative impact to the bridge as a valued cultural heritage structure will be completely replaced.	High negative impact to the bridge as a valued cultural heritage structure will be completely replaced.	High negative impact to the bridge as a valued cultural heritage structure will be completely replaced.
	Rating	○	●	◑	●	●	●
	Summary Socio-Cultural Environment	◔	◕	◔	◔	◔	◕

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	Alternative 4: Replace Structure		
					4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
D	**Financial Factors**						
1	**Construction and Demolition Costs**	$100,000 to remove structure and install barricades when condition warrants removal	Minimal costs for barricades and road closed signs. Moderate costs to remove the bridge in the future.	Moderate construction costs associated with rehabilitation (~$485K)	Highest construction costs associated with replace and widening (~ $1.4M)	High cost associated with replacement (~$650K)	Moderate cost associated with replacement (`$440K)
	Rating	○	◔	◔	●	◕	◔
2	**Operating and Maintenance**	Operating and maintenance costs for continued safety at the bridge. Will increase over time. Remaining service life of 5-10 yrs anticipated.	Minimal operating and maintenance costs except for periodic inspections.	Moderate operating and maintenance costs as the structure will require continued maintenance over time. Extended service life of 20 years anticipated.	Low initial operating and maintenance costs, but will increase over time.Service life of 75 years anticipated.	Low initial operating and maintenance costs, but will increase over time. Service life of 75 years anticipated.	Low initial operating and maintenance costs, but will increase over time. Service life of 75 years anticipated.
	Rating	●	◔	◑	◔	◔	◔
	Summary Financial Factors	◑	◔	◔	◑	◑	◔

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	Alternative 4: Replace Structure		
					4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
E	**Technical Factors**						
1	**Structural - Condition and Load Capacity**	Defects not addressed; Structure generally in fair to poor condition with limited (5-10 yrs.) service life remaining. Load posting to be considered due to corrosion of reinforcing steel.	Defects addressed with removal and road closure; Structure generally in fair to poor condition with limited (5-10 yrs.) service life remaining.	Defects can be addressed to extend the service life to 20 years. Load posting requirements to be evaluated based on current design loading.	A new structure will not have any defects and all issues will be addressed. Service life of 75 years expected. A new bridge will not have any load restrictions.	A new structure will not have any defects and all issues will be addressed. Service life of 75 years expected. A new bridge will not have any load restrictions.	A new structure will not have any defects and all issues will be addressed. Service life of 75 years expected. Pedestrian loading only. Opportunity to design for maintenance vehicle loading if desired.
	Rating	●	◔	◑	○	○	◑
2	**Geometry - Road and Bridge Profile and Width**	No opportunity to improve platform and side clearance. Existing sightlines and profile maintained. 30km/h design speed curves to tie into raised intersection.	No opportunity to improve platform and side clearance.	Opportunity to remove raised curbs to meet minimum two-lane bridge platform width. Existing sightlines and profile maintained. 30km/h design speed curves to tie into raised intersection.	Replacement structure can be designed to meet desirable two-lane platform width. Opportunity for minor improvement to profile and sight lines (40 km/h design speed).	Replacement structure designed for single-lane, two-way structure. Right-of-way control required on approaches. Opportunity for improvements to profile and sight lines up to 50 km/h design speed.	Pedestrian width bridge; narrower than approach roadways.
	Rating	●	●	◕	○	◔	◑
	Summary Technical Factors	●	◑	◑	○	○	◑

	Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
F	**Problem Statement**						
1	**Addresses Problem Statement**	Yes	Yes	Yes	Yes	Yes	Partially
	Summary Problem Statement	**Preferred**	**Preferred**	**Preferred**	**Preferred**	**Preferred**	**Partially Preferred**

Criteria for Evaluating Alternatives	Alternative 1: Do Nothing	Alternative 2: Abandon/Remove Structure and Close the Road	Alternative 3: Rehabilitate Structure	4A: Vehicular Bridge (Two Lane)	4B: Vehicular Bridge (Single Lane, Modular)	4C: Pedestrian Bridge
Overall Summary	**Least Preferred**	**Less Preferred**	**Somewhat Preferred**	**More Preferred**	**Most Preferred**	**Somewhat Preferred**

Order of Preference

Most Preferred ○

More Preferred ◔

Somewhat Preferred ◑

Less Preferred ◕

Least Preferred ●

Client:	**Town of Caledon**
Project:	**Patterson Road Bridge 1**
Project No.:	**300051839.7**
Date:	**February 22, 2021**

REHABILITATE EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Asphalt Removal - Full Depth	255	sq.m	$12.50	$3,187.50
10	Removal of Ex. Fill from Deck	1	LS	$5,000.00	$5,000.00
11	Concrete Removals, Partial Depth - Type A	0.5	cu.m	$5,000.00	$2,500.00
12	Concrete Removals, Partial Depth - Type B	0.6	cu.m	$12,500.00	$7,500.00
13	Concrete Removals, Partial Depth - Type C	0.7	cu.m	$12,500.00	$8,750.00
14	Hot Mix HL-3	20	t	$200.00	$4,000.00
15	Hot Mix HL-8	40	t	$200.00	$8,000.00
16	Pavement Markings	120	m	$20.00	$2,400.00
17	Granular 'A'	150	t	$22.00	$3,300.00
18	Earth Excavation for Structure	1	LS	$5,000.00	$5,000.00
19	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
20	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
21	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
22	Concrete in Deck Overlay	1	LS	$37,500.00	$37,500.00
23	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
24	Concrete in Abutment Refacing	1	LS	$8,500.00	$8,500.00
25	Concrete Patches, Partial Depth, Form & Pump	0.6	cu.m	$7,000.00	$4,200.00
26	Dowels into Concrete	200	ea.	$20.00	$4,000.00
27	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
28	Steel Reinforcing	1	LS	$12,500.00	$12,500.00
29	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
30	Bridge Deck Waterproofing	59	sq.m	$75.00	$4,425.00
31	Joint Fillers, Seals and Compounds	1	LS	$2,500.00	$2,500.00
32	Rip-Rap	125	t	$65.00	$8,125.00
33	Topsoil, Imported	40	cu.m	$60.00	$2,400.00
34	Seed and Cover	400	sq.m	$5.00	$2,000.00
35	Heavy Duty Silt Fence Barriers	100	m	$20.00	$2,000.00
36	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
37	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
38	Smooth Run River Stone	100	t	$90.00	$9,000.00

Estimated Construction Cost Subtotal	$336,862.50
15% Contingency	$50,529.38
Project Cost Subtotal	$387,391.88
13% H.S.T.	$50,360.94
TOTAL ESTIMATED PROJECT COST	$437,752.82

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Road Bridge 1**
Project No.:	**300051839.7**
Date:	**February 22, 2021**

REHABILITATE & WIDEN BRIDGE (10.0m Wide Platform) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$15,000.00	$15,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$30,000.00	$30,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Asphalt Removal - Full Depth	720	sq.m	$12.50	$9,000.00
10	Removal of Ex. Fill from Deck	1	LS	$5,000.00	$5,000.00
11	Remove Ex. Concrete Curbs & Wingwall Tops	1	LS	$12,500.00	$12,500.00
12	Concrete Removals, Partial Depth - Type A	0.5	cu.m	$5,000.00	$2,500.00
13	Concrete Removals, Partial Depth - Type B	0.6	cu.m	$12,500.00	$7,500.00
14	Concrete Removals, Partial Depth - Type C	0.7	cu.m	$12,500.00	$8,750.00
15	Hot Mix HL-3	90	t	$150.00	$13,500.00
16	Hot Mix HL-8	190	t	$150.00	$28,500.00
17	Pavement Markings	320	m	$20.00	$6,400.00
18	Granular 'A'	150	t	$22.00	$3,300.00
19	Granular 'B' - Type 1 Roadway	350	t	$18.00	$6,300.00
20	Granular 'B' - Backfill to Structure	2400	t	$20.00	$48,000.00
21	Pipe Subdrain	52	m	$15.00	$780.00
22	Earth Excavation for Structure	1	LS	$40,000.00	$40,000.00
23	Unwatering Structure Excavation	1	LS	$40,000.00	$40,000.00
24	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
25	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
26	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
27	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
28	H Piles - HP 310 x 110	160	m	$500.00	$80,000.00
29	Driving Shoes	8	ea.	$450.00	$3,600.00
30	Concrete in Footings	1	LS	$9,000.00	$9,000.00
31	Concrete in Structure Widening	1	LS	$60,000.00	$60,000.00
32	Concrete in Wingwalls	1	LS	$65,000.00	$65,000.00
33	Concrete in Deck Overlay	1	LS	$37,500.00	$37,500.00
34	Concrete in Barrier Wall	1	LS	$22,000.00	$22,000.00
35	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
36	Concrete in Abutment Refacing	1	LS	$8,500.00	$8,500.00
37	Dowels into Concrete	650	ea.	$20.00	$13,000.00
38	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
39	Steel Reinforcing	1	LS	$55,000.00	$55,000.00
40	Stainless Reinforcing Steel	1	LS	$25,000.00	$25,000.00
41	Bridge Deck Waterproofing	89	sq.m	$75.00	$6,675.00
42	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
43	Rip-Rap	150	t	$65.00	$9,750.00
44	Topsoil, Imported	60	cu.m	$60.00	$3,600.00
45	Seed and Cover	600	sq.m	$5.00	$3,000.00
46	Heavy Duty Silt Fence Barriers	200	m	$20.00	$4,000.00
47	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
48	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
49	Smooth Run River Stone	120	t	$90.00	$10,800.00
				Estimated Construction Cost Subtotal	$1,001,030.00
				15% Contingency	$150,154.50
				Project Cost Subtotal	$1,151,184.50
				13% H.S.T.	$149,653.99
				TOTAL ESTIMATED PROJECT COST	$1,300,838.49

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Sideroad Bridge 1**
Project No.:	**300051839.7**
Date:	**February 22, 2021**

REPLACE BRIDGE (10m Wide Platform, 16.25m Span) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$25,000.00	$25,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$75,000.00	$75,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Remove Existing Guide Rail	115	m	$15.00	$1,725.00
9	Remove Existing Asphalt	1350	sq.m	$12.50	$16,875.00
10	Hot Mix HL-3	165	t	$150.00	$24,750.00
11	Hot Mix HL-8	375	t	$150.00	$56,250.00
12	Pavement Markings	580	m	$8.00	$4,640.00
13	Granular 'A'	700	t	$22.00	$15,400.00
14	Granular 'B' - Type 1 Roadway	1900	t	$18.00	$34,200.00
15	Granular 'B' - Backfill to Structure	1600	t	$20.00	$32,000.00
16	Earth Borrow	1600	t	$16.00	$25,600.00
17	Pipe Subdrain	400	m	$15.00	$6,000.00
18	Earth Excavation for Structure	1	LS	$50,000.00	$50,000.00
19	Unwatering Structure Excavation	1	LS	$50,000.00	$50,000.00
20	Steel Beam Guide Rail	95	m	$150.00	$14,250.00
21	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
22	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
23	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
24	H Piles - HP 310 x 110	400	m	$500.00	$200,000.00
25	Driving Shoes	20	ea.	$450.00	$9,000.00
26	Concrete in Footings	1	LS	$30,000.00	$30,000.00
27	Concrete in Substructure	1	LS	$135,000.00	$135,000.00
28	Concrete in Deck	1	LS	$60,000.00	$60,000.00
29	Concrete in Barrier Wall	1	LS	$22,000.00	$22,000.00
30	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
31	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
32	Steel Reinforcing	1	LS	$80,000.00	$80,000.00
33	Stainless Reinforcing Steel	1	LS	$25,000.00	$25,000.00
34	Fabrication of Prestressed Girders	1	LS	$225,000.00	$225,000.00
35	Delivery of Prestressed Girders	1	LS	$30,000.00	$30,000.00
36	Erection of Prestressed Girders	1	LS	$50,000.00	$50,000.00
37	Bridge Deck Waterproofing	185	sq.m	$75.00	$13,875.00
38	Joint Fillers, Seals and Compounds	100%	LS	$7,500.00	$7,500.00
39	Rip-Rap	175	t	$65.00	$11,375.00
40	Topsoil, Imported	110	cu.m	$60.00	$6,600.00
41	Seed and Cover	1100	sq.m	$5.00	$5,500.00
42	Heavy Duty Silt Fence Barriers	350	m	$20.00	$7,000.00
47	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
43	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
44	Smooth Run River Stone	155	t	$90.00	$13,950.00
				Estimated Construction Cost Subtotal	$1,647,590.00
				15% Contingency	$247,138.50
				Project Cost Subtotal	$1,894,728.50
				13% H.S.T.	$246,314.71
				TOTAL ESTIMATED PROJECT COST	$2,141,043.21

Note - Total estimated construction price does not include any cost for property

BURNSIDE	**Client:**	**Town of Caledon**
	Project:	**Patterson Road Bridge 2**
	Project No.:	**300051839.8**
	Date:	**February 24, 2021**

REHABILITATE EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Access to Work Area, Work Platform & Scaffolding	1	LS	$40,000.00	$40,000.00
9	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
10	Remove Existing Barriers	48.1	m	$200.00	$9,620.00
11	Asphalt Removal - Full Depth	252	sq.m	$12.50	$3,150.00
12	Asphalt Removal - From Concrete Deck	206	sq.m	$17.50	$3,605.00
13	Deck & Approach Slab Scarification	206	sq.m	$35.00	$7,210.00
14	Concrete Removals, Partial Depth - Type A	5.1	cu.m	$4,000.00	$20,400.00
15	Concrete Removals, Partial Depth - Type B	4.5	cu.m	$7,500.00	$33,750.00
16	Concrete Removals, Partial Depth - Type C	5.0	cu.m	$6,000.00	$30,000.00
17	Hot Mix HL-3	60	t	$200.00	$12,000.00
18	Hot Mix HL-8	115	t	$200.00	$23,000.00
19	Pavement Markings	275	m	$20.00	$5,500.00
20	Granular 'A'	150	t	$22.00	$3,300.00
21	Earth Excavation for Structure	1	LS	$5,000.00	$5,000.00
22	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
23	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
24	Steel Beam Energy Attenuating System	2	ea.	$4,500.00	$9,000.00
25	Concrete in Deck & Approach Slab Overlay	1	LS	$40,000.00	$40,000.00
26	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
27	Concrete Patches, Form & Pump	9.5	cu.m	$7,000.00	$66,500.00
28	Galvanic Cathodic Protection System	70.0	sq.m	$500.00	$35,000.00
29	Dowels into Concrete	750	ea.	$20.00	$15,000.00
30	Replace Deck Drains	4	ea.	$1,500.00	$6,000.00
31	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
32	Steel Reinforcing	1	LS	$7,500.00	$7,500.00
33	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
34	Bridge Deck Waterproofing	123	sq.m	$75.00	$9,225.00
35	Joint Fillers, Seals and Compounds	1	LS	$5,000.00	$5,000.00
36	Rip-Rap	125	t	$65.00	$8,125.00
37	Topsoil, Imported	40	cu.m	$60.00	$2,400.00
38	Seed and Cover	400	sq.m	$5.00	$2,000.00
39	Heavy Duty Silt Fence Barriers	125	m	$20.00	$2,500.00
40	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
41	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
42	Smooth Run River Stone	100	t	$90.00	$9,000.00
				Estimated Construction Cost Subtotal	$585,515.00
				15% Contingency	$87,827.25
				Project Cost Subtotal	$673,342.25
				13% H.S.T.	$87,534.49
				TOTAL ESTIMATED PROJECT COST	$760,876.74

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Road Bridge 2**
Project No.:	**300051839.8**
Date:	**February 24, 2021**

REHABILITATE & WIDEN EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Temporary Protection System	1	LS	$75,000.00	$75,000.00
9	Access to Work Area, Work Platform & Scaffolding	1	LS	$40,000.00	$40,000.00
10	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
11	Remove Existing Barriers	48.1	m	$200.00	$9,620.00
12	Asphalt Removal - Full Depth	252	sq.m	$12.50	$3,150.00
13	Asphalt Removal - From Concrete Deck	206	sq.m	$17.50	$3,605.00
14	Deck & Approach Slab Scarification	206	sq.m	$35.00	$7,210.00
15	Concrete Removals, Partial Depth - Type A	5.1	cu.m	$4,000.00	$20,400.00
16	Concrete Removals, Partial Depth - Type B	4.5	cu.m	$7,500.00	$33,750.00
17	Concrete Removals, Partial Depth - Type C	5.0	cu.m	$6,000.00	$30,000.00
18	Hot Mix HL-3	60	t	$200.00	$12,000.00
19	Hot Mix HL-8	115	t	$200.00	$23,000.00
20	Pavement Markings	275	m	$20.00	$5,500.00
21	Granular 'A'	150	t	$22.00	$3,300.00
22	Earth Excavation for Structure	1	LS	$25,000.00	$25,000.00
23	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
24	H Piles - HP 310 x 110	160	m	$500.00	$80,000.00
25	Driving Shoes	8	ea.	$450.00	$3,600.00
23	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
24	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
25	Steel Beam Energy Attenuating System	2	ea.	$4,500.00	$9,000.00
26	Concrete in Deck & Approach Slab Overlay	1	LS	$40,000.00	$40,000.00
27	Concrete in Deck Widening	1	LS	$35,000.00	$35,000.00
28	Concrete in Substructure Widening	1	LS	$75,000.00	$75,000.00
29	Concrete in Footings Widening	1	LS	$7,500.00	$7,500.00
30	Concrete in Barrier Wall	1	LS	$20,000.00	$20,000.00
31	Concrete Patches, Form & Pump	9.5	cu.m	$7,000.00	$66,500.00
32	Galvanic Cathodic Protection System	70.0	sq.m	$500.00	$35,000.00
33	Dowels into Concrete	100	ea.	$20.00	$2,000.00
34	Deck Drains	4	ea.	$1,500.00	$6,000.00
35	Barrier Wall Railing	1	LS	$10,000.00	$10,000.00
36	Steel Reinforcing	1	LS	$35,000.00	$35,000.00
37	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
38	Bridge Deck Waterproofing	152	sq.m	$75.00	$11,400.00
39	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
40	Rip-Rap	125	t	$65.00	$8,125.00
41	Topsoil, Imported	60	cu.m	$60.00	$3,600.00
42	Seed and Cover	600	sq.m	$5.00	$3,000.00
43	Heavy Duty Silt Fence Barriers	125	m	$20.00	$2,500.00
44	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
45	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
46	Smooth Run River Stone	100	t	$90.00	$9,000.00
				Estimated Construction Cost Subtotal	$952,990.00
				15% Contingency	$142,948.50
				Project Cost Subtotal	$1,095,938.50
				13% H.S.T.	$142,472.01
				TOTAL ESTIMATED PROJECT COST	$1,238,410.51

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Patterson Sideroad Bridge 2**
Project No.:	**300051839.8**
Date:	**February 24, 2021**

REPLACE BRIDGE (10m Wide Platform, 14m Span) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Contract Bonds and Insurance	1	LS	$20,000.00	$20,000.00
3	Construction Layout	1	LS	$25,000.00	$25,000.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$75,000.00	$75,000.00
7	Waterway Control	1	LS	$60,000.00	$60,000.00
8	Temporary Protection System	1	LS	$75,000.00	$75,000.00
9	Remove Existing Guide Rail	122	m	$15.00	$1,830.00
10	Remove Existing Asphalt	2310	sq.m	$12.50	$28,875.00
11	Hot Mix HL-3	280	t	$150.00	$42,000.00
12	Hot Mix HL-8	680	t	$150.00	$102,000.00
13	Pavement Markings	1050	m	$8.00	$8,400.00
14	Granular 'A'	1320	t	$22.00	$29,040.00
15	Granular 'B' - Type 1 Roadway	3500	t	$18.00	$63,000.00
16	Granular 'B' - Backfill to Structure	2220	t	$20.00	$44,400.00
17	Earth Borrow	1175	t	$16.00	$18,800.00
18	Pipe Subdrain	150	m	$15.00	$2,250.00
19	Earth Excavation for Structure	1	LS	$60,000.00	$60,000.00
20	Unwatering Structure Excavation	1	LS	$50,000.00	$50,000.00
21	Steel Beam Guide Rail	92	m	$150.00	$13,800.00
22	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
23	Steel Beam Energy Attenuating System	4	ea.	$4,500.00	$18,000.00
24	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
25	H Piles - HP 310 x 110	580	m	$500.00	$290,000.00
26	Driving Shoes	20	ea.	$450.00	$9,000.00
27	Concrete in Footings	1	LS	$40,000.00	$40,000.00
28	Concrete in Substructure	1	LS	$155,000.00	$155,000.00
29	Concrete in Deck	1	LS	$52,500.00	$52,500.00
30	Concrete in Barrier Wall	1	LS	$15,000.00	$15,000.00
31	Concrete in Approach Slabs	1	LS	$40,000.00	$40,000.00
32	Barrier Wall Railing	1	LS	$6,500.00	$6,500.00
33	Steel Reinforcing	1	LS	$90,000.00	$90,000.00
34	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
35	Fabrication of Prestressed Girders	1	LS	$150,000.00	$150,000.00
36	Delivery of Prestressed Girders	1	LS	$30,000.00	$30,000.00
37	Erection of Prestressed Girders	1	LS	$50,000.00	$50,000.00
38	Bridge Deck Waterproofing	162	sq.m	$75.00	$12,150.00
39	Joint Fillers, Seals and Compounds	1	LS	$7,500.00	$7,500.00
40	Rip-Rap	175	t	$65.00	$11,375.00
41	Topsoil, Imported	127	cu.m	$60.00	$7,620.00
42	Seed and Cover	1270	sq.m	$5.00	$6,350.00
43	Heavy Duty Silt Fence Barriers	500	m	$20.00	$10,000.00
44	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
45	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
46	Smooth Run River Stone	155	t	$90.00	$13,950.00
				Estimated Construction Cost Subtotal	$1,890,440.00
				15% Contingency	$283,566.00
				Project Cost Subtotal	$2,174,006.00
				13% H.S.T.	$282,620.78
				TOTAL ESTIMATED PROJECT COST	$2,456,626.78

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Duffy's Lane EA**
Project No.:	**300051839.7**
Date:	**May 10, 2021**

REHABILITATE EXISTING BRIDGE - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$30,000.00	$30,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$7,500.00	$7,500.00
4	As-Built Drawings	1	LS	$2,500.00	$2,500.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation, Grading	1	LS	$10,000.00	$10,000.00
7	Waterway Control	1	LS	$10,000.00	$10,000.00
8	Remove Existing Guide Rail	33.24	m	$25.00	$831.00
9	Asphalt Removal - Full Depth	160	sq.m	$12.50	$2,000.00
10	Asphalt Removal - From Concrete Deck	71	sq.m	$35.00	$2,485.00
11	Concrete Removals, Partial Depth - Type A	2.4	cu.m	$5,000.00	$12,000.00
12	Concrete Removals, Partial Depth - Type B	11.0	cu.m	$7,500.00	$82,500.00
13	Concrete Removals, Partial Depth - Type C	1.9	cu.m	$7,500.00	$14,250.00
14	Concrete Removals, Full Depth	1	LS	$15,000.00	$15,000.00
15	Hot Mix HL-3	35	t	$200.00	$7,000.00
16	Hot Mix HL-8	75	t	$200.00	$15,000.00
17	Granular 'A'	50	t	$25.00	$1,250.00
18	Earth Excavation for Structure	1	LS	$2,500.00	$2,500.00
19	Steel Beam Guide Rail	80	m	$150.00	$12,000.00
20	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
21	Steel Beam Energy Attenuating System	3	ea.	$4,500.00	$13,500.00
22	Concrete Repairs, Partial Depth, Unformed	2.4	cu.m	$1,250.00	$3,000.00
23	Concrete Repairs, Partial Depth, Formed	13	cu.m	$2,500.00	$32,250.00
24	Concrete in Wingwall Reconstruction	1	LS	$11,000.00	$11,000.00
25	Concrete in Deck Reconstruction	1	LS	$15,000.00	$15,000.00
26	Dowels into Concrete	500	ea.	$20.00	$10,000.00
27	Barrier Railing	1	LS	$25,000.00	$25,000.00
28	Steel Reinforcing	1	LS	$10,000.00	$10,000.00
29	Stainless Reinforcing Steel	1	LS	$20,000.00	$20,000.00
30	Bridge Deck Waterproofing	92	sq.m	$75.00	$6,900.00
31	Joint Fillers, Seals and Compounds	1	LS	$2,500.00	$2,500.00
32	Rip-Rap	40	t	$65.00	$2,600.00
33	Topsoil, Imported	15	cu.m	$60.00	$900.00
34	Seed and Cover	150	sq.m	$5.00	$750.00
35	Heavy Duty Silt Fence Barriers	160	m	$20.00	$3,200.00
36	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
37	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00

Estimated Construction Cost Subtotal	$419,516.00
15% Contingency	$62,927.40
Project Cost Subtotal	$482,443.40
13% H.S.T.	$62,717.64
TOTAL ESTIMATED PROJECT COST	$545,161.04

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Duffy's Lane EA**
Project No.:	**300051839.7**
Date:	**May 10, 2021**

TWO LANE BRIDGE REPLACEMENT (10m Wide Platform) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$12,500.00	$12,500.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$17,500.00	$17,500.00
7	Waterway Control	1	LS	$45,000.00	$45,000.00
8	Remove Existing Guide Rail	33	m	$25.00	$831.00
9	Remove Existing Structure	1	LS	$35,000.00	$35,000.00
10	Asphalt Removal - Full Depth	160	sq.m	$12.50	$2,000.00
11	Hot Mix HL-3	90	t	$150.00	$13,500.00
12	Hot Mix HL-8	195	t	$150.00	$29,250.00
13	Granular 'A'	215	t	$25.00	$5,375.00
14	Granular 'B' - Type II Roadway	385	t	$25.00	$9,625.00
15	Granular 'B' - Backfill to Structure	1350	t	$20.00	$27,000.00
16	Pipe Subdrain	60	m	$15.00	$900.00
17	Earth Excavation for Structure	1	LS	$50,000.00	$50,000.00
18	Unwatering Structure Excavation	1	LS	$20,000.00	$20,000.00
19	Steel Beam Guide Rail	77.5	m	$150.00	$11,625.00
20	Steel Beam Guide Rail Structural Connection	4	ea.	$2,500.00	$10,000.00
21	Steel Beam Energy Attenuating System	3	ea.	$4,500.00	$13,500.00
22	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
23	H Piles - HP 310 x 110	400	m	$500.00	$200,000.00
24	Driving Shoes	20	ea.	$450.00	$9,000.00
25	Concrete in Footings	1	LS	$28,000.00	$28,000.00
26	Supply and Install Precast Conc. Rigid Frame	10	m	$21,000.00	$210,000.00
27	Concrete in Distribution Slab	1	LS	$50,000.00	$50,000.00
28	Concrete in Retaining Walls	1	LS	$45,000.00	$45,000.00
29	Barrier System with Railing	1	LS	$70,000.00	$70,000.00
30	Concrete in Approach Slabs	1	LS	$20,000.00	$20,000.00
31	Steel Reinforcing	1	LS	$30,000.00	$30,000.00
32	Stainless Reinforcing Steel	1	LS	$50,000.00	$50,000.00
33	Bridge Deck Waterproofing	125	sq.m	$75.00	$9,375.00
34	Joint Fillers, Seals and Compounds	100%	LS	$7,500.00	$7,500.00
35	Rip-Rap	100	t	$65.00	$6,500.00
36	Topsoil, Imported	45	cu.m	$60.00	$2,700.00
37	Seed and Cover	450	sq.m	$5.00	$2,250.00
38	Heavy Duty Silt Fence Barriers	160	m	$20.00	$3,200.00
39	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
40	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00
41	Streambed Material	130	t	$90.00	$11,700.00
				Estimated Construction Cost Subtotal	$1,179,931.00
				15% Contingency	$176,989.65
				Project Cost Subtotal	$1,356,920.65
				13% H.S.T.	$176,399.68
				TOTAL ESTIMATED PROJECT COST	$1,533,320.33

Note - Total estimated construction price does not include any cost for property

Client:	**Town of Caledon**
Project:	**Duffy's Lane EA**
Project No.:	**300051839.7**
Date:	**May 10, 2021**

SINGLE LANE MODULAR BRIDGE REPLACEMENT (4m Wide Platform) - PROJECT COST ESTIMATE

				Engineering Estimate	
Item No.	Description	Contract Quantity	Unit	UNIT PRICE	ESTIMATED PRICE
1	Mobilization/Demobilization	1	LS	$40,000.00	$40,000.00
2	Contract Bonds and Insurance	1	LS	$15,000.00	$15,000.00
3	Construction Layout	1	LS	$12,500.00	$12,500.00
4	As-Built Drawings	1	LS	$5,000.00	$5,000.00
5	Traffic Control and Signing	1	LS	$7,500.00	$7,500.00
6	Earth Excavation (Grading)	1	LS	$17,500.00	$17,500.00
7	Remove Existing Guide Rail	33.24	m	$25.00	$831.00
8	Remove Existing Structure	1	LS	$25,000.00	$25,000.00
9	Asphalt Removal - Full Depth	160	sq.m	$12.50	$2,000.00
10	Hot Mix HL-3	30	t	$150.00	$4,500.00
11	Hot Mix HL-8	68	t	$150.00	$10,200.00
12	Granular 'A'	100	t	$25.00	$2,500.00
13	Granular 'B' - Type II Roadway	260	t	$25.00	$6,500.00
14	Granular 'B' - Backfill to Structure	250	t	$20.00	$5,000.00
15	Pipe Subdrain	24	m	$15.00	$360.00
16	Earth Excavation for Structure	1	LS	$15,000.00	$15,000.00
17	Unwatering Structure Excavation	1	LS	$2,500.00	$2,500.00
18	Steel Beam Guide Rail	87.6	m	$150.00	$13,140.00
19	Steel Beam Energy Attenuating System	3	ea.	$4,500.00	$13,500.00
20	Supply Equipment for Installing Driven Piles	1	LS	$50,000.00	$50,000.00
21	H Piles - HP 310 x 110	200	m	$500.00	$100,000.00
22	Driving Shoes	10	ea.	$450.00	$4,500.00
23	Concrete in Footings	1	LS	$10,000.00	$10,000.00
24	Supply and Install Prefabricated Modular Bridge	1	LS	$160,000.00	$160,000.00
25	Concrete in Substructure	1	LS	$15,000.00	$15,000.00
26	Steel Reinforcing	1	LS	$7,500.00	$7,500.00
27	Joint Fillers, Seals and Compounds	1	LS	$2,000.00	$2,000.00
28	Rip-Rap	100	t	$65.00	$6,500.00
29	Topsoil, Imported	10	cu.m	$60.00	$600.00
30	Seed and Cover	100	sq.m	$5.00	$500.00
31	Heavy Duty Silt Fence Barriers	160	m	$20.00	$3,200.00
32	Temporary Rock Flow Checks	4	ea.	$600.00	$2,400.00
33	Temporary Straw Bale Flow Checks	4	ea.	$300.00	$1,200.00

Estimated Construction Cost Subtotal	$561,931.00
15% Contingency	$84,289.65
Project Cost Subtotal	$646,220.65
13% H.S.T.	$84,008.68
TOTAL ESTIMATED PROJECT COST	$730,229.33

Note - Total estimated construction price does not include any cost for property

BURNSIDE

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Appendix C

Consultation Record

Project Contact List	C1
Notices	C2
Correspondence	C3

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Project Contact List

Agency/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Comments Received	Response Given
Hydro One Networks Inc.										SecondaryLandUse@HydroOne.com		210318_Email, preliminary assessment, confirms there are no existing Hydro One Transmission assets in subject area. Note this is only a preliminary assessment based on current information.	
Infrastructure Ontario	Ms.	Lisa	Myslicki	Environmental Specialist	1 Dundas Street, West, Suite 2000		Toronto	ON	M5G 1Z3	lisa.myslicki@infrastructureontario.ca	416-557-3116		
Ministry of the Environment, Conservation and Parks - Central Region Technical Support Section		Trevor	Bell							trevor.bell@ontario.ca		240411_Email failed. contact no longer with MECP. 210322_Email from T. Bell, with attached letter regarding project. Potentially affected Indigenous communities are: MCFN, Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council); and Huron-Wendat Nation. Areas of Interest are: SAR, A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019), Parts of the study area may be subject to the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019), ORMCP (2017), NEC Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable policies should be referenced in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans, PPS (2020), Source Water Protection, Climate Change, Air Quality, Dust and Noise, Ecosystem Protection and Restoration, Surface Water, Groundwater, Contaminated Soils, Excess Materials Management, Servicing and Facilities, Mitigation and Monitoring, Consultation, 201015_Email from T. Bell, Based on the information provided and in the absence of technical information about the study and potential impacts that may be identified through the study, MECP recommends the following communities be engaged: MCFN, Six Nations of the Grand River; HDI, & Huron-Wendat Nation (only if there are potential archeological impacts). 200930_Email from T. Bell, Noting that an advisor has been requested to assist in the selection of Indigenous communities to contact.	240411_Email. Burnside emailed link to draft PFR for review. 200929_Email from Burnside. Request confirmation of recommended list of Indigenous communities to contact. Previous experience in Caledon, recommend: Chippewas of Mnjikaning FN (Rama), Curve Lake FN, MCFN, Chippewas of Georgina Island, MNO. NOCm will be provided via central region one window email process with Project Information Form.
Ministry of the Environment, Conservation and Parks - Central Region Technical Support Section		Chunmei	Liu							Chunmei.Liu@ontario.ca		240411_Email. Chunmei Liu responded to draft PFR with new MECP contact (Krishna Selvakumar) for Halton, Peel, Muskoka region. Krishna will respond.	240411_Email. Burnside emailed link to draft PFR for review.
Ministry of the Environment, Conservation and Parks - Central Region Technical Support Section		Gavin	Battrino							Gavin.Battarino@ontario.ca			240411_Email. Burnside cc'd Gavin on emailed link to draft PFR for review.
Ministry of the Environment, Conservation and Parks - Central Region Technical Support Section		Krishna	Selvakumar							krishna.selvakumar@ontario.ca		240411_Email. Krishna Selvakumar responded to draft PFR, draft looks great, no comments at this time, looking forward to receiving the final report.	
Ministry of the Environment, Conservation and Parks - Central Region Technical Support Section										eanotification.cregion@ontario.ca			210223_Email from Burnside, with attached EA Project Information Form and NOCm.
Ministry of the Environment, Conservation and Parks Environmental Assessment and Permissions Branch										MEA.NOTICES.EAAB@ontario.ca			
Ministry of Natural Resources and Forestry Aurora District (Southern Region)	Mr.	Steven	Strong	Senior District Planner	50 Bloomington Road		Aurora	ON	L4G 0L8	steven.strong@ontario.ca	905-713-7366		
Ministry of Heritage, Sport, Tourism ad Culture Culture Division Programs and Services Branch, Heritage Planning Unit	Ms.	Laura	Hatcher	Heritage Planner	401 Bay Street	Suite 1700	Toronto	ON	M7A 0A7	laura.e.hatcher@ontario.ca		210414_Email from L. Hatcher with attached letter noting that records indicate that a Stage 1 archaeological assessment has not been be submitted. Note that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports. Final Cultural Heritage Evaluation Report (CHER) and Heritage Impact Assessment (HIA) should be included as an Appendix. MHSTCI finds that due diligence has been undertaken in preparing this CHER. MHSTCI recommends the following edits to proposed recommendations for the Duffy's Lane Bridge: A Cultural Heritage Impact Statement/ Heritage Impact Assessment should be completed for the Duffy's Lane Bridge during the EA process and prior to NOCp; and completed by a qualified person.	

Blue Highlight = email only
Grey Highlight = remove from contact list

Agency/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Comments Received	Response Given
Ministry of Citizenship and Culture	Ms.	Karla	Barboza	Team Lead, Heritage (Acting)	401 Bay Street	Suite 1700	Toronto	ON	M7A 0A7	karla.barboza@ontario.ca	416-314-7120		
Region of Peel													
Region of Peel	Mr.	Stefan	Herceg	Technical Specialist/ Alternate RMO/RMI	10 Peel Centre Drive		Brampton	ON	L6T 4B9	Stefan.Herceg@peelregion.ca zzg-sourcewater@peelregion.ca		210401_Email from S. Herceg with attached letter expanding on comments, as it relates to CWA, consideration of CTC Source Protection Plan policies. Mapping shows Study Area is not within a WHPA, or IPZ delineated under CWA, therefore, the significant drinking water threat policies contained within the Approved CTC Source Protection Plan do not apply. Study Area is in HVA and SGRA, however, structure improvements to the bridges are not anticipated to impact, thus no action is required under the Approved CTC Source Protection Plan. Ensure to include a section on Source Water Protection.	210406_Email from Caledon. Staff will reach out if there are any further questions.
Region of Peel	Ms.	Sally	Rook	Manager Infrastructure Planning and Studies (of Transportation)	10 Peel Centre Drive		Brampton	ON	L6T 4B9	sally.rook@peelregion.ca			
Region of Peel	Ms.	Asha	Saddi	Technical Analyst, Infrastructure Programming & Studies	10 Peel Centre Drive		Brampton	ON	L6T 4B9	asha.saddi@peelregion.ca			
Region of Peel	Ms.	Aretha	Adams	Regional Clerk	10 Peel Centre Drive		Brampton	ON	L6T 4B9	regional.clerk@peelregion.ca			
Region of Peel	Mr.	Steve	Ganesh	Manager, Engineering & Infrastructure Planning	10 Peel Centre Drive		Brampton	ON	L6T 4B9	steve.ganesh@peelregion.ca			
OPP Caledon Detachment	Ms.	MaryLouise	Kearns	Detachment Commander	15924 Innis Lake Rd		Caledon East	ON	L7C 3B3				
OPP Caledon Detachment	Inspector	Ryan	Carothers	Detachment Commander	15924 Innis Lake Rd		Caledon East	ON	L7C 3B3				
Peel Regional Paramedic Services					1600 Bovaird Road east		Brampton	ON			(905)791-7800		
Bell Canada	Mr.	Richard	de Bokx	Implementation Department	5115 Creekbank Road	3rd Floor, West Tower	Mississauga	ON	L4W 5R1	richard.de_bokx@bell.ca	905-219-4558		
Bell Canada	Mr.	Scott	Moon	Implementation Department	5115 Creekbank Road	3rd Floor, West Tower	Mississauga	ON	L4W 5R1	scott.moon@bell.ca	905-219-4558	Retired Feb 2022	
Bell Canada, Municipal Operations Centre	Mr.	John	Lachapelle		100 Borough Drive	Floor 5 Blue	Scarborough	ON	M1P 4WZ				
Enbridge		Kevin	Schimus							Kevin.Schimus@enbridge.com	519-885-7400 ext. 5067506 519-635-9488		
Enbridge Gas Distribution Inc.	Mr.	Vince	Cina	Supervisor, Planning and Design	500 Consumers Road		North York	ON	M2J 1P8	vince.cina@enbridge.com			
Enbridge Pipelines Inc.		Evguenia	Clark	Supervisor Construction Project Management GTA West						evguenia.clark@enbridge.com			
Enbridge Pipelines Inc.		Sarah	Taylor	Sr. Analyst, Lands & ROW						notifications@enbridge.com; mark-ups@enbridge.com;		210225_Email, requesting that staff update the Project Contact List to remove Ann Newman and est.reg.crossing@enbridge.com, and include notifications@enbridge.com; mark-ups@enbridge.com, as they review for our gas assets.	
Enbridge Pipelines Inc.	Ms.	Ann	Newman	Crossing Co-ordinator	1086 Modeland Road.	Building 1050, 1st Floor	Sarnia	ON	N7S 6L2	ann.newman@enbridge.com			

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Agency/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Comments Received	Response Given
Enbridge Pipelines Inc.				Lands & ROW Administrator - Crossings, Eastern Region	Western Research Park	1086 Modeland Road, Bldg. 1050 1st Floor	Sarnia	ON	N7S 6L2	est.req.crossing@enbridge.com	519-333-6753		
Enersource Hydro Mississauga	Mr.	Paul	Sidhu	Senior Manager, Systems Planning	3240 Mavis Road		Mississauga	ON	L5C 3K1				
Rogers Communications		Marion	Wright	Planning Coordinator	3573 Wolfedale Road		Mississauga	ON	L5C 3T6		905-897-3914; 888-764-3771		
Trans Canada Corporation MHBC Planning, Urban Design & Landscape	Ms.	Darlene	Presley	Plannng Co-ordinator, EA contact	442 Brant Street, Suite 204		Burlington	ON	L7R 2G4	dpresley@mhbcplan.com	905-639-8686 ext. 229 Cell:	210225_Email, TC Energy does not have any pipelines within the Study Area.	
Trans-Northern Pipelines Inc.		Cliff	Lee		45 Vogell Road	Suite 310	Richmond Hill	ON	L4B 3P6	clee@tnpi.ca			
Union Gas Limited	Ms.	Youmna	Ahmed	Hamilton District Engineering EIT II	918 S Service Rd		Stoney Creek	ON	L8E 5M4	YAhmed@uniongas.com	289-649-2060; Cell: 905-906-9311		
Zayo										Utility.Circulations@zayo.com	416-649-7527	210302_Email, Zayo has no existing plant in the Study Area indicated in your submission. No markup and no objection.	
Toronto and Region Conservation Authority	Ms.	Caroline	Mugo	Acting Planner II. Environmental Assessment Planning	101 Exchange Avenue		Concord	ON	L4K 5R6	caroline.mugo@trca.ca			
Toronto and Region Conservation Authority	Ms.	Victoria	Kramkowski	Govt. and Community Relations Specialist	101 Exchange Avenue		Concord	ON	L4K 5R6	victoria.kramkowski@trca.ca			
Toronto and Region Conservation Authority	Ms.	Shirin	Varzgani	Planner, Infrastructure Planning and Permits	101 Exchange Avenue		Concord	ON	L4K 5R6	shirin.varzqani@trca.ca		210322_Email from S. Varzgani with attached response. TRCA noted areas of Interest are: TRCA Program and Policy Areas (Natural System Programs and Policies; Sustainability Programs and Policies); Provincial Program Areas; Federal Program Areas. In developing, evaluating and selecting alternatives, staff require the LCP policies be considered. TRCA staff recommends the Preferred Alternative meets the policies of Section 7. In order to fulfil requirements of Ontario Regulation 166/06 at detailed design, staff require the Preferred Alternative meet LCP policies in Section 8. TRCA planner to be contacted at key intervals provided in the correspondence and provided a list of requested submissions for review and comment along with associated review fee.	230427_email. Caledon responded:confirmed will provide a copy of the handouts and presentation associated with PIC and provided link to webpage. Noted preferred design alternative for the Duffy's Lane bridge was discussed with Suzanne Bevan and Richard Ubbens last year and their preference was to replace the bridge.
Toronto and Region Conservation Authority	Ms.	Suzanne	Beven	Senior Planner, Infrastructure Planning and Permits	101 Exchange Avenue		Concord	ON	L4K 5R6	suzanne.bevin@trca.ca			
Toronto and Region Conservation Authority	Mr.	Alex	Schuler	Associate Director, Property, Assets and Risk Management	101 Exchange Avenue		Concord	ON	L4K 5R6	alexander.schuler@trca.ca			
Albion Hills Conservation Park	Mr.	Jay	Clark		16500 Peel Regional Road 50		Caledon	ON	L7E 3E7	Jay.Clark@TRCA.ca	905-880-0227		
Town of Caledon	Mr.	Arash	Olia	Manager of Transportation	6311 Old Church Road		Caledon	ON	L7C 1J6	arash.olia@caledon.ca			
Town of Caledon	Mr.	Ryan	Grodecki	Manager of Engineering	6311 Old Church Road		Caledon	ON	L7C 1J6	Ryan.Grodecki@caledon.ca			
Town of Caledon	Mr.	Andrew	Pearce	Director Engineering Services	6311 Old Church Road		Caledon	ON	L7C 1J6	andrew.pearce@caledon.ca			
Town of Caledon	Ms.	Carey	Herd	Chief Adminstrative Officer	6311 Old Church Road		Caledon	ON	L7C 1J6	carey.herd@caledon.ca			

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Agency/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Comments Received	Response Given
Town of Caledon		To whom it concerns		Mayors Office	6311 Old Church Road		Caledon	ON	L7C 1J6	mayors.office@caledon.ca			
Town of Caledon	Mr.	Darryl	Bailey	Fire Chief	6311 Old Church Road		Caledon	ON	L7C 1J6	fire@caledon.ca			
Town of Caledon	Mr.	Allan	Thompson	Mayor	6311 Old Church Road		Caledon	ON	L7C 1J6	allan.thompson@caledon.ca			
Town of Caledon	Ms	Sally	Drummond	Heritage Resource Officer	6311 Old Church Road		Caledon	ON	L7C 1J6	sally.drummond@caledon.ca			
Town of Caledon	Ms	Jennifer	Innis	Regional Councillor- Wards 3/4			Caledon	ON		jennifer.innis@caledon.ca			
Town of Caledon	Mr.	Nick	deBoer	Area Councillor- Ward 4			Caledon	ON		nick.deboer@caledon.ca			
School Boards													
Peel District School Board												221221_left mssg Shelia x 2355 for new Planner / Manager	
Peel District School Board	Mr.	Steve	Hare	Senior Planner/Manager	5660 Hurontario Street		Mississauga	ON	L5R 1C6			Deceased May 2021 https://www.skinnerandmiddlebrook.com/memorials/stephen-hare/4631382/	
Dufferin-Peel Catholic District School Board	Ms.	Stephanie	Cox	Manager of Planning	40 Matheson Boulevard West		Mississauga	ON	L5R 1C5				
Dufferin-Peel Catholic District School Board	Ms.	Krystina	Koops	Planner	40 Matheson Boulevard West		Mississauga	ON	L5R 1C5	krystina.koops@dpcdsb.org			
Dufferin-Peel Catholic District School Board		Kevin	Kilinskas		17030 Duffy's Lane					Kevin.Kilinskas@dpcdsb.org		See Local Resident tab for comment	https://www.dpcdsb.org/Documents/Agenda%20Package%20-%20Regular%20Board%20Meeting_Mar26_2019%20website.pdf#search=kevin%20kilinskas

Community/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Notices	Comments Received	Response Given
Six Nations of the Grand River	Chief	Mark	Hill							markhill@sixnations.ca		210223_email NOCm 230424_email Notice of PIC		
Six Nations of the Grand River		Tanya	Hill-Montour	Archaeology Coordinator						tanyahill-montour@sixnations.ca		210223_email NOCm 230424_email Notice of PIC	240410_Email. T. Hill-Montour responded to request to review draft stage 1AA included in draft PRF report; At the time upon review SNGREC don't have comments, but looking forward to conversations in the design phase. 230525_Email. T. Hill-Montour inquired if there is a time frame for review. 230430_Email from T. Hill-Montour, SNGREC has interest in the project. Has archaeology been completed?	240408_Email. Town sent follow up email requesting the review of the stage 1 AA that was included in the draft EA link that was provided. Original email and shared links included in email. 240312_email. Town sent follow up email inquiring if Six Nations has had a chance to review the draft PRF, requested if Six Nations could provide input by March 20th. If Six Nations would like to discuss project please contact Township or Burnside (contact details included). 240228_email. Town followed up phone call (with T. Hill-Montour) with email to circulate the draft PFR and PIC slides. 240226_phone call. Burnside spoke with Tanya Hill-Montour to confirm whether Six Nations was still interested in reviewing the Stage 1 Archaeological Assessment completed for the project. Neither Town staff or RJ Burnside staff received any input from Six Nations by the previously proposed review deadline of June 2023. Six Nations expressed they would still like the opportunity to review the assessment. 230616_email. Burnside sent email requesting confirmation of Stage 1 AA report review 230525_email. Burnside sent copy of Stage 1 AA for review and link to PIC materials for interest with request for review response by June 14
Six Nations of the Grand River		Lonny	Bomberry	Lands and Resources Director,						lonnybomberry@sixnations.ca		210223_email NOCm 230424_email Notice of PIC	221011_Email. Dawn emailed noting that Robbin is no longer employed with Six Nations, and to send any further documentation to Lonny Bomberry, Director of Lands and Resources	
Six Nations of the Grand River		Robbin	Linn	Lands and Resources section						rlinn@sixnations.ca	519-753-0665	210223_email NOCm	221011_Email. Dawn emailed Avid noting that Robbin is no longer employed with Six Nations, and to send any further documentation to Lonny Bomberry, Director of Lands and Resources	
Six Nations of the Grand River	Ms.	Dawn	LaForme		2498 Chiefwood Road	P.O. Box 5000	Ohswegan	ON	N0A 1M0	cc dlaforme@sixnations.ca	519-445-2201	210223_email NOCm 230424_email Notice of PIC		
Six Nations of the Grand River	Chief	Ava	Hill	Chief		P.O. Box 5000	Ohsweken	ON	NOA 1MO		(519) 445-2201		210209_Chief, Mark Hill, has replaced Ava Hill.	
Haudenosaunee Confederacy	Mr.	Todd	Williams	Archaeolgical Coordinator	2634 6th Line	RR#2	Ohsweken	ON	N0A 1H0	williams.todde@gmail.com		210223_email NOCm 230424_email notice of PIC		
Haudenosaunee Confederacy		Raechelle (Janice)	Williams	Environmental Supervisor	2634 6th Line	RR#2	Ohsweken	ON	N0A 1H0	janicewilliams@hdi.land		230424_email notice of PIC		
Haudenosaunee Confederacy	Hohahes	Leroy Misty	Hill Hill	Secretary to Haudensaunee Confederacy Admin Assis.	2634 6th Line	RR#2	Ohsweken	ON	N0A 1H0	jocko@sixnationsns.com; hdi2@bellnet.ca	Cell: 519-717-7326	210223_email NOCm 230424_email notice of PIC		
Nation Huronne-Wendat	Mr.	Mario	Gros-Louis							mario.groslouis@cnhw.qc.ca		210408_email NOCm 230424_email Notice of PIC		2100408_Email from Burnside with correspondence which was previously sent to M. Picard, as Burnside understands M. Gros-Louis is now the contact for this project.
Nation Huronne-Wendat	Mr.	Louis	Lesage							louis.lesage@cnhw.qc.ca		210408_email NOCm		2100408_Email copy from Burnside with correspondence which was previously sent to M. Picard, as Burnside understands M. Gros-Louis is now the contact for this project.

Blue highlight - email only
Grey highlight - Remove from mailing list

Community/ Organization	Title	First Name	Last Name	Position	Address 1	Address 2	City	Prov.	Postal Code	Email	Telephone	Notices	Comments Received	Response Given
Nation Huronne-Wendat	Mr.	Maxime	Picard	Coordinator of Projects	255, place Chef Michel Laveau		Wendake	QC	G0A 4V0	maxime.picard@cnhw.qc.ca	Cell / SMS: (418) 580-4442	210223_email NOCm	210223_Email from M. Picard acknowledging receipt of NOCm. Huron-Wendat Nation, is requesting to participate in all archaeological field work of this project as well as receiving copys of the draft reports for review and comments.	210331_Email from Burnside, noting that comments will become part of the public record. Burnside staff also attached the completed Stage 1 Archaeological Assessment (AA). Staff noted that the Stage 1 concluded that parts of the Study Area exhibit archaeological potential and recommends a Stage 2 AA in select areas, if impacted.A Stage 2 AA will be completed as part of the project if the preliminary preferred solution has the potential to impact identified areas of archaeological potential due to construction activities. Staff noted that the communiy wishes to participate in all archaeological field work for this project. Note, the MCFN has also requested to participate in the archaeological field work, and has an agreement with the Town of Caledon to have a Field Liaison Representative present during archaeological field work, subject to the level of COVID-19 restrictions, and to review the reporting. Staff will keep the community informed of any upcoming Stage 2 archaeological field work and to receive future notices.
Nation Huronne-Wendat	Ms.	Melanie	Vincent	Exhibit Project Manager	255, place Chef Michel Laveau		Wendake	QC	G0A 4V0	melanievincent21@yahoo.ca		210223, 210408_email NOCm 230424_email Notice of PIC		
D - Indigenous	Chief	Claire	Sault	Chief	2789 Mississauga Road, RR #6		Hagersville	ON	N0A 1H0	claires@mncfn.ca				
Mississaugas of the Credit First Nation										MCFN.Consultation@mncfn.ca; DOCA.Admin@mncfn.ca		230424_email notice of PIC	210401_Email from Adrian Blake, MCFN-DOCA has reviewed Stage 1 Archaeological Assessment (AA). At this time MCFN had no additional comments for inclusions and is in agreement with the recommendations made within the report.	210202_Email from Burnside with attached signed MCFN FLR Participation Agreement and the Archaeological Review Agreement, for review and signatures, and the Stage 1 AA, for review and reference. Town Staff requested a signed copy of each agreement to be returned when completed.
Mississaugas of the Credit First Nation		Abby	Lee (LaForme)	Consultation Manager	4065 Hwy 6	Hagersville	ON	N0A 1H0		abby.laforme@mncfn.ca		230424_email notice of PIC	230428_Email from A, Lee, DOCA would like to review and comment on Stage 1 AA. DOCA expects to have field involvement for Stage 2.	
Mississaugas of the Credit First Nation	Ms.	Fawn	Sault	Consultation Manager	4065 Hwy 6		Hagersville	ON	N0A 1H0	fawn.sault@mncfn.ca	905-768-4260	210223_email NOCm	220117_Email from F. Sault to Region. F. Sault has moved to a new role for MCFN Council and will not be checking or recieving any emails at this address.	
Mississaugas of the Credit First Nation		Peter	Epler	Field Archaeologist						Peter.Epler@mncfn.ca		210223_email NOCm 230424_email notice of PIC	230424_Bounceback email, no longer in role. Contact Megan DeVries for archaeology.	
Mississaugas of the Credit First Nation		Megan	DeVries	Archaeological Operations Supervisor						Megan.DeVries@mncfn.ca		210223_email NOCm	As of October 20th, 2021, I will no longer be in the position of Archaeological Operations Supervisor at the Mississaugas of the Credit First Nation.	

Blue highlight - email only
Grey highlight - Remove from mailing list

Resident	Comments Received	Response Given
Resident 1	210308_Email. Resident notes that their property is in direct contact with one of the three bridges being assessed. Resident requested what the objectives of the project and scope of the assessment to the bridges over Coffee Creek and the Humber River would include, and whether the research be intrusive to the current infrastructure or would it be simply a monitoring program.	210325_Email from Burnside, An assessment of the three bridges is being completed to consider options for improvements. Options for each of the Patterson Road bridges include: Do Nothing option, as well as an option to rehabilitate the bridge, rehabilitate the bridge with widening of the bridge, or replace the bridge with a wider bridge. Future management options are being considered for the Duffy's Lane bridge. The EA process will evaluate pros and cons of the improvement options against a set of criteria developed under key areas of the project environment including the natural environment, the social-cultural environment, the technical environment and the financial environment. Studies assessing existing conditions in the Study Area, such as a topographic survey, an assessment of natural features and cultural heritage assessment. At this stage, the majority of the studies are non-intrusive and consist of a desk top review and field reconnaissance. Additional studies, such as a Stage 2 AA, may be required, depending on the recommended solution and its potential impacts, including grading and vegetation removal. A Stage 2 AA would include hand dug test pits in areas of proposed earthworks, where archaeological resources have the potential to be located. Concept Designs of the improvement options are currently being developed and information about the options, potential impacts, constraints and consideration related to the project as well as a recommended option will be presentedat a

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

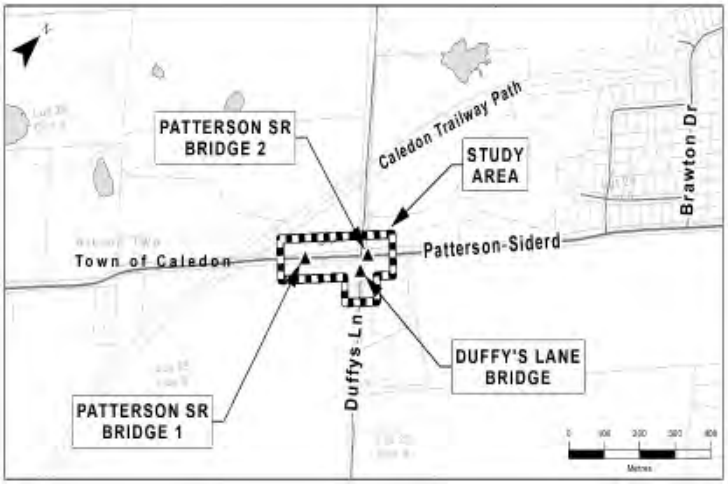
Notices

Town of Caledon
Notice of Commencement

Municipal Class Environmental Assessment Structure Improvements

The Study:

As part of the Town of Caledon's Asset Management Strategy, improvements are being considered for bridges and culverts. This is due to the wear and tear on existing infrastructure due to increased traffic use. The Town has initiated a Schedule 'B' Municipal Class Environmental Assessment (EA) to consider options for improvements to the following bridges. The approximate location of the project is shown on the map.



Patterson Side Road Bridge (1)
For improvements to the existing 2 lane, T-beam reinforced cast-in-place structure constructed in 1950 and located approximately 0.1 km West of Duffy's Lane over the Humber River.

Patterson Side Road Bridge (2)
For improvements to the existing 2 lane, rigid frame, vertical leg reinforced cast-in-place structure constructed in 1950 and located approximately 0.03 km East of Duffy's Lane over the Humber River.

Duffy's Lane Bridge
For feasibility investigation to determine future management of the existing 2 lane structure. The structure is located approximately 0.03km South of Patterson Side Road over the Humber River.

The Process:

The project is being planned under the Municipal Class EA process (October 2000, as amended in 2007, 2011 & 2015) (Class EA) which is an approved process under the *Ontario Environmental Assessment Act*. Further information about the project and planning process can be found at caledon.ca/notices. At the end of the study, the process will be documented in a Project File Report (PFR), prepared for public review.

Public Input:

The public is invited to provide comments for consideration in the planning and design of the project. A virtual Public Information Centre (PIC) is planned for Spring 2021. Further notice will be provided closer to the date of the PIC. Subject to comments received and obtaining the necessary approvals, the Town of Caledon intends to proceed with the planning and design of the project, with a construction date to be determined dependent on funding.

To provide comment or to request additional information concerning this study or if you would like to be added to the Project Contact List to receive future project notices, please contact either of the following Project Team members:

Ian Todhunter, P.Eng.
Senior Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4065
ian.todhunter@caledon.ca

Matt Brooks, P.Eng.
Project Manager
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4284
matt.brooks@rjburnside.com

Project and notice information will be made accessible upon request in accordance with the Accessibility Standard for Information and Communication under the *Accessibility for Ontarians with Disabilities Act, 2005.*

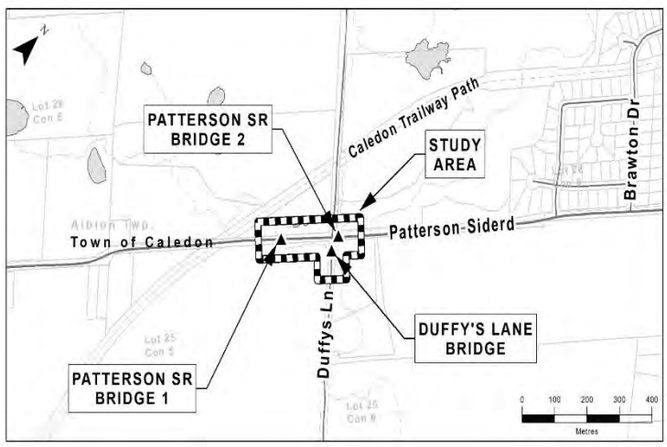
Information will be collected and maintained to meet the requirements of the *Environmental Assessment Act* and for the purposes of creating a record that will be available to the general public as described in Section 37 of the *Freedom of Information and Protection of Privacy Act.* With the exception of personal information such as name, address, telephone number and property location, all comments will become part of the public record that is available to the general public.

This Notice First Issued on February 18, 2021.

Town of Caledon
Notice of Public Information Centre

Municipal Class Environmental Assessment for Structure Improvements

The Study:
As part of the Town of Caledon's Asset Management Strategy, improvements are being considered for bridges and culverts. This is due to the wear and tear on existing infrastructure and to plan for future increased traffic use. The Town of Caledon (Town) has initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to consider options for improvements to the following bridges. The approximate location of the project is shown on the map.



Patterson Side Road Bridge (1)
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Duffy's Lane Bridge
For feasibility investigation to determine future management of the existing structure. The bridge is located approximately 0.03 km South of Patterson Side Road over the Humber River.

The Process:
The project is being planned under the Municipal Class EA process (2023) which is an approved process under the *Ontario Environmental Assessment Act*. The Study will evaluate Alternative Solutions with consideration of the natural, cultural, technical, and financial environments and recommend a Preferred Solution in consultation with the public, agencies and Indigenous communities. At the end of the study, the process will be documented in a Project File Report (PFR), prepared for public review.

Comments Invited:
A Public Information Centre (PIC) is being held to describe the study, the proposed alternative solutions, identify next steps in the process and gather public comments. Anyone with an interest in this study is invited to attend the virtual open house to discuss the project with the Town and its consultant. Following the PIC, information materials about the study will be made available online at www.caledon.ca/en/news/public-notice-patterson-duffy-s-lane-bridge-environmental-assessment.aspx for review and comment until May 31st, 2023. Subject to comments received and obtaining the necessary approvals, the Town of Caledon intends to proceed with the planning and design of the project, with a construction date to be determined dependent on funding.

PIC Date: **Monday May 8, 2023**
Time: **5:00 PM – 6:00 PM**
Location: **Virtual – Join via the link at the Town of Caledon website**

https://www.caledon.ca/en/news/public-notice-patterson-duffy-s-lane-bridge-environmental-assessment.aspx
Or the direct link below:
https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

Please contact either of the following Project Team members if you would like to provide us with your comments, require additional information, or would like to be placed on the Project Contact List to be notified about future project notices:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

Project and notice information will be made accessible upon request in accordance with the Accessibility Standard for Information and Communication under the *Accessibility for Ontarians with Disabilities Act, 2005.*

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This Notice First Issued on April 27th, 2023

PUBLIC NOTICE

HAVE YOUR SAY

NOTICE OF COMMENCEMENT

Municipal Class Environmental Assessment Structure Improvements

As part of the Town of Caledon's Asset Management Strategy, improvements are being considered for bridges and culverts. This is due to the wear and tear on existing infrastructure due to increased traffic and use.

The Town has initiated a Schedule 'B' Class Environmental Assessment (EA) to consider options for improvements to the following bridges. The approximate location of the project is shown on the map.

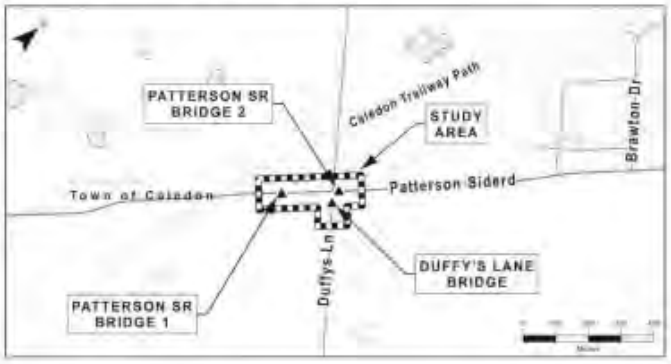
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DUFFY'S LANE BRIDGE
For feasibility investigation to determine future management of the existing 2 lane structure. The structure is located approximately 0.03km South of Patterson Side Road over the Humber River.

THE PROCESS:
The project is being planned under the Municipal Class EA process (October 2000, as amended in 2007, 2011 & 2015), which is an approved process under the Ontario Environmental Assessment Act. Further information about the project and planning process can be found at **caledon.ca/notices**. At the end of the study, the process will be documented in a Project File Report (PFR), prepared for public review.

PUBLIC INPUT:
The public is invited to provide comments for consideration in the planning and design of the project. A virtual Public Information Centre (PIC) is planned for Spring 2021. Further notice will be provided closer to the date of the PIC. Subject to comments received and obtaining the necessary approvals, the Town of Caledon intends to proceed with the planning and design of the project, with a construction date to be determined dependent on funding.



To provide comment or to request additional information concerning this study or if you would like to be added to the project contact list to receive future project notices, please contact either of the following project team members:

Ian Todhunter, P.Eng.
Senior Project Manager
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
905-584-2272 x 4065
ian.todhunter@caledon.ca

Matt Brooks, P.Eng.
Project Manager
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
705-797-4284
matt.brooks@rjburnside.com

Project and more information will be made accessible upon request in accordance with the Accessibility Standard for Information and Communication under the Accessibility for Ontarians with Disabilities Act, 2005.

Information will be collected and maintained to meet the requirements of the Environmental Assessment Act and for the purposes of creating a record that will be available to the general public as described in Section 37 of the Freedom of Information and Protection of Privacy Act. With the exception of personal information such as name, address, telephone number and property location, all comments will become part of the public record that is available to the general public.

This Notice First Issued on February 18, 2021.

TOWN OF CALEDON

6311 Old Church Road
Caledon, ON L7C 1J6
www.caledon.ca
T. 905.584.2272 | 1.888.225.3366 | F. 905.584.4325



Dreamstime

Is your workplace not following the COVID workplace rules outlined by the province?

WHAT TO KNOW BEFORE REPORTING YOUR UNSAFE WORKPLACE DURING COVID

YOU CAN FILE A COMPLAINT BY PHONE OR ONLINE

JAMES CHAARANI
jchaarani@metroland.com

Monte McNaughton, Minister of Labour, Training and Skills Development in Ontario said he would like workers to know that if they feel unsafe at work, they can call the Ministry of Labour at 1-877-202-0008, "and a ministry inspector will investigate immediately."

Is your workplace not following the COVID-19 workplace rules outlined by the province? Before you pick up the phone, here are five things to know.

WHAT TO KNOW

1. Although the Ministry's website encourages "you to try to resolve your dispute internally" and says you can bring up your concerns with a supervisor or employer, or, if your workplace has one, a joint health and safety committee or health and safety representative before filing a complaint, it's not necessary if you don't feel you can.

2. You can file a complaint anonymously — they do say that "Although the ministry will not give your name to anyone in your workplace, we cannot guarantee that your employer won't guess that you are the complainant. We also cannot guarantee that you will remain anonymous if there is a prosecution."

3. According to the Ministry's website, "if you believe you've been fired or punished for exercising your rights under the (Occupational Health and Safety Act), you can also file a reprisal complaint with the Ontario Labour Relations Board (OLRB). The OLRB is an independent tribunal that can review a worker's reprisal complaint." This includes COVID-19 workplace hazard complaints, too.

4. Not only can you file a complaint by phone but you can also file one online if it's not urgent. Learn more here.

5. You can find more COVID-19 health and safety guidance about your specific sector at ontario.ca/covidsafety. If you think your workplace conditions are unsafe, you can file a complaint.

"There's no excuse for businesses," says McNaughton. "Today they know exactly the protocols that need to be followed, and I will not hesitate to shut down any factory, any distribution centre, any workplace that's violating the rules."

SCAN THIS CODE to find the latest data about COVID-19 cases in Mississauga.



COVID-19 update

Virtual Town Hall February 24, 7 p.m.

Join Dr. Lawrence Loh, Medical Officer of Health for Peel Public Health and Mayor Allan Thompson for a virtual town hall to discuss the latest COVID-19 updates for the Town of Caledon.

To participate, dial **1-833-311-4101**, access code **132 947 5450#** or access the live stream at **caledon.ca/agenda** .

Have a question about COVID 19?
Send in advance to mayor@caledon.ca





CALEDON COVID-19 TESTING SITES

- **CALEDON CENTRE FOR RECREATION AND WELLNESS**
  14111 Regional Road 50 North | Bolton, ON
  Hours: Mondays 2 to 7 p.m.
- **SOUTHFIELDS COMMUNITY CENTRE**
  225 Dougall Ave, Caledon
  Hours: Wednesdays 2 to 7 p.m.

  *For the above locations call **905-796-4922** to book an appointment.*
- **HEADWATERS HEALTH CARE CENTRE**
  100 Rolling Hills Drive, Orangeville
  *Visit **headwatershealth.ca** to book an appointment.*

Winter pet safety

Here are some tips to protect your pet from ice, snow, freezing temperatures and other hazards.

- Never leave your pet unattended in a cold car.
- Keep your pets warm. If it's too cold for you to stay outside, it's too cold for your pet.
- Provide your pet with a warm cozy bed.
- Keep your pet away from puddles or large bodies of water.
- Wipe your pets' paws and underside after being outside.
- Beware of cats seeking warmth under vehicle hoods.
- Dress your pet appropriately for winter outings.
- Prepare an emergency pet survival kit for possible power outages.

caledon.ca/animalservices
#CaledonAnimalShelter



PUBLIC NOTICE

HAVE YOUR SAY

NOTICE OF PUBLIC MEETING

Columbia Way Environmental Assessment

A Public Meeting will be held to share information and receive public input on the Municipal Class Environmental Assessment (EA) for Columbia Way between Highway 50 and Caledon King Townline. The EA will improve traffic conditions and enhance the safety of all road users, including pedestrians and cyclists, and to identify road drainage and stormwater management improvements.

Due to continuing efforts to contain the spread of COVID-19 and to protect individuals, Town Hall will not be open for community members to attend Public Meetings until further notice. This meeting will be held electronically.

Date: **February 24, 2021**
Time: **5 p.m.**

To listen to the Meeting, you may call 1-833-311-4101, Meeting Access Code: 132 982 6233#. You can also watch live from the Town's website. Members of the community are encouraged to submit questions in advance to transportation@caledon.ca to be answered by the consultant during the meeting.

For more information on how to access the meeting details, including background on the project, please visit **caledon.ca/notices.**

CONTACTS:

Arash Olia, Ph.D., P.Eng.
Manager, Transportation Engineering
Town of Caledon
arash.olia@caledon.ca
905.584.2272 x.4073

Andrew McGregor, MCIP, RPP
Senior Planner, EA & Approvals
R.V. Anderson Associated Limited
AMcGregor@rvanderson.com
905.685.5049

ACCESSIBILITY:

If you require an accessibility accommodation in relation to this Public Meeting, or to access any materials related to this project in an alternate format please contact Legislative Services by phone at 905-584-2272 x.2366 or via email at legislative.services@caledon.ca. Requests should be submitted at least 10 days before the Public Meeting.

Notice Date: February 11, 2021

2021 Interim Property Tax Bills have been mailed out

Be sure to pay your taxes by March 4 and May 6 to avoid late payment fees.
Still going through financial hardship because of COVID-19?
Apply for one of the COVID-19 property tax relief programs.
caledon.ca/tax

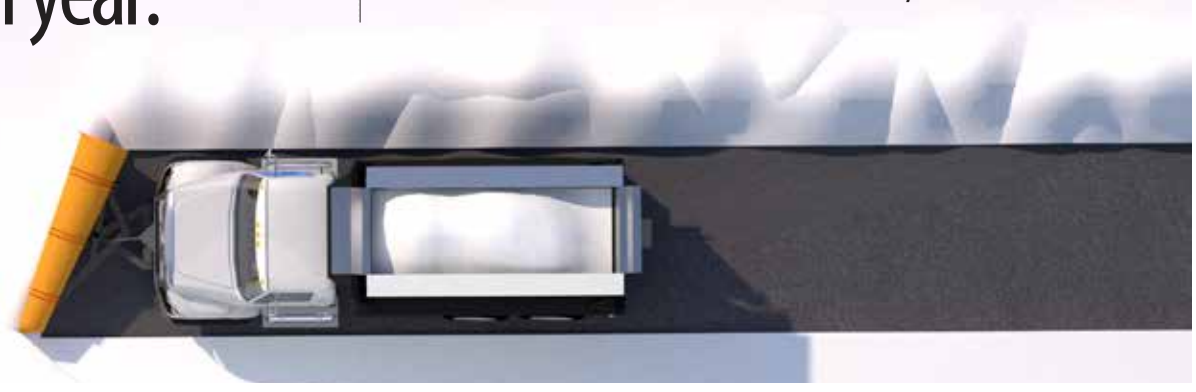
Support local businesses

LOCAL

#shoplocalcaledon

Snowplows are busy this time of year.

Keep roads, driveways and sidewalks free of obstructions so that they can do their job quickly – and safely!
caledon.ca/snow #CaledonWinterSafety





Get funding for your "green" idea!

The Town invites not-for-profit or volunteer groups in Caledon to apply to the Community Green Fund to undertake environmental projects.

DEADLINE: Submit a letter of intent before February 19, 2021 for the project funding stream (see chart).

Unsure if your idea fits? Contact the Energy and Environment Division by email at environment@caledon.ca.
For more information, and to find the Letter of Intent template, visit **caledon.ca/greenfund**

Community Green Fund has two streams		
Maximum Grant Request	***Project Funding Stream***	***Fast Track Stream***
	$5000	$1000
Requirements	Two - stage application	One - stage application
Deadlines	Letter of intent: Feb 19 Full Application: Mar 26	Full Application: Mar 26

COMMUNITY GREEN FUND

TOWN OF CALEDON
6311 Old Church Road
Caledon, ON L7C 1J6
caledon.ca
T. 905.584.2272 | 1.888.225.3366 | F. 905.584.4325

To obtain this page in an alternative format please contact x.2366 or legislative.services@caledon.ca

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caledon.ca/app

PUBLIC NOTICE

HAVE YOUR SAY

NOTICE OF COMMENCEMENT

Municipal Class Environmental Assessment Structure Improvements

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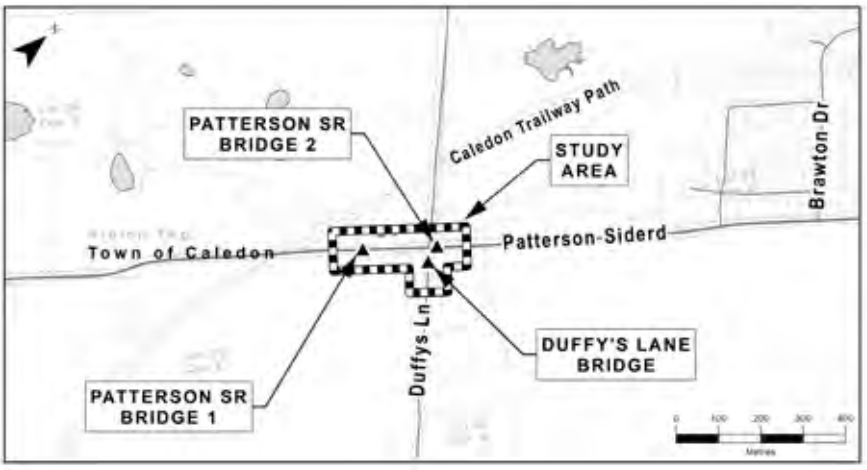
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THE PROCESS:
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PUBLIC INPUT:
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This Notice First Issued on February 18, 2021.

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Size: 1/2 Vertical
Color: YES
Date: Feb 18, 2021
Distribution: Caledon Citizen
Department: Engineering & Capital Projects
Account#:

Run X1

PUBLIC NOTICE

HAVE YOUR SAY

NOTICE OF COMMENCEMENT

Municipal Class Environmental Assessment Structure Improvements

As part of the Town of Caledon's Asset Management Strategy, improvements are being considered for bridges and culverts. This is due to the wear and tear on existing infrastructure due to increased traffic and use.

The Town has initiated a Schedule 'B' Class Environmental Assessment (EA) to consider options for improvements to the following bridges. The approximate location of the project is shown on the map.

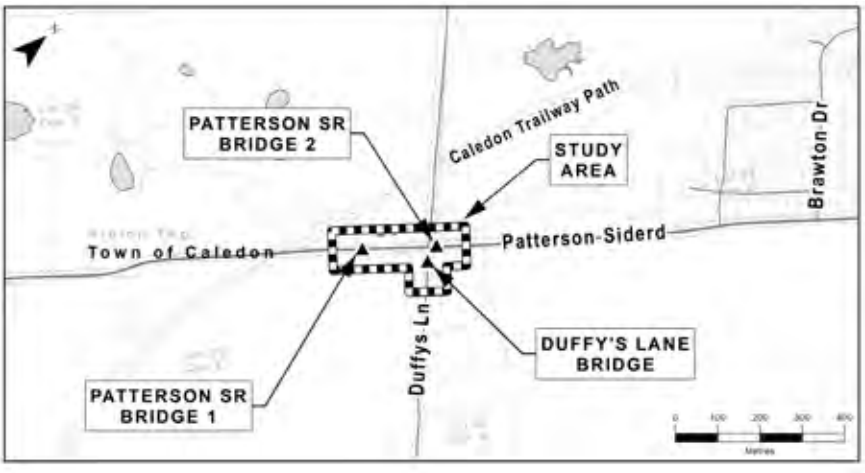
PATTERSON SIDE ROAD BRIDGE (1)
For improvements to the existing 2 lane, T-beam reinforced cast-in-place structure constructed in 1950 and located approximately 0.1 km West of Duffy's Lane over the Humber River.

PATTERSON SIDE ROAD BRIDGE (2)
For improvements to the existing 2 lane, rigid frame, vertical leg reinforced cast-in-place structure constructed in 1950 and located approximately 0.03 km East of Duffy's Lane over the Humber River.

DUFFY'S LANE BRIDGE
For feasibility investigation to determine future management of the existing 2 lane structure. The structure is located approximately 0.03km South of Patterson Side Road over the Humber River.

THE PROCESS:
The project is being planned under the Municipal Class EA process (October 2000, as amended in 2007, 2011 & 2015), which is an approved process under the Ontario Environmental Assessment Act. Further information about the project and planning process can be found at **caledon.ca/notices**. At the end of the study, the process will be documented in a Project File Report (PFR), prepared for public review.

PUBLIC INPUT:
The public is invited to provide comments for consideration in the planning and design of the project. .A virtual Public Information Centre (PIC) is planned for Spring 2021. Further notice will be provided closer to the date of the PIC. Subject to comments received and obtaining the necessary approvals, the Town of Caledon intends to proceed with the planning and design of the project, with a construction date to be determined dependent on funding.



To provide comment or to request additional information concerning this study or if you would like to be added to the project contact list to receive future project notices, please contact either of the following project team members:

Ian Todhunter, P.Eng.
Senior Project Manager
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
905-584-2272 x 4065
ian.todhunter@caledon.ca

Matt Brooks, P.Eng.
Project Manager
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
705-797-4284
matt.brooks@rjburnside.com

Project and notice information will be made accessible upon request in accordance with the Accessibility Standard for Information and Communication under the Accessibility for Ontarians with Disabilities Act, 2005.

Information will be collected and maintained to meet the requirements of the Environmental Assessment Act and for the purposes of creating a record that will be available to the general public as described in Section 37 of the Freedom of Information and Protection of Privacy Act. With the exception of personal information such as name, address, telephone number and property location, all comments will become part of the public record that is available to the general public.

This Notice First Issued on February 18, 2021.

TOWN OF CALEDON

6311 Old Church Road
Caledon, ON L7C 1J6
www.caledon.ca
T. 905.584.2272 | 1.888.225.3366 | F. 905.584.4325

Size: 1/2 Vertical
Color: YES
Date: Feb 18, 2021
Distribution: Caledon Enterprise
Department: Engineering & Capital Projects
Account#:

Run X1

COVID-19 update

Virtual Town Hall
February 24, 7 p.m.

Join Dr. Lawrence Loh, Medical Officer of Health for Peel Public Health and Mayor Allan Thompson for a virtual town hall to discuss the latest COVID-19 updates for the Town of Caledon.





To participate, dial **1-833-311-4101**, access code **132 947 5450#** or access the live stream at **caledon.ca/agenda** .

Have a question about COVID 19?
Send in advance to mayor@caledon.ca

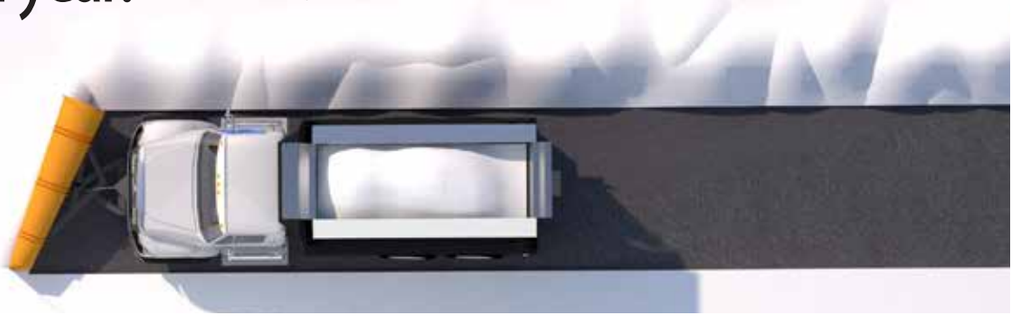
CALEDON COVID-19 TESTING SITES

- **CALEDON CENTRE FOR RECREATION AND WELLNESS**
  14111 Regional Road 50 North | Bolton, ON
  Hours: Mondays 2 to 7 p.m.
- **SOUTHFIELDS COMMUNITY CENTRE**
  225 Dougall Ave, Caledon
  Hours: Wednesdays 2 to 7 p.m.

  *For the above locations call **905-796-4922** to book an appointment.*
- **HEADWATERS HEALTH CARE CENTRE**
  100 Rolling Hills Drive, Orangeville
  *Visit **headwatershealth.ca** to book an appointment.*

Snowplows are busy this time of year.

Keep roads, driveways and sidewalks free of obstructions so that they can do their job quickly – and safely!
caledon.ca/snow #CaledonWinterSafety





Get funding for your "green" idea!

The Town invites not-for-profit or volunteer groups in Caledon to apply to the Community Green Fund to undertake environmental projects.

DEADLINE: Submit a letter of intent before February 19, 2021 for the project funding stream (see chart).

Unsure if your idea fits? Contact the Energy and Environment Division by email at environment@caledon.ca.
For more information, and to find the Letter of Intent template, visit **caledon.ca/greenfund**

Community Green Fund has two streams		
Maximum Grant Request	***Project Funding Stream***	***Fast Track Stream***
	$5000	$1000
Requirements	Two - stage application	One - stage application
Deadlines	Letter of intent: Feb 19 Full Application: Mar 26	Full Application: Mar 26

COMMUNITY GREEN FUND



Winter pet safety

Here are some tips to protect your pet from ice, snow, freezing temperatures and other hazards.

- Never leave your pet unattended in a cold car.
- Keep your pets warm. If it's too cold for you to stay outside, it's too cold for your pet.
- Provide your pet with a warm cozy bed.
- Keep your pet away from puddles or large bodies of water.
- Wipe your pets' paws and underside after being outside.
- Beware of cats seeking warmth under vehicle hoods.
- Dress your pet appropriately for winter outings.
- Prepare an emergency pet survival kit for possible power outages.



caledon.ca/animalservices
#CaledonAnimalShelter

PUBLIC NOTICE

HAVE YOUR SAY

NOTICE OF PUBLIC MEETING

Columbia Way
Environmental Assessment

A Public Meeting will be held to share information and receive public input on the Municipal Class Environmental Assessment (EA) for Columbia Way between Highway 50 and Caledon King Townline. The EA will improve traffic conditions and enhance the safety of all road users, including pedestrians and cyclists, and to identify road drainage and stormwater management improvements.

Due to continuing efforts to contain the spread of COVID-19 and to protect individuals, Town Hall will not be open for community members to attend Public Meetings until further notice. This meeting will be held electronically.

Date: **February 24, 2021**
Time: **5 p.m.**

To listen to the Meeting, you may call 1-833-311-4101, Meeting Access Code: 132 982 6233#. You can also watch live from the Town's website. Members of the community are encouraged to submit questions in advance to transportation@caledon.ca to be answered by the consultant during the meeting.

For more information on how to access the meeting details, including background on the project, please visit **caledon.ca/notices.**

CONTACTS:

Arash Olia, Ph.D., P.Eng.
Manager, Transportation Engineering
Town of Caledon
arash.olia@caledon.ca
905.584.2272 x.4073

Andrew McGregor, MCIP, RPP
Senior Planner, EA & Approvals
R.V. Anderson Associated Limited
AMcGregor@rvanderson.com
905.685.5049

ACCESSIBILITY:

If you require an accessibility accommodation in relation to this Public Meeting, or to access any materials related to this project in an alternate format please contact Legislative Services by phone at 905-584-2272 x.2366 or via email at legislative.services@caledon.ca. Requests should be submitted at least 10 days before the Public Meeting.

Notice Date: February 11, 2021

2021 Interim Property Tax Bills have been mailed out

Be sure to pay your taxes by March 4 and May 6 to avoid late payment fees.

Still going through financial hardship because of COVID-19?

Apply for one of the COVID-19 property tax relief programs.

caledon.ca/tax

Support local businesses



#shoplocalcaledon

TOWN OF CALEDON

6311 Old Church Road
Caledon, ON L7C 1J6
caledon.ca
info@caledon.ca
T. 905.584.2272 | 1.888.225.3366 | F. 905.584.4325

To obtain this page in an alternative format please contact x.2366 or legislative@caledon.ca

twitter.com/yourcaledon
facebook.com/yourcaledon
@yourcaledon
mobile app: caledon.ca/app

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

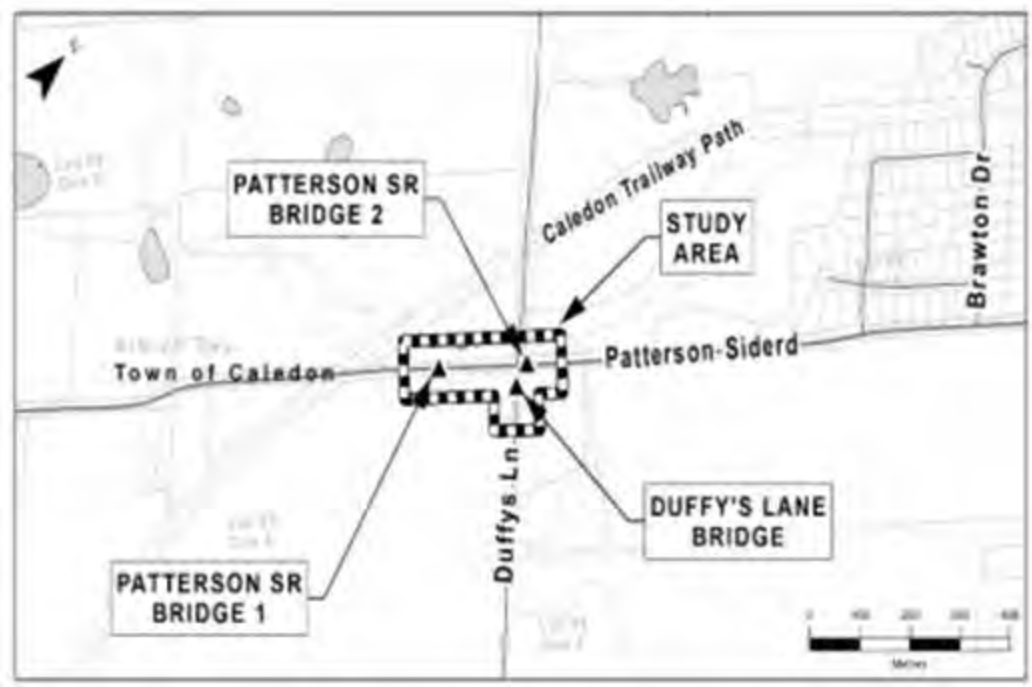
Appendix C

Agency Correspondence

Sylvia Waters

From: Deanna De Forest
Sent: Tuesday, February 23, 2021 3:31 PM
To: Myslicki, Lisa (IO); steven.strong@ontario.ca; karla.barboza@ontario.ca; sally.rook@peelregion.ca; Saddi, Asha; regional.clerk@peelregion.ca; steve.ganesh@peelregion.ca; scott.moon@bell.ca; Kevin.Schimus@enbridge.com; vince.cina@enbridge.com; ann.newman@enbridge.com; est.reg.crossing@enbridge.com; dpresley@mhbcplan.com; clee@tnpi.ca; YAhmed@uniongas.com; Utility.Circulations@zayo.com; caroline.mugo@trca.ca; Shirin Varzgani; Suzanne Bevan; Jay.Clark@TRCA.ca; arash.olia@caledon.ca; Ryan.Grodecki@caledon.ca; andrew.pearce@caledon.ca; carey.herd@caledon.ca; mayors.office@caledon.ca; fire@caledon.ca; allan.thompson@caledon.ca; sally.drummond@caledon.ca; jennifer.innis@caledon.ca; nick.deboer@caledon.ca; krystina.koops@dpcdsb.org; SecondaryLandUse@HydroOne.com
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 051839EA_Caledon_SchB_NoCm_.pdf

Hello,
On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator
R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

Sylvia Waters

From: Eastern Region Crossing <est.reg.crossing@enbridge.com>
Sent: Thursday, February 25, 2021 11:21 PM
To: Deanna De Forest
Subject: RE: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Hi Deanna,

Please update your distribution list to include notifications@enbridge.com; you can remove Ann Newman and est.reg.crossing@enbridge.com. You might also want to include mark-ups@enbridge.com, as they review for our gas assets.

Thanks for updating your records!

Sarah Taylor
Sr. Analyst, Lands & ROW
—
ENBRIDGE
TEL 780-392-4765 CELL 403-650-2157 FAX 780-392-4059 EMAIL sarah.taylor@enbridge.com
10175 101 St NW, Edmonton, Alberta T5J 0H3
Mail/Couriers: Suite 330, 10180 - 101 Street, Edmonton, AB T5J 3S4
Canada Post: PO Box 398, Edmonton, AB T5J 2J9

enbridge.com

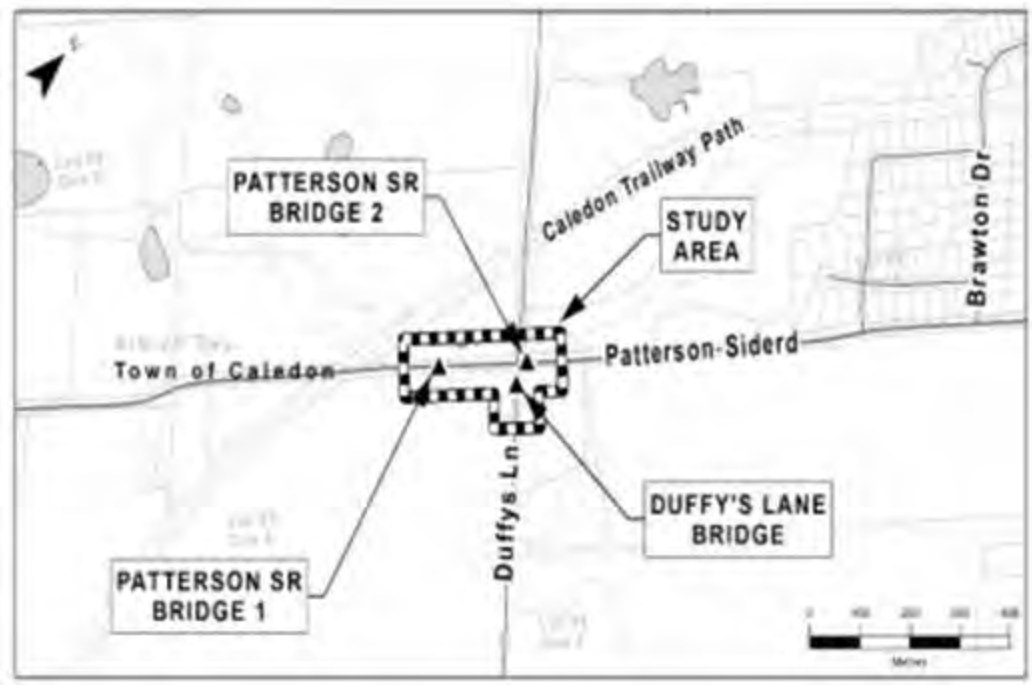
Safety. Integrity. Respect. Inclusion

From: Deanna De Forest <Deanna.DeForest@rjburnside.com>
Sent: Tuesday, February 23, 2021 1:31 PM
To: Myslicki, Lisa (IO) <Lisa.Myslicki@infrastructureontario.ca>; steven.strong@ontario.ca; karla.barboza@ontario.ca; sally.rook@peelregion.ca; Saddi, Asha <asha.saddi@peelregion.ca>; regional.clerk@peelregion.ca; steve.ganesh@peelregion.ca; scott.moon@bell.ca; Kevin Schimus <Kevin.Schimus@enbridge.com>; vince.cina@enbridge.com; Ann Newman <ann.newman@enbridge.com>; Eastern Region Crossing <est.reg.crossing@enbridge.com>; dpresley@mhbcplan.com; clee@tnpi.ca; Youmna Ahmed <Youmna.Ahmed@enbridge.com>; Utility.Circulations@zayo.com; caroline.mugo@trca.ca; Shirin Varzgani <Shirin.Varzgani@trca.ca>; Suzanne Bevan <Suzanne.Bevan@trca.ca>; Jay.Clark@TRCA.ca; arash.olia@caledon.ca; Ryan.Grodecki@caledon.ca; andrew.pearce@caledon.ca; carey.herd@caledon.ca; mayors.office@caledon.ca; fire@caledon.ca; allan.thompson@caledon.ca; sally.drummond@caledon.ca; jennifer.innis@caledon.ca; nick.deboer@caledon.ca; krystina.koops@dpcdsb.org; SecondaryLandUse@HydroOne.com
Subject: [External] 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

EXTERNAL: PLEASE PROCEED WITH CAUTION.
This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe.

Hello,
On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge in Caledon.

The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | http://secure-web.cisco.com/1edDdFazm8JByozNNWS0-Svz
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8R4RAP92NpSECf1UkcHkmeu9nuEhoHEiWmqhWbvpo44Qozcbkg1mDtVSus66djmle-04Mxfhmu
Office: +1 800-265-9662 Direct: +1 705-797-4357

COVID 19: We remain open for business

The health and safety of our employees and clients is of paramount importance. Most of our staff are working remotely and continue to serve clients using our well established collaborative technology platforms. For our full COVID 19 response please click here.

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If you have received this communication in error please notify the sender at the above email address and delete this email immediately.
Thank you.

****

Sylvia Waters

From: Darlene Quilty <dquilty@mhbcplan.com>
Sent: Thursday, February 25, 2021 2:18 PM
To: Deanna De Forest
Subject: RE: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Hi Deanna,

TC Energy does not have any pipelines within the study area.

Thank you,

DARLENE QUILTY | Planning Co-ordinator

I am currently working remotely and it is best to reach me via email or at 705-627-2302.

MHBC **Planning, Urban Design & Landscape Architecture**
On behalf of TransCanada PipeLines Limited

113 Collier St. | Barrie | ON | L4M 1H2 | C 705 627 2302 | dquilty@mhbcplan.com |

Follow us: Webpage | Linkedin | Facebook | Twitter | Vimeo

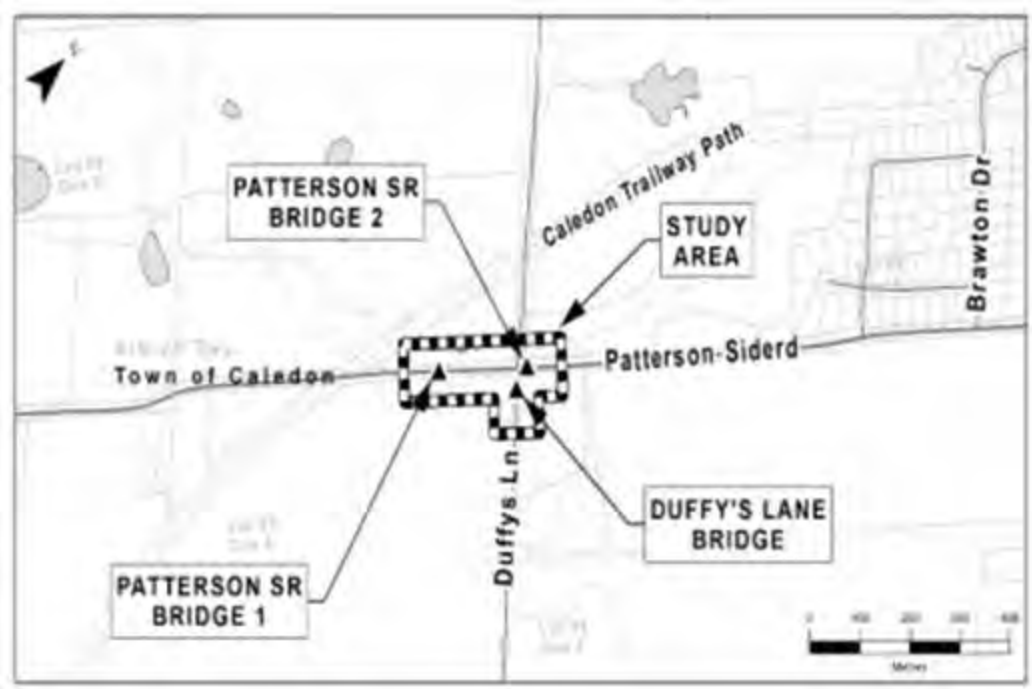


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From: Deanna De Forest <Deanna.DeForest@rjburnside.com>
Sent: February-23-21 3:31 PM
To: Myslicki, Lisa (IO) <Lisa.Myslicki@infrastructureontario.ca>; steven.strong@ontario.ca; karla.barboza@ontario.ca; sally.rook@peelregion.ca; Saddi, Asha <asha.saddi@peelregion.ca>; regional.clerk@peelregion.ca; steve.ganesh@peelregion.ca; scott.moon@bell.ca; Kevin.Schimus@enbridge.com; vince.cina@enbridge.com; ann.newman@enbridge.com; est.reg.crossing@enbridge.com; Darlene Quilty <dquilty@mhbcplan.com>; clee@tnpi.ca; YAhmed@uniongas.com; Utility.Circulations@zayo.com; caroline.mugo@trca.ca; Shirin Varzgani <Shirin.Varzgani@trca.ca>; Suzanne Bevan <Suzanne.Bevan@trca.ca>; Jay.Clark@TRCA.ca; arash.olia@caledon.ca; Ryan.Grodecki@caledon.ca; andrew.pearce@caledon.ca; carey.herd@caledon.ca; mayors.office@caledon.ca; fire@caledon.ca; allan.thompson@caledon.ca; sally.drummond@caledon.ca; jennifer.innis@caledon.ca; nick.deboer@caledon.ca; krystina.koops@dpcdsb.org; SecondaryLandUse@HydroOne.com
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Hello,

On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge in Caledon.
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To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

COVID 19: We remain open for business

The health and safety of our employees and clients is of paramount importance. Most of our staff are working remotely and continue to serve clients using our well established collaborative technology platforms. For our full COVID 19 response please click here.

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****

Sylvia Waters

From: phil.arbeau@zayo.com on behalf of Utility Circulations <utility.circulations@zayo.com>
Sent: Tuesday, March 02, 2021 7:25 PM
To: Deanna De Forest
Subject: Re: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

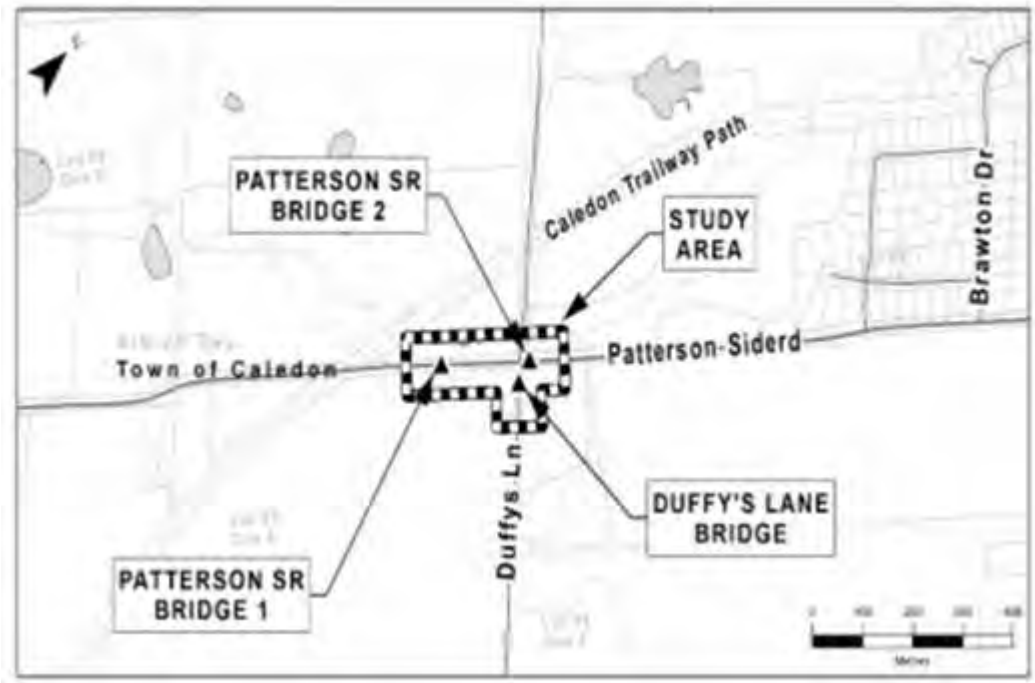
Good afternoon,

Zayo has no existing plant in the area indicated in your submission. No markup and no objection. Thank you.

Phil Arbeau
Utility Circulations

On Tue, 23 Feb 2021 at 15:31, Deanna De Forest <Deanna.DeForest@rjburnside.com> wrote:

> Hello,
>
> On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge in Caledon.
>
> The approximate location of the Study Area is illustrated in the map below and on the attached notice.
>
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Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

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If you have received this communication in error please notify the sender at the above email address and delete this email immediately.
Thank you.

****

Sylvia Waters

From: Matt Brooks
Sent: Thursday, March 18, 2021 10:45 AM
To: Deanna De Forest; Devin Soeting; Andrew Dawson
Subject: FW: Hydro One Response: Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy s Lane Bridge in Caledon
Attachments: 20210318-NoticeOfCommence-Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy s Lane Bridge in Caled.pdf

---

From: SecondaryLandUse@HydroOne.com <SecondaryLandUse@HydroOne.com>
Sent: Thursday, March 18, 2021 10:22 AM
To: Ian Todhunter <Ian.Todhunter@caledon.ca>
Cc: Matt Brooks <Matt.Brooks@rjburnside.com>
Subject: Hydro One Response: Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy s Lane Bridge in Caledon

Please see the attached for Hydro One's Response.

Hydro One Networks Inc
SecondaryLandUse@HydroOne.com

This email and any attached files are privileged and may contain confidential information intended only for the person or persons named above. Any other distribution, reproduction, copying, disclosure, or other dissemination is strictly prohibited. If you have received this email in error, please notify the sender immediately by reply email and delete the transmission received by you. This statement applies to the initial email as well as any and all copies (replies and/or forwards) of the initial email

Hydro One Networks Inc
483 Bay St
Toronto, ON

March 18, 2021

Re: Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy s Lane Bridge in Caledon

Attention:
Ian Todhunter, P.Eng.
Senior Project Manager
Engineering Services Town of Caledon

Thank you for sending us notification regarding (Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy s Lane Bridge in Caledon). In our preliminary assessment, we confirm there are no existing Hydro One Transmission assets in the subject area. Please be advised that this is only a preliminary assessment based on current information.

If plans for the undertaking change or the study area expands beyond that shown, please contact Hydro One to assess impacts of existing or future planned electricity infrastructure.

Any future communications are sent to Secondarylanduse@hydroone.com.

Be advised that any changes to lot grading and/or drainage within proximity to Hydro One transmission corridor lands must be controlled and directed away from the transmission corridor.

Sent on behalf of,

Secondary Land Use
Asset Optimization
Strategy & Integrated Planning
Hydro One Networks Inc.

Sylvia Waters

From: Matt Brooks
Sent: Thursday, March 25, 2021 4:29 PM
To: Deanna De Forest; Devin Soeting
Cc: Andrew Dawson; 300051839 - Town of Caledon 2020-83 - Bridge & Culvert Works 2020
Subject: FW: CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter
Attachments: CFN 64514 -MCEA Structure Improvements - Patterson SdRd & Duffy's Lane Bridge_NoCm_March 22, 2021.pdf

Dido for this document

From: Shirin Varzgani <Shirin.Varzgani@trca.ca>
Sent: Monday, March 22, 2021 4:02 PM
To: Ian Todhunter <Ian.Todhunter@caledon.ca>
Cc: Matt Brooks <Matt.Brooks@rjburnside.com>; Suzanne Bevan <Suzanne.Bevan@trca.ca>; Jay Clark <Jay.Clark@trca.ca>; sourcewater@peelregion.ca
Subject: CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter

Hi Ian,

Please see the attached TRCA response to the Notice of Commencement.

Should you have any questions, please do not hesitate to contact me.

Thank you and regards,

Shirin Varzgani, MIP, MES (Pl.)
Planner
Infrastructure Planning and Permits | Development and Engineering Services

T: (416) 661-6600 ext. 5785
E: shirin.varzgani@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Sent: Monday, March 22, 2021 3:45 PM
To: Ian Todhunter <Ian.Todhunter@caledon.ca>
Cc: Wild, Loralyn (MECP) <Loralyn.Wild@ontario.ca>; Potter, Katy (MECP) <Katy.Potter@ontario.ca>; Matt Brooks <Matt.Brooks@rjburnside.com>
Subject: Structural Improvements for Patterson Side Road Bridges and Duffy's Lane Bridge - Schedule B Municipal Class EA

Good afternoon,

Please find attached a letter from the Ministry of the Environment, Conservation and Parks, Environmental Approvals Branch, regarding the above mentioned project. Feel free to contact me directly with any questions or concerns you may have.

Sincerely,

Trevor Bell | Environmental Planner/Environmental Assessment Coordinator
Project Review Unit, Environmental Assessment and Permissions Branch
Ministry of the Environment, Conservation and Parks
5775 Yonge Street, 8th floor, Toronto ON, M2M 4J1
New Phone: 437-770-3731 | trevor.bell@ontario.ca

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

March 22, 2021

Ian Todhunter, P.Eng.
Senior Project Manager, Engineering Services
Town of Caledon
ian.todhunter@caledon.ca
BY EMAIL ONLY

Re: **Structural Improvements for Patterson Side Road Bridges and Duffy's Lane Bridge**
Town of Caledon
Schedule B Municipal Class Environmental Assessment
Notice of Study Commencement

Dear Mr. Todhunter,

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 Town of Caledon has indicated that the study is following the approved environmental planning process for a Schedule B project under the Municipal Engineers Association's 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 Aboriginal 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:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council); and
- Huron-Wendat Nation (if there is potential for the project to impact archeological resources).

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".

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 Branch under the following circumstances after initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities;
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right;
- Consultation with Indigenous communities or other stakeholders has reached an impasse; or
- A Part II Order request is expected based on impacts to Aboriginal or treaty rights.

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 you will be asked to play should additional steps and activities be required.

Once the report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the Proponent.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to:

Minister Jeff Yurek
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Please note the project cannot proceed until at least 30 days after the end of the public review period provided for in the Notice of Completion.

Further, the project may not proceed after this time if:

- a Part II Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights; or
- the Director has issued a Notice of Proposed Order regarding the project.

The public can request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent.

Once the requested information has been received, the Minister will have 30 days to make a decision or impose conditions on your project.

A draft copy of the report should be sent to me prior to the filing of the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments.

Please also ensure a copy of the final notice is sent to the ministry's Central Region EA notification email account (eanotification.cregion@ontario.ca) after the report is finalized.

Should you or your project team members have any questions regarding the material above, please contact me at trevor.bell@ontario.ca.

Sincerely,



Trevor Bell
Regional Environmental Assessment Coordinator

cc: Lorlyn WIld, Manager (A), Halton Peel District Office, MECP
Katy Potter, Supervisor, Project Review Unit, MECP
Matt Brooks, Project Manager, R.J. Burnside & Associates Ltd.

Attachments: 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.

☐ **Species at Risk**

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

☐ **Planning and Policy**

- Ontario has released "A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)" which replaces the "Growth Plan for the Greater Golden Horseshoe (2017)". More information, including the Plan, is found here: https://www.placestogrow.ca.

- Parts of the study area may be subject to the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019), Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable policies should be referenced in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The Provincial Policy Statement (2020) contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

☐ **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.

- 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 report 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 report 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. The contact for this project is Jennifer Stephens at (416) 661-6600 ext 5568 or jstephens@trca.on.ca. 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).**

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. Consider 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 report 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.

- 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.

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 report 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 report 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.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- All natural heritage features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:

    - Areas of Natural and Scientific Interest (ANSIs)
    - Rare Species of flora or fauna
    - Watercourses
    - Wetlands
    - Woodlots

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Surface Water

- The report must include enough 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 report 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 report 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 report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for 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 report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report 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 report. 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 appropriate MECP District Office for further consultation if contaminated sites are present.

- Any current or historical waste disposal sites should be identified in the report. 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 report. 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 report 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).

- 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 environmental land use planning guides 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 report 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 report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report 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 SR 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 report 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, 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*, although the plan itself would not be.

- The report 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 report 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.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The report 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 report.

- Please include in the report 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 *Impact Assessment Act*, 2019.

- 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 report.

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 or not 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.

March 22, 2021

CFN 64514
X-ref CFN 62622.292

BY E-MAIL ONLY (ian.todhunter@caledon.ca)

Mr. Ian Todhunter
Town of Caledon
6311 Old Church Road
Caledon, ON
L7C 1J6

Dear Mr. Todhunter;

Re: Notice of Study Commencement
Municipal Class Environmental Assessment Structure Improvements (Improvement of Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge)
Humber River Watershed; Town of Caledon; Regional Municipality of Peel

Toronto and Region Conservation Authority (TRCA) staff received the Notice of Study Commencement for the above noted on February 23, 2021. As a recognized commenting agency under the Ontario Environmental Assessment Act, TRCA has interests in this project.

PROJECT OVERVIEW

It is our understanding that this undertaking involves development of options for improvements to the following bridges: i) Patterson Side Road Bridge (1); ii) Patterson Side Road Bridge (2), and, iii) Duffy's Lane Bridge. The study area includes the area on Patterson Side Road between the two (2) existing bridges on Patterson Side Road on the east and west sides of Duffy's Lane and Duffy's Lane to approximately 30 m south of Patterson Side Road. Improvements are being considered for these bridges due to the wear and tear on existing infrastructure from increased traffic use and as a part of the Town of Caledon's Asset Management Strategy. The study will examine options under Schedule B Municipal Class Environmental Assessment (EA).

TRCA COMMENTING ROLES

As detailed in TRCA's 2014 **The Living City Policies** (LCP), TRCA has a number of commenting roles relative to its review of this environmental assessment, including:

1. Regulatory Authority
2. Delegated Provincial Interests
3. Public Commenting Body
4. Resources Management Agency
5. Service Provider
6. Land Owner

7. Source Protection Authority under the Clean Water Act

These are further detailed in **Appendix A: TRCA Commenting Roles**.

TRCA AREAS OF INTEREST

In relation to this application, TRCA staff has identified a number of areas of interest within the study area related to these various commenting roles, including:

1. TRCA Program and Policy Areas
    a. Natural System Programs and Policies
    b. Sustainability Programs and Policies
2. Provincial Program Areas
3. Federal Program Areas

Further details are provided in **Appendix B: TRCA Areas of Interest**.

In relation to these areas of interest, please be advised that TRCA has select digital data available through an open data platform on the TRCA website that should be used to supplement the existing conditions analysis in the development of the environmental assessment. Upon request, TRCA can provide additional data for areas of interest not available on the web. Please contact the undersigned as needed. Municipalities do not pay data fees.

ASSESSMENT OF ALTERNATIVES

In developing, evaluating and selecting alternatives, staff require the LCP policies be considered. TRCA staff recommends the preferred alternative meets the policies of Section 7. In particular, impacts to and opportunities for the following should be addressed:

1. Flooding, erosion or slope instability
2. Existing landforms, features and functions
3. Aquatic and terrestrial habitat and functions, including connectivity
4. TRCA property and heritage resources
5. Environmental best management practices that support climate change mitigation and adaptation
6. Community and public realm benefits

TRCA requires that the preferred alternative considers avoiding, minimizing, mitigating, and compensating impacts to the ecosystem, and avoid, mitigate or remediate hazards, in that order. In order to fulfil requirements of Ontario Regulation 166/06 at the detailed design stage, staff also requires that the preferred alternative meets LCP policies in Section 8.

In order to ensure TRCA concerns are addressed early in the review process, it is recommended that the TRCA planner be contacted when key project milestones are reached, as detailed in **Appendix C: Recommended Contact Points.** Please contact the planner to discuss the appropriate time for a site visit; please ensure the TRCA planner is included in the technical advisory committee; and please add Victoria Kramkowski (Victoria.kramkowski@trca.ca), Government and Community Relations Specialist to the project mailing list to receive any public information updates.

SUBMISSION REQUIREMENTS

As this project proceeds through the various stages of the environmental assessment process, please ensure the following is provided to TRCA for review and comment as the appropriate time:

Digital Submissions

1. All technical advisory committee meeting agendas, as well as draft and final meeting minutes
2. All TRCA technical meeting agendas, as well as draft and final meeting minutes
3. Draft public information boards, prior to public review
4. Notices of public meetings, including final display material and handouts
5. Draft Phase 1 and 2 Report, if applicable
6. Draft technical reports and associated materials, including a covering letter that outlines the project purpose and lists the reports enclosed for review
7. Draft evaluation criteria and matrices, including a summary that details how the criteria and weighting (if applicable) were established
8. Draft EA document, including a covering letter that outlines how previous TRCA comments have been addressed
9. Final EA document, including a covering letter that outlines how previous TRCA comments have been addressed
10. Ensure all materials are submitted in PDF format, with drawings pre-scaled to print on 11”x17” pages.
11. Materials submitted through e-mail must be less than 25 MB.
12. Materials submitted through a file transfer protocol (FTP) site must be posted a minimum of two weeks.

Please note, prior to submitting the technical reports and materials, as well as appendices related to the draft and final EA documents, it is recommended that the project manager be contacted so that review requirements can be scoped to the TRCA areas of interest.

REVIEW FEES

Please be advised that this application is subject to a $ 12,805 application review fee as per our 2018 Fee Schedule. Please note:

1. **To ensure accurate processing of your fee, please ensure your accounting department references CFN 64514 when making any payments.**
2. Payment method and timing must be noted in your covering letter response.
3. Additional fees are applied as per the fee schedule for reviews beyond two (2) three (3) submissions, including the final.
4. Payments can be made by:
    a. Cheque: please attach the cheque to your resubmission. Alternatively, if sending separately through your accounting department, please request your accounting department submit the cheque to the attention of Oxana Stanislavskaya - Accounting Clerk, Finance Corporate Services, TRCA.
    b. Credit Card: please contact Oxana Stanislavskaya at extension 6442 for payments made over the phone.
    c. Electronic Fund Transfer: this option may be available through your accounting department.

Should you have any questions, please contact me at extension 5785 or at shirin.varzgani@trca.ca.

Regards,



Shirin Varzgani
Planner, Infrastructure Planning and Permits
Development and Engineering Services

Attached: Appendix A: TRCA Commenting Roles
Appendix B: TRCA Areas of Interest
Appendix C: Recommended TRCA Contact Points

BY E-MAIL

cc: Consultant: Matt Brooks, Project Manager (matt.brooks@rjburnside.com)
TRCA: Suzanne Bevan, Senior Manager, Infrastructure Planning and Permits
Brandon Hester, Senior Property Agent, Property and Risk Management
Jay Clark, Supervisor Albion Hills Conservation Area
Regional Municipality of Peel Regional Risk management Office,
(sourcewater@peelregion.ca) – CTC Source Protection Plan

APPENDIX A: TRCA COMMENTING ROLES

TRCA COMMENTING ROLES	
Public Commenting Body	
Planning Act	Pursuant to the **Planning Act**, conservation authorities are a "public commenting body", and therefore must be notified of municipal policy documents and planning and development applications under the Planning Act. TRCA comments according to its Board-approved policies as a local resource management agency to the municipality planning approval authority on these documents and applications.
Environmental Assessment Act	Pursuant to the federal and provincial **Environmental Assessment** (EA) **Acts**, conservation authorities are a commenting body. Conservation authorities are also responsible for comments made under environmental assessment (EA) exemption regulations, and the Ontario and National Energy boards. TRCA reviews and comments on environmental assessment that occur within TRCA's jurisdiction under these various forms of legislation.
Delegated Provincial Interests	
Hazard Lands	As outlined in the Conservation Ontario/ Ministry of Natural Resources and Forestry/ Ministry of Municipal Affairs and Housing Memorandum of Understanding on CA Delegated Responsibilities, CAs have been delegated the responsibility of representing the provincial interest on natural hazards encompassed by Section 3.1 of the PPS 2020.
Conservation Authorities Act	
Regulatory Authority	
Ontario Regulation 166/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses	In accordance with Ontario Regulation 166/06 (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses), a permit is required from the TRCA prior to any development (e.g. construction) if, in the opinion of TRCA, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected. The Regulation Limit defines the greater of the natural hazards associated with Ontario Regulation 166/06 (listed below). NOTE: The Regulation Limit provides a geographical screening tool for determining if Ontario Regulation 166/06 will apply to a given proposal. Through site assessment or other investigation, it may be determined that areas outside of the defined Regulation Limit require permits under Ontario Regulation 166/06. In these instances, it is the text of the regulation that will prevail; modifications to the regulation line may be required. Any development within the Regulation Limit must comply with the applicable sections of The Living City Policies (2014).
Resources Management Agency	

TRCA Programs	In accordance with Section 20 and 21 of the **Conservation Authorities Act**, CAs are local watershed-based natural resource management agencies that develop programs that reflect local resource management needs within their jurisdiction. TRCA has developed programs and policies related to our role as a resource management agency that include, but are not limited to, watershed plans, fisheries management plans, land management plans, ecosystem restoration programs, and **The Living City Policy** (2014), which are approved by the TRCA Board. Please confirm that the preferred alternative design for this project addresses TRCA concerns related to its program areas. These will be further defined through the EA review process.
Land Owner	
TRCA Property	TRCA is a major landowner in the GTA, owning close to 18,000 hectares of land. TRCA comments provided as a landowner are separate from comments provided under a technical, advisory or regulatory role.
Acquisition and Easement	If TRCA property land transfer or easement is required for the implementation of the preferred alternative, permission and approval from TRCA and the Minister of Natural Resources and Forestry are required. The design must demonstrate that TRCA program and policy objectives are met. Formal approval typically takes 12 to 18 months from the completion of the EA document. Please contact Brandon Hester, Senior Property Agent at brandon.hester@trca.ca for additional information.
Permission to Enter	If TRCA property access is required for the purpose of completing technical studies associated with this project, a Permission To Enter (PTE) must be obtained from TRCA Property staff prior to entry. Please contact Brandon Hester, Senior Property Agent at brandon.hester@trca.ca for additional information.
Archaeological Resources	An archaeological review by TRCA's archaeological staff must precede any disturbance to TRCA property. If an archaeological assessment is required, scheduling will be subject to weather, seasonal programs and other field work and are at additional cost to the proponent. Please contact Alistair Jolly, Archaeologist at alistair.jolly@trca.ca for additional information.
Service Provider	
Service Agreements and Memorandum of Understandings	**Service Level Agreements:** TRCA has service level agreements to provide EA Review services to various partners within specific service delivery timelines. Fees are charged as per agreement stipulations; review fees are not charged for individual files. **Memorandum of Understandings:** The provision of planning advisory services to municipalities is implemented through a Memorandum of Understandings (MOU)

	with participating municipalities or as part of a CA's approved program activity. In this respect, the CA is essentially acting as a technical advisor to municipalities. The agreements cover the CA's areas of technical expertise such as water management, natural hazards, and natural heritage.
Restoration Opportunities	TRCA requires that the preferred alternative considers avoiding, minimizing, mitigating, and compensating impacts to ecosystems in that order. In areas where impacts are unavoidable, mitigation or compensation will be required. It is recommended that the costs associated with these impacts be factored into decisions made during the EA. TRCA has identified opportunities for habitat restoration and enhancement on TRCA property and some privately owned lands, targeted to improve natural form and function based on goals in the watershed strategies. Should ecosystem restoration or compensation be required for this project, TRCA may be able to provide both restoration opportunities and restoration field services on a project specific basis. This will be further discussed through the EA review process.
Community and Public Realm Benefits	TRCA understands that the purpose of providing project-based community benefits is to provide measurable economic benefits to the local community, and that the purpose of providing public realm benefits is to support local opportunities for social and environmental improvements. As part of the 2013-2022 TRCA Strategic Plan (updated), TRCA has identified the need to achieve measurable positive impacts on the health of our watersheds and has developed a number of programs that actively engage with local communities to support a green, local economy. These programs include but are not limited to, Sustainable Neighbourhood Retrofit Action Plans, TRCA Conservation Land Care Program, TRCA Trails Program, TRCA Community Transformation Program and Partners in Project Green. It is recommended that commitment be made to work with TRCA and other partners to develop a Community and Public Realm Benefits Strategy for this project. This will be further discussed through the EA review process.

APPENDIX B: TRCA AREAS OF INTEREST

TRCA PROGRAM AND POLICY AREAS *Note: Additional program and policy information may be available at www.trca.ca, or by request.*	
Natural System Programs and Policies	
Systems Approach	TRCA follows a systems approach in which the natural features and water resources are considered in relation to each other and the broader landscape in which they occur. The systems approach recognizes the role that linkages and connectivity within the natural system has in supporting ecological and hydrologic processes and functions that are vital to maintaining a healthy and robust natural system that is resilient against the impacts of urbanization and climate change. TRCA may require an assessment of the existing systems, together with an evaluation as to how the proposal may impact the systems.
Aquatic Systems, Species and Habitat	The aquatic system includes watercourses, wetlands, and flora and fauna species. Aquatic species and habitat should be assessed based on their conservation status according to sensitivity to disturbance and specialized ecological needs, as well as rarity. TRCA has prepared watershed plans or strategies, as well as fisheries management plans for some watersheds. The proposal must prevent negative impacts to the aquatic system, and as such, TRCA may require an assessment of the existing aquatic system, an evaluation as to how the proposal will meet the objectives articulated in the watershed plan or strategy, and/or an evaluation as to how the proposal will meet the objectives of the fisheries management plan.
Terrestrial System, Species and Habitat	The terrestrial system includes landscape features, vegetation communities, and flora and fauna species. Terrestrial species and habitat should be assessed based on their conservation status according to sensitivity to disturbance and specialized ecological needs, as well as rarity. TRCA has identified the need to improve both the quality and quantity of terrestrial habitat. TRCA's **Terrestrial Natural Heritage System Strategy** sets measurable targets for attaining a healthier natural system by creating an expanded and targeted land base. It includes strategic directions for stewardship and securement of the land base, a land use policy framework to help achieve the target system, and other implementation mechanisms. TRCA may require an assessment of the existing terrestrial species and habitat, together with an evaluation as to how the proposal will meet the objectives articulated in the watershed plan or terrestrial natural heritage strategy, as well as prevent negative impacts to the terrestrial system.
Environmentally Significant Areas	Environmentally Significant Areas have been identified by TRCA based on a set of ecological criteria regarding the function, significance and rarity of the features or species found in the area. These areas should be identified in the assessment of the terrestrial species and habitat, as noted above.

Groundwater Systems	
Aquifers and Hydrogeological Features and Functions	Groundwater systems include aquifers and their functional connections to surface water. The extraction and discharge of groundwater has the potential to negatively impact surrounding natural features and their functions. Even small amounts of groundwater extraction may reduce contributions to groundwater dependent features such as wetlands, springs, or fish spawning habitat. In addition, the discharge of groundwater must be controlled to avoid impacts to watercourses and fish habitat from temperature, erosion and sedimentation, as well other water quantity and quality issues. TRCA may require geotechnical or hydrogeological investigations to confirm dewatering and discharge requirements, and to identify appropriate mitigation measures with respect to potential impacts to natural features and functions.
Surface Water Systems	
Watercourses	Typically, watercourses are associated with aquatic species, and direct or indirect habitat. Any alteration or interference to a watercourse (e.g., straightening, diverting, realigning, altering baseflow) has the potential to impact fish communities, but may also affect the Regulatory Flood Plain, erosion or other natural channel processes. TRCA may require an environmental study or site confirmation of watercourse locations.
Meander Belt	Channel migration has a significant impact on infrastructure, structures and property located near river systems. Determining channel stability is important to ensure that damage from erosion, down-cutting or other natural channel processes is avoided. TRCA may require a meander belt delineation study or fluvial geomorphology analysis to confirm that any development does not conflict with natural channel processes.
Regulatory Flood Plain	The Regulatory Flood Plain is the approved standard used in a particular watershed to define the limit of the flood plain for regulatory purposes. Within TRCA's jurisdiction, the Regulatory Flood Plain is based on the greater of the regional storm, Hurricane Hazel, and the 100-year flood. TRCA's framework for Flood Plain Management is the LCP. TRCA may require a flood study or hydraulic update to confirm that there will be no impacts to the storage or conveyance of flood waters.
Wetlands	Wetlands are sensitive natural habitats that play an important role in numerous physical, chemical and biological processes, including storm water control, natural habitat and water quality improvement. Most wetlands are designated by the Ministry of Natural Resources and Forestry as Provincially Significant or Locally Significant. Other wetlands have also been identified on a site specific basis by TRCA. All wetlands are regulated under Ontario Regulation 166/06. TRCA may require an environmental study or site confirmation of wetland locations.

Storm Water Management, including Green Infrastructure	Stormwater management is integral to the health of streams, rivers, lakes, fisheries and terrestrial habitats, and source water protection is integral for managing the quality and quantity of drinking water at its source. TRCA requires all development, infrastructure and site alteration meet the criteria in the TRCA 2012 Stormwater Management Criteria document for water quantity, water quality, erosion control, discharge water temperature, and water balance for groundwater recharge and natural features. Green Infrastructure techniques, including Low Impact Development (LID) measures should be used to address issues related to stormwater management, as well as maximize ecosystem services and mitigate the impacts of urbanization and climate change. For further information, please refer to the TRCA Introduction to Green Infrastructure, the Sustainable Technologies Evaluation Program (STEP) -Urban Runoff Green Infrastructure and the STEP 2010 Low Impact Development Stormwater Management Planning and Design Guide.
Valley Slopes	
Crest of Slope	Valley and stream corridors are dynamic systems that provide important natural functions and linkages for the physical, chemical and biological processes of wildlife, watercourses, and other natural features. The crest of slope identifies the physical limit of these corridors; however, due to ecological sensitivities, development restrictions typically extend beyond the actual crest of slope. TRCA may require the determination of the long term stable crest of slope (or toe of slope) through a staking with TRCA staff, as well as a geotechnical assessment.
Sustainability Programs and Policies	
Climate Change	In October 2017, MECP released a guideline under the Ontario environmental assessment legislation directing that all projects going through the EA process, including IEAs, Class EAs, and those governed by EA regulations, must consider impacts to and opportunities for climate change mitigation and adaptation, and consider the vulnerability of projects to climate change. It was further recommended that applicable policies in the 2020 **Provincial Policy Statement** be addressed, including but not limited to encouraging green infrastructure and strengthening stormwater management requirements; requiring consideration of energy conservation and efficiency, reduced greenhouse gas emissions and climate change adaptation (e.g. tree cover); and consideration of the potential impacts of climate change that may increase the risk associated with natural hazards (e.g. flooding due to severe weather). The climate change section of the EA should include recommendations for Green Infrastructure, Sustainable Energy, Sustainable Buildings and Sustainable Construction Practices, as further described below. It is recommended that a completed Sustainable Technologies for Green Building, Green Infrastructure, and Sustainable Energy Design in Evaluation Matrix be included in the EA document.

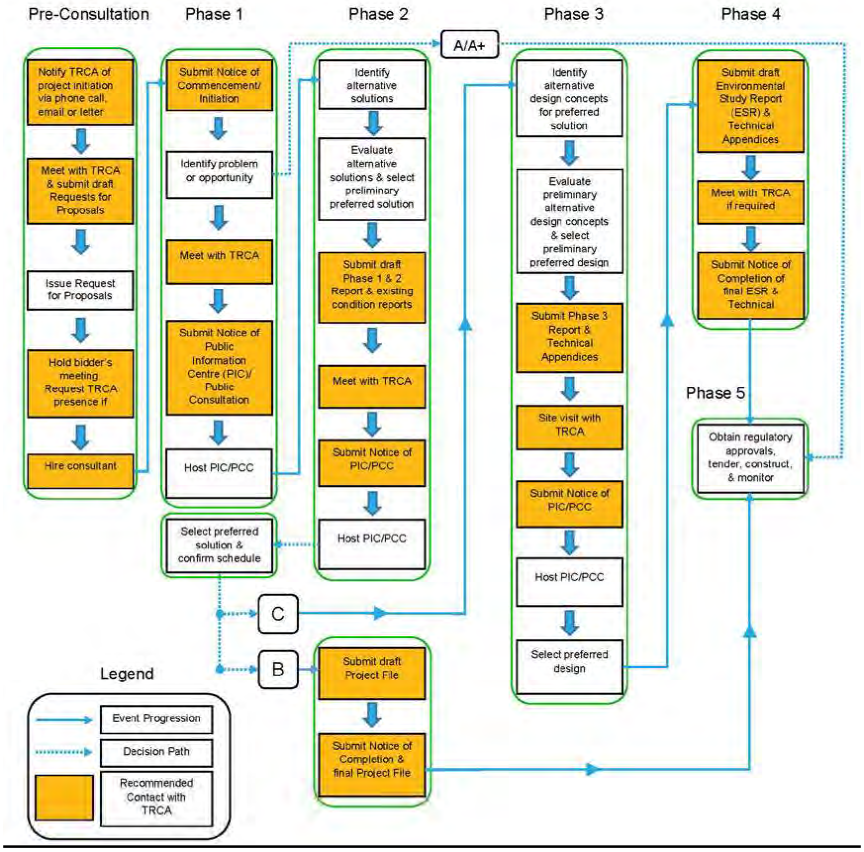
Sustainable Infrastructure & Buildings	The sustainability of infrastructure and buildings determined through a variety of factors through planning, design, construction, operation, maintenance and decommissioning. Sustainability factors include the efficiency environmental impact of project inputs through all phases, including energy, water and natural resources/materials. The type and amount of energy used in construction and operation is one of the most significant factors affecting climate change, the ecological footprint of our communities, and ultimately our ability to create sustainable communities. As supported by the LCP, TRCA advocates that proponents consider the use of appropriate sustainable energy networking (e.g., community energy project), technologies (e.g., solar lights, etc.) and practices (e.g., selection of materials, transportation of materials, energy efficiency, passive solar energy) in their projects. Various sustainability best management practices include sustainable procurement, reusing resources, using recyclable/recycled resources, protecting natural systems, eliminating toxics, applying life-cycle costing and ensuring a high quality of construction. If designed appropriately, sustainable infrastructure or buildings generally cost less to operate, are more resilient and adaptable as comparted to standard designs and are an aesthetic and environmental benefit to the community. TRCA recommends that a commitment to sustainable infrastructure or buildings through all project phases be made in the EA document. Please consider using a rating system such as Envision or LEED to guide the EA and detailed design.
Sustainable Communities	The TRCA Living City vision is based on a foundation that includes Sustainable Communities. Planning for community sustainability requires the identification of the complex and inter-related social, economic and ecological systems involved; TRCA supports a systems approach to developing integrative and adaptive solutions to improve community sustainability. Key socio-economic systems include: transportation facilities (including trails, sidewalks & multi-use pathways), community greenspaces (including parks), urban forests, cultural heritage resources, and the local economy. For transportation projects, a context sensitive design/solutions framework are encouraged.
Archaeological and Heritage Resources	TRCA watershed strategies include recommendations for the management of archaeological and heritage resources in accordance with Ministry of Culture and Municipal standards. The project should aim to preserve, protect and celebrate archaeological and heritage resources where possible.
PROVINCIAL PROGRAM AREAS	
Greenbelt Plan	The Greenbelt consists of more than 809,000 hectares of environmentally sensitive land, urban river valleys and agricultural land in the Golden Horseshoe. The **Greenbelt Plan** identifies limits to urbanization to provide permanent protection to the agricultural land base and the ecological features and functions occurring within this landscape. Contact the Ministry of Municipal Affairs and Housing for more details.

	Please confirm that the preferred alternative design for this project conforms with Section 4.2 Infrastructure Policies and Section 6 Urban River Valley Policies of the **Greenbelt Plan**.
Oak Ridges Moraine Conservation Plan	The Oak Ridges Moraine is an environmentally sensitive, geological landform in south central Ontario, covering 190,000 hectares. The **Oak Ridges Moraine Conservation Plan** provides land use and resource management direction for the land and water within the Moraine. Contact the Ministry of Municipal Affairs and Housing for more details. Please confirm that the preferred alternative design for this project conforms with Section 41 of the **Oak Ridges Moraine Conservation Plan**.
Credit Valley - Toronto & Region - Central Lake Ontario (CTC) Source Protection Plan	The Clean Water Act, 2006 ensures communities protect their drinking water supplies through prevention by developing collaborative, watershed-based source protection plans that are locally driven and based on science. Please be advised that the subject property appears to fall within the Wellhead Protection Area – Quality (WHPA), Wellhead Protection Area – Quantity (WHPA-Q), Significant Groundwater Recharge Area (SGRA), Intake Protection Zone (IPZ), Highly Vulnerable Aquifers (HVA) as described in the Toronto and Region Source Protection Authority (TRSPA) Assessment Report. Please confirm that actions undertaken for this project conform with the policies contained within the Credit Valley - Toronto and Region - Central Lake Ontario Source Protection Plan (CTC SPP). Please note that vulnerable areas identified under the Clean Water Act are documented in the Ontario Source Protection Information Atlas. For additional support, please consult the Regional Risk Management Office/Official as copied on this letter. sourcewater@peelregion.ca Please note that in accordance with Ontario Regulation 166/06, permits from TRCA may be required for mitigation solutions that are designed to ensure conformity with the CTC SPP.
PROVINCIAL PROGRAM AREAS	
Please contact the Ministry of Natural Resources and Forestry to confirm if there are program interests related to this project for: • **Areas of Natural and Scientific Interest** (ANSI) • **Provincially Significant Wetlands** (PSW) • **Provincially Endangered Species under the Species at Risk Act** (SARA) Please be advised that this list is not inclusive and the onus is on the proponent and it consultants to consult with other provincial agencies, as required, to ensure that requirements of their respective legislation is met.	
FEDERAL PROGRAM AREAS	
Please contact the relevant federal agency to confirm if there are issues related to:	

- Asian Long-horned Beetle Regulated Area
- Federally Endangered Species under the **Endangered Species Act** (ESA)
- The **Fisheries Act**

Please be advised that this list is not inclusive and the onus is on the proponent and it consultants to consult with other provincial agencies, as required, to ensure that requirements of their respective legislation is met.

Appendix C: Recommended TRCA Contact Points in the Municipal Class EA Process



Sylvia Waters

From: Matt Brooks
Sent: Tuesday, April 06, 2021 8:57 AM
To: Devin Soeting; Deanna De Forest
Cc: Andrew Dawson
Subject: FW: CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter

---

From: Ian Todhunter <Ian.Todhunter@caledon.ca>
Sent: Tuesday, April 06, 2021 8:56 AM
To: ZZG-SourceWater <zzg-sourcewater@peelregion.ca>
Cc: Shirin Varzgani <Shirin.Varzgani@trca.ca>; Matt Brooks <Matt.Brooks@rjburnside.com>
Subject: RE: CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter

Morning,
Thank you for your email Stefan. We will be sure to reach out to you should we have any questions.
Best Regards,
Ian

Ian Todhunter, P.Eng.
Senior Project Manager
Engineering Services Department

Office: 905.584.2272 x.4065
Cell: 647.390.8704
Email: ian.todhunter@caledon.ca

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From: ZZG-SourceWater <zzg-sourcewater@peelregion.ca>
Sent: Thursday, April 1, 2021 2:49 PM
To: Shirin Varzgani <Shirin.Varzgani@trca.ca>; Ian Todhunter <Ian.Todhunter@caledon.ca>
Cc: ZZG-SourceWater <zzg-sourcewater@peelregion.ca>
Subject: RE: CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the contents to be safe.

Hi Ian,

This email expands on TRCA's response letter to the Notice of Commencement as it relates to the requirements under the *Clean Water Act* and in consideration of the Approved Credit Valley-Toronto and Region-Central Lake Ontario (CTC) Source Protection Plan which came into effect on December 31, 2015 and contains policies to protect municipal drinking water sources.

A review of the mapping shows the project study area is not within a wellhead protection area or intake protection zone delineated under the *Clean Water Act*, therefore, the significant drinking water threat policies contained within the Approved CTC Source Protection Plan do not apply.

It is noted that the study area transects other vulnerable areas mapped as highly vulnerable aquifer and significant groundwater recharge area where there can be moderate or low threats. Policies that apply within these areas encourage best management practices for the application of road salt (Policy ID: SAL 10-12) and for the handling and storage of hazardous chemicals (respectively Policy ID: DNAP-3 for dense non-aqueous phase liquids and Policy ID: OS-3 for organic solvents). These activities are not expected to be associated with the structure improvements to the bridges; therefore, no anticipated impacts or action required under the Approved CTC Source Protection Plan as a direct result of the proposed project.

As you may be aware, proponents undertaking a Municipal Class EA project must identify whether a project is occurring within a source water protection vulnerable area, and if so, document whether any project activities are a prescribed drinking water threat and thus have the potential to adversely affect the quality or quantity of drinking water sources. Therefore, please ensure a section on "Source Water Protection" is part of the project file report or environmental study report as required under the Municipal Class EA process.

Please note: comments relate strictly to the *Clean Water Act* and the policies contained in the applicable Source Protection Plan and does not address any other water resources considerations or approvals of interest to the Region of Peel.

Should you have any questions, please contact me.

Stefan Herceg
Technical Specialist/Alternate RMO/RMI
Region of Peel Public Works
Infrastructure Planning - Water Resources
10 Peel Centre Drive
Brampton, ON L6T 4B9
(905)-791-7800 ext. 4489
(437)-215-5937

From: Shirin Varzgani <Shirin.Varzgani@trca.ca>
Sent: March 22, 2021 4:02 PM
To: Ian Todhunter <Ian.Todhunter@caledon.ca>
Cc: Matt Brooks <Matt.Brooks@rjburnside.com>; Suzanne Bevan <Suzanne.Bevan@trca.ca>; Jay Clark <Jay.Clark@trca.ca>; ZZG-SourceWater <zzg-sourcewater@peelregion.ca>
Subject: [WARNING: MESSAGE ENCRYPTED]CFN 64514 - MCEA Structure Improvements (Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge) - TRCA Response Letter

CAUTION: EXTERNAL MAIL. DO NOT CLICK ON LINKS OR OPEN ATTACHMENTS YOU DO NOT TRUST.

Hi Ian,

Please see the attached TRCA response to the Notice of Commencement.

Should you have any questions, please do not hesitate to contact me.

Thank you and regards,

Shirin Varzgani, MIP, MES (Pl.)
Planner
Infrastructure Planning and Permits | Development and Engineering Services

T: (416) 661-6600 ext. 5785
E: shirin.varzgani@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

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Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:30 PM
To: SecondaryLandUse@HydroOne.com; lisa.myslicki@infrastructureontario.ca; trevor.bell@ontario.ca; eanotification.cregion@ontario.ca; steven.strong@ontario.ca; karla.barboza@ontario.ca; zzg-sourcewater@peelregion.ca; sally.rook@peelregion.ca; asha.saddi@peelregion.ca; regional.clerk@peelregion.ca; richard.de_bokx@bell.ca; Kevin.Schimus@enbridge.com; vince.cina@enbridge.com; notifications@enbridge.com; mark-ups@enbridge.com; clee@tnpi.ca; YAhmed@uniongas.com; caroline.mugo@trca.ca; victoria.kramkowski@trca.ca; shirin.varzgani@trca.ca; suzanne.bevin@trca.ca; alexander.schuler@trca.ca; Jay.Clark@TRCA.ca; arash.olia@caledon.ca; Ryan.Grodecki@caledon.ca; andrew.pearce@caledon.ca; carey.herd@caledon.ca; mayors.office@caledon.ca; fire@caledon.ca; allan.thompson@caledon.ca; sally.drummond@caledon.ca; jennifer.innis@caledon.ca; nick.deboer@caledon.ca; krystina.koops@dpcdsb.org
Cc: Andrew Dawson; Devin Soeting
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

The Town would like to ensure that anyone interested in this Study has the opportunity to provide input into the planning and design of the project.

A virtual Public Information Centre (PIC) will be held on May 8th, from 5:00pm to 6:00pm to discuss the project with the Town and its consultants.

Join via the Town website at https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

PIC Information materials will be available on the Town's webpage following the PIC. Your comments on the project and information materials are encouraged by **May 31, 2023**.

To provide comment or request additional information concerning this Study, please contact either of the following Project Team members:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

April 26, 2023 CFN 64514

BY E-MAIL ONLY (George.golding@caledon.ca)

George Golding
Project Manager
Town of Caledon
6311 Old Church Road,
Caledon, ON L7C 1J6

Dear George Golding,

Re: Notice of Public Information Centre
Municipal Class Environmental Assessment for Structure Improvements (Improvement of Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge)
Humber River Watershed; Town of Caledon; Regional Municipality of Peel

These comments respond to the above noted notice that Toronto and Region Conservation Authority (TRCA) received on behalf of the Town of Caledon, on April 24, 2023.

TRCA REVIEW

1. Further to TRCA correspondence dated April 24, 2023 staff has expressed interest in this project, however staff will not be attending the meeting.

2. Please forward one copy of any handouts or display materials from this meeting for our files following the TRCA Digital Submission Requirements for Environmental Assessment Documents.

Should you have any questions, please contact me at 437.880.2429 or at Shirin.varzgani@trca.ca.

Regards,

Shirin Varzgani

Shirin Varzgani
Senior Planner, Infrastructure Planning and Permits
Development and Engineering Services

SV/

BY E-MAIL

cc: R.J. Burnside: Andrew Dawson, Project Engineer
TRCA: Kristen Sullivan, Planner – Infrastructure Planning and Permits

From: George Golding <George.Golding@caledon.ca>
Sent: Thursday, April 27, 2023 9:21 AM
To: Shirin Varzgani <Shirin.Varzgani@trca.ca>
Cc: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>; Andrew Dawson <Andrew.Dawson@rjburnside.com>; Kristen Sullivan <kristen.sullivan@trca.ca>; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good Morning Shirin,

Thank you for the email and your interest in this MCEA. As requested within your letter, we will provide you and your team a copy of the handouts and presentation associated with PIC. I have posted the final PIC presentation on the Town's OneDrive and have shared a link with both you and Kristen.

Please note that preferred design alternative for the Duffy's Lane bridge (bridge replacement with single lane prefab structure) was discussed with Suzanne Bevan and Richard Ubbens last year and their preference was to replace the bridge. This bridge provides access to two properties, one of which being the Albion Hill CA (providing secondary/emergency access to the conservation area) and the other being a residential property at 8541 Patterson Sideroad which has its primary access from Patterson Sideroad. As bridges are very costly to replace and given the fact that the road provided very limited function/benefit to the Town, we also considered the option or completing decommissioning the existing bridge and closing this dead-end section of road down.

If you have any questions regarding this project or what was discussed previously, please feel free to contact me to discuss.

Thank you,

George

George Golding, P.Eng.
Project Manager, Engineering Capital Design & Construction
Engineering Services Department

Office: 905.584.2272 x 4523
Cell: 437.326.8995
Email: george.golding@caledon.ca

Town of Caledon | www.caledon.ca | www.visitcaledon.ca | Follow us @YourCaledon

Please consider the environment before printing.

From: Shirin Varzgani <Shirin.Varzgani@trca.ca>
Sent: Wednesday, April 26, 2023 3:00 PM
To: George Golding <George.Golding@caledon.ca>
Cc: mishaal.rizwan@rjburnside.com; Andrew Dawson <Andrew.Dawson@rjburnside.com>; Kristen Sullivan <kristen.sullivan@trca.ca>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the contents to be safe.

Hi George,

Please see the attached letter.

Thank you and regards,

Shirin Varzgani, MIP, MES (Pl.) (she, her, hers)
Senior Planner
Infrastructure Planning and Permits | Development and Engineering Services

T: (437) 880-2429
E: shirin.varzgani@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Sent: Monday, April 24, 2023 2:30 PM
To: SecondaryLandUse@HydroOne.com; lisa.myslicki@infrastructureontario.ca; trevor.bell@ontario.ca; eanotification.cregion@ontario.ca; steven.strong@ontario.ca; karla.barboza@ontario.ca; zzg-sourcewater@peelregion.ca <zzg???sourcewater@peelregion.ca>; sally.rook@peelregion.ca; asha.saddi@peelregion.ca; regional.clerk@peelregion.ca; richard.de_bokx@bell.ca; Kevin.Schimus@enbridge.com; vince.cina@enbridge.com; notifications@enbridge.com; mark-ups@enbridge.com; clee@tnpi.ca; YAhmed@uniongas.com; Caroline Mugo <Caroline.Mugo@trca.ca>; Victoria Kramkowski <Victoria.Kramkowski@trca.ca>; Shirin Varzgani <Shirin.Varzgani@trca.ca>; suzanne.bevin@trca.ca; Alexander Schuler <Alexander.Schuler@trca.ca>; Jay Clark <Jay.Clark@trca.ca>; arash.olia@caledon.ca; Ryan.Grodecki@caledon.ca; Andrew Pearce <Andrew.Pearce@caledon.ca>; carey.herd@caledon.ca; mayors.office@caledon.ca; fire@caledon.ca; allan.thompson@caledon.ca; sally.drummond@caledon.ca; Jennifer Innis <jennifer.innis@caledon.ca>; nick.deboer@caledon.ca; krystina.koops@dpcdsb.org
Cc: Andrew Dawson <Andrew.Dawson@rjburnside.com>; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

The Town would like to ensure that anyone interested in this Study has the opportunity to provide input into the planning and design of the project.

A virtual Public Information Centre (PIC) will be held on May 8th, from 5:00pm to 6:00pm to discuss the project with the Town and its consultants.

Join via the Town website at https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

PIC Information materials will be available on the Town's webpage following the PIC. Your comments on the project and information materials are encouraged by **May 31, 2023**.

To provide comment or request additional information concerning this Study, please contact either of the following Project Team members:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com



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****

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recorded and the content may be required to be disclosed by the Town to a third party in certain circumstances). Thank you."

June 12, 2023

CFN 64514
Xref. CFN 62622.292

BY E-MAIL ONLY (George.golding@caledon.ca)

George Golding
Town of Caledon
6311 Old Church Road
Caledon, ON L7C 1J6

Dear George Golding,

Re: TRCA Response to Public Information Centre (PIC) #1
Municipal Class Environmental Assessment for Structure Improvements (Improvement of Patterson Side Road Bridge 1, Patterson Side Road Bridge 2 and Duffy's Lane Bridge)
Humber River Watershed; Town of Caledon; Regional Municipality of Peel

These comments respond to the Public Information Centre #1 Presentation slides received by Toronto and Region Conservation Authority (TRCA) on April 24, 2023.

OVERVIEW

The Town of Caledon has initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) (The Study) to consider options for improvements to the following bridges:

1. Patterson Side Road Bridge (1): An existing bridge over the Humber River located approximately 0.1 km west side of Duffy's Lane.
2. Patterson Side Road Bridge (2): An existing bridge over the Humber River located approximately 0.03 km east of Duffy's Lane.
3. Duffy's Lane Road Bridge: An existing structure located 0.03 km south of Patterson Side Road. A feasibility investigation is being undertaken to determine future management of the existing structure.

The project is planned under the Municipal Class EA process (October 2000, as amended in 2007, 2011 & 2015) (Class EA) which is approved under the *Ontario Environmental Assessment Act*. Alternative solutions will be evaluated with consideration of the natural, cultural, technical and financial environments and recommend a Preferred Solution in consultation with the public.

TRCA REVIEW

Staff have completed the review of the PIC#1 presentation slides and have several comments which are enclosed as Appendix A: TRCA Comments and Proponent Responses. Please be advised that only high levels comments are being provided at this time to guide future works. These should be addressed as the EA progresses. Please provide the Draft ESR for TRCA review, when ready. Detailed comments will be provided by TRCA staff once all supporting documentation, including drawings and reports are provided for review.

Should you have any questions, please contact Shirin Varzgani at 437.880.2429 or at Shirin.varzgani@trca.ca.

Regards,

Shirin Varzgani

Shirin Varzgani
Senior Planner, Infrastructure Planning and Permits
Development and Engineering Services

SV/

Attached: Appendix A: TRCA Comments and Proponent Responses
Enclosed: Appendix A: TRCA Comments and Proponent Responses, WORD digital file for consultant/proponent response purposes

BY E-MAIL

cc:
R.J. Burnside: Andrew Dawson, Project Engineer
TRCA: Richard Ubbens, Director, Conservation Parks & Lands

APPENDIX A: TRCA COMMENTS AND PROPONENT RESPONSES

ITEM	TRCA COMMENTS (June 12, 2023)	PROPONENT/CONSULTANT RESPONSE (INSERT DATE)
1.	A table on Slide #21 regarding Preferred Alternative for Duffy's Lane shows Alternative **4B** as the Most Preferred Alternative whereas a title on the same slide states "Preliminary Preferred Solution Alternative **3B** – Replace Structure with Vehicular Bridge (Single Lane, Modular) with scope of works involving a new larger structure with one-lane, two way structure with a 4.15 m (+/-) wide driving platform as a pre-fabricated girder-type structure. This new structure will be supported by new bridge abutments that would also allow for road profile improvement. • Please clarify whether this is a typo: 4B in the table and 3B in the title. • It is TRCA staff's understanding that the preferred alternative discussed previously with Caledon staff involves the removal and replacement of the bridge deck with similar sized bridge deck on existing abutments. The road platform will also remain the same. Please clarify and confirm the preferred alternative.	
Property		
2.	There are TRCA owned lands to the north of Bridge 2 and west of Duffy's Lane bridge. If TRCA property access is required for the purpose of completing technical studies associated with this project, a Permission To Enter (PTE) must be obtained from TRCA Property staff prior to entry. Please contact Brandon Hester, Senior Property Agent at brandon.hester@trca.ca for additional information.	
3.	An archaeological review by TRCA's archaeological staff must precede any disturbance to TRCA property. If an archaeological assessment is required, scheduling will be subject to weather, seasonal programs and other field work and are at additional cost to the proponent. Please contact Alistair Jolly, Archaeologist at alistair.jolly@trca.ca for additional information.	
Water Resources		
4.	The policies related to flooding hazards in the TRCA's the Living City document needs to be followed. For further information regarding requirements, please ensure to follow TRCA's Crossing Guideline for Valley and Stream Corridors (link provided below). For example:	

ITEM	TRCA COMMENTS (June 12, 2023)	PROPONENT/CONSULTANT RESPONSE (INSERT DATE)
	a. Undertake a hydraulic assessment for the structures to ensure that there is no increase in existing flooding hazard and demonstrating improvement to the flooding situation. b. Undertake fluvial assessment to ensure that the new abutments of bridges are located outside of 100 year erosion limits.	
Geotechnical Engineering		
5.	As details are not available at this stage, the following are high-level comments that needs to be considered: a. The detailed engineering needs to be completed including structural and geotechnical studies. All pertinent studies (including geotechnical studies), details, specifications, and engineering drawings need to be provided. b. If the proposed works need some access to the bridge close to the slopes/banks or on them, it is required that all information and alterations be provided. Any alterations with potential risk to the slope/bank stability needs to be avoided. c. Further review by geotechnical engineer may be needed regarding the alterations to the slopes/banks as part of this works (either interim during construction or permanent) to ensure that slope stability will not be jeopardized. d. As part of the detailed design submission, the information for construction activities and sequencing, including the stockpiling, staging, and storage areas, construction access, site grading alterations and earthworks, and measures to stabilize the temporary excavations, need to be provided with all justifications that they will not aggravate the slope/bank stability. The review will be continued once more materials are available.	
Planning Ecology		
6.	Please provide all supporting documentation, including reports and drawings. Please note that: a. The proposed design of all bridges should follow the requirements outlined in the following Guidelines: i. Crossing Guideline for Valley and Stream Corridors, available at: https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2021/09/21095149/TRCA_Crossings_Guideline_2015-v2.pdf	

ITEM	TRCA COMMENTS (June 12, 2023)	PROPONENT/CONSULTANT RESPONSE (INSERT DATE)
	ii. Fish and Wildlife Crossing Guidelines, available at: https://files.cvc.ca/cvc/uploads/2017/05/CVC-Fish-and-Wildlife-Crossing-Guidelines-final-web.pdf b. If channel modification is being proposed, the following requirements should be met: https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2016/02/17185407/CHANNEL_MODIFICATION_REQUIREMENTS.pdf c. A multi-barrier phased Erosion and Sediment Control Plan will be required. Please refer to the Erosion and Sediment Control Guide for Urban Construction available at: https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2020/01/30145157/ESC-Guide-for-Urban-Construction_FINAL.pdf i. If in-water works are required, specific in-water ESCs should be provided, in addition to specification of how watercourse flows will be maintained at all times. d. If seeding is being proposed, please provide all details according to Appendix A of the Seed Mix Guideline, available at: https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2022/02/01124117/Seed-Mix-Guidelines-Update_January-19-2022.pdf e. For proposed restoration, please utilize species native to TRCA jurisdiction, according to the following table: https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2022/10/18104147/Flora-Species-Native-to-the-TRCA-Jurisdiction-October-2022.pdf	

Crystal Ferguson

From: Crystal Ferguson
Sent: Thursday, April 11, 2024 2:03 PM
To: Bell, Trevor (MECP)
Cc: Devin Soeting; 'george.golding@caledon.ca'
Subject: Caledon Structural Improvements MCEA - DRAFT Report

Good Afternoon Trevor,

The Schedule 'B' Municipal Class Environmental Assessment (EA) to consider options for structural improvements to Caledon Bridges and Culverts is nearing completion.

Please find a link to the DRAFT Project File Report for the Caledon Bridges and Culverts Project here: 051839_Caledon Bridges-Culverts_PFR_DRAFT (240222).pdf for your review.

We would appreciate your comments by May 13, 2024 in order for us to meet our timelines for the Project.

Kind Regards,
On behalf of the study team,

george.golding@caledon.ca
Subject: Caledon Structural Improvements MCEA - DRAFT Report

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good Afternoon Chunmei,

The Schedule 'B' Municipal Class Environmental Assessment (EA) to consider options for structural improvements to Caledon Bridges and Culverts is nearing completion.

The previous MECP contact on this project, Trevor Bell, is no longer in position.

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We would appreciate your comments by May 13, 2024 in order for us to meet our timelines for the Project.

Kind Regards,
On behalf of the study team,

BURNSIDE
Crystal Ferguson
Environmental Coordinator

R.J. Burnside & Associates
128 Wellington Street West, Suite 301, Barrie, Ontario L4N 8J6
Office: +1 800-265-9662 Direct: +1 705-797-4352
www.rjburnside.com

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Thank you.
****

Crystal Ferguson

From: Liu, Chunmei (MECP) <Chunmei.Liu@ontario.ca>
Sent: Thursday, April 11, 2024 3:50 PM
To: Crystal Ferguson; Devin Soeting; george.golding@caledon.ca
Cc: Battarino, Gavin (MECP); Selvakumar, Krishna (MECP)
Subject: RE: Caledon Structural Improvements MCEA - DRAFT Report

Good afternoon, Crystal Ferguson and project team, hope you're all doing well 😊

Thanks for updating us on the project. My colleague Krishna Selvakumar is now responsible for all projects within Halton, Peel and Muskoka areas. Krishana might respond you directly.

Many thanks,
Chunmei

From: Crystal Ferguson <Crystal.Ferguson@rjburnside.com>
Sent: Thursday, April 11, 2024 2:17 PM
To: Liu, Chunmei (MECP) <Chunmei.Liu@ontario.ca>
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; Devin Soeting <Devin.Soeting@rjburnside.com>; george.golding@caledon.ca
Subject: Caledon Structural Improvements MCEA - DRAFT Report

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Kind Regards,
On behalf of the study team,

BURNSIDE
Crystal Ferguson
Environmental Coordinator

R.J. Burnside & Associates
128 Wellington Street West, Suite 301, Barrie, Ontario L4N 8J6
Office: +1 800-265-9662 Direct: +1 705-797-4352
www.rjburnside.com

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Crystal Ferguson

From: Selvakumar, Krishna (MECP) <Krishna.Selvakumar@ontario.ca>
Sent: Tuesday, April 16, 2024 8:43 AM
To: Liu, Chunmei (MECP); Crystal Ferguson; Devin Soeting; george.golding@caledon.ca
Cc: Battarino, Gavin (MECP); EA Notices to CRegion (MECP)
Subject: Re: Caledon Structural Improvements MCEA - DRAFT Report

Good morning Crystal,

Thank you for sharing the Draft Project File Report for the Schedule B MCEA to consider options for structural improvements to bridges and culverts in Caledon.

The Draft looks great, and we have no comments at this time.

We're looking forward to receiving the final report.

Kind regards,

Krish Selvakumar, MFC (he/him)
Environmental Resource Planner/Assessment Coordinator
Environmental Assessment Services Section
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
T: (437) 240-5922 | krishna.selvakumar@ontario.ca

Ontario

From: Liu, Chunmei (MECP) <Chunmei.Liu@ontario.ca>
Sent: Thursday, April 11, 2024 3:50 PM
To: Crystal Ferguson <Crystal.Ferguson@rjburnside.com>; Devin Soeting <Devin.Soeting@rjburnside.com>; george.golding@caledon.ca <george.golding@caledon.ca>
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; Selvakumar, Krishna (MECP) <Krishna.Selvakumar@ontario.ca>
Subject: RE: Caledon Structural Improvements MCEA - DRAFT Report

Good afternoon, Crystal Ferguson and project team, hope you're all doing well 😊

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Many thanks,
Chunmei

From: Crystal Ferguson <Crystal.Ferguson@rjburnside.com>
Sent: Thursday, April 11, 2024 2:17 PM
To: Liu, Chunmei (MECP) <Chunmei.Liu@ontario.ca>
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; Devin Soeting <Devin.Soeting@rjburnside.com>;

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Public Correspondence

Crystal Ferguson

From: Matt Brooks
Sent: Monday, March 08, 2021 3:05 PM
To: Devin Soeting; Andrew Dawson; Deanna De Forest
Subject: FW: Duffy's Lane Project

From: [redacted]
Sent: Monday, March 08, 2021 1:39 PM
To: ian.todhunter@celedon.ca; Matt Brooks <Matt.Brooks@rjburnside.com>
Subject: Duffy's Lane Project

Hello Ian, I have a place at 17030 Duffy's Lane which is in direct contact with one of the three bridges being assessed in the proposed research scheduled for this spring. What is the scope of the assessment to the bridges over Coffee Creek and The Humber River.
Will the research be intrusive to the current infrastructure or is this simply a monitoring program.
What are the objectives of the project?
Thanks for your time

Sylvia Waters

From: Matt Brooks
Sent: Thursday, March 25, 2021 4:26 PM
To: [redacted]
Cc: Ian Todhunter; 300051839 - Town of Caledon 2020-83 - Bridge & Culvert Works 2020
Subject: RE: Duffy's Lane Project (Kevin Kilinskas comment)

Hello [redacted]

Thank you for your inquiry regarding the Duffys lane Project.

An assessment of the three bridges is being completed to consider options for improvements. Options for each of the Patterson Road bridges include a Do Nothing option as well as an option to rehabilitate the bridge, rehabilitate the bridge with widening of the bridge, or replace the bridge with a wider bridge. Future management options are being considered for the Duffy's Lane bridge.

The assessment is being completed under the Municipal Class Environmental Assessment process and will evaluate pros and cons of the improvement options against a set of criteria developed under key areas of the project environment including the natural environment, the social-cultural environment, the technical environment and the financial environment.

A number of studies are being completed to assess the existing conditions of the environment in the Study Area, such as a topographic survey, an assessment of natural features and cultural heritage assessment. At this stage, the majority of the studies are non-intrusive and consist of a desk top review and field reconnaissance. Additional studies, such as a Stage 2 archaeological assessment, may be required, depending on the recommended solution and its potential impacts, including grading and vegetation removal. A Stage 2 Archaeological Assessment would include hand dug test pits in areas of proposed earthworks, where archaeological resources have the potential to be located.

The concept designs of the improvement options are currently being developed and information about the options, potential impacts, constraints and consideration related to the project as well as a recommended option will be presented for public input at a virtual Public Information Centre planned for later this spring.

We will add your contact information to our project contact list to receive future notices about this project

Thank you for your interest in the Municipal Class Environmental Assessment for Structure Improvements. Your comments will become part of the public record for the project.

If you have any other questions or comments regarding the project, please do not hesitate to contact me

Regards,

Matt Brooks, P.Eng.
Manager, Bridge Group
R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4284

From: [redacted]
Sent: Monday, March 08, 2021 1:39 PM
To: ian.todhunter@celedon.ca; Matt Brooks <Matt.Brooks@rjburnside.com>
Subject: Duffy's Lane Project

Hello Ian, I have a place at 17030 Duffy's Lane which is in direct contact with one of the three bridges being assessed in the proposed research scheduled for this spring. What is the scope of the assessment to the bridges over Coffee Creek and The Humber River.
Will the research be intrusive to the current infrastructure or is this simply a monitoring program.
What are the objectives of the project?
Thanks for your time

Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: [redacted]
Cc: Devin Soeting; Andrew Dawson
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

The Town would like to ensure that anyone interested in this Study has the opportunity to provide input into the planning and design of the project.

A virtual Public Information Centre (PIC) will be held on May 8th, from 5:00pm to 6:00pm to discuss the project with the Town and its consultants.

Join via the Town website at https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

PIC Information materials will be available on the Town's webpage following the PIC. Your comments on the project and information materials are encouraged by **May 31, 2023**.

To provide comment or request additional information concerning this Study, please contact either of the following Project Team members:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

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Appendix C

Indigenous Correspondence

R.J. Burnside & Associates Limited 128 Wellington Street West Suite 301 Barrie ON L4N 8J6 CANADA
telephone (705) 797-2047 **fax** (705) 797-2037 **web** www.rjburnside.com

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November 13, 2020

Via: Email (Megan.DeVries@mncfn.ca)

Megan DeVries
Archaeological Operations Supervisor
Department of Consultation and Accommodation
Mississaugas of the Credit First Nation
4065 Hwy #6,
Hagersville ON N0A 1H0

Dear Ms. DeVries:

Re: Information Request
Caledon Bridges, Patterson Side Road – Schedule B Municipal Class Environmental Assessment, Structure Improvements
Project No.: 300051839.0000

Thank you for your letter dated October 22, 2020 on behalf of the Department of Consultation and Accommodation, requesting information on a project within the Mississaugas of the Credit First Nation's (MCFN) treaty territory.

The Town of Caledon (Town) has identified a need to consider improvements to its inventory of bridges and culverts as part of the Town of Caledon's Asset Management Strategy and as a result of increased wear and tear on existing infrastructure through increased traffic use.

The Town has initiated a Schedule 'B' Municipal Class Environmental Assessment (EA) to consider options for improvements to two bridges on Patterson Side Road as well as a feasibility investigation to determine future management of the Duffy's Lane bridge. Additionally, the Town is undertaking the detailed design of the Kennedy Road bridge. The locations of the bridges are described below. A map of the locations is provided attached. R.J. Burnside & Associates Limited (Burnside) has been retained by the Town to coordinate the Schedule B EA and complete the detailed design for the bridges.

- Patterson Side Road bridge 1 is located approximately 0.1 km West of Duffy's Lane over the Humber River.
- Patterson Side Road bridge 2 is located approximately 0.03 km East of Duffy's Lane, over the Humber River.
- Duffy's Lane bridge is located 0.03 km South of Patterson Side Road over the Humber River.
- Kennedy Road bridge is located approximately 1.4 km north of Olde Base Line Road over the East Credit/Little Credit River.

A Stage 1 Archaeological Assessment and Cultural Heritage Resource Assessment is being completed in November for the Patterson Road bridges and Duffy's Lane bridge, with reporting anticipated in December 2020. A copy of the draft Stage 1 report will be provided to you for your information when available. The need for a Stage 2 Archaeological Assessment will be determined based on the results of the Stage 1 and the evaluation of a preliminary preferred solution. A Stage 2 Archaeological Assessment will be completed as part of the project if the preliminary preferred solution selected has the potential to impact identified areas of archaeological potential within the study area due to earthworks and ground disturbance.

A Heritage Documentation Report and Stage 2 Archaeological Assessment will be completed for the Kennedy Road bridge following recommendations made in the Heritage Impact Assessment Report (ASI 2016) and Stage 1 Archaeological Assessment (ASI 2016), conducted as part of the EA completed for Kennedy Road bridge in 2018 for the Town by IBI. The field work for the studies is anticipated to be completed in the Spring of 2021. The date for the Stage 2 field work will be confirmed following coordination with Mississaugas of the Credit First Nation (MCFN) for the participation of FLRs closer to the date of the work.

An assessment of the existing terrestrial and aquatic conditions will be completed in support of the EA for the Patterson Road bridges and Duffy's Lane bridge. The assessment consists of a database information review along with a field assessment.

The terrestrial conditions field assessment includes a single season terrestrial habitat assessment adjacent to the bridges and road right-of-ways. The field assessment was completed September 30 and October 23, 2020. The terrestrial habitat assessment consists of a general vegetation inventory and vegetation community mapping completed according to the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al. 1998) and ELC Ecosystem Catalogue: 2008 Version (Lee 2008), where applicable, as well as incidental wildlife observations and characterization of wildlife habitats, including potential habitat for Species at Risk (e.g., bats and birds) within the Study Area corridor. The findings will be summarized in a Terrestrial Assessment Technical Memo.

The aquatic habitat field assessment follows the MTO Environmental Guide for Fish and Fish Habitat (MTO, 2009) for field information collection. The watercourses will be assessed for form, function, morphology and fish habitat (including mussel species). The aquatic field assessment was completed October 30, 2020. The findings will be summarized in an Aquatic Assessment Technical Memo.

The Town of Caledon will be issuing the Notice of Commencement for the Patterson Road bridge improvements EA in the near future. MCFN is included on our Project Contact List to receive the notices about the project.

If you would like to provide comment or request additional information concerning this project, please contact one of the project team members listed below:

Ian Todhunter, P.Eng.
Senior Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon ON L7C 1J6
T 905-584-2272 x 4065
ian.todhunter@caledon.ca

Matt Brooks, P.Eng.
Project Manager

R.J. Burnside & Associates Limited
3 Ronell Crescent
Collingwood ON L9Y 4J6
T 705-797-4284
matt.brooks@rjburnside.com

Yours truly,

R.J. Burnside & Associates Limited



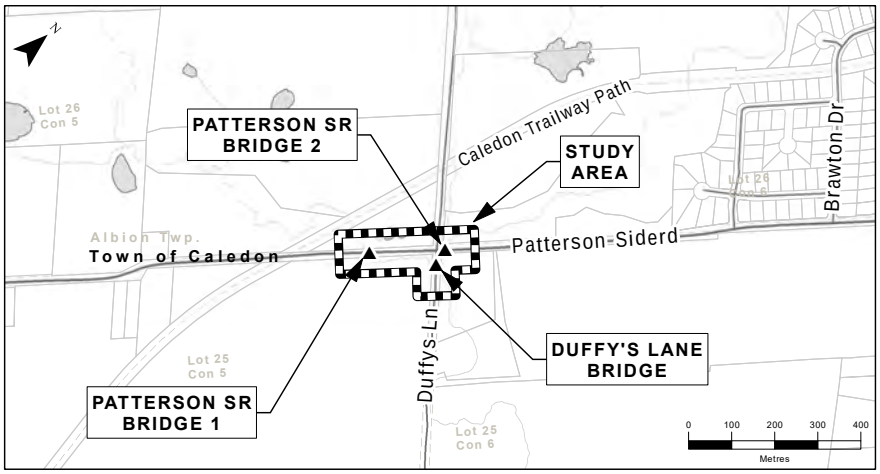
Matt Brooks P.Eng.
Project Manager
DDF:sc

Enclosure(s) Location Map

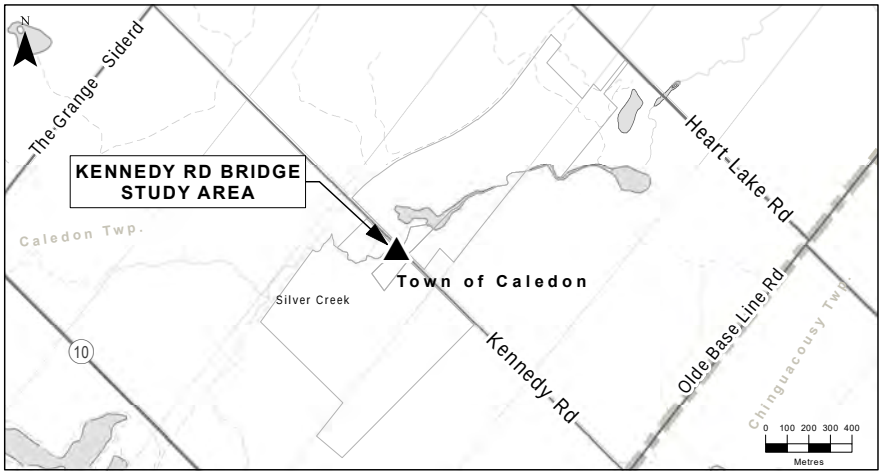
cc: Mark LaForme, MCFN-DOCA (mark.laforme@mncfn.ca)
Ministry of Heritage, Sport, Tourism, and Culture Industries (archaeology@ontario.ca)

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Location of the Patterson Road bridges and Duffy's Lane bridge Schedule B EA Study Area



Location of the Kennedy Road bridge



Deanna De Forest

From: Megan DeVries <Megan.DeVries@mncfn.ca>
Sent: Monday, November 16, 2020 9:49 AM
To: Deanna De Forest
Cc: Mark LaForme; archaeology@ontario.ca; Matt Brooks; Ian Todhunter
Subject: RE: 300051839 Caledon Bridges- Patterson Side Rd
Attachments: MCFN FLR Participation Agreement [2020].docx; DOCA Archaeological Review Agreement [2020].docx; MCFN Standards and Guidelines for Archaeology [2020].pdf

Good morning Deanna,

Thank you for reaching out. MCFN has formed the Department of Consultation and Accommodation ("DOCA") to represent its interests in consultation and accommodation matters. In this regard, it is DOCA's mandate to ensure that we are directly involved in all planning and development that impacts the integrity of our Territory. DOCA will assess and help alleviate impacts on our rights, land claims, and ways of life by building relationships with governments and private sector proponents. We share a mutual interest in ensuring that projects in the Territory are planned, reviewed, and developed in a manner which ensures healthy communities, ecological protection, and sustainable development for present and future generations in the Territory.

One of the ways we require proponents to engage with us is in providing transparency during the environmental survey and archaeological assessment process. The best way to accomplish this is by having Field Liaison Representatives ("FLRs") on location while fieldwork is occurring, who can ensure that the Nation's special interests and concerns are respected and considered during fieldwork. The cultural and natural resources in question are part of MCFN's territory and heritage and it is our responsibility to ensure their protection, on behalf of the Nation. MCFN's stewardship of its territory extends through the life of any development project and beyond.

DOCA deploys FLRs to be boots on the ground so that fieldwork by a proponent and their consultants/contractors is carried out with appropriate care, thoroughness, and respect. In the context of MCFN's Territory, where so much natural and cultural heritage has already been lost or destroyed, MCFN's monitoring of fieldwork is of utmost importance to ensure that the trail of desecration stops. FLRs are deployed to observe fieldwork, provide cultural advice, act as a direct link back to DOCA and MCFN, and assist with compliance.

The cost for the participation of our FLRs is covered by the proponent, not the consultant, whom we view as having the ultimate responsibility to consult with, and accommodate, the Nation. Therefore, please find attached the agreement that covers MCFN's participation in the upcoming fieldwork. The costs associated with this involvement reflect a number of expenses not visible at first glance: payment for the FLRs themselves, operational costs for DOCA, and efforts to engage the community to garner feedback on development projects. If you could please fill in the additional required information, highlighted in yellow, and return to us a signed copy so that we may arrange for FLR participation on your project, that would be greatly appreciated. Once a signed agreement is in place, DOCA generally arranges scheduling and other related matters directly with the consultant conducting the fieldwork, unless you prefer otherwise.

Please note that this year, in order to continue maintaining DOCA capacity for fulsome project participation, DOCA will be introducing charges for technical review of project information. In the exercise of its stewardship responsibility, DOCA seeks to work together with project proponents and their archaeological consultants to ensure that archaeological work is done properly and respectfully. DOCA has retained technical advisers with expertise in the field of archaeology. These experts will review the technical aspects and cultural appropriateness of the archaeological assessments and strategies associated with your project. Upon completion of these reviews, MCFN will identify, if necessary, mitigation measures to address any project impacts upon MCFN rights. For cultural materials and human

remains, DOCA may advise that this includes ceremonies required by Anishinaabe law, as well as request adjustments to the proposed fieldwork strategy.

The proponent is expected to pay the costs for MCFN to engage in a technical review of the project. DOCA anticipates at this time that all archaeological review will be undertaken by in-house technical experts, but will advise the proponent if an outside peer-review is required. Please find attached the agreement that covers MCFN's inhouse technical review of the archaeological assessments and strategies associated with your project(s). If you could please fill in the additional required information, highlighted in yellow, and return to us a signed copy, that would be greatly appreciated. After we have received it, we can execute the contract on our end and return the completed contract to you.

Sincerely,
Megan.

Megan DeVries, M.A.
Archaeological Operations Supervisor

Department of Consultation and Accommodation (DOCA)
Mississaugas of the Credit First Nation (MCFN)
4065 Highway 6 North, Hagersville, ON N0A 1H0
P: 905-768-4260 | M: 289-527-2763
http://www.mncfn.ca

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From: Deanna De Forest <Deanna.DeForest@rjburnside.com>
Sent: Friday, November 13, 2020 3:30 PM
To: Megan DeVries <Megan.DeVries@mncfn.ca>
Cc: Mark LaForme <Mark.LaForme@mncfn.ca>; archaeology@ontario.ca; Matt Brooks <Matt.Brooks@rjburnside.com>; Ian Todhunter <Ian.Todhunter@caledon.ca>
Subject: 300051839 Caledon Bridges- Patterson Side Rd

Hello Megan DeVries, Archaeological Operations Supervisor

Please find attached our letter outlining the information requested in your October 22, 2020 correspondence to R.J. Burnside and Associates Limited (attached) regarding Caledon Bridges- Patterson Side Rd (20EA-129).
If you would like to provide comment or request additional project information, please feel free to contact either of the project team members listed in the correspondence.

Regards,
Deanna De Forest

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

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Thank you.

****

Sylvia Waters

From: Deanna De Forest
Sent: Tuesday, February 23, 2021 2:19 PM
To: jocko@sixnationsns.com
Cc: williams.todde@gmail.com; hdi2@bellnet.ca
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 051839EA_Caledon_SchB_NoCm_.pdf

Hello Leroy Hill, Secretary to Haudenosaunee Confederacy
On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge over the Humber River in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or request additional information, please contact either of the Project Team members identified on the notice.



Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

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Sylvia Waters

From: Deanna De Forest
Sent: Tuesday, February 23, 2021 2:32 PM
To: fawn.sault@mncfn.ca
Cc: Peter.Epler@mncfn.ca; Megan.DeVries@mncfn.ca
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 051839EA_Caledon_SchB_NoCm_.pdf

Hello Fawn Sault, Consultation Manager for the Mississaugas of the Credit First Nation

On behalf of the Town of Caledon, please find attached the Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge over the Humber River in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

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Sylvia Waters

From: Deanna De Forest
Sent: Tuesday, February 23, 2021 2:19 PM
To: jocko@sixnationsns.com
Cc: williams.todde@gmail.com; hdi2@bellnet.ca
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 051839EA_Caledon_SchB_NoCm_.pdf

Hello Leroy Hill, Secretary to Haudenosaunee Confederacy
On behalf of the Town of Caledon, please find attached a Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge over the Humber River in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or request additional information, please contact either of the Project Team members identified on the notice.



Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator
R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

Sylvia Waters

From: Deanna De Forest
Sent: Tuesday, February 23, 2021 3:07 PM
To: rlinn@sixnations.ca
Cc: dlaforme@sixnations.ca; lonnybomberry@sixnations.ca; tanyahill-montour@sixnations.ca; markhill@sixnations.ca
Subject: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 051839EA_Caledon_SchB_NoCm_.pdf

Hello Robin Linn, Lands and Resources

On behalf of the Town of Caledon, please find attached the Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Sideroad Bridges 1 and 2 and Duffy's Lane Bridge over the Humber River in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator
R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

Sylvia Waters

From: Adrian Blake <Adrian.Blake@mncfn.ca>
Sent: Thursday, April 01, 2021 4:08 PM
To: Devin Soeting
Cc: Matt Brooks; Deanna De Forest; Ian Todhunter; lmerritt@asiheritage.ca; 300051839 - Town of Caledon 2020-83 - Bridge & Culvert Works 2020; Megan DeVries
Subject: RE: 2020-83 Caledon Bridges - Patterson SR - MCFN Agreements and Stage 1 Archaeological Assessment Report

Good afternoon Devin,

MCFN-DOCA has now had time to review the Stage 1AA For the Caledon bridge & culvert: Patterson side road bridges lots 25-26, concessions 5-6 project you are undertaking. At this time MCFN had no additional comments for inclusions and is in agreement with the recommendations made within the report. We look forward to continuing to work with R.J. Burnside & Associates Limited as this project progresses.

Best Regards,
Adrian Blake, M.S.
Field Archaeologist

Department of Consultation and Accommodation (DOCA)
Mississaugas of the Credit First Nation (MCFN)
4065 Highway 6 North, Hagersville, ON N0A 1H0
M: 905-979-3862
http://www.mncfn.ca
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From: Devin Soeting <Devin.Soeting@rjburnside.com>
Sent: Tuesday, February 2, 2021 2:02 PM
To: Megan DeVries <Megan.DeVries@mncfn.ca>
Cc: Matt Brooks <Matt.Brooks@rjburnside.com>; Deanna De Forest <Deanna.DeForest@rjburnside.com>; Ian Todhunter <Ian.Todhunter@caledon.ca>; lmerritt@asiheritage.ca; Joelle Wiliams <Joelle.Williams@mncfn.ca>; Mark LaForme <Mark.LaForme@mncfn.ca>; archaeology@ontario.ca; 300051839 - Town of Caledon 2020-83 - Bridge & Culvert Works 2020 <300051839-TownofCaledon2020-83-BridgeCulvertWorks2020@rjburnside.com>
Subject: 2020-83 Caledon Bridges - Patterson SR - MCFN Agreements and Stage 1 Archaeological Assessment Report

Hi Megan,

Please find the signed copies of the MCFN FLR Participation Agreement and the Archaeological Review Agreement attached, for your review and signatures. Please return a signed copy of each agreement to me once completed.

I've also attached a copy of the Stage 1 Archaeologic Assessment Report, completed by ASI Heritage for your review and reference.

Should you have any questions regarding any of the documents, please don't hesitate to reach me.

Best regards,
Devin

BURNSIDE

Devin Soeting, C.E.T., EP, CAN-CISEC
Project Coordinator

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario N1H 1C4
Office: +1 800-265-9662 Direct: +1 226-486-1551
www.rjburnside.com

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****

Sylvia Waters

From: Deanna De Forest
Sent: Thursday, April 08, 2021 1:16 PM
To: mario.groslouis@cnhw.qc.ca
Cc: melanievincent21; Louis Lesage; Devin Soeting; Matt Brooks; Andrew Dawson; Ian Todhunter; Sylvia Waters
Subject: FW: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon
Attachments: 20EA-129 Stage 1 Report.pdf

Hello Mario,
I am forwarding to you the correspondence below which was previously sent to Maxime's attention as I understand you are now the Project Coordinator point of contact for this information.
Please feel free to contact me if you have any questions.
Regards,
Deanna

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

From: Deanna De Forest
Sent: Wednesday, March 31, 2021 3:22 PM
To: Maxime Picard <maxime.picard@cnhw.qc.ca>
Cc: melanievincent21 <melanievincent21@yahoo.ca>; Devin Soeting <Devin.Soeting@rjburnside.com>; Matt Brooks <Matt.Brooks@rjburnside.com>; Andrew Dawson <Andrew.Dawson@rjburnside.com>; Ian Todhunter <Ian.Todhunter@caledon.ca>
Subject: RE: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Hello Maxime,

Thank you for your email comments following the Notice of Commencement for the EA for Structure Improvements for Patterson Sideroad and Duffy's Lane bridges in Caledon. Your comments will become part of the public record for the project.

A Stage 1 Archaeological Assessment has been completed for the study area. I have attached a copy of the report for your information. The Stage 1 concluded that parts of the study area exhibit archaeological potential and recommends a Stage 2 Archaeological Assessment in select areas, if impacted.

A Stage 2 Archaeological Assessment will be completed as part of the project if the preliminary preferred solution has the potential to impact identified areas of archaeological potential due to construction activities.

Your request to participate in all archaeological field work for this project is noted.

For your interest, the Mississaugas of the Credit First Nation (MCFN) has also requested to participate in the archaeological field work for this project. The MCFN has an agreement with the Town of Caledon to have a Field Liaison Representative present during archaeological field work, subject to the level of COVID-19 restrictions at the time of the field work, and to review the reporting.

Please let us know if you have any comments following your review of the attached information.

We will keep you informed of any upcoming Stage 2 archaeological field work and will maintain your contact information on the project contact list to receive future notices about the project.

Regards,

Deanna

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Tuesday, February 23, 2021 4:29 PM
To: Deanna De Forest <Deanna.DeForest@rjburnside.com>
Cc: melanievincent21 <melanievincent21@yahoo.ca>
Subject: RE: 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Good morning Deanna,

This is to acknowledge reception of your email and notice on the Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges.

Please note that the Huron-Wendat Nation is requesting to participate in all archaeological fieldwork of this project as well as receiving copys of the draft reports for review and comments.

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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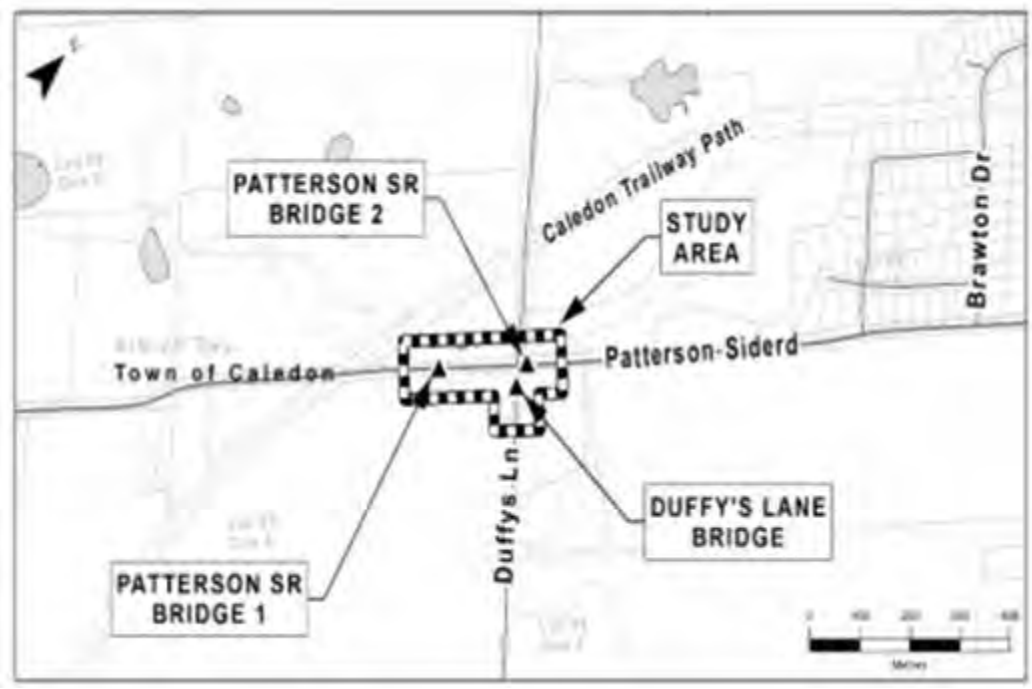
Warning on protection and confidentiality of information

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content is intended specifically for the recipient(s) to whom it is addressed. It is therefore prohibited to distribute or to disclose t
content. If you receive this communication by error, please destroy it and notify us as soon as possible.

De : Deanna De Forest [mailto:Deanna.DeForest@rjburnside.com]
Envoyé : 23 février 2021 14:43
À : maxime.picard@cnhw.qc.ca
Cc : melanievincent21 <melanievincent21@yahoo.ca>
Objet : 51839_Municipal Class Environmental Assessment Notice of Commencement for Structure Improvements, Patterson Sideroad and Duffy's Lane bridges, Caledon

Hello Maxime Picard, Coordinator of Projects for Huron-Wendat

On behalf of the Town of Caledon, please find attached the Notice of Commencement for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road Bridges 1 and 2 and Duffy's Lane Bridge over the Humber River in Caledon.
The approximate location of the Study Area is illustrated in the map below and on the attached notice.
The EA project will include a Stage 1 Archaeological Assessment and a Cultural Heritage Evaluation among other studies planned as part of the project.
To provide comment or to request additional information, please contact either of the Project Team members identified on the notice.



Regards,

Deanna De Forest, B.Sc., E.P.
Senior Environmental Coordinator

R.J. Burnside & Associates Limited | www.rjburnside.com
Office: +1 800-265-9662 Direct: +1 705-797-4357

COVID 19: We remain open for business

The health and safety of our employees and clients is of paramount importance. Most of our staff are working remotely and continue to serve clients using our well established collaborative technology platforms. For our full COVID 19 response please click here.

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****

Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: williams.todde@gmail.com; janicewilliams@hdi.land; jocko@sixnationsns.com; hdi2@bellnet.ca
Cc: Devin Soeting; Andrew Dawson
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

The Town would like to ensure that anyone interested in this Study has the opportunity to provide input into the planning and design of the project.

A virtual Public Information Centre (PIC) will be held on May 8th, from 5:00pm to 6:00pm to discuss the project with the Town and its consultants.

Join via the Town website at https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

PIC Information materials will be available on the Town's webpage following the PIC. Your comments on the project and information materials are encouraged by **May 31, 2023**.

To provide comment or request additional information concerning this Study, please contact either of the following Project Team members:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

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Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: mario.groslouis@cnhw.qc.ca; melanievincent21@yahoo.ca
Cc: Devin Soeting; Andrew Dawson
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

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www.rjburnside.com

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Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: Peter.Epler@mncfn.ca
Cc: Devin Soeting; Andrew Dawson
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

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Mishaal Rizwan

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: markhill@sixnations.ca; tanyahill-montour@sixnations.ca; lonnybomberry@sixnations.ca
Cc: dlaforme@sixnations.ca; Devin Soeting; Andrew Dawson
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

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www.rjburnside.com

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Mishaal Rizwan

From: Mishaal Rizwan
Sent: Tuesday, April 25, 2023 11:15 AM
To: MCFN.Consultation; Abby LaForme; DOCA.Admin@mncfn.ca
Cc: Devin Soeting; Andrew Dawson
Subject: FW: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements
Attachments: 051839EA_SchB_Combined_PIC_2023_04_24.pdf

Hello,

I understand Peter Epler has left his position with MCFN-DOCA. Please see below the email I sent him yesterday and the attached Notice.

Thank you,

BURNSIDE
Mishaal Rizwan
Environmental Planner

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CELEBRATING 50 YEARS

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: Peter.Epler@mncfn.ca
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>; Andrew Dawson <Andrew.Dawson@rjburnside.com>
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

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George Golding, P.Eng.
Project Manager, Engineering Services

Andrew Dawson, P.Eng.
Project Engineer

Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

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Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com



Mishaal Rizwan

From: Abby LaForme <Abby.LaForme@mncfn.ca>
Sent: Friday, April 28, 2023 2:10 PM
To: Mishaal Rizwan
Cc: Devin Soeting; Andrew Dawson; Mark LaForme
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon Mishaal,

My name is Abby (LaForme) Lee and I am the Acting Consultation Coordinator for the Mississaugas of the Credit First Nation (MCFN), Department of Consultation and Accommodation (DOCA).
Thank you for reaching out for consultation regarding the MCEA for Structure Improvements to Patterson Side Road Bridge 1 & 2, and Duffy's Lane Bridge in Caledon.

MCFN DOCA has a question regarding whether any new construction will be conducted for this project?
If new construction is being done on this project, MCFN DOCA would like to see a Stage 1 report done to determine if there is any Archaeological Potential in the area. MCFN DOCA would like to review and comment on the Stage 1 Archaeological Report. If the Study requires Stage 2 work, MCFN DOCA would be expected to have in-field involvement. The cost of this involvement will be at the cost of the proponent.

Thank you

Abby (LaForme) Lee
Acting Consultation Coordinator

Mississaugas of the Credit First Nation (MCFN)
Department of Consultation & Accommodation (DOCA)
4065 Highway 6, Hagersville, ON N0A 1H0
Ph: (905) 768 – 4260
Email: Abby.LaForme@mncfn.ca

From: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Sent: Tuesday, April 25, 2023 11:15 AM
To: MCFN.Consultation <MCFN.Consultation@mncfn.ca>; Abby LaForme <Abby.LaForme@mncfn.ca>; DOCA Admin <DOCA.Admin@mncfn.ca>
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>; Andrew Dawson <Andrew.Dawson@rjburnside.com>
Subject: FW: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Hello,

I understand Peter Epler has left his position with MCFN-DOCA. Please see below the email I sent him yesterday and the attached Notice.

Thank you,

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
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CELEBRATING 50 YEARS

From: Mishaal Rizwan
Sent: Monday, April 24, 2023 2:31 PM
To: Peter.Epler@mncfn.ca
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>; Andrew Dawson <Andrew.Dawson@rjburnside.com>
Subject: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

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George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
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www.rjburnside.com

CELEBRATING 50 YEARS

From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Sunday, April 30, 2023 8:18 AM
To: Mishaal Rizwan
Subject: Re: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Follow Up Flag: Follow up
Flag Status: Flagged

SNGREC has interest in the Town of Caledon structural improvements. Has there been an Archaeological survey completed?

Kind Regards,

Tanya-Hill Montour B.A Hons.
Six Nations of the Grand River - Archaeology Supervisor.
c.226.388.0665
e. tanyahill-montour@sixnations.ca

On Apr 24, 2023, at 2:31 PM, Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com> wrote:

On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.

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George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline

Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

<image001.gif>

Mishaal Rizwan
Environmental Planner

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<image002.gif>

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Thank you.

****

<051839EA_SchB_Combined_PIC_2023_04_24.pdf>

From: Devin Soeting
Sent: Tuesday, April 16, 2024 10:58 AM
To: Deanna De Forest; Crystal Ferguson
Subject: FW: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

---

From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Wednesday, April 10, 2024 10:37 AM
To: George Golding <George.Golding@caledon.ca>
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Hi George,

It was delightful to have conversation.

At this time upon review SNGREC don't have comments, but looking forward to conversations in the design phase.

Nia':wen ko:wa (thankyou)

Tanya Hill-Montour
SNGR Archaeological Supervisor
226.388.0665

From: George Golding <George.Golding@caledon.ca>
Sent: Monday, April 8, 2024 1:50 PM
To: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: [External] RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good Afternoon Tanya,

Its George Golding from the Town of Caledon. As discussed earlier on this afternoon, can you please review the stage 1 archeological assessment that was included within the draft EA document that we provided to you previously. The original email and links for the shared EA document are included within this email. If you could review in the next couple of days, that would be very much appreciated as we want to file the EA as soon as possible in order for our consultant (RJ Burnside and Associates) to proceed to the detailed design stage.

Thank you again for your time today and your help.

George

George Golding, P.Eng.
Senior Project Manager, Stormwater
Engineering, Public Works & Transportation Department

Office: 905.584.2272 x 4523
Cell: 437.326.8995
Email: george.golding@caledon.ca

Town of Caledon | www.caledon.ca | www.visitcaledon.ca | Follow us @YourCaledon

Please consider the environment before printing.

From:	George Golding <George.Golding@caledon.ca>
Sent:	Tuesday, March 12, 2024 12:45 PM
To:	Tanya Hill-Montour
Cc:	Devin Soeting
Subject:	RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good Afternoon Tanya,

Its George Golding from the Town of Caledon. I was wondering if you and your teams have had a chance to review the archeological assessment that was completed in support of the Municipal Class EA for the Patterson Sideroad and Duffy's Lane bridge replacements within the Town. Can you please provide me with your input by next Wednesday March 20th, 2024 so we can start to finalize the EA and post.

If you want to discuss this project, please don't hesitate to either Devin Soeting or myself. Thank you again for your time and involvement with this project.

George

George Golding, P.Eng.
Senior Project Manager, Stormwater
Engineering, Public Works & Transportation Department

Office: 905.584.2272 x 4523
Cell: 437.326.8995
Email: george.golding@caledon.ca

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Office: 905.584.2272 x 4523
Cell: 437.326.8995
Email: george.golding@caledon.ca

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Please consider the environment before printing.

From: George Golding
Sent: Wednesday, February 28, 2024 9:39 AM
To: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Cc: Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good Morning Tanya,

Thanks again for your time last Monday, it was good to talk to you. My apologies for not getting this to you sooner; I was out of office yesterday and didn't have a chance to get this information for you until now. Please see the following link for the draft EA report as well as the PIC slide:

Duffy's Lane and Paterson Sideroad EA - Town of Caledon

You can find additional information related to this EA on the Town's website via the following link:
Public Notice: Patterson/Duffy's Lane Bridge Environmental Assessment - Town of Caledon (esolg.ca)

Please let me know if you and your team have any questions regarding this information. As discussed, I would be more than happy to set up either a virtual or in-person meeting with you, RJ Burnside and Associates (consultant) and myself to go over anything.

Thank you,

George

George Golding, P.Eng.
Senior Project Manager, Stormwater
Engineering, Public Works & Transportation Department

Office: 905.584.2272 x 4523
Cell: 437.326.8995
Email: george.golding@caledon.ca

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Please consider the environment before printing.

Devin Soeting

From:	Mishaal Rizwan
Sent:	Friday, June 16, 2023 3:09 PM
To:	Tanya Hill-Montour
Cc:	George.Golding@caledon.ca; Devin Soeting
Subject:	RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Hi Tanya,

I hope you are doing well.

I am just following up on your review of the Stage 1 AA. Please confirm if you have reviewed the document.

Thank you,

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

From: Mishaal Rizwan
Sent: Friday, May 26, 2023 11:21 AM
To: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Cc: George.Golding@caledon.ca; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Hi Tanya,

Could you please provide any comments on the Stage 1 AA report by June 14, 2023.

Thank you,

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

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From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Thursday, May 25, 2023 5:49 PM
To: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Cc: George.Golding@caledon.ca; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Thank you so much Mishaal, is there a timeframe for review ?

From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Thursday, May 25, 2023 5:49 PM
To: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Cc: George Golding <George.Golding@caledon.ca>; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

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Thank you so much Mishaal, is there a timeframe for review ?

From: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Sent: Thursday, May 25, 2023 2:38 PM
To: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Cc: George.Golding@caledon.ca; Devin Soeting <Devin.Soeting@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Hello Tanya,

Please find attached the Stage 1 Archaeological Assessment report for your review.

Additionally, please note that the slides from the Public Information Centre are available on the Town's project webpage: https://www.caledon.ca/en/news/public-notice-patterson-duffy-s-lane-bridge-environmental-assessment.aspx

If you are interested, George Golding, the Town of Caledon Project Manager, can arrange a call with you to go over the projects and next steps.

Best regards,

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

CELEBRATING 50 YEARS

From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Wednesday, May 03, 2023 1:44 PM
To: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good afternoon

Most definitely

Kind Regards,

Tanya j. Hill-Montour B.A Hons.
Six Nations of the Grand River - Archaeology Supervisor.

c.226.388.0665
e. tanyahill-montour@sixnations.ca

From: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Sent: Wednesday, May 3, 2023 1:03 PM
To: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Subject: RE: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

Good afternoon,

Yes, a Stage 1 Archaeological Assessment was completed for the project. Is SNGREC interested in reviewing the report?

Best regards,

BURNSIDE
Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com



From: Tanya Hill-Montour <tanyahill-montour@sixnations.ca>
Sent: Sunday, April 30, 2023 8:18 AM
To: Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com>
Subject: Re: Town of Caledon Notice of Public Information Centre - Municipal Class Environmental Assessment for Structure Improvements

SNGREC has interest in the Town of Caledon structural improvements. Has there been an Archaeological survey completed?

Kind Regards,

Tanya-Hill Montour B.A Hons.
Six Nations of the Grand River - Archaeology Supervisor.
c.226.388.0665
e. tanyahill-montour@sixnations.ca

> On Apr 24, 2023, at 2:31 PM, Mishaal Rizwan <Mishaal.Rizwan@rjburnside.com> wrote:
>
> On behalf of the Town of Caledon, please see the attached Notice of Public Information Centre for the Municipal Class Environmental Assessment for Structure Improvements to Patterson Side Road bridge 1 & 2, and Duffy's Lane bridge in Caledon.
>
> The Town would like to ensure that anyone interested in this Study has the opportunity to provide input into the planning and design of the project.

A virtual Public Information Centre (PIC) will be held on May 8th, from 5:00pm to 6:00pm to discuss the project with the Town and its consultants.

Join via the Town website at https://townofcaledon.webex.com/townofcaledon/j.php?MTID=m0574e4adf54887139c4bcacddcac6a6b

PIC Information materials will be available on the Town's webpage following the PIC. Your comments on the project and information materials are encouraged by **May 31, 2023**.

To provide comment or request additional information concerning this Study, please contact either of the following Project Team members:

George Golding, P.Eng.
Project Manager, Engineering Services
Town of Caledon
6311 Old Church Road
Caledon, Ontario L7C 1J6
T 905-584-2272 x 4523
george.golding@caledon.ca

Andrew Dawson, P.Eng.
Project Engineer
R. J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4
T 705-797-4310
andrew.dawson@rjburnside.com

<image001.gif>

Mishaal Rizwan
Environmental Planner

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Unit 20, Guelph, Ontario, N1H 1C4
Office: 800-265-9662 Direct Line: 226-343-7014
www.rjburnside.com

<image002.gif>

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Thank you.

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R.J. Burnside & Associates Limited