REPORT

Schedule 'C' Municipal Class Environmental Assessment for Wellington Road 109 Bridges

Environmental Study Report (ESR)

Submitted to:

County of Wellington

Submitted by:

WSP Canada Inc

150 Commerce Valley Drive West Thornhill, ON
L3T 7Z3 Canada

T +1 905-882-1100

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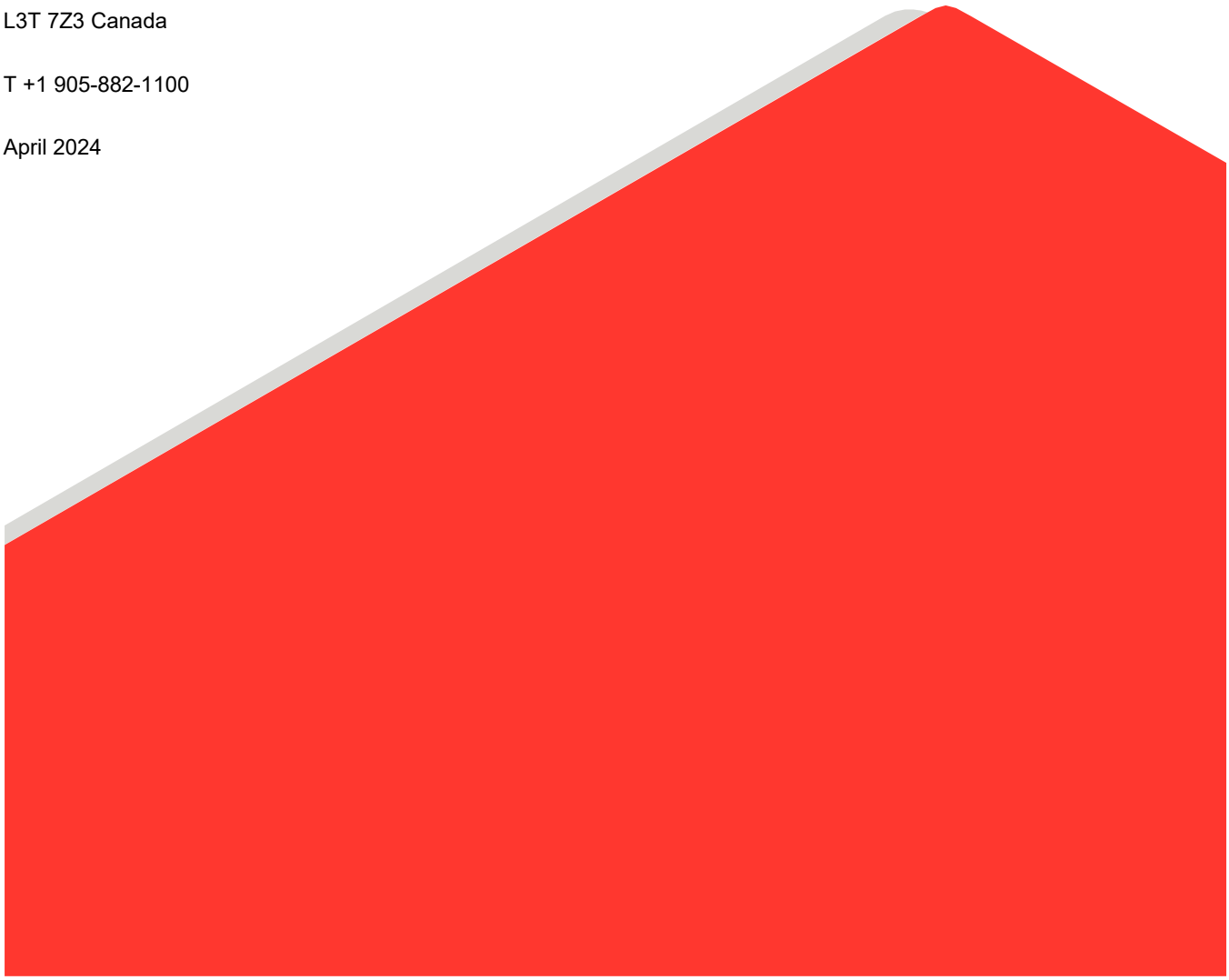

Executive Summary

Introduction

County of Wellington retained WSP Canada Inc. to undertake the Schedule 'C' Municipal Class Environmental Assessment (MCEA) Study to consider potential solutions to address the condition of four structures that cross the Conestogo River on Wellington Road 109, east of Highway 6 in Arthur, Township of Wellington North, Ontario. The four crossing structures, identified by reference numbers (from west to east) B109132, C109123, B109133 and B109134 are all reaching the end of their design life. The bridges at all four crossings are in an advanced state of deterioration with some elements identified as not meeting current standards.

Municipal Class EA Planning Schedule

The Wellington Road 109 Bridges Class EA has been identified as a Schedule 'C' project under the MCEA (**Figure 1-3**). Environmental Study Report (i.e. this report) is required for Schedule 'C' projects to document the decision-making process.

Problem and Opportunity Statement

The Problem/Opportunity Statement for Wellington Road 109 bridges Municipal Class EA is defined as follows:

The four WR109 structures are in **poor condition with major elements in an advanced state of deterioration**.

- In general, severe deterioration including delaminated and spalled concrete with rust staining and efflorescence are present throughout the wingwalls, abutments, deck soffit and fascia. In addition the concrete railings have significant deterioration including full section loss in areas and do not meet current standards.
- Several components on each structure are in need of maintenance, rehabilitation or replacement, as **all of the structures approach the end of their design life**.
- As the conditions worsen, the **structures may be subject to load restrictions or closures** which would be extremely disruptive given the important of WR109 as a local and regional east-west transportation and goods movement route.
- Two of the structures are undersized and **do not meet flood conveyance criteria**.
- With the number of bridges and the scope of works that will likely be needed, construction will extend over multiple years. **Multi-year construction and associated traffic disruption will come with challenges** for local residents, businesses and travellers.
- There is an opportunity to consider the feasibility and cost, for comparison purposes, of a localized permanent realignment of WR109 that would eliminate or reduce the multiple river crossings and the need for future works.

Alternative Solutions

The following alternative solutions were identified to address the problems and opportunities identified in the Problem and Opportunity Statement. The alternatives were assessed using screening criteria, such as compatibility with County's and Provincial objectives and policies, ability to serve planned developments, ability to accommodate future travel demand and provide strategic multi-modal connections linking future planned destinations, impact on public safety, potential impacts on natural environment (Vegetation and Wildlife, Water Resources, Species-at-Risk and Fisheries), and capital costs.

- Do Nothing
- Rehabilitation
- Replacement **(Recommended)**
- New Road Alignment

Design Alternatives

As the need for the project was established and a Preferred Alternative Solution was selected, this phase involved the development and evaluation of design alternatives for the study area. Phase 3 for this Class EA study involved the following activities:

- Development and Screening of the Alternatives;
- Identification of evaluation criteria and weighting for evaluation of alternatives;
- Consider feedback received at Public Information Centre #2; and
- Selection of the Technically Preferred Alternative.

In evaluating the list of design alternatives, several key factors and design elements were considered. The evaluation criteria is listed below:

- Socio-Economic;
- Cultural Heritage;
- Surface and Groundwater;
- Natural Environment;
- Technical;
- Transportation; and
- Costs.

The results of the evaluation determined that **Replacement** is the preferred option because it has fewer impacts to socio-economic, natural and cultural environments than the New Road Alignment option. Initial capital costs and lifecycle costs are lower than the New Road Alignment option.

Recommended Plan

The recommended design for four structures has been provided and are shown in table below.

Structure Number	Construction Type	Structure Type	Traffic Management	Preliminary Cost Estimate
B109132	Traditional Staging Method with an overbuilt deck.	Welded Plate Girder or I-Girder Bridge	Two-way traffic to be maintained due to close proximity to the Highway 6 intersection.	$4.2 Million
C109123	Temporary Bridge proposed.	Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to maintain two-way traffic	$4.2 Million

Structure Number	Construction Type	Structure Type	Traffic Management	Preliminary Cost Estimate
			depending on final construction plan.	
B109133	Traditional Staging Method.	Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to use ABC methods to reduce duration of work.	$3.4 Million
B109134		Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to use ABC methods to reduce duration of work.	$4.1 Million

Consultation

Recognizing that public, technical agency, and Indigenous consultation is a critical aspect of the Municipal Class EA process, a detailed consultation and engagement program was implemented to gather input at key stages throughout the Project.

A range of stakeholders with identified and contacts to address key issues and provide an opportunity to gather areas of concern regarding the Project. Various methods were undertaking to achieve the objectives of the consultation program, including:

- Notices of Study Commencement, Public Information Centres 1 and 2, as well as Study of Completion;
- Two Public Information Centres during Phase 2 and 3 of the Study; and
- Distribution of notices to the Public, agencies, stakeholders, and Indigenous communities via mail, website, email and postings in the newspaper.

Construction Staging and Cost

Bridge replacement occurs by removing the existing structure and building the new structure in the same place. This may be achieved through full road closure or through temporary lane restrictions with traffic staging, where traffic is maintained and staged on half of the bridge while the other half is demolished and replaced, then flipped to complete the other half. Traffic delays will occur over multiple construction seasons.

The overall preliminary cost estimate for the recommended design is estimated to be approximately $15.9M (includes B109132 at $4.2M, C109123 at $4.2 Million, B109133 at $3.4 Million, and B109134 at $4.1 Million). The estimate cost for works reflect initial capital cost (2024 dollars) and do not include property or utility relocations.

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1.0 INTRODUCTION AND BACKGROUND

1.1 Background

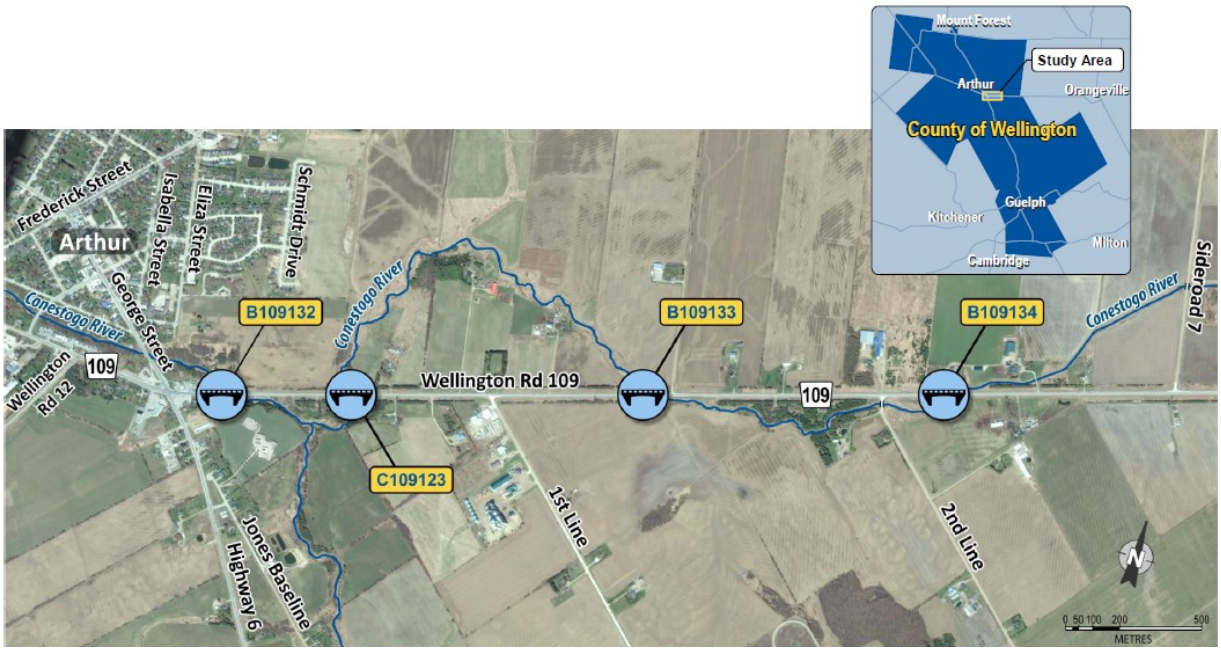
WSP Canada Inc. was retained by the County of Wellington to undertake the Municipal Class Environmental Assessment (MCEA) Study to address the condition of structures on Wellington Road 109, east of Highway 6 in Arthur, Township of Wellington North, Ontario. The study was initiated following the requirements for Schedule 'C' projects as outlined in the Municipal Engineers Association Municipal Class Environmental Assessment (2000, as amended in 2007, 2011, 2015 and 2023). The following structures are included in **Table 1-1**.

Table 1-1: Wellington Road 109 Structures

Name	Structure Number	Structure Type	Span	Width	Built	Location
Conestogo River Bridge #6	B109132	Rigid Frame	19	12	1931	0.2 km East of Hwy 6
Conestogo River Bridge #4	B109133	Rigid Frame	16	12	1931	1.7 km East of Hwy 6
Conestogo River Bridge #10	B109134	Rigid Frame	14	11	1934	1.0 km East of Wellington Road 45
Conestogo River Bridge #5	C109123	Concrete Barrel Arch	14	12	1930	0.7 km East of Hwy 6

The four crossing structures, identified by reference numbers (from west to east) B109132, C109123, B109133 and B109134 are all reaching the end of their design life. The bridges at all four crossings are in an advanced state of deterioration with some elements identified as not meeting current standards. The County has considered all options to address these conditions including do nothing, bridge rehabilitations, bridge replacements, and the feasibility of a localized permanent realignment of Wellington Road 109 that would eliminate or reduce the multiple bridge crossings. **Figure 1-1** depicts the four crossing structures.

Figure 1-1: Wellington Road 109 Four Structures



Given the number of structures, their close spacing, the proximity to the Highway 6 intersection and the traffic volumes (including truck volumes) on WR 109, it is anticipated that traffic management will be a significant construction issue if these structures are rehabilitated or replaced. While traffic management strategies may include looking at opportunities for local detours and staging/signalization, the impact of traffic delays over potentially a multi-year construction horizon will be challenging. Therefore, the County wishes to take this opportunity to explore all reasonable solutions to address the problem, including possible new road alignments that could replace the function of existing WR 109 and eliminate the need for these four structures, in the long term.

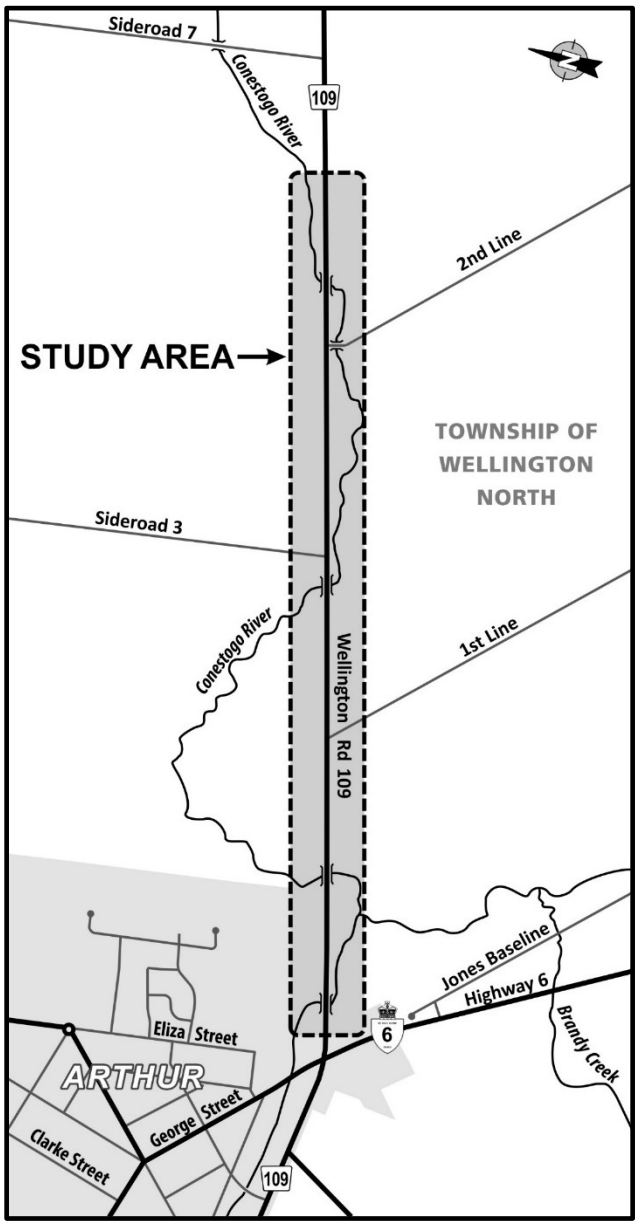
The study examines the problem, identify and evaluate alternative solutions and design concepts, recommend a design, assess potential impacts and identify mitigation measures associated with the preferred design. The study will consider numerous aspects including but not limited to: construction staging and traffic delays during construction, potential for property and business impacts, heritage values and protection of the natural environment.

1.2 Study Area

Wellington County Road 109 crosses the Conestogo River at four locations between Highway 6 and Sideroad 7, southeast of community of Arthur in the Township of Wellington North. The Conestogo River through this area is also known as Brandy Creek, however it is referred to as Conestogo River herein.

The structures are located close to one another, all within about 2.7 km stretch of WR 109, with the first structure being located approximately 180 m east of the intersection of Highway 6 and WR 109, at the south end of Arthur. The approximate limits of the study area are shown in **Figure 1-2.**

Figure 1-2: Project Study Area



1.3 Study Objectives

This report was prepared to meet the requirements of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (Class EA) document (October 2000, as amended in 2007, 2011, 2015 and 2023). The report combines all phases of the planning process under one cover and incorporates steps considered essential for compliance with the requirements of the Environmental Assessment Act (EAA).

The purpose of this Municipal Class EA Study is to provide a comprehensive and environmentally sound planning process which is open to public participation to address the existing structural deficiencies of the Wellington 109 four structures.

This Environmental Study Report (ESR) documents the Schedule 'C' planning process used for the:

1) Identification of the problems and opportunities (Municipal Class EA Phase 1);

2) Consideration and evaluation of alternative solutions and the selection of the preferred alternative solution (Municipal Class EA Phase 2); and,

3) Consideration and evaluation of design alternatives and the selection of the preliminary preferred design alternative (Municipal Class EA Phase 3).

This ESR also documents the consultation work and technical studies that were completed as part of this EA Study to satisfy Municipal Class EA Phase 4.

1.4 Study Team

This Class Environmental Assessment Study was managed by WSP Canada Inc., consulting engineers to the County of Wellington. Guidance was obtained from the County of Wellington Engineering Department. A team of consultant specialists and their associated roles included: Project Management, Class EA process, Hydraulic Analysis, Structural Analysis, Natural Environment, Archaeology, and Built Heritage Assessment.

1.5 Study Process

The Municipal Class EA planning process approved under the *Environmental Assessment Act* (EA Act) was followed for this project. The Municipal Class EA allows County of Wellington to meet the requirements of the EA Act for municipal infrastructure projects without having to either undertake an Individual EA or request a specific exemption for the project. Municipal projects addressed by the Municipal Class EA may be implemented without further approval under the EA Act, provided the approved Municipal Class EA planning process was carried out.

Wellington Road 109 is subject to the MCEA process outlined for Schedule "C" projects, to adequately address the technical and environmental needs of this project. Therefore, it is subject to Phases 1 through 4 of the Class EA process, and that an Environmental Study Report (ESR) be prepared and filed for review by the public and review agencies.

1.5.1 Municipal Class EA Schedule 'C' Process and Requirements

Municipal infrastructure projects are subject to the Ontario Environmental Assessment Act (EA Act). The Municipal Class EA (October 2000, as amended in 2007, 2011, 2015 and 2023) is an approved self-assessment process under the EA Act that applies to municipal infrastructure projects including roads, water and wastewater.

The Municipal Class EA outlines a planning process to consider the environmental and technical advantages and disadvantages of alternatives in order to determine a preferred solution for addressing problems and opportunities. The project commenced prior to the amendments to the Ontario EA Act that resulted in the updated MCEA Schedule and requirements. During the course of the project the MCEA requirements were restructured to allow exemptions for Schedule A and A+. The types of projects and activities are intended to be categorized based on the magnitude of their anticipated environmental impact. In specific cases, however, a project may have a greater environmental impact than indicated by the Schedule. The classification of the various undertakings in the approved class of undertakings outlined in the MCEA 2023 are:

- Exempt From Environmental Assessment Act (EAA) requirements.
- Eligible for exemption based on the results of the screening process(es) in MCEA Appendix 1.
    - Exemption eligible examples: Various maintenance, operation, rehabilitation, and other small projects that

are limited in scale and have minimal adverse environmental effects are exempt from the EAA. Previously these projects were classified as Schedule A or A+ but are now classified as exempt.

- Proceed through Schedule B or C despite being eligible for screening.
- Schedule B projects, the proponent may, at its discretion, decide to carry out the process for a Schedule C project.
    - Schedule B: Includes projects that have the potential for adverse environmental effects. This includes improvements and minor expansions of existing facilities. These projects area approved subject to a screening process which includes consulting with stakeholders who may be directly affected and relevant review agencies.
- Schedule C projects, the proponent may decide to carry out an individual EA. Proponents of exempt projects may decide to carry out an EA- like process outside of the EAA regime.
    - Schedule C: Includes the construction of new facilities and major expansions to existing facilities. These undertakings have the potential for significant environmental effects.

The Wellington Road 109 bridges Class EA has been identified as a Schedule 'C' project under the MCEA (**Figure 1-3**). An Environmental Study Report (i.e. this report) is required for Schedule 'C' projects to document the decision-making process. It was determined that the project is not eligible for exemption under the MCEA changes that described above.

As illustrated in **Figure 1-3** the Municipal Class EA document outlines the planning and design process. Schedule 'C' projects are required to follow Phases 1 through 4 of this process.

1.5.2 Environmental Study Report

This Environmental Study Report (ESR) documents the process followed to develop the Preferred Plan and the environmentally significant aspects of the planning, design, and construction of the proposed works. The ESR describes: the problem being addressed; the existing social, natural cultural environmental considerations, planning, and design alternatives that were considered; a description of the recommended alternative and its environmental effects and proposed mitigation measures; and commitments to further work, consultation / engagement, and monitoring associated with the implementation of the project.

As required by the MCEA, this ESR is being made available to stakeholders, regulatory agencies, Indigenous communities, and the public for a 30 calendar-day review period. A Notice of Completion was placed in local newspaper and on County of Wellington's project website, and letters were mailed / emailed to notify government agencies, Indigenous communities, and members of the public on the study mailing list. During the review period, parties with outstanding issues are encouraged to bring their project concerns to the attention of County of Wellington for resolution. This ESR has been placed on the public record on the project website **http://www.wellington.ca/109EA** and at the following in-person viewing location:

Viewing Location	Wellington County Library – Arthur Branch 110 Charles Street East PO Box 550 Arthur ON N0G 1A0

1.6 Section 16 Order

The Class EA process includes an appeal provision. The Minister of the Environment, Conservation and Parks has the authority and discretion to make an Order under Section 16 of the *Environmental Assessment Act*.

A Section 16 Order may require that the proponent of a project going through a Class Environmental Assessment (Class EA) process, such as the MCEA:

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

2) Meet further conditions in addition to the conditions in the Class EA. This could include conditions for: further study, monitoring and/or consultation.

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

Before making an Order, the minister must consider the factors set out in Section 16(5) of the Environmental Assessment Act. If a Section 16 Order request is made, the project proponent cannot proceed with the project until the minister makes a decision on the request. If the minister makes a Section 16 Order, the proponent may only proceed with the project if they follow the conditions in the Order.

Note, Section 16 Order requests were previously known as Part II Order requests.

Reasons for Requesting an Order

A concerned party may ask the minister to make a Section 16(6) Order if:

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

A Section 16(6) Order request cannot be made to simply delay or stop the planning and implementation of a project that is going through a Class EA process. Prior to making a Section 16(6) Order request, the concerned party should first try to resolve any concerns directly with the project proponent, in this case, Wellington County.

Timing for an Order Request

During the 30-day public comment period, anyone can review the documentation, submit any comments or concerns to the proponent, and request a Section 16(6) Order.

To request a Section 16 Order for a project, on the grounds that an Order may prevent, mitigate or remedy potential adverse impacts on constitutionally protected, Aboriginal and treaty rights, a concerned party must make the request before the public comment period is complete.

How to make a request

To submit a Section 16(6) Order request, the following information must be provided:

- name, address and email address;
- project name;
- proponent name;
- what kind of Order is being requested i.e., a request for additional conditions or a request for an individual environmental assessment;

- details about the concerns about potential adverse impacts on constitutionally protected Aboriginal or treaty rights and how the proposed Order may prevent, mitigate or remedy the identified adverse impacts;
- whether the concerned party belongs to, represents or has spoken with an Indigenous community whose constitutionally protected Aboriginal or treaty rights may be adversely impacted by the proposed project;
- whether the concerned party has raised their concerns with the proponent, the proponent's response (if any) and why the concerns could not be resolved with the proponent; and
- any other information to support the request.

Section 16 Order requests are made to the Minister of Environment, Conservation and Parks and the Director of Environmental Assessment Branch:

Minister Ministry of the Environment, Conservation and Parks 777 Bay Street, 5th Floor Toronto ON M7A 2J3 Minister.mecp@ontario.ca	Director Environmental Assessment Branch Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto ON M4V 1P5 enviropermissions@ontario.ca

There is no appeal of the minister's decision with respect to a Section 16 Order. If the request for a Section 16(6) Order is denied by the minister, the proponent can proceed with the project. If the minister makes an Order, the proponent may only proceed with the project if they follow the conditions in the Order.

The above discussion is intended as an overview of the process only. For more information and specific instruction, please visit:

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

Nima Mahmoudi, P.Eng.
Consultant Project Manager
WSP Canada Inc.
150 Commerce Valley Dr W
Thornhill ON L3T 7Z3
(289) 982-4039
Nima.Mahmoudi@wsp.com

Joe de Koning, P.Eng.
Manager of Roads
County of Wellington
74 Woolwich Street
Guelph ON N1H 3T9
(519) 837-2601 x 2270
joedk@wellington.ca

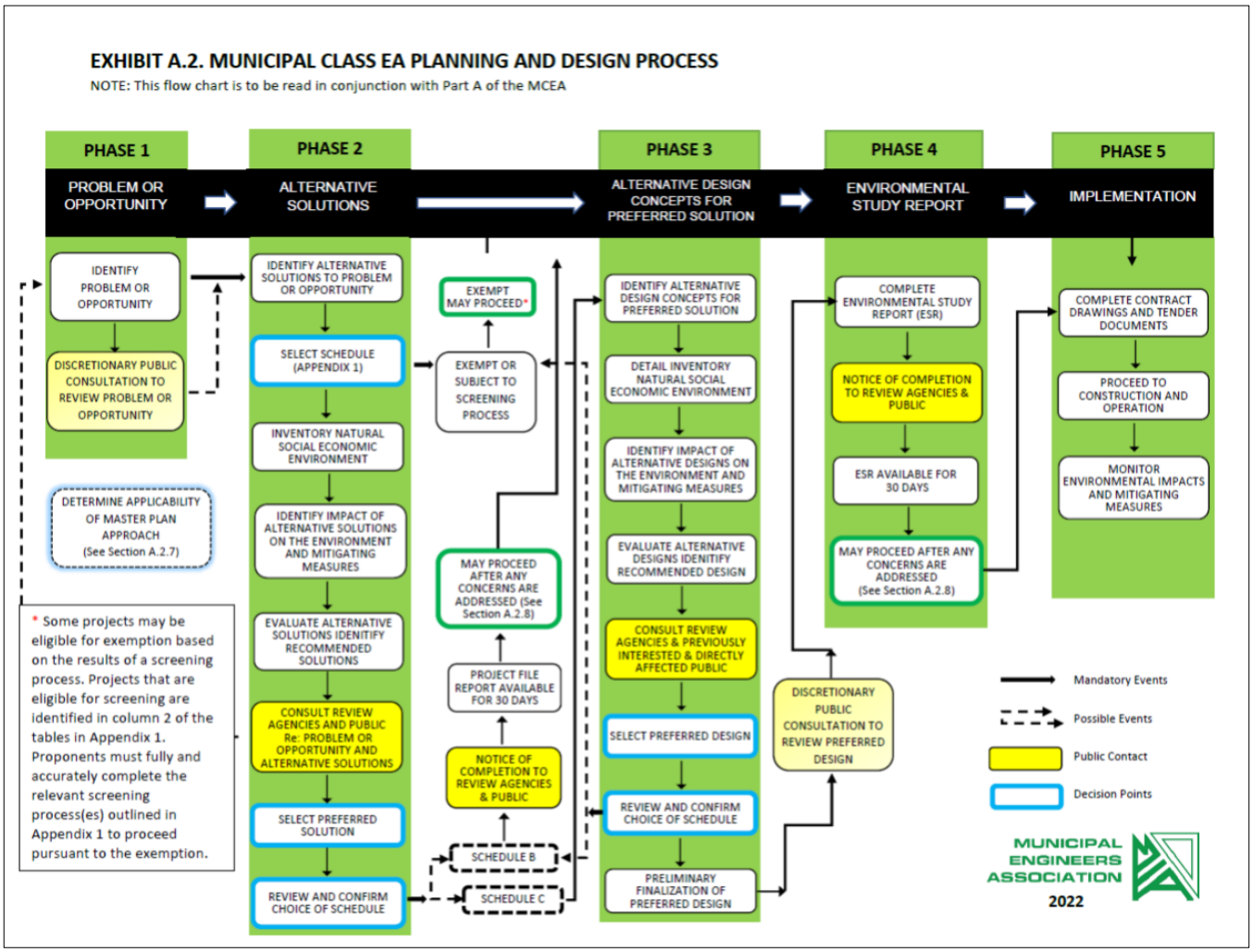
1.7 Mandatory Principles

The planning process followed not only adheres to the guidelines outlined by the Municipal Class EA document but reflects the following five mandatory principles of Class EA planning under the EA Act:

- Consultation with affected parties early on and throughout the process, such that the planning process is a co-operative venture;
- Consideration of a reasonable range of alternatives, both the functionally different alternatives to the project (known as alternative solutions) and the alternative methods of implementing the preferred solution;
- Identification and consideration of the effects of each alternative on all aspects of the environment;
- Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects; and
- Provision of clear and complete documentation of the planning process followed, to allow 'traceability' of decision-making with respect to the project.

Following these five principles ensures that the Class EA process is devoted to the prevention of problems and environmental damage through planning and decision-making, recognizing that research and evaluation of possible impacts have been considered prior to implementation of the project. As illustrated in **Figure 1-3**, the Municipal Class EA document outlines the planning and design process. Schedule C projects are required to follow Phases 1 through 4 of this process.

Figure 1-3: Municipal Class EA Process



2.0 PLANNING AND POLICY CONTEXT

This chapter reviews the planning and policy framework applicable to Wellington Road 109 Bridges Class EA Study. The planning and policy framework guides infrastructure planning, land use planning, and strategic investment decisions to support Provincial, County and Local objectives in growth and transportation.

The identification of the study area problems considered this policy framework, to ensure that the final recommendations are consistent with Provincial, Regional and Local policies and objectives.

2.1 Provincial Policy Statement (2020)

The Provincial Policy Statement (PPS), 2020 provides overall policy directions on matters of provincial interest related to land use and development in Ontario. The PPS was prepared under the authority of the Planning Act but may be considered in the planning and policy context of infrastructure planning completed under the Ontario Environmental Assessment Act (OEAA).

The PPS provides policy direction for the use and management of land, as well as infrastructure while protecting the environment and resources and to ensure opportunities for employment and residential development. The sections of the PPS applicable to the planning of transportation infrastructure are as follows:

Part IV: Vision for Ontario's Land Use Planning System – The development of land should be optimized to promote efficient use of land, resources and public investment in infrastructure and public service facilities. These land use patterns promote mixed uses including residential, employment, recreation, parks and open space. The supporting transportation infrastructure is to provide choices and promote increased use of active transportation as well as transit before other modes of travel. This is in support of building livable and healthy communities.

Part V: Policies – Specifically, Section 1.6.7 Transportation Systems and Section 1.6.8 Transportation and Infrastructure Corridors outlines the policies for infrastructure and public service facilities under transportation systems and policies for transportation and infrastructure corridors. The policies state that:

- "Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs."
- "As part of a multimodal transportation system, connectivity within and amongst the transportation systems and modes should be maintained and, where possible, improved including connections which cross jurisdictional boundaries."
- "A land use pattern, density and mix of uses should be promoted that minimize the length and number of vehicle trips and support current and future use of transit and active transportation." and
- "When planning for corridors and rights-of-way for significant transportation, electricity transmission, and infrastructure facilities, consideration will be given to the significant resources in Section 2: Wise Use and Management of Resources."

The following policies within the PPS support potential improvements to the Study Area:

Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns (Section 1.1, subsection 1.1.1, (g)):

- *"Healthy, livable and safe communities are sustained by: Ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs.*"

Infrastructure and Public Service Facilities (Section 1.6, subsection 1.6.1 and 1.6.4):

- *"Infrastructure and public service facilities shall be provided in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs."*
- *"Infrastructure and public service facilities should be strategically located to support the effective and efficient delivery of emergency management services, and to ensure the protection of public health and safety in accordance with the policies in Section 3.0: Protecting Public Health and Safety".*

Infrastructure and Public Service Facilities (Section 1.6, subsection 1.6.7 (1.6.7.1) - Transportation Systems):

- "*Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs*."

Planning for the Wellington Road 109 Bridges is consistent with the policy directions as prescribed by the PPS by promoting safe transportation as part of a wider connected transportation network.

2.2 Wellington County Official Plan (2023)

This Wellington County Official Plan is intended to give direction over the next 20 years, to the physical development of the County, its local municipalities and to the long-term protection of County resources. Through this Plan, County Council will outline a long-term vision for Wellington County's communities and resources. **Figure 2-1** depicts the Wellington North Schedule A6 Official plan.

The Plan provides policy to attain the long-term vision. The Wellington County Official Plan was adopted by Wellington County Council on September 24, 1998, approved by the Ministry of Municipal Affairs on April 13, 1999 and came into effect on May 6, 1999 and last Updated in September 2023.

Wellington County will make planning decisions which properly balance between protecting and enhancing the natural environment, enhancing economic competitiveness, and fostering a healthy, safe and socially responsible society.

Section 4.1.5 prescribes the Heritage Areas Policy Direction.

- *Where development and site alteration is allowed, significant archaeological resources must be conserved. Such resources will be conserved through removal, and documentation, or preservation on site. Where significant archaeological resources must be preserved on site, development and site alteration will only be allowed if the heritage integrity of the site is maintained.*
- *Where the County has determined a proposed development has areas of archaeological potential, an assessment of the property will be required to identify archaeological resources. Resources identified and determined to be significant will be conserved. The County may also require parts of a site to be excluded from development in order to maintain the heritage integrity of the site.*
- *The need for a Heritage Impact Assessment and/or Conservation plan will be based on the heritage attributes or reasons for which the resource is identified as significant, and will normally be identified in pre-consultation on development applications.*

Section 9.9.9.1 prescribes the general infrastructure policies.

a) *All existing, expanded or new infrastructure subject to and approved under the Canadian Environmental Assessment Act, the Environmental Assessment Act, the Planning Act, the Aggregate Resources Act, the Telecommunications Act or by the National or Ontario Energy Boards, or which receives a similar environmental approval, is permitted within the Protected Countryside, subject to the policies of this section and provided it meets one of the following two objectives:*

   i) *It supports agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted within the Greenbelt; or*

   ii) *It serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connection*.

b) *The location and construction of infrastructure and expansions, extensions, operations and maintenance of infrastructure in the Protected Countryside, are subject to the following:*

   i) *Planning, design and construction practices shall minimize, wherever possible, the amount of the Greenbelt, and particularly the Natural Heritage System, traversed and/or occupied by such infrastructure;*

   ii) *Planning, design and construction practices shall minimize, wherever possible, the negative impacts and disturbance of the existing landscape, including, but not limited to, impacts caused by light intrusion, noise and road salt;*

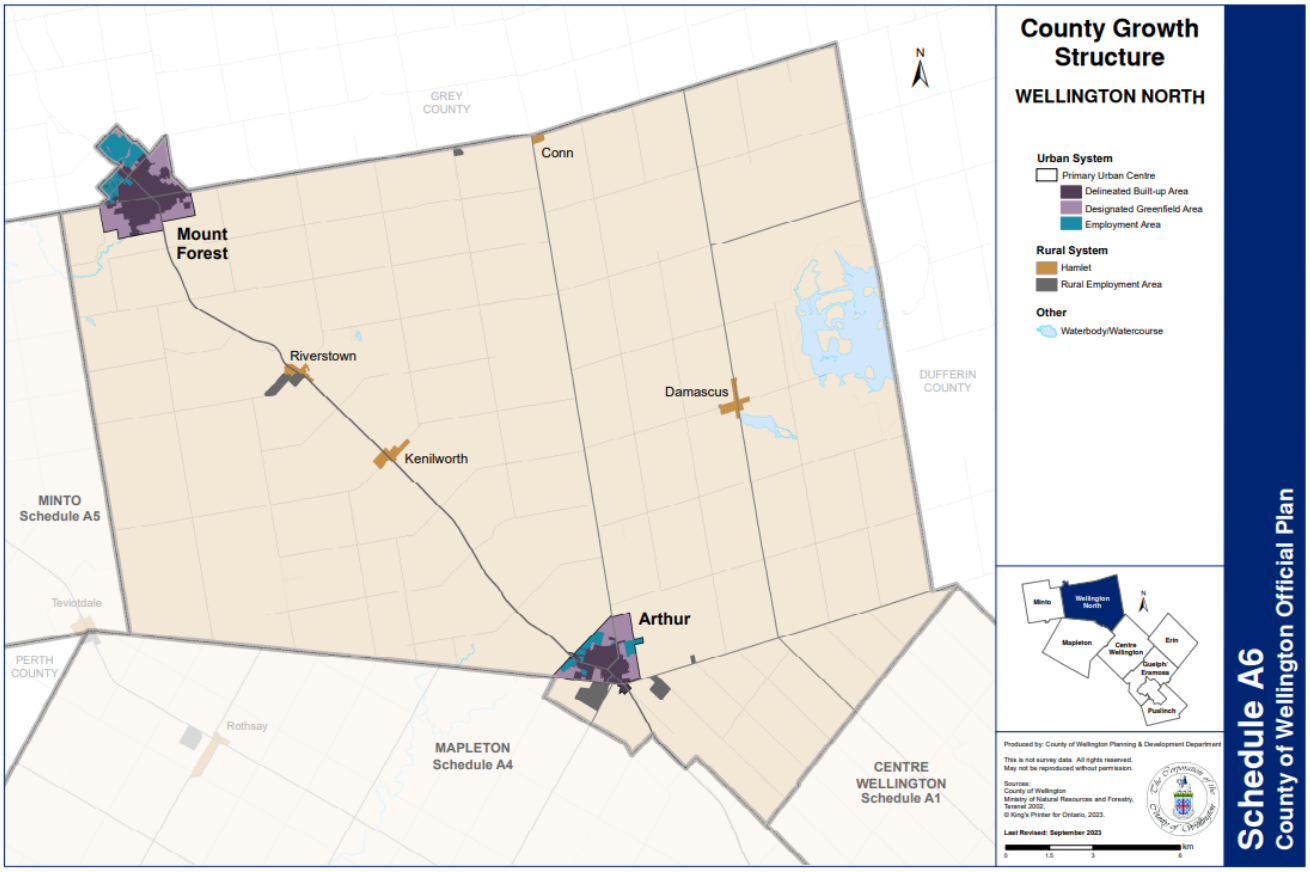
   iii) *Where practicable, existing capacity and coordination with different infrastructure services is optimized so that the rural and existing character of the Protected Countryside and the overall urban structure for southern Ontario established by Greenbelt and any provincial growth management initiatives are supported and reinforced;*

   iv) *New or expanding infrastructure shall avoid key natural heritage features or key hydrologic features unless need has been demonstrated and it has been established that there is no reasonable alternative; and*

   v) *Where infrastructure does cross the Natural Heritage System or intrude into or result in the loss of a key natural heritage feature or key hydrologic feature, including related landform features, planning, design and construction practices shall minimize negative impacts and disturbance on the features or their related functions, and where reasonable, maintain or improve connectivity.*

c) *Infrastructure serving the agricultural sector, such as agricultural irrigation systems, may need certain elements to be located within the vegetation protection zone of a key natural heritage feature or key hydrologic feature. In such instances, these elements of the infrastructure may be established within the feature itself or its associated vegetation protection zone but all reasonable efforts shall be made to keep such infrastructure out of key natural heritage features or key hydrologic features or the vegetation protection zones.*

Figure 2-1: Wellington North Schedule A6 Official Plan Map



2.3 A Place to Grow: The Growth Plan for the Greater Golden Horseshoe

A Place to Grow: Growth Plan for the Greater Golden Horseshoe ("Growth Plan"), 2019, was prepared and approved under the Places to Grow Act (2005) as a legal framework to implement the Province's vision for managing growth within the Greater Golden Horseshoe (GGH). Amendment 1 to the Growth Plan 2019 was approved by the Lieutenant Governor in Council taking effect in August 2020.

The GGH is a dynamic and diverse area, and one of the fastest growing regions in North America. By 2051, this area is forecast to grow to, at a minimum, 14.8 million people and 7 million jobs, with the Region of York accounting for 2 million people and approximately 1 million jobs.

To better co-ordinate planning for growth across the region, this Plan provides population and employment forecasts for all upper- and single-tier municipalities in the GGH. This Plan is about accommodating forecasted growth in complete communities by providing guidance on transportation, infrastructure planning, land-use planning, urban form, housing, natural heritage and resource protection. Complete communities support quality of life and human health by encouraging the use of active transportation and providing high quality public open space, adequate parkland, opportunities for recreation, and access to local and healthy food.

The Growth Plan contains specific policies and directions regarding transportation infrastructure, land use planning, urban form, housing, natural heritage and resource protection to be considered by municipalities in their planning activities. Of particular interest, the Growth Plan provides direction on where growth can occur, the form of future development and future population and employment forecasts.

Policy 3.2.2 (2) and (3) of the Growth Plan provides direction on General Transportation Planning. The following excerpted policies are applicable to this Class EA Study:

2 The *transportation system within the GGH* will be planned and managed to:

b) provide connectivity among transportation modes for moving people and, for moving goods;

c) offer a balance of transportation choices that reduces reliance upon the automobile and promotes transit and active transportation;

d) be sustainable and reduce greenhouse gas emissions by encouraging the most financially and environmentally appropriate mode for trip-making and supporting the use of zero- and low-emission vehicles;

e) offer multimodal access to jobs, housing, schools, cultural, and recreational opportunities, and goods and services; and

f) provide for the safety of system users.

3 In the design, refurbishment, or reconstruction of the existing and planned street network, *a complete streets* approach will be adopted that ensures the needs and safety of all road users are considered and appropriately accommodated.

Policy 3.2.3 of the Growth Plan provides direction on Moving People. The following excerpted policies are applicable to this Class EA Study:

4 Municipalities will ensure that *active transportation* networks are comprehensive and integrated into transportation planning to provide:

a) safe, comfortable travel for pedestrians, bicyclists, and other users of *active transportation*; and

f) continuous linkages between *strategic growth areas, adjacent neighbourhoods, major trip generators*, and transit stations, including dedicated lane space for bicyclists on the major street network, or other safe and convenient alternatives.

Planning for the replacement of the Wellington Road 109 bridges are consistent with the policy direction of the Growth Plan by contributing to the development to provide connectivity among transportation modes for moving people and for moving goods. As well it will enhance continuous linkages between strategic growth areas, adjacent neighbourhoods, major trip generators, and transit stations by providing an alternative branch to the existing intersection.

2.4 Greenbelt Plan

The *Greenbelt Plan* strives to:

- protect against loss and fragmentation of agricultural lands;
- provide permanent protection to natural heritage and water resource systems; and
- provide for a range of economic and social activities associated with rural communities.

The objectives of the Infrastructure and Natural Resources policies of the Greenbelt Plan are to promote infrastructure that is consistent with the goal of the *Greenbelt Plan* and *Growth Plan*, while pursuing to minimize the impact on the environment. The Greenbelt Plan acknowledges that infrastructure is essential to Ontarians' economic well-being, human health, and quality of life. It allows existing, expanded or new infrastructure in the Greenbelt, provided that the infrastructure serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among urban centres and between these centres and Ontario's borders.

Similar to the PPS and *Growth Plan*, *Greenbelt Plan* policies influence transportation primarily through municipal planning policy as the *Greenbelt Act* requires that Official Plans conform to the policies of the Plan. The *Greenbelt Plan* also sets out policies for how transportation infrastructure may be planned, designed and constructed. No portion of the Study Area is located within the Greenbelt Plan Natural Heritage System. An analysis of the Greenbelt Plan Area will include protection measures to minimize the environmental impacts to the habitats, resources systems, agricultural lands, and socio-economic factors.

Original or modified existing infrastructure approved under the EA process is permitted within the Protected Countryside, although the infrastructure is required to avoid Key Natural Heritage and Key Hydrologic Features unless a compelling need is established and there is no reasonable alternative. Where development does intrude or result in loss of Key Natural Heritage and/or Key Hydrologic Features, the impacts and disturbance must be minimized.

The project team considered the land-use in the area and confirmed there will be minimal to no impacts in the key natural features of the Greenbelt Areas.

3.0 IDENTIFICATION/DESCRIPTION OF THE PROBLEM/OPPORTUNITY

Phase 1 of the five phased Municipal Class EA planning process requires the proponent of an undertaking (the County of Wellington) to first document factors leading to the conclusion that structures on WR 109 improvements are required, and ultimately, develop a clear statement of the identified problem to be investigated and/or opportunity to be realized.

As such, the **Problem/Opportunity Statement** is the principle starting point in the undertaking of a Municipal Class EA and becomes the central theme integrating elements of the project. It also assists in setting the scope of the project.

The Problem/Opportunity Statement for Wellington Road 109 bridges Municipal Class EA is defined as follows:

- The four WR109 structures are in **poor condition with major elements in an advanced state of deterioration**. In general, severe deterioration including delaminated and spalled concrete with rust staining and efflorescence are present throughout the wingwalls, abutments, deck soffit and fascia. In addition the concrete railings have significant deterioration including full section loss in areas and do not meet current standards.
- Several components on each structure are in need of maintenance, rehabilitation or replacement, as **all of the structures approach the end of their design life**.
- As the conditions worsen, the **structures may be subject to load restrictions or closures** which would be extremely disruptive given the important of WR109 as a local and regional east-west transportation and goods movement route.
- Two of the structures are undersized and **do not meet flood conveyance criteria**.
- With the number of bridges and the scope of works that will likely be needed, construction will extend over multiple years. **Multi-year construction and associated traffic disruption will come with challenges** for local residents, businesses and travellers.
- There is an opportunity to consider the feasibility and cost, for comparison purposes, of a localized permanent realignment of WR109 that would eliminate or reduce the multiple river crossings and the need for future works.

4.0 PUBLIC AND AGENCY CONSULTATION

4.1 General

Throughout the planning process, a variety of communications and consultation methods were undertaken with numerous stakeholders, including the county of Wellington, Ministry of Natural Resources and Forestry (MNRF), Ministry of Environment, Conservation and Parks (MECP), Grand River Conservation Authority (GRCA), Ministry of Citizenship and Multiculturalism (formerly MTCS), Ministry of Transportation (MTO), various Indigenous communities, elected officials, external government review agencies, property owners and other stakeholders and interested members of the public.

A project contact list was developed at the outset of the study consisting of external agencies, utility companies, area businesses, residents, Indigenous communities and other stakeholders. Through the consultation program, additional contacts were added, and were removed from the list. Letters and project notifications were distributed to this list by mail or e-mail to advise of the key points of contact. The project contact list can be found in **Appendix A**.

Several steps were undertaken to inform the affected stakeholders about this Municipal Class EA Study, obtain their input, and address their comments or concerns as much as possible, as they arose. This was accomplished throughout the study beginning with the notification of Study Commencement, continuing through two Public Information Centres (PICs), and Study Completion.

The following means of communication was used in this study to ensure that all potentially affected and interested stakeholders were notified of the project.

- **Notices** – Notices appeared in the Wellington Advertiser to announce the Study Commencement, Public Information Centre (PIC) No. 1, PIC No. 2, as well as Study Completion;
- **Letters** – An initial contact letter and an invitation letter to the PICs were delivered by mail and e-mail to those on the master contact list including agencies, Indigenous communities, landowners including residents in the study area, as well as other stakeholders;
- **PIC Materials** – Display boards and comment sheets were produced for use during the PICs;
- **Webpage** – The County's main website was the host webpage for this project providing background information, relevant documents and contact information. The web page was updated at key milestones during the span of the project. The link for the webpage was noted on all communication materials; and
- **Environmental Study Report (ESR)** – All forms of communication and consultation with agencies and the public are included in the ESR.

Refer to **Appendices A, B, C and D** for copies of the letters, notices, correspondences and PIC materials.

4.2 External Agency Consultation

The following external agencies, including Federal and Provincial government agencies and Indigenous communities (IC) were consulted as part of this study. These agencies included:

Provincial Government Agencies:

- Ministry of Environment, Conservation and Parks (MECP)

- Grand River Conservation Authority (GRCA)
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Natural Resources and Forestry (MNRF)
- Ontario Provincial Police
- Ministry of Citizenship and Multiculturalism (formerly MTCS)
- Ministry of Transportation (MTO)

Municipal, Emergency Services, and District School Boards:

- Township of Wellington North
- Wellington North Fire Services
- Guelph-Wellington Emergency Medical Services
- Wellington County Museum and Archives
- Wellington County Historical Society
- Wellington Catholic District School Board
- Upper Grand District School Board
- Conseil scolaire Viamonde
- Conseil scolaire de district catholique Centre-Sud
- Wellington-Dufferin Student Transportation Services

Utilities:

- Wightman Telecom
- Bell Aliant
- Bell Canada
- Bell IM Orangeville
- Mornington Communications Co-operative Limited
- Hydro One Networks Inc.
- Rogers Communications
- Cogeco
- Enbridge Gas Distribution Inc.
- Wellington North Power Inc.
- Union Gas

A summary of external agency participation that occurred during the Study Commencement, PIC #1 and PIC #2 is included in **Table 4-1**. Agency correspondences are provided in **Appendix B.**

Table 4-1: Summary of Correspondence Obtained from External Agencies

Agency	Comment Received	WSP Response/Action
Indira Sharma, Project Support Telus Utility	**Comment received on August 27, 2020 following Notice of Study Commencement indicate the following**: • Telus has no infrastructure in the area of your proposed work. Permit expires six (6) months from approval date	• Comments noted. No further action required.
Frank brown, Bell Implementation Manager Bell Canada	**Comment received on August 28, 2020 following Notice of Study Commencement indicate the following:** • Thanked the Project Team	• Comments noted. No further action required.
Barb Slattery Ministry of the Environment, Conservations and Park (MECP)	**Comment received on August 28, 2020 following Notice of Study Commencement indicate the following:** • Provided a summary of the Part II Order process • MECP provided a list of ICs that need to be contacted • Provided a proponent's introduction to the delegation of procedural aspects of consultation with Indigenous Communities	• Comments noted. No further action required.
Kevin Schimus Enbridge Gas	**Comment received on September 3, 2020 following Notice of Study Commencement indicate the following:** • Enbridge Gas plant locations were provided and noted locates must be obtained through Ontario One Call Limited to confirm location of gas line prior to excavation.	• Comments noted. No further action required.
Joseph Harvey Ministry of Citizenship and Multiculturalism (Formerly MTCS)	**Comment received on September 15, 2020 following Notice of Study Commencement indicate the following:** • Concerns about identifying Cultural Heritage Resources, the Cultural, Heritage & Archaeological Resources Assessment Checklists, and Environmental Assessment Reporting.	• Comments noted. No further action required.
Secondary Land Use, Asset Optimization SecondaryLandUse@HydroOne.com Hydro One	**Comment received on September 17, 2020 following Notice of Study Commencement indicate the following:** • Confirmed that based on preliminary assessment, there are no existing Hydro one Transmission assets in the subject study area. • Indicated if the undertaking change or the study area expands beyond shown, need to contact Hydro one to assess impacts of existing or future planned electricity infrastructure. 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. • Requested to sent future communications to Secondarylanduse@hydroone.com.	• Comments noted. No further action required.

Agency	Comment Received	WSP Response/Action
Karina Černiavskaja, District Planner Ministry of Natural Resources and Forestry (MNRF)	**Comment received on September 17, 2020 following Notice of Study Commencement indicate the following:** • Noted that MNRF have not completed a screening of natural heritage or other resource values for the project at this time and it is WSP's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals. • MNRF provided information to guide in identifying and assessing natural features and resources as required by applicable policies and legislation and engaging with the MNRF for advice as needed. The following information were provided by MNRF: o Natural Heritage & Endangered Species Act o Petroleum Wells & Oil, Gas and Salt Resource Act o Public Lands Act & Lakes and Rivers Improvement Act • Requested to receive copies of any draft reporting completed in support of this project.	• Comments noted. No further action required.
Allan Hodgins, Corridor Management Planner MTO	**Comment received on January 15, 2021 following PIC #1 indicate the following:** • Requested to update the project mailing list to include the new MTO contacts • The following responses received from MTO per comments sent to MTO on January 5, 2021: 1.We assume the first sentence in your email was intended to say the Ministry does not have any current plans for changes to Highway 6 in this area. **a. MTO confirmed, does not*** 2.Related to Question 1, while MTO has no current plans - has there been any consideration of a realignment around Arthur in the long term (i.e. 20 yr planning horizon)? **a.MTO has no current or long range plans for realignment of Highway 6 around the Town of Arthur or this intersection.** 3.Related to Questions 1 and 2 - The comment we received from the member of the public indicated anecdotally "traffic problems at the WR109 and Hwy 6 intersection and heavy, through, traffic in the town of Arthur". Has MTO registered similar anecdotal reports/complaints from local residents, travellers or Wellington North? Has there been or is there any plan by MTO to study potential issues? **a.MTO has not identified any concerns with traffic operations at the intersection of Highway 6 and Wellington Road 109**. **i.MTO is not aware of any complaints registered regarding traffic operations at this intersection.** **b.There are no studies of this intersection planned at this time.** 4.Can you confirm the year that the intersection improvements were made at Highway 6 / WR109. Was a roundabout considered at that time? Or would a roundabout be considered in future?	• The project noted that contact list will be updated accordingly and will have a look at the web portal. • The Project Team will be in touch as the project moves forward into design, including traffic management analysis.

Agency	Comment Received	WSP Response/Action
	a.Intersection improvements to the Highway 6/Wellington Road 109 intersection were completed by MTO as part of a Highway 6 rehabilitation project (Fergus to Arthur) in 2006/2007 (see attached contract drawings). **i.A roundabout was not considered at the time(2006)** **ii.A roundabout would be evaluated as an option in a future design study (Horizontal/vertical alignment and existing commercial development at the intersection would need to be considered in the evaluation of a roundabout optio**) • Indicated MTO has recently launched a MTO Highway Corridor Management System (HCMS) web-portal, with a "Request a Pre-Consultation" and "General Inquiry" function (https://www.hcms.mto.gov.on.ca). This platform has been developed to better serve the general public and development sectors and track the status of a submission. Once submitted the file will be assigned to the appropriate MTO staff to facilitate review and comment. This could be utilized on future to reduce any delays in contacting MTO across the province.	
Karina Černiavskaja, District Planner Ministry of Natural Resources and Forestry (MNRF)	**Comment received on January 15, 2021 following PIC #1 indicate the following:** • Confirmed the receipt of PIC #1 Notice • Noted that MNRF have not completed a screening of natural heritage or other resource values for the project at this time and it is WSP's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals. • MNRF provided information to guide in identifying and assessing natural features and resources as required by applicable policies and legislation and engaging with the MNRF for advice as needed. The following information were provided by MNRF: ○ Natural Heritage & Endangered Species Act ○ Petroleum Wells & Oil, Gas and Salt Resource Act ○ Public Lands Act & Lakes and Rivers Improvement Act • Requested to review any draft reporting completed in support of this project.	• Indicated we will review the package and will be in touch should we have any questions.
Barb Slattery EA/Planning Coordinator Ministry of the Environment, Conservation and Parks (MECP)	**Comment received on December 15, 2020 following PIC #1 indicate the following:** • MECP confirmed the correct person to be receiving this Notice. • Asked when the Notice of Commencement was issued • Requested continue to provide future notices to kept informed of the process	• Indicated the Notice of Study Commencement was issued on August 27, 2020. Copy of the Notice sent to the MECP contact for reference.
Indira Sharma Project Support	**Comment received on May 28, 2021 following PIC #2 indicate the following:** • Noted Telus has no underground infrastructure in the study area.	• Comments noted. No further action required.

Agency	Comment Received	WSP Response/Action
Telus Utility		
Trevor Bell, Environmental Resource Planner & EA Coordinator Ministry of the Environment, Conservation and Parks (MECP)	**Comment received on May 28, 2021 following PIC #2 indicate the following:** • Provided updated contact information for the EA Coordinator for Wellington County and a file showing the areas of responsibility of all EA Coordinators for reference.	• Comments noted. No further action required.
Joseph Harvey, Heritage Planner MCM (Formerly MHSTCI)	**Comment received on June 2, 2021 following PIC #2 indicate the following:** • Noted that Katherine Kirzati recently retired and send all additional project updates and materials to Karla Barboza and Joseph Harvey. • Requested for copies of any technical cultural heritage studies completed to support of this project.	• Comments noted. Technical reports were sent to the ministry. No further action required.
Joseph Harvey, Heritage Planner MCM (Formerly MHSTCI)	**Comment received on June 11, 2021 following PIC #2 indicate the following:** • Confirmed that a combined approach to documenting cultural heritage due diligence is acceptable. • Confirmed that comments will be provided on the CHERs and HIAs completed for the four bridges.	• Comments noted. No further action required.
Joseph Harvey, Heritage Planner MCM (Formerly MTCS)	**Comment received on July 6, 2021 following PIC #2 indicate the following:** • Noted that the HIA report for Bridge #4 was missing from the report package sent by WSP.	• HIA report for Bridge #4 was shared for MCM's review.
Matthew Aston Director of Operations Township of Wellington North	**Comment received on June 21, 2021 following PIC #2 indicate the following:** • Inquired would Wellington North be expected to continue to maintain 2nd Line Bridge for driveway access. • Noted Wellington North supports one lane of traffic always being maintained during construction. • Wellington North requested project signage to promote downtown Arthur businesses during construction. • Request to be consulted if any Township roads were used as detour route. • Wellington North would request project team give due consideration to traffic queue that would be created in and around Highway 6 / County Rd 109 and Tim Horton's as this is a busy intersection.	• Noted yes, 2nd Line would need to be maintained for driveway access. Wellington North will be consulted regarding any detours on Township roads. Traffic queue will be considered when designing the construction staging, particularly for the 2 structures near Arthur.
Joseph Harvey, Heritage Planner MCM (Formerly MTCS)	**Comment received on February 22, 2022 following PIC #2 indicate the following:** • Noted that MCM has reviewed the CHERs and HIAs for the four bridges and found these reports to be consistent with the requirements, guidance and standards of the MCEA. • Recommended that the technical cultural heritage studies be appended to any EA report for public review.	• Comments noted. No further action required.

4.3 Public Involvement

4.3.1 Study Commencement

A “Notice of Study Commencement” inviting initial input was published in the *Wellington Advertiser* on August 27, 2020. In addition, notice of Study Commencement letter was distributed to stakeholders (e.g. the public, Indigenous communities, municipalities, agencies, etc.) on the Project Team’s mailing list on August 27, 2020. The Notice was also sent via bulk mail to property owners and business owners within and adjacent the study area.

The Notice of Study Commencement and a copy of agency/utility response form were sent to provincial and municipal agencies via email. The Notice of Study Commencement and agency/utility response form can be found in **Appendix A**.

Comments received during the review period and accordingly were addressed and documented. Correspondence can be found in **Appendix B**.

The purpose of this notice was to:

- Identify and confirm the nature and/or extent of the study;
- Outline the planning process required under the Class EA (Schedule C); and
- Request comments from public and review agencies related to any issues, and/or concerns they had, which should be considered and/or addressed as part the work to be completed.

4.3.2 Public Information Centre No. 1

The first of two PICs was held virtually on the County of Wellington website at www.wellington.ca/109EA due to the on-going global pandemic. The PIC display panels were published on the County of Wellington website beginning on December 17, 2020. The virtual engagement allowed stakeholders to review information presented at their own time and submit comments using the online comment form available on the County’s website or by contacting the County of Wellington Manager of Roads, Joe de Koning, or the WSP Project Engineer, William Van Ruyven (former consultant Project Manager). The Notice was sent to Indigenous communities, agencies and stakeholders via email on December 14, 2020. The Notice was also sent via bulk mail to property owners and business owners within and adjacent the study area.

The purpose of PIC No. 1 was to provide an opportunity for agencies, special interest groups, potentially affected property owners and the public to review the background information, problem and opportunity statement, significant study features, evaluation of alternative planning solutions, the preliminary recommended planning solution, and to meet and discuss their concerns with the project team.

The Notice of PIC No. 1 was published in the *Wellington Advertiser* on December 14, 2020. The PIC No. 1 notice can be found in **Appendix A** and PIC #1 display panels can be found in **Appendix C**.

Comments received during the review period and accordingly were addressed and documented. Correspondence can be found in **Appendix B**.

During the study, an online questionnaire after the PIC No.1 was developed. The questionnaire was published on the County of Wellington website at www.wellington.ca/109EA. The PIC #1 Questionnaire and suvery results can be found in **Appendix A** and **Appendix B,** respectively.

4.3.3 Public Information Centre No. 2

Public Information Centre No. 2 for this study was held virtually on the County of Wellington website at www.wellington.ca/109EA due to the on-going global pandemic. The PIC display panels were published on the website beginning on May 27, 2021. The Notice was sent to Indigenous communities, agencies and stakeholders via email on May 27, 2021. The Notice was also sent via bulk mail to property owners and business owners within and adjacent the study area.

The purpose of PIC No. 2 was to provide an opportunity for agencies, special interest groups, potentially affected property owners and the public to review comments received from PIC No. 1, work completed since then, evaluation of alternative design concepts including the preliminary recommended design, and to meet and discuss their concerns with the project team.

The Notice of PIC No. 2 was published in the *Wellington Advertiser* on May 20, 2021. Notice of PIC No. 2 is shown in **Appendix A** and PIC #2 display panels can be found in **Appendix D**.

Comments received during the review period and accordingly were addressed and documented. Correspondence can be found in **Appendix B**.

A summary of comments received from property owners during the Study Commencement, PIC #1 and PIC #2 is included in **Table 4-2**. Public correspondences are provided in **Appendix B**.

Table 4-2: Summary of Public Consultation

Summary of Comments received	County of Wellington / WSP Response/Action taken	Future Commitments
Comment received on August 31, 2020 • Inquiries about the process of inclusion as a member of the public.	**Response sent on August 31, 2020 and indicated the following:** • Our direct mailout area includes all properties within Arthur and along Wellington Road 109 and if you received a Notice via regular mail then you are already included in the mailing list and will continue to receive direct notices as the study progresses. • Provided a link to the County of Wellington website for additional study background https://www.wellington.ca/en/resident-services/rd-wellingtonroad109ea.aspx • Noted at two study milestones, a full information package of the study progress, key decision-making items and request for public feedback will be provided. Anticipated these milestones to be in late fall 2020 and early spring 2021. • Direct notices will be sent when these packages become available. If public meetings are permitted, these events may also consist of an open house.	• Comments noted. No further action required.
Comment received on September 13, 2020 • Requested to be added on the study mailing list	**Response sent on September 14, 2020 and indicated the following:** • Confirmed that they will be added to the mailing list • Provided a link to the County of Wellington website for additional study background https://www.wellington.ca/en/resident-services/rd-wellingtonroad109ea.aspx • Noted at two study milestones, a full information package of the study progress, key decision-making items and request for public feedback will be provided. Anticipated these milestones to be in late fall 2020 and early spring 2021. • Direct notices will be sent when these packages become available. If public meetings are permitted, these events may also consist of an open house.	• Comments noted. No further action required.
Comment received on September 21, 2020 • Requested to be added on the study mailing list	**Response sent on September 22, 2020 and indicated the following:** • Confirmed that they will be added to the mailing list • Provided a link to the County of Wellington website for additional study background https://www.wellington.ca/en/resident-services/rd-wellingtonroad109ea.aspx • Noted at two study milestones, a full information package of the study progress, key decision-making items and request for public feedback will be provided. Anticipated these milestones to be in late fall 2020 and early spring 2021. • Direct notices will be sent when these packages become available. If public meetings are permitted, these events may also consist of an open house.	• Comments noted. No further action required.
Comment received on December 18, 2020 • Concerned property owner in the study area and wants to be kept informed of the EA progress. • Noted given the limited scope of this study a wrong conclusion will be the outcome. A lot of money will be spent to fix bridges that would possibly be of no use in the future when the traffic problems at the WR109 and Hwy 6 intersection still exist. The long-term solution could be a re-location of Hwy 6 to the west. ---------- **Follow-up email received on January 8, 2021** • Thanked for the reply. • Noted the decision to replace the bridges is the wrong conclusion as there will be much disruption to the traffic on 109 during construction and environmental issues with temporary by-pass construction in the river.	**Response sent on January 6, 2021 and indicated the following:** • The Project Team has made a preliminary recommendation to replace the bridges. • This preliminary recommendation will be subject to confirmation based on agency and stakeholder feedback. • The Project Team is currently consulting with MTO West Region to review all current and long-term plans for the study area and ensure that the Wellington Road 109 Class EA Study fully considers MTO's program and priorities in the decision-making process	• Comments noted. No further action required.

Summary of Comments received	County of Wellington / WSP Response/Action taken	Future Commitments
Comment received on June 1, 2021 • Suggested that bridges should be repaired and widened to allow for larger farm equipment to pass.	**Response sent and indicated the following:** • Noted that future considerations for traffic flow will be utilized while finalizing preliminary and detailed design.	• Comments noted. No further action required.
Comment received on June 2, 2021 • Suggested that a roundabout should not be included in the project design plans due to the uphill grade of Highway 6 south of Wellington Road 109, which could cause traffic issues.	**Response sent and indicated the following:** • Confirmed that a roundabout is not planned as part of this work.	• Comments noted. No further action required.
Comment received on June 8, 2021 • Thanked for a phone call conversation and discussing the project progress.	**Response sent on June 8, 2021 and indicated the following:** • Following comments noted as they relate to the WR109: • At Structure B109132 (Conestogo River Bridge # 6), which is the bridge closest to Highway 6, it is noted that there is a large volume of truck traffic that is often slow to climb up WR 109 (eastbound) from the Highway 6 intersection/Tim Hortons/Gas Station. In order to address this, it may be worthwhile to consider a second land (climbing lane/passing lane) over the bridge. • In addition, it may be worth considering 4 lanes (2 eastbound and 2 westbound) given the planned growth in the community and traffic volumes. It is understood that the water treatment facility has been upgraded to accommodate 10,000 houses. • Noted your feedback will be documented in the study and ensure these suggestions are considered. • Noted or additional information contact Joe de Koning (County Manager of Roads, 519-837-2601) or Jamie Yeung (WSP PM, 289-835-2637)	• Comments noted. No further action required.
Comments received on June 23, 2021 • Inquired if the Municipal Drain 23 could be relocated to farmland with the water conveyed through a large diameter pipe inground. • Also wondered if it would be possible to work with the Ministry of Agriculture, Ministry of Natural Resources and the GRCA to relocate the 'Municipal Drain 23' to one side of WR109.	**Response sent on January 20, 2022 and indicated the following:** • Noted for major changes to a municipal drain bridge crossing (water elevations, flow velocities, drain alignment, diverting flow to a new crossing or channel, …), this has to be undertaken under a separate study "Drainage Report for Municipal Drain Updates" and should be reviewed by a third-party Municipal Drain Engineer hired by the Municipality, which is beyond the scope of this assignment.	• Comments noted. No further action required.

4.4 Indigenous Communities Consultation

Consultation with Indigenous communities is an integral component in the consultation process for planning projects. Indigenous communities were contacted by the Project Team at key milestones throughout the study process. The following Indigenous communities were notified of the Study Commencement on August 27, 2020 and sent a Notice of PIC #1 and a Notice of PIC #2 on December 14, 2020 and May 28, 2021, respectively.

- Mississaugas of the Credit First Nation
- Six Nations of the Grand River
- Council c/o Haudenosaunee Development Institute

Any requests for information and/or opportunities to meet with the Indigenous community were encouraged by the project team throughout the course of the study.

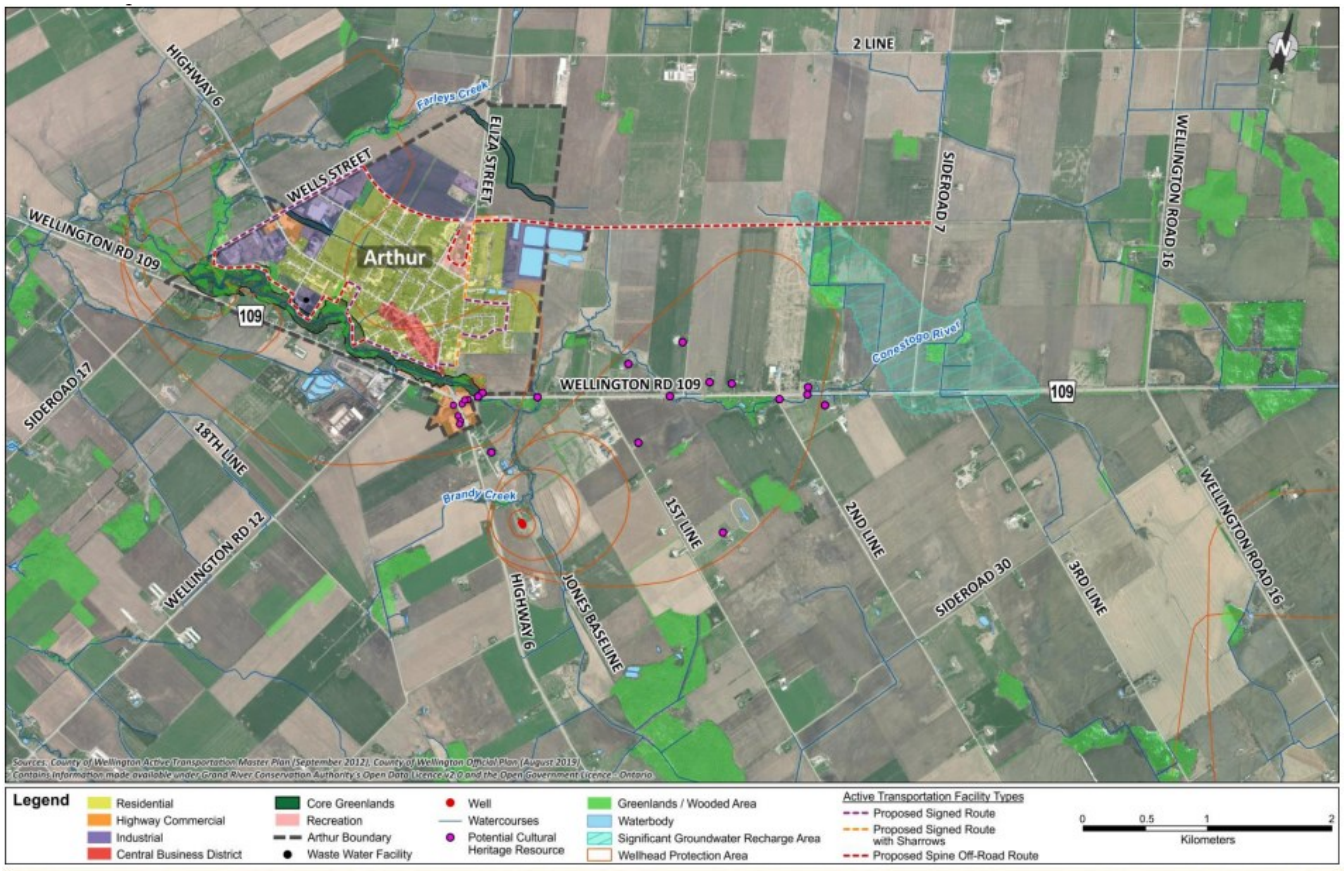
One comment was received from Mississaugas of the Credit First Nation (MCFN) after PIC #2. The MCFN expressed concern about the Field Liaison Representative participation agreement which needs to be reviewed and executed by Wellington County to facilitate MCFN's involvement in a Stage 2 archaeological assessment for Wellington Road 109. Based on the results of the Stage 1 Archaeological Assessment (AA) and further communication with MCFN, it was determined that a Stage 2 Archaeological Assessment is not required and there is no archaeological potential in the study area. Copy of correspondence is included in **Appendix B**.

5.0 EXISTING CONDITIONS

5.1 Land Use

Existing land use along the WR109 is a mix of rural residences, farm properties and farming operations, and commercial/industrial businesses with frontage and/or access on WR109. Highway commercial uses are present around the intersection of Highway 6 and WR109, in the west part of the study limits. The nearby Urban Centre of Arthur includes residential, highway commercial, central business district, industrial land use designations. **Figure 5-1** depicts the Wellington Road 109 study area overview.

Figure 5-1: Wellington Road 109 Bridges – Study Area Overview



5.2 Cultural Environment

5.2.1 Cultural Heritage Evaluation Report (CHER)

In October 2021, WSP completed a Cultural Heritage Evaluation Report (CHER) for the Wellington Road 109 four structures (B109132, B109134, B109133, C109123). A Cultural Heritage Evaluation Report (CHER) has been prepared to document listed/designated and potential heritage resources within the study area. The Cultural Heritage Evaluation Report can be found in **Appendix E**.

5.2.1.1 B109132 (Bridge #6)

The Conestogo River Bridge #6 is a two-lane, single span structure on Wellington Road 109, located approximately 0.2 km east of Highway 6 in the Township of Wellington North in Wellington County. It was built in 1931 and has a span of 17 m.

- Based on the results of research, site investigation, and application of the criteria in O. Reg. 9/06 it was determined that the Conestogo River Bridge #6 has cultural heritage value or interest. As such, a Heritage Impact Assessment shall be undertaken by a qualified person during the EA process.

5.2.1.2 B109134 (Bridge #10)

The Conestogo River Bridge #10 is a two-lane, single span structure on Wellington Road 109, located approximately 1 km east of Wellington Road 45 in the Township of Wellington North in Wellington County. It was built in 1934 and has a span of 13.5 m.

- Based on the results of research, site investigation, and application of the criteria in O. Reg. 9/06 it was determined that the Conestogo River Bridge #10 has cultural heritage value or interest. As such a Heritage Impact Assessment shall be undertaken by a qualified person during the EA process.

5.2.1.3 B109133 (Bridge #4)

The Conestogo River Bridge #4 is a two-lane, single span structure located approximately 1.7 km east of Highway 6 in the Township of Wellington North in Wellington County. It was built in 1931 and has a span of 13.8 m.

- Based on the results of research, site investigation, and application of the criteria in O. Reg. 9/06 it was determined that the Conestogo River Bridge #4 has cultural heritage value or interest. Therefore, a Heritage Impact Assessment is required for this resource to identify appropriate mitigation measures.

5.2.1.4 C109123 (Bridge #5)

The Conestogo River Bridge #5 is a two-lane concrete barrel arch bridge, on Highway 109 located approximately 0.7 km west of Highway 6 in Wellington County. It was built in 1930 and has a length of 14 m and a width of 11.7 m.

- Based on the results of research, site investigation, and application of the criteria in O. Reg. 9/06 it was determined that the Conestogo River Bridge #5 has cultural heritage value or interest. Therefore, a heritage impact assessment should be completed during detailed design.

None of the structures are currently listed on Municipal Heritage Registers or designated under the Ontario Heritage Act. Based on the results of research, site investigation, and application of the criteria, all of the structures were identified as meeting one or more of the “Criteria for Determining Cultural Heritage Value or interest” under Ontario Heritage Act Regulation 9/06.

5.2.2 Heritage Impact Assessment (HIA)

In January 2022, WSP completed a Heritage Impact Assessment (HIA) for the Wellington Road 109 four structures (B109132, B109134, B109133, C109123). A Heritage Impact Assessment (HIA) has been prepared for each bridge to assess the impacts of the bridge’s replacement and recommend appropriate mitigation measures. The Heritage Impact Assessment Report can be found in **Appendix F**.

The completion of the HIA studies for all four bridges have resulted in the following recommendations:

- All four (4) Bridges should be recorded through a Documentation and Salvage Report containing measured drawings, a thorough photographic record and written description of the bridge as well as recommendations for elements worthy of salvage prior to demolition (i.e., steel truss members, commemorative bridge plaque). Given that these bridges have a contextual relationship to each other and Wellington Road 109, being built around the same time by the DHO, WSP recommends that the documentation of each bridge be combined into one report. This report should be shared with the County of Wellington and the County of Wellington Museum & Archives. The bridge(s) should be documented to the standard outlined according to section 6.3.1.4 of the MTO Environmental Guide for Built Heritage and Cultural Heritage Landscapes (2007), and according to the Historic American Engineering Record (HAER) guidelines.
- Commemoration opportunities should be explored for the bridge with community input.
- The construction of new bridges should be designed in a manner that draws from the design inspiration and materials of the extant bridge while maintaining legibility. Design considerations should explore the incorporation of the scale, massing, rhythm and finishes of the original bridge, where possible and feasible. Specifically, the arched concrete design, the placement and design of the concrete railings, and siting at the same location over the Conestogo River should be considered in the final design for the replacement structure.

5.3 Archaeological Assessment

A Stage 1 Archaeological Assessment (AA) was completed in May 2022 and entered into the register in August 2022 as part of the Schedule 'C' Municipal Class EA for four bridges on Wellington Road 109 between Highway 6 and Sideroad 7. From west to east, these bridges are B109132, C109123, B109133, and B109134. The Stage 1 AA of the study area includes a review of previous archaeological research, historic maps, land registry documents, and local histories. A property inspection was conducted from public lands on December 2nd, 2021 to better understand the current conditions of the study area.

Archaeological recommendations have been made based on the background historic research, property inspection, and indicators of archaeological potential as outlined in the 2011 *Standards and Guidelines for Consultant Archaeologists* and are as follows:

- Based on the results of the Stage 1 archaeological assessment, the study areas have been determined to be subject to deep and intensive disturbance. Areas of visually confirmed disturbance include the roadway, bridge berms, roadway ditches, underground infrastructure, and cut slopes. These areas no longer retain archaeological potential, and a **Stage 2 archaeological assessment is not required**.
- If there are to be in-water impacts within the Conestogo River, a marine archaeological assessment required to ascertain the presence or absence of marine archaeological resources. If marine archaeological resources are present, the assessment will evaluate the significance of these resources and outline measures to mitigate the impact(s) of development.

It should be noted that areas determined to no longer retain archaeological potential should not be subject to ground disturbing activities until the recommendations stated herein have been accepted by the Ontario Ministry

of heritage, Sport, Tourism and Cultural Industries, and the report has been entered into the Public Register of Archaeological Reports. The Stage 1 Archaeological Assessment Report can be found in **Appendix G**.

5.4 Natural Environment

Ecological surveys were carried out to identify and assess natural environment constraints, including terrestrial and aquatic habitats, and Species at Risk (SAR)[1]. The findings (i.e., existing conditions) are presented in this section, along with an assessment of the impacts of the preferred alternative (replacement of the four bridges within the study area). Recommended mitigation measures to address the anticipated impacts, and any potential permitting requirements based on the Preliminary Design are provided in **Section 8.0**. Existing background information for the study area has been incorporated where appropriate.

5.4.1 Study Approach

This study process involved collection and assessment of existing natural environment information and field investigations completed by WSP. The compilation of the background information involved a review of relevant existing information, as well as consultation with agency staff.

Background information was collected and reviewed to identify preliminary natural environment issues and potential sensitivities. The background information and field data were then analyzed to identify potential constraints, sensitivities and potential impacts. Mitigation measures have been developed to minimize any potential impacts.

5.4.1.1 Review Of Background Information and Agency Consultation

The study approach to document the existing conditions encompassed the collection and review of background information and completion of ecological field surveys. The background information reviewed included relevant natural environmental databases and documents (e.g., Natural Heritage Information Centre [NHIC] website, Land Information Ontario [LIO], eBird website, iNaturalist website, Ontario Reptile and Amphibian Atlas [ORAA] website, topographic mapping, aerial photography and existing studies), as well as direct agency contact (Ministry of the Environment, Conservation and Parks [MECP], Ministry of Natural Resources and Forestry [MNRF] – Guelph District and the Grand River Conservation Authority [GRCA]). Fisheries and Oceans Canada (DFO) Species at Risk (SAR) mapping was also reviewed. A County of Wellington Regional SAR list (**Appendix H**), documenting 50 SAR with the potential to occur in the County, was also reviewed with respect to potential habitat availability in the vicinity of the crossing site for each species.

Descriptions of terrestrial (including vegetation and wildlife) and aquatic features and species are based on secondary source information compiled from previous studies and agencies, augmented with site specific field information collected in 2017 and 2020 (Section 5.4.2). In addition to the sources noted above, the *County of Wellington Official Plan* (updated June 1, 2022) was also reviewed. A full list of references is found in **Appendix H**.

[1] **Species at Risk (SAR)** –The term “Species at Risk” (SAR) is used to encompass species that are: listed under the federal Species at Risk Act (SARA 2002) and listed under Ontario’s Endangered Species Act (ESA 2007).

5.4.2 Field Surveys

5.4.2.1 Aquatic Habitat and Fisheries

Field surveys were completed by WSP biologists to assess aquatic habitat (including mapping) on August 14 and 15, 2017. An additional site visit to verify and/ update any changes to the existing conditions changes since 2017 was completed on August 19, 2020. Fish community surveys were not completed due to the availability of fisheries information provided by the agencies. All visual observations of fish were also recorded.

Aquatic habitat assessments were focused in the areas of the four bridge crossings (as dictated by the preferred alternative) along WR 109 (Bridge B109132, Bridge C109123, Bridge B109133, and Bridge B109134). See Figure H.1 (**Appendix H**) for the crossing locations. Aquatic habitat conditions were assessed along the reaches of each watercourse approximately 50 m upstream through 50 m downstream of WR 109 where possible. Data collection encompassed the following fisheries and aquatic habitat parameters:

- Flow condition, clarity, general gradient and velocities
- Channel dimensions and general character
- Morphology (e.g., riffles, pools, flats)
- Cover opportunities (e.g., woody debris, undercut banks, boulders, aquatic vegetation)
- Substrate type
- Bank height, character and stability / evidence of erosion
- Riparian vegetation
- Any observations of fish presence and / or barriers to fish movement
- Potential specialized and important habitat areas including potential spawning habitat, good nursery cover, holding habitat (deeper refuge pools)
- Evidence of groundwater discharge or indicators
- Disturbances, habitat limitations and potential habitat enhancement opportunities.

Representative photographs of each watercourse are provided in **Appendix H**. Aquatic habitat mapping is also found in **Appendix H**.

5.4.2.2 Vegetation

The botanical inventory and vegetation assessments within the study area included a site visit in 2017 (August 21) with an additional site visit in 2020 (July 24) to update and refine plant species and vegetation community characterizations. These surveys documented the characteristics of the natural and culturally influenced vegetation communities, with a focus on the natural features within and adjacent to the footprint of the roadway.

Detailed assessments were focused in the areas of the four bridge crossings (as dictated by the preferred alternative) along WR 109 (Bridge B109132, Bridge C109123, Bridge B109133, and Bridge B109134), with a general overview of the broader landscape included for context during the evaluation of alternatives. See **Appendix H** for crossing locations. The area within approximately 30 m upstream and downstream of each structure was surveyed in detail and specific attention was given to documenting any significant or sensitive plant

species within this area. Property access was not available beyond the ROW; therefore, a full assessment of vegetation communities and botanical inventory of each unit outside of the ROW was not completed. However, the dominant species for each community beyond the ROW were noted and as much detail on community composition as possible was recorded using binoculars and Google Earth imagery.

Vegetation communities and floristics were assessed as follows:

- Vegetation communities were characterized using the Ecological Land Classification for Southern Ontario (ELC) (Lee et al. 1998), where applicable, and generally describing vegetation features where distinct ELC communities were not present (e.g., planted vegetation features and hedgerows). The ELC communities are delineated on Figure H.2 (**Appendix H**).
- Vegetation community significance was evaluated using Natural Heritage Resources of Ontario: Vegetation Communities of Southern Ontario (Bakowsky 1996; NHIC website).
- Plant species status was evaluated using The Flora of Wellington County (Frank and Anderson 2009) and The Distribution and Status of the Vascular Plants of Central Region (Riley, J. et. al. 1989.) for regional significance; the NHIC website for provincial rarity ranks (i.e., S-Ranks); the Species at Risk in Ontario list (updated regularly) for provincial status designations; and the Canadian Species At Risk list (Committee on the Status of Endangered Wildlife in Canada [COSEWIC]) for national status designations.

Botanical inventory data from each survey date listed above has been complied into a vascular plant species list, which is presented in Table H.1 (**Appendix H**).

The terrestrial vegetation site visits, where property access permitted, were conducted on the following dates:

- 2017: August 21 (ELC and botanical inventory)
- 2020: July 24 (ELC and botanical inventory updates based on current conditions for 2020)

Representative site photos from the 2020 site visit are photos are presented in **Appendix H**.

5.4.2.3 Wildlife and Wildlife Habitat

Wildlife surveys within the study area were completed by WSP and were focused at the four bridge crossings as dictated by the preferred alternative along WR 109 (Bridge B109132, Bridge C109123, Bridge B109133, and Bridge B109134) in 2017 and 2020. As property access was not available beyond the ROW, these areas were surveyed by listening (for breeding bird surveys) and with the use of binoculars and google earth. The surveys included:

- **Breeding Bird Surveys:** May 30 and June 19, 2017 -- Breeding bird surveys were completed by qualified, experienced staff according to standard protocols established in the Ontario Breeding Bird Atlas (OBBA; Bird Studies Canada 2001). Surveys were completed during appropriate timing (i.e., early morning during the breeding bird season) and suitable weather conditions (i.e., low wind and no precipitation). Species, abundance, and level of breeding evidence were recorded for all avifauna observations.
- **General Wildlife Surveys and Habitat Assessments:** April 17, May 30 and June 29, 2017 and July 20, 2020 -- All incidental wildlife observations and sign (e.g., tracks / trails, scat, burrows, dens, nests, browse, vocalizations, breeding evidence) of birds, mammals, and herpetofauna were recorded during all

field surveys. The habitat conditions associated with the various features along the study area were assessed by qualified, experienced staff in relation their suitability to provide Significant Wildlife Habitat (SWH) and to support potential SAR in the vicinity of the study area. All surveys were conducted through visual, non-intrusive methods.

- **Turtle Basking and Snake Emergence Surveys:** April 17, 2017 – Turtle basking and snake emergence surveys were conducted by qualified, experience staff under appropriate weather conditions (e.g., warm sunny days, >10°C with no rain) in early spring to confirm presence of individuals in proximity to hibernacula shortly after emergence.

5.4.3 Site Description and Physical Setting

5.4.3.1 Physiography and Soils

The study area is mapped entirely within the Stratford Till Plain physiographic region. This till plain is extensive, in that it extends west past Stratford to London and north to Blythe and Listowel. The overall slope is to the southwest with the Conestoga and Nith Rivers draining the highest section of the region. The till is fairly uniform and comprised of a brown calcareous silty clay (Chapman and Putnam 1984).

5.4.3.2 Drainage and Watershed Characteristics

As noted on the GRCA website https://www.grandriver.ca/en/our-watershed/Our-Watershed.aspx, the study area lies within the Grand River watershed which drains approximately 6800 km² of land that includes 39 municipalities and two First Nations territories (Six Nations of the Grand River Territory and the Mississaugas of the Credit First Nation). Land use within the watershed is predominantly agricultural with active farms making up approximately 70% of the watershed, along with naturalized areas (woodlands and wetlands) and urban areas including the cities of Brantford, Cambridge, Guelph, Kitchener and Waterloo. The Grand River starts in the highlands in Dufferin County and travels about 310 km before emptying into Lake Erie.

The Conestogo River is the most prominent natural feature within the study area along with its associated riparian habitat. The river winds though all four of the bridge crossings within the study area. The river has also been identified as Brandy Creek by some of the agencies and on topographic mapping, however it is also known as the Conestogo River, and as noted in Section 1.2 it is named as such within this report. The river is considered warmwater and supports a diverse fish community including sportfish / top predators (e.g., Smallmouth Bass [*Micropterus dolomieu*] and Northern Pike [*Esox Lucius*]) and a variety warm and coolwater baitfish species (see Section 5.4.2.1).

5.4.4 Designated Natural Areas

5.4.4.1 Provincially Designated Areas

Based on a review of the MNRF Make A Map: Natural Heritage Areas website and Land Information Ontario (LIO) database, as well as consultation with the MNRF (Guelph District), there are no designated Provincially Significant Wetlands (PSWs), Areas of Natural or Scientific Interest (ANSIs) or Significant Wildlife Habitat (SWH) features mapped in the study area or general vicinity of the structures.

5.4.4.2 Regionally and Locally Designated Areas

There are no Environmentally Significant Areas (ESAs) in the study area or general vicinity, however according to the *County of Wellington Official Plan* (2022), Conestogo River (and its riparian area) is identified as ‘Core

Greenlands'. Also, Conestogo River and its riparian area falls within the GRCA Regulation Limits (see Figure H.1, **Appendix H**).

5.4.5 Aquatic Habitat and Fisheries

The Conestogo River (also known as Brandy Creek) is a warmwater watercourse that originates approximately 7 km upstream of Bridge B109134. The river flows west, winding though this crossing and the remaining three WR 109 bridge crossings found within the study area (Bridge B109132, Bridge C109123 and Bridge B109133). See Figure H.1 (**Appendix H**) for bridge locations.

As noted, the aquatic habitat assessments were focused in the areas of the four bridge crossings (as dictated by the preferred alternative) along WR 109 (Bridge B109132, Bridge C109123, Bridge B109133, and Bridge B109134). The existing aquatic habitat and fisheries conditions at each of the crossings are described below. Aquatic habitat mapping at each crossing site is found in **Appendix H**. At the time of the August 2020 aquatic habitat survey, flow velocity was relatively low and the water was slightly turbid.

Conestogo River at Bridge B109132

The existing bridge (built in 1931) is a two-lane single span (17 m) concrete structure. The roadway embankments rise up approximately 4.5 m in the vicinity of the bridge and are colonized by old field dominant vegetation. The east abutment of the bridge is found from 3.0 m to 6.5 m back from or outside of the bankfull channel. The west abutment is found partially within the bankfull channel. The flow of the river extends directly to and along the full length of the west abutment and the north corner extends out into the channel approximately 2.5 m. There are large pieces of concrete found just upstream (south) of the west abutment (southwest quadrant of bridge) and along the west bank that appear to have been placed for erosion control.

A section of the steep bank in that area (approximately 16 m downstream of the bridge) and a small ditch (found further west) that leads to the bank has been lined with rip rap, and which appears to be an outlet area for a small storm water management pond located approximately 20 m west of the river and 13 m east of the road. The isolated pond is approximately 20 m long x 15 m wide with 0.2 m high banks which contain dense cattail. The depth of the pond was approximately 0.5 m and the substrate is clay. Filamentous algae was evident at the time of survey and no fish were observed.

On the upstream (south) side of WR 109 the river flows west and parallel to the roadway for approximately 170 m before bending 90˚ into the bridge structure, approximately 14 m upstream of the bridge. The river channel is fairly uniform in the vicinity of the bridge ROW with a bankfull width that ranges from approximately 12.1 m to 12.2 m (depth 0.3 m and 0.5 m respectively) in the area of the bridge, and the wetted width ranged from 4 m to approximately 11.8 m at the time of survey. Approximately 14 m upstream of the bridge (just upstream of the bend), the river divides into two smaller channels that flow around a small island for approximately 20 m. Approximately 14 m downstream of the bridge the channel is restricted by a Reed Canary Mineral Meadow Marsh in which flow is dispersed through a series of smaller channels, the widest (around 2 m width) of which is found approximately 7.5 downstream of the bridge along the east bank. Further downstream (approximately 15 m) this channel increases in size to a bankfull width of approximately 5 m, gradually increasing up to around 10 m width (0.4 m depth) approximately 50 m further downstream. Floodplain (Reed Canary Mineral Meadow Marsh) extends further back from the channel in the NW quadrant.

Morphology is pool dominant in the vicinity of the ROW. A large pooling area (0.8 to 1.5 m depth at time of survey) is found through the bridge (extends approximately 7.5 m out from the west abutment) and extends approximately

10 m upstream and 4 m downstream. In the smaller divided channels found further upstream, the morphology is riffle dominant. Further upstream of this area the morphology is flat dominant with some pooling. Downstream of the bridge and pool noted above, morphology in the main channel (that gradually widens in size further downstream) becomes a series of riffles, flats and small pools. The riverbanks within the ROW and further up and downstream range in height from 0.6 m to approximately 2 m and rise higher (4.5 m) where they connect to the road embankments on the west side. Bank erosion (slumping) was observed on west bank, 5 m and 10 m downstream of the bridge and immediately upstream.

Flow depth in the vicinity of the bridge (outside of the large pool) ranged from 0.05 to 0.6 m at the time of the survey. Substrates within the bridge ROW consisted of a mix of rubble, gravel, sand and occasional boulders, with rubble becoming more dominant (50%) just downstream of the large pool. Further downstream substrates are similar with gravel becoming more dominant in the riffle areas (70 to 80%) along with rubble and sand and occasional boulders. Substrates upstream of the ROW are again gravel dominant in the riffle areas and a mix of rubble, gravel, sand and occasional boulders is found further upstream. Instream cover includes rubble, some boulders and some undercut banks. There is little instream vegetation.

Riparian vegetation in the vicinity of the bridge ROW generally consists Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2) further upstream and downstream of the bridge as further detailed in Section 5.4.2.2.

Conestogo River at Bridge C109123

The existing structure (built in 1930) is a two-lane concrete barrel arch bridge. It has a length (span) of 14 m and a width of 11.7 m. The roadway embankments rise approximately 3 to 4 m in the vicinity of the bridge and are colonized by old field dominant vegetation. Both abutments are found partially within the bankfull channel.

There is Reed Canary Grass Mineral Meadow Marsh (MAM2-2) that extends approximately 30 m upstream (north) of the bridge and throughout the 20 m wide floodplain in this area. The river winds through the marsh feature within a series of four small defined channels that range from 0.75 m to 2.0 m in width. Further upstream of this marsh feature, the channel is more uniform with a bankfull channel of approximately 12.5 m (0.5 depth) and 7.5 m wetted width at the time of survey. Just upstream of the bridge, the marsh feature ends, and the four small channels join into the one larger channel. At the inlet of the structure the flow is directed from the northwest corner of the west abutment over to and along the full length of the east abutment. The wetted width through the structure was around 6.25 m at the time of survey. The bankfull width through the structure was difficult to discern with no clear top of bank and / or bankfull channel definition through the coarse substrates that were found. The channel became clearly defined immediately downstream of the bridge with a bankfull channel width of 6.6 m (0.4 m depth), which widens approximately 10 m further downstream. The channel wraps around the south corner of the east abutment (approximately 0.5m).

Within bridge and downstream ROW there is a small riffle followed by a flat and pool morphology. The riffle flowed ‘through’ the coarse substrate at the time of survey. The pool is approximately 8 m long x 3 m wide and 0.75m deep and extends 5.2 m downstream of the bridge. The morphology through the smaller channels found upstream within the meadow marsh feature is run dominant with flats and some small riffles. Further upstream the morphology is flat dominant. The river banks within the ROW and further up and downstream range in height from 0.5 to 0.6 m and rise higher (3.0 to 4.0 m) where they connect to the road embankments. A small area of bank erosion (slumping) was observed on east side immediately downstream of the bridge. Upstream of the bridge

along the west bank, there are areas of bank erosion (slumping) found upstream of the abutment and larger areas of slumping were observed upstream of the ROW.

Flow depth in the vicinity of the bridge ranged from 0.05 to 0.75 (in the pool) m at the time of the survey. Substrates within the bridge ROW consisted of rubble (60%), gravel (25%), sand (10%) and boulders (5%) with a more even mix on the upstream side. Substrates were similar further upstream and downstream. Instream cover includes rubble and boulders. There is little instream vegetation.

Riparian vegetation in the vicinity of the bridge ROW generally consists Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments, Reed Canary Mineral Meadow Marsh (MAM2-2) and White Cedar Mixed Forest (SWM1-1) and Coniferous Plantation (CUP3) is found on the downstream side of the bridge as further detailed in Section 5.4.2.2.

Conestogo River at Bridge B109133

The existing bridge (built in 1931) is a two-lane single span (13.8 m) concrete structure. The roadway embankments rise up approximately 2.5 m in the vicinity of the bridge and are colonized by old field dominant vegetation. The east abutment of the bridge is found approximately 4.6 m back from or outside of the bankfull channel. The west abutment is found partially within the bankfull channel. The flow of the river extends directly to and along the full length of the west abutment and the north corner extends out into the channel approximately 1.25 m. Erosion control in the form of gabion basket is found for approximately 30 m upstream (south) of the bridge (within the bankfull channel) and is slumping / failing in sections. There is another small bridge (for agricultural use between fields) found approximately 31 m downstream of the WR 109 bridge.

On the upstream (south) side of WR 109, the river flows east and relatively parallel to the roadway before bending 90° into the bridge structure, approximately 30 m upstream of the bridge. The river channel is fairly uniform in the vicinity of the bridge ROW with a bankfull width that ranges from approximately 6 m to 8.9 m (0.5 m and 0.6 m depth respectively), and a wetted width that ranged from 5 m to 8.1 at the time of survey. Further upstream and downstream of the ROW, the bankfull channel width ranged from 5 m (0.6 depth) to 7.5 m (0.6 depth) respectively.

Morphology within the ROW and further up and downstream consists of a series of flats and pooling areas. A large pooling area (0.7 to 1.0 m depth at time of survey) extends from approximately 5 m within the downstream end of the bridge to approximately 9 m further downstream and ranges in width from 4.5 m to around 7. Another pooling area (approximately 16 m long x 2.5 wide and 0.75 x 1.5 m in depth) is found approximately 8 m upstream of the bridge along the gabion basket on the west bank. The riverbanks within the ROW and further up and downstream range in height from 0.8 m to approximately 1.2 m and rise higher (approximately 2.5 m) where they connect to the road embankments. The gabion basket noted above is approximately 2.75 m in height. There is little bank erosion in the vicinity of the bridge.

Flow depth in the vicinity of the bridge (outside of the pools noted above) ranged from 0.2 to 0.6 m at the time of the survey. Substrates within the bridge ROW and further upstream and downstream consisted of a mix of rubble, gravel, sand and occasional boulders with hardpan clay being noted in the large pool and in a couple sections downstream of the agricultural bridge. Instream cover includes rubble, some boulders and some undercut banks. There is little instream vegetation.

Riparian vegetation in the vicinity of the bridge ROW generally consists Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2) further upstream and downstream of the bridge as further detailed in Section 5.4.2.2.

Conestogo River at Bridge B109134

The existing bridge (built in 1934) is a two-lane single span (13.5 m) concrete structure. The roadway embankments rise up approximately 2.5 to 3.0 m in the vicinity of the bridge and are colonized by old field dominant vegetation. The east abutment of the bridge is found approximately from 2.4 m to 4.4 m back from or outside of the bankfull channel. The west abutment is found partially within the bankfull channel. The flow of the river extends directly to and along the full length of the west abutment. Rip rap has been placed along the base of the west abutment. Erosion control in the form of gabion basket is found for approximately 20 m upstream (north) of the bridge (located outside of bankfull channel) and for approximately 5 m downstream (within the bankfull channel). On the east bank, gabion basket (located outside of bankfull channel) was also observed along the bank for approximately 5 m downstream of the bridge.

On the upstream (south) side of WR 109, the river flows west and relatively parallel to the roadway before close to bending 90° into the bridge structure, approximately 14 m upstream of the bridge. The river channel is fairly uniform in the vicinity of the bridge ROW with a bankfull width that ranges from approximately 7 m to 9 m (0.5 m and 0.6 m depth respectivel), and a wetted width that ranged from 4.6 m to 8.0 at the time of survey. Further upstream and downstream of the ROW, the bankfull channel width ranged from 9 m (0.5 depth) to 5 m (0.5 depth).

Morphology within the ROW and further up and downstream is flat dominant with a couple pools. One pool (approximately 3.5 m width x 6 m long and 1 m deep) is located approximately 5 m downstream of the bridge. The riverbanks within the ROW and further up and downstream range in height from 0.6 m to approximately 3 m. There is little bank erosion in the vicinity of the bridge.

Flow depth in the vicinity of the bridge (outside of the pools noted above) ranged from 0.3 to 0.6 m at the time of the survey. Substrates within the bridge ROW and further downstream consisted of rubble (50%), gravel (40%) and sand (10%). Further upstream of the ROW a higher percentage of gravel was observed with gravel (60%), rubble (40%) and sand (10%). Instream cover includes rubble and some undercut banks. There is little instream vegetation (one small patch of Arrowhead was observed).

Riparian vegetation in the vicinity of the bridge ROW generally consists Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2) further upstream and downstream of the bridge as further detailed in Section 5.4.2.2.

Conestogo River Fishery

Conestogo River is a permanent watercourse that is classified as a warmwater by MNRF. MNRF provided fish data that indicates a Conestogo River fish community consisting of 23 species of fish including sportfish (e.g., Smallmouth Bass [Micropterus dolomieu] and Northern Pike [*Esox Lucius*]) and a variety of warm and coolwater bait / forage fish and panfish species (e.g., Bluntnose Minnow [*Pimephales notatus*], Bridle Shiner [*Notropis bifrenatus*]. Central Mudminnow [*Umbra limi*], Common Shiner [*Luxilus cornutus*], Creek Chub [*Semotilus atromaculatus*], Fantail Darter [*Etheostoma flabellare*], Pumpkinseed [*Lepomis gibbosus*], Fathead Minnow [*Pimephales promelas*], Northern Redbelly Dace [*Chrosomus eos*], Rainbow Darter [*Etheostoma caeruleum*],

White Sucker [*Catostomus commersonii*], etc.). See Table H.2 (**Appendix H**) for a complete list of the fish species found in the vicinity of each of the four bridges that cross WR 109.

Bridle Shiner, a Special Concern (SC) species under the Endangered Species Act (ESA) was found in the data provided by MNRF. Please see Section 5.4.8.1 for more information on this species.

5.4.6 Vegetation

5.4.6.1 Floristics

A total of 103 vascular plants have been identified by WSP within the study area during botanical inventory surveys in 2017 and 2020, of which five were identified to genus rather than species due lack of observable identification characters. A complete list of vascular plant species for each vegetation community is provided in Table H.1 (**Appendix H**).

Of the 98 identified species recorded within the study area:

- 47 (48%) are native and 51 (52%) are non-native.
- Many of the non-native species are typical of old field and disturbed areas.
  - Of the 45 native species recorded for which CC values are provided, values range from 0 to 6 with the exception of Water Horsetail (*Equisetum fluviatile*) and Bristly Buttercup (*Ranunculus hispidus*) which have a CC value of 7 and 8, respectively. Species with a Coefficient of Conservation (CC) value of 6 or under are considered to have a moderate to high disturbance tolerance, while species with a CC value of 7 or over are typically found in less disturbed sites.
- Species of Conservation Concern:
  - All of the native species observed are common and secure or apparently secure in Ontario (i.e., ranked S5, S4S5, S4 or S4?).
  - No globally rare species (i.e., G-rank G1 - G3) were recorded.
  - None of the species is listed as SAR under the ESA (2007).
  - None of the species is listed as regionally significant (rare or uncommon) based on Frank and Anderson 2009 or Riley et al. 1999 regional vascular plant status lists.

5.4.6.2 Vegetation Communities and Hedgerows

Seven natural / semi-natural vegetation community classes were recorded within the study area including cultural meadow, shallow marsh, meadow marsh, forest, swamp, cultural woodland, and cultural plantation. None of the delineated vegetation types is considered to be provincially significant (S1-S3) in Ontario (Bakowsky 1996 / NHIC). Several narrow, linear hedgerows, including planted and naturally regenerating types, were also recorded within the study area (including the broader study area assessed during the early stages of the study) (See Figure H.2, **Appendix H**).

Each of the vegetation communities within the study area exhibit signs of anthropogenic disturbance including recreational use (e.g., trails, mowing, access laneways), planted trees, dumping, and presence of non-native / invasive species (widespread, but generally not abundant). These disturbances are attributable to historic and active land uses within and adjacent to the study area.

Vegetation Communities associated with each bridge crossing include the following units, which are described in more detail in **Table 5-1**, below:

- Bridge B109132: Unit 1a (MAM2-2 / MAS2-1), Unit 1b (MAM2-2), Unit 2 (FOC2-1), Unit 3 (SWD4-1), CUM1-1, Unit 5 (HR), and TC1
- Bridge C109123: Unit 1b (MAM2-2), Unit 1c (MAM2-2), Unit 5 (HR), Unit 7a (SWM1-1 / CUP3), Unit 7b (SWM1-1 / CUP3), Unit 7c (SWM1-1 / CUP3), and CUM1-1
- Bridge B109133: Unit 5 (HR), Unit 11a (MAM2-2), Unit 11b (MAM2-2), and CUM1-1
- Bridge B109134: Unit 11c (MAM2-2), Unit 11d (MAM2-2), and CUM1-1

As indicated, the area within approximately 30 m of each crossing structure was surveyed in detail in 2020 to document the vegetation communities and any significant species. Characterizations of the vegetation communities in the study area are presented in **Table 5-1**, and a detailed vascular plant species list, by unit, has been provided in **Appendix H**.

Table 5-1: Vegetation Community Characterization within the Study Area

Unit	Habitat / Community Type	Layer	Dominant Species	Attributes and Comments2
1a / 1b / 1c	**Meadow Marsh** **MAM2-2** Reed Canary Grass Mineral Meadow Marsh Inclusion(s): M**AS2-1** Cattail Mineral Shallow Marsh	Canopy/ Sub-canopy	White Willow (*Salix alba*), White Elm (*Ulmus americana*)	• Low botanical richness: 15 spp. recorded (67% native) • Age: young • Disturbance: Moderate - exotic species • SCC recorded: none • Unit 1a (located north of bridge B109132) includes a small (~150 m2) MAS2-1 inclusion to the west of the bridge • Unit 1b includes pockets of MAS2-1 inclusion within 70 m of Bridge C10123 • Overall botanical quality: **Low**
		Shrub	Sandbar Willow (Salix interior)	
		Ground	Spotted Joe Pye Weed (*Eutrochium maculatum var. maculatum*), Coltsfoot (*Tussilago farfara*), Narrow-leaved Cattail (*Typha angustifolia*), Reed Canarygrass (*Phalaris arundinacea var. arundinacea*)	
2	**Coniferous Forest** **FOC4-1** Fresh - moist White Cedar Coniferous Forest	Canopy/ Sub-canopy	Eastern White Cedar (*Thuja occidentalis*) with occasional Manitoba Maple (*Acer negundo*), Green Ash (*Fraxinus pennsylvanica*), European Mountain-ash (*Sorbus aucuparia*), White Elm	• 8 spp. recorded (50% native) • Age: mid-aged • Disturbance: Low – some exotic species • SCC recorded: none • Overall botanical quality: Low
		Shrub	Morrow's Honeysuckle (*Lonicera morrowii*), European Buckthorn (*Rhamnus cathartica*),	
		Ground	No ground layer species visible from the ROW	
3	**Deciduous Swamp** SWD4-1 Willow Mineral Deciduous Swamp	Canopy/ Sub-canopy	Manitoba Maple, Freeman's Maple (*Acer × freemanii*), Green Ash, Scots Pine (*Pinus sylvestris*), Eastern Cottonwood (*Populus deltoides ssp. deltoides*), Crack Willow (*Salix euxina*)	• 10 spp. recorded (70% native) • Age: Mid-aged • Disturbance: Low • SCC recorded: none

[2] Note that all botanical inventory surveys were completed from within the ROW. Thus, these communities may have artificially lower species richness and potentially quality rankings than would be recorded as if permission to access these lands were granted.

Unit	Habitat / Community Type	Layer	Dominant Species	Attributes and Comments2
		Shrub	Cottony Willow (*Salix eriocephala*)	• Overall botanical quality: Low
		Ground	No ground layer species visible from the ROW	
4	**Cultural Woodland** **CUW1** Mineral Cultural Woodland	Canopy/ Sub-canopy	Manitoba Maple, Green Ash, Spruce sp. (*Picea sp.*), Eastern Cottonwood	• spp. recorded (67% native) • Age: young to mid-aged • Disturbance: Moderate - exotic species • Overall botanical quality: Low • SCC recorded: none
		Shrub / Ground	European Buckthorn	
		Ground	No ground layer species visible from the ROW	
5	**Hedgerows** (located on both sides of WR 109)	Canopy/ Sub-canopy	Freeman's Maple, Hawthorn sp. (*Crataegus sp.*), Green Ash, Eastern White Pine (*Pinus strobus*), Scots Pine, Eastern White Cedar	• 13 spp. recorded (69% native) • Age: young to mid-aged • Disturbance: High - exotic species and mowing / active agriculture under trees • Overall botanical quality: Low • SCC recorded: none
		Shrub	Chokecherry (*Prunus virginiana*), Tatarian Honeysuckle (*Lonicera tatarica*), Alternate-leaved Dogwood (*Cornus alternifolia*),	
		Ground	Yellow Avens (*Geum aleppicum*), Green Ash, Common Milkweed (*Asclepias syriaca*),	
6a / 6b	**Deciduous Swamp / Woodland** **SWD4-1** Willow Mineral Deciduous Swamp **CUW1** Mineral Cultural Woodland	Canopy/ Sub-canopy	Manitoba Maple, Green Ash, Scots Pine, White Poplar (*Populus alba*), Eastern Cottonwood, White Willow	• Very low botanical richness: 6 spp. recorded (50% native) • Age: young • Disturbance: Moderate - exotic species • Overall botanical quality: Low • SCC recorded: none • Transitional riparian deciduous community that transitions from lowland willow swamp to disturbed cultural woodland with elevation changes along the valley slope
		Shrub	Manitoba Maple, Green Ash, European Buckthorn	
		Ground	Manitoba Maple, Green Ash, European Buckthorn	

Unit	Habitat / Community Type	Layer	Dominant Species	Attributes and Comments2
7a / 7b / – 7c	**Mixed Swamp / Plantation** **SWM1-1** White Cedar Mixed Swamp **CUP3** Coniferous Planation	Canopy/ Sub-canopy	Scots Pine, European Mountain-ash, Eastern White Cedar, White Spruce (Picea glauca), Manitoba Maple, Green Ash, Eastern Cottonwood, Trembling Aspen (*Populus tremuloides*), Willow sp.	• 19 spp. recorded (63% native) • Age: Mid-aged • Disturbance: Moderate - exotic species and evidence of trails and trampling • Overall botanical quality: Moderate • Transitional riparian mixed community that transitions from lowland mixed swamp to cultural plantation with elevation changes along the valley slope
		Shrub	Hawthorn sp., European Buckthorn, Alternate-leaved Dogwood, Tatarian Honeysuckle, Chokecherry, Highbush Cranberry (*Viburnum opulus ssp. trilobum*),	
		Ground	Bittersweet Nightshade (Solanum dulcamara), Yellow Avens (*Geum aleppicum*) with sparse Large Yellow Lady's-slipper (Cypripedium parviflorum var. pubescens) in Unit 7b and 7c (>50 m from C109123)	
11a / 11b / 11c / 11d	**Meadow Marsh** **MAM2-2** Reed Canary Grass Mineral Meadow Marsh	Canopy/ Sub-canopy	Green Ash, Eastern Cottonwood	• 26 spp. recorded (69% native) • Age: young to mid-aged • Disturbance: Moderate - exotic species • Overall botanical quality: Moderate • SCC recorded: none
		Shrub	Red-osier Dogwood (*Cornus sericea*), Sandbar Willow, Cottony Willow,	
		Ground	Reed Canarygrass, Northern Water-plantain (*Alisma triviale*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Dame's Rocket (*Hesperis matronalis*), Spotted Jewelweed (*Impatiens capensis*), Coltsfoot, Narrow-leaved Cattail, Broad-fruited Burreed (*Sparganium eurycarpum*), Calico Aster (*Symphyotrichum lateriflorum var. lateriflorum*), Broad-leaved Cattail (*Typha latifolia*), Water Horsetail	
12a / 12b	**Coniferous Plantation** **CUP3** Coniferous Plantation	Canopy/ Sub-canopy	Eastern White Pine, Austrian Pine, Norway Spruce, Green Ash	• 8 spp. recorded (50% native) • Age: mid-aged
		Shrub	Green Ash	

Unit	Habitat / Community Type	Layer	Dominant Species	Attributes and Comments2
		Ground	No ground layer species visible from the ROW	• Disturbance: Moderate - exotic species • Overall botanical quality: Low • SCC recorded: none
CUM1-1	**Cultural Meadow** **CUM1-1** Dry-Moist Old Field Cultural Meadow	Canopy/ Sub-canopy	Sparse Eastern White Cedar, Eastern Red Cedar (*Juniperus virginiana*), European Buckthorn, North American Red Raspberry (*Rubus strigosus*)	• 49 spp. recorded (22% native) • Age: pioneer • Disturbance: High - exotic species and regular disturbance / mowing • Overall botanical quality: Low • SCC recorded: none
		Ground	Smooth Brome (*Bromus inermis*), Quackgrass (*Elymus repens*), Kentucky Bluegrass (*Poa pratensis ssp. pratensis*), Tufted Vetch (*Vicia cracca*), Common Burdock (*Arctium minus*), Wild Chicory (*Cichorium intybus*), Canada Thistle (*Cirsium arvense*), Wild Carrot (*Daucus carota*), Dame's Rocket, Oxeye Daisy (*Leucanthemum vulgare*), Common Milkweed, Eastern Tall Goldenrod (*Solidago altissima var. altissima*),	

5.4.7 Wildlife and Wildlife Habitat

5.4.7.1 Aviafauna

A total of 37 avifauna were recorded within the study area, both within and beyond the right-of-way (ROW) during WSP field surveys. Observations are summarized below with a list of observations provided in Table H.3 (**Appendix H**).

- Of the 37 avifauna observed, 32 species showed some level of breeding evidence (possible, probable or confirmed).
- Four (4) SAR avifauna were observed: Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*) and Eastern Wood-pewee (*Contopus virens*).
- Of the 37 species observed, none is considered regionally 'rare', but 11 are considered 'priority species' for the region.

During the field surveys in 2017 and 2020, migratory bird nesting was confirmed on three of the structures:

- Bridge B109132:
  - 2017: 2 active Cliff Swallow (*Petrochelidon pyrrhonota*) nests
  - 2020: 21 active Cliff Swallow nests
- Bridge B109133:
  - 2017: 61 active Cliff Swallow nests
  - 2020: 100 active Cliff Swallow nests
- Bridge B109134:
  - 2017: 42 active Cliff Swallow nests
  - 2020: 27 active Cliff Swallow nests.

Bird species observed are predominantly common, generalist, urban- and rural-adapted species, with forest species recorded in appropriate habitats. The avifauna observed and exhibiting breeding evidence in the study area are expected for the site conditions present. See **Section 5.4.8.2** for further discussion regarding SAR avifauna.

5.4.7.2 Herpetofauna

A total of two anuran species and two reptile species were observed as incidentals during the 2017 and 2020 field surveys: American Toad (*Anaxyrus americanus*), Green Frog (*Lithobates clamitans*), Midland Painted Turtle (*Chrysemys picta marginata*) and Snapping Turtle (*Chelydra serpentina*).

Although not recorded during the field surveys, the general area also supports the following additional common amphibian and reptile species (Ontario Nature 2021), which are likely to occur within the study area: Dekay's Brownsnake (*Storeria dekayi*), Eastern Gartersnake (*Thamnophis s. sirtalis*), Gray Tree Frog (*Hyla versicolor*), Milksnake (*Lampropeltis triangulum*), Mudpuppy (*Necturus maculosus*), Northern Leopard Frog (*Lithobates pipiens*), Northern Watersnake (*Nerodia s. spiedino*), Red-bellied Snake (*Storeria occipitomaculata*), Spring Peeper (*Pseudacris crucifer*), Western Chorus Frog (*Pseudacris triseriata*) and Wood Frog (*Lithobates sylvaticus*).

See Section 5.4.7.5 for further discussion regarding SWH for herpetofauna and Section 5.4.8.2 for further discussion regarding SAR herpetofauna. Incidental observations and locations are provided in Table H.3 (**Appendix H**).

5.4.7.3 Mammals

A total of four mammal species were observed as incidentals during the 2020 field surveys through visual observation or through evidence such as tracks, including: Raccoon (*Procyon lotor*), Red Fox (*Vulpes vulpes*), Short-tailed Weasel (*Mustela erminea*) and White-tailed Deer (*Odocoileus virginianus*).

Although not confirmed during the field surveys, the general area supports several other common mammal species which are likely to occur within the study area, such as Coyote (*Canis latrans*), Eastern Cottontail (*Sylvilagus floridanus*), Grey Squirrel (*Sciurus carolinensis*), Eastern Chipmunk (*Tamias striatus*), Long-tailed Weasel (*Mustela frenata*), Muskrat (*Ondatra zibethicus*), Striped Skunk (*Mephitis mephitis*), Virginia Opossum (*Didelphis virginiana*), Woodchuck (*Marmota monax*) and a number of small mammals that often go undetected (e.g., shrews, moles, voles, mice, bats) (Dobbyn 1994).

No provincially or federally designated SAR or provincially rare (S-Rank) mammal species were observed within the study area during the field surveys. See Section 5.4.8.2 for further discussion regarding SAR mammals. Incidental observations and locations are provided in Table H.3 (**Appendix H**).

5.4.7.4 Insects

One Lepidoptera species was recorded during the field surveys: Monarch (*Danaus plexippus*).

Although not confirmed during the field surveys, the general area supports several other common Lepitoptera and Odonata species (iNaturalist 2021; Ontario Butterfly Atlas 2021; Ontario Moth Atlas 2021) which are likely to occur within the study area, including: American Copper (*Lycaena phlaeas*), American Lady (*Vanessa virginiensis*), Bronze Copper (*Lycaena hyllus*), Cabbage White (*Pieris rapae*), Canadian Tiger Swallowtail (*Papilio canadensis*), Carrot Seed Moth (*Sitochroa palealis*), Cecropia Moth (*Hyalophora cecropia*), Clouded Sulphur (*Colias philodice*), Common Whitetail (*Plathernis lydia*), Common Wood-Nymph (*Cercyonis pegala*), Eastern Tent Caterpillar Moth (*Malacosoma americana*) Fall Webworm Moth (*Hyphantria cunea*), Gray Comma (*Polygonia progne*), Hickory Tussock Moth (*Lophocampa caryae*), Milkweed Tussock Moth (*Euchaetes egle*), Mourning Cloak (*Nymphalis antiopa*), Painted Lady (*Vanessa cardui*), Red Admiral (*Vanessa atalanta*), Striped Hairstreak (*Satyrium liparops*), Twelve-spotted Skimmer (*Libellula pulchella*), Virginian Tiger Moth (*Spilosoma virginica*), Waved Sphinx (*Ceratomia undulosa*), Virginia Ctenucha (*Ctenucha virginica*), White Admiral (*Limenitis a. arthemis*), White-striped Black (*Trichodezia albovittata*) and Yellow-collared Scape Moth (*Cisseps fulvicollis*).

Incidental observations are and locations are provided in Table H.3 (**Appendix H**).

5.4.7.5 Significant Wildlife Habitat Assessment

As outlined in the MNRF's *Significant Wildlife Habitat Technical Guide* (OMNR 2000), Significant Wildlife Habitat (SWH) is broadly categorized as:

- Seasonal Concentration Areas
- Rare Vegetation Communities or Specialized Habitats for Wildlife
- Habitat for Species of Conservation Concern (excluding Endangered or Threatened species)
- Animal Movement Corridors.

No provincially designated SWH features have been identified or mapped by MNRF as occurring within or adjacent to the study area. However, WSP completed a SWH assessment for the study area based on evaluation criteria in the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E* (MNRF 2015). Key results of this assessment are provided below:

Seasonal Concentration Areas:

- Potential SWH:
  - **Turtle Wintering Areas:** Potential SWH for Turtle Wintering Areas occurs within the study area at Bridge B109132. During early spring emergence surveys conducted on April 13, 2017, one adult Snapping Turtle and two adult Midland Painted Turtles were observed basking in a small wetland pocket / pond in the northwest quadrant of the bridge crossing (see Figure H.2, **Appendix H** for location). The presence of at least one Snapping Turtle is enough to qualify this habitat as Confirmed SWH. However, due to the small berms located around and within this wetland, the pond appears to have been constructed for storm water control from the adjacent parking lot (i.e., Tim Hortons parking lot). If this the case (i.e., the pond is a constructed SWM pond), these turtle wintering areas would not qualify as SWH. GRCA has been contacted via email (see agency consultation in **Appendix B**) to confirm if these ponds were constructed for stormwater, however a reply has not been received at the time of writing. The wetland occurs along the Conestoga River floodplain, adjacent to the road ROW.
- Candidate SWH:
  - Bat Maternity Colonies: Candidate SWH for Bat Maternity Colonies occurs within the study area in the Deciduous and Mixed Swamp eco-sites (SWD4-1, SWM1-1) which occur beyond and partially within the ROW at structures B109132 and C209123 respectively.

Rare Vegetation Communities or Specialized Habitats for Wildlife:

Candidate SWH:

- **Amphibian Breeding Habitat (Wetlands and Woodlands):** Candidate SWH for Amphibian Breeding Habitat is likely present within the study area within the wetland and forest communities adjacent to each of the structures. Amphibian Calling surveys were not undertaken as part of this assignment.
- **Habitat for Special Concern Species (excluding Endangered or Threatened species)**: Confirmed SWH:
  - Habitat for Special Concern Species: Habitat for four Special Concern (SC) species was confirmed within the study area:
    - Eastern Wood-pewee – Possible breeding evidence (a singing male in suitable habitat) was recorded in the swamp ecosite (SWM-1) adjacent to C109123;
    - Midland Painted Turtle – two adult Midland Painted Turtles were observed basking in a small wetland pocket at Bridge B109132, in the northwest quadrant of the bridge crossing (see Turtle Wintering Areas above);
    - Snapping Turtle – one adult Snapping Turtle was observed basking in a small wetland pocket in the northwest quadrant of the Bridge B109132 (see Turtle Wintering Areas above); and

- Monarch – one (1) adult butterfly was observed in the meadow community adjacent to Bridge C109123.

See Section 5.4.8 for further discussion regarding SAR.

Animal Movement Corridors:

- Candidate SWH:
  - The Conestogo River riparian corridor provides at least 15 m of vegetation on both sides of the watercourse for most of its length through the study area, and thus provides movement opportunities anurans, deer and other wildlife. Deer tracks were observed along the watercourse at Bridge C109123, while American Toad and Green Frog individuals were observed in the riparian zone at Bridge B109133 and Bridge B109132, respectively. Evidence of other wildlife movement along the riparian corridor included Raccoon tracks observed at all four crossings and Red Fox tracks observed at Bridge B109132.

5.4.8 Species at Risk

Species at Risk (SAR) are defined as species listed as extirpated, endangered, threatened or special concern under the provincial *Endangered Species Act, 2007* (ESA) and/or by the Committee on the Status of Species at Risk in Ontario (COSSARO); however, only those listed as extirpated, endangered or threatened on the ESA are afforded legal protection under the act. Likewise, only species listed as extirpated, endangered, or threatened on Schedule 1 of the federal SARA are afforded legal protection. Special concern species are not afforded the same legal protection under the ESA and SARA, however confirmed habitat for these SC SAR is considered Significant Wildlife Habitat (SWH) under the Provincial Policy Statement (PPS).

At the time of the background review in 2017, MNRF noted records of Barn Swallow (THR under ESA), Eastern Meadowlark (THR under ESA) and Bobolink (THR under ESA) in the vicinity of the four crossings and MECP confirmed these species in an email dated January 12, 2021 (see agency consultation in **Appendix B**).

A County of Wellington Regional SAR list (**Appendix H**), documenting 50 SAR with the potential to occur in the County, was reviewed with respect to potential habitat availability in the vicinity of the crossing sites for each species. Those species that were considered to have at least some potential to occur in the vicinity of the study area were surveyed for (subject to time of year) during the field investigations, and habitat conditions were assessed for potential suitability for the various SAR.

5.4.8.1 Aquatic SAR potential

DFO SAR mapping does not identify any aquatic SAR in the vicinity of the crossings. However, MNRF provided a fish species list that included Bridle Shiner, which is a Special Concern species under the ESA and SARA.

From the Ontario Species at Risk webpage (https://www.ontario.ca/page/bridle-shiner), “Bridle Shiners prefer clear, unpolluted streams, rivers and lakes which have an abundance of aquatic vegetation. These vegetated areas provide suitable spawning habitat and places to feed and hide from predators. Bridle Shiners prefer warm water habitats where the bottom is either sand, silt or organic debris, which is necessary for the establishment of aquatic vegetation.” Given the lack of instream vegetation and fine substrates found in vicinity of the four bridge crossings, it is unlikely that this species would be found in those areas.

Also, MNRF provided the following response (email dated September 12, 2022) when asked about the location of the Bridle Shiner in Conestogo River (also known as Brandy Creek). See **Appendix B** for correspondence:

> *"I've searched through our electronic fisheries records but haven't been able to locate any detailed information for the Bridle Shiner (Notropis bifrenatus) or Striped Bass observations so far. Both records were uploaded to Land Information Ontario (LIO) in January 2001 but appear to have no further details provided with their entry.*
>
> *I've consulted with the Grand River Fisheries Management Plan (1998) and note that neither species were listed as confirmed, probable or possible fish species known in the Grand River at that time. It also appears that this location (Brandy Creek) is outside of the known distribution range for Bridle Shiner. The 2013 COSSARO Assessment Report lists the known range of Bridle Shiner in the province as the eastern Lake Ontario drainage and the St. Lawrence River.*
>
> http://cossaroagency.ca/wp-content/uploads/2017/06/FInal-COSSARO-Evaluation-Bridle-Shiner_GFM_processed-FINAL-s.pdf
>
> *Without being able to locate the actual detailed records of either observation, I can't confirm the accuracy of these sightings. However, they do appear to be outside of the known distribution ranges."*

Furthermore, MECP was also contacted with results of the MNRF response and noted (in an email dated September 30, 2022) that they have not found any records of Bridle Shiner in Conestogo River in the vicinity of the bridge crossings (see **Appendix B** for correspondence). Based on the habitat of Conestogo River and the results of the background information noted above, it is unlikely that Bridle Shiner (or any other aquatic SAR species noted on the County of Wellington Regional SAR list [**Appendix H**]) are found in Conestogo River in the vicinity of the bridge crossings

5.4.8.2 Terrestrial SAR Potential

SAR – Wildlife

Of the 50 regionally occurring SAR, six (6) species were confirmed within the study area during the field investigations in 2017 and 2020:

- **Barn Swallow** (*Hirundo rustica* – Special Concern under the ESA – It was downlisted to Special Concern in January 2023 from Threatened) – This species was observed foraging overhead at each of the structures during the field surveys in 2017 and 2020 and there are recent records within <5 km of the study area (eBird 2022). No Barn Swallow nests were observed on the structures during the field surveys; however, nesting may occur during the year of construction.
- **Bobolink** (*Dolichonyx oryzivorus* - Threatened under the ESA) – This species was observed in the agricultural lands >100 m beyond the ROW at Bridge B109132, Bridge B109134 and Bridge C109123 during the 2017 breeding bird surveys and there are recent records within <5 km of the study area (eBird 2022). Suitable breeding habitat occurs beyond the ROW within the hayfields and pasture lands within the study area.
- **Eastern Meadowlark** (*Sturnella magna* - Threatened under the ESA) – This species was observed in the agricultural lands >100 m beyond the ROW at Bridge B109134 and Bridge C109123 during the 2017 breeding bird surveys and there are recent records within <5 km of the study area (eBird 2022). Suitable breeding habitat occurs beyond the ROW within the hayfields and pasture lands within the study area.
- **Eastern Wood-pewee** (*Contopus virens* – Special Concern under the ESA) – This species was heard singing in the woodland beyond the ROW at Bridge C109123 during the 2017 breeding bird surveys and

there are recent records within <5 km of the study area (eBird 2022). Suitable breeding habitat occurs within the deciduous forest and swamp communities within the study area.

- **Monarch** (*Danaus plexippus* - Special Concern under the ESA) – This species was observed in the vicinity of Bridge C109123 during the 2017 field surveys. Suitable breeding habitat (i.e., Milkweed) was observed within the ROW adjacent to Bridge B109132.
- **Snapping Turtle** (*Chelydra serpentina* - Special Concern under the ESA) – An adult Snapping Turtle was observed basking in a wetland feature within the ROW adjacent to Bridge B109132 during a spring emergence survey on April 13, 2017 (this likely represents an overwintering site). Furthermore, suitable aquatic habitat for this species occurs within the watercourse (and associated wetland communities) at each of the structures. Thus, there is potential for turtles to hibernate within the ROW reaches or to nest along the road shoulders adjacent to each of the structures.

Furthermore, an additional nine of the 50 regional SAR have a moderate to high potential to occur within the study area in the vicinity of proposed bridge replacement works, based on the presence of suitable habitat features adjacent to the structures, including:

- **Bank Swallow** (*Riparia riparia*; Threatened under the ESA) – This species was not observed within the study area during the field surveys; however, potentially suitable breeding habitat for this species was observed along the steep riparian banks of the Conestogo River, beyond the ROW, approximately 90 m north of structure Bridge C109123.
- **Chimney Swift** (*Chaetura pelagica* - Threatened under the ESA) – This species was not observed in the study area during the field surveys; however, there are known records within <5 km of the study area (eBird 2015). Suitable breeding habitat occurs within the deciduous forest and swamp communities within the study area.
- **Eastern Ribbonsnake** (*Thamnophis sauritus* - Special Concern under the ESA) – This species was not observed in the study area during the field surveys; however, there are known records within 10 km of the study area (ORAA 2011). Suitable habitat occurs in the wetland communities within the study area.
- **Eastern Small-footed Myotis** (*Myotis leibii* - Endangered under the ESA) – This species was not observed in the study area during the field surveys; however, no evening surveys or acoustic monitoring was conducted. Suitable breeding habitat occurs in the forested communities within the study area.
- **Little Brown Myotis** (*Myotis lucifugus* - Endangered under the ESA) – This species was not observed in the study area during the field surveys; however, no evening surveys or acoustic monitoring was conducted. Suitable breeding habitat occurs in the forested communities within the study area.
- **Northern Myotis** (*Myotis septentrionalis* - Endangered under the ESA) – This species was not observed in the study area during the field surveys; however, no evening surveys or acoustic monitoring was conducted. Suitable breeding habitat occurs in the forested communities within the study area.
- **Red-headed Woodpecker** (*Melanerpes erythrocephalus* - Endangered under the ESA) – This species was not observed in the study area during the field surveys; however, however there is a known record within <6 km of the study area (eBird 2016). Suitable breeding habitat occurs within all treed areas within the study area.

- **Tri-coloured Bat** (*Perimyotis subflavus* - Endangered under the ESA) – This species was not observed in the study area during the field surveys; however, no evening surveys or acoustic monitoring was conducted. Suitable breeding habitat occurs in the forested communities within the study area.
- **Wood Thrush** (*Hylocichla mustelina* - Special Concern under the ESA) – This species was not observed in the study area during the field surveys; however, there is a recent record within <6 km of the study area (eBird 2022). Suitable breeding habitat occurs within the deciduous forest and swamp communities within the study area.

SAR - Flora

Of the four regionally occurring vascular plant SAR listed for Wellington County, two have reasonable potential to occur within the study area, based on the documented habitat conditions: Butternut (*Juglans cinerea*) and Hill's Pondweed (*Potamogeton hillii*). Neither species was observed during field work.

5.5 Fluvial Geomorphology

WSP completed a field visit on November 1, 2021 for four Conestogo River crossings along Wellington Road 109 and the Hydraulic analysis for the 4 subject bridges under both existing and proposed conditions was completed in October 2022. The Fluvial Geomorphology can be found in **Appendix I.**

The site is located in a rural setting, surrounded primarily by agricultural farm fields and rural residences with some commercial businesses. The GRCA (2001) Technical Background Report for the Grand River Fisheries Management Plan describes part of the Conestogo River is an area with till plains, with relatively low infiltration, and rapid runoff, especially now that the land use is primarily agricultural, with tile drained fields. This indicates that the Conestogo River and smaller creeks may become sediment-laden due to runoff from fields, and higher runoff flows increase the potential for creek channel erosion and flooding.

WSP observed gabion baskets bank protection at B109133 and B109134. No bank protection was observed at B109132 and C109123.

As per the general arrangements the gabion baskets will be removed and replaced at B109133 and B109134 during construction. The erosion protection methods employed have been largely adequate to protect the abutments.

It is recommended that bank protection measures also be considered at B109132 and C109123. Also, some of the existing abutments (at all four crossings) to be removed with the works are located below the bankfull channel width and opportunity to restore the banks and bed to more natural conditions will be reviewed at detail design.

Based on the fluvial assessment the following conclusion and recommendations are presented:

- Based on General Arrangements the proposed and existing spans are as follows:
    a) B109132 – proposed 22.3m vs 17.1m for the existing span;
    g) C109123 – proposed 18.3m vs 13.1m for the existing span;
    h) B109133 – proposed 17.3m vs 13.7m for the existing span; and
    i) B109134 – proposed 17.3m vs 12.2m for the existing span.

- Based on the ecology field visit the watercourse bankfull width average for B109132 was 12.2 m; C109123 was 11.3 m, B109133 was 7.0 m and B109134 was 8.0 m.
- Based on the rapid geomorphic assessment B109133 and B109134 were in regime; C109123 was transitional and C109123 was adjusting.
- Based on the lateral and down-valley erosion rate assessment this watercourse was found to have a migration rate and 100-year toe erosion rate as follows:
  - B109132: 41m;
  - C109123: 36m;
  - B109133: 23m; and
  - B109134: 23m.
- Based on the meander belt assessment this watercourse was determined to have a final belt width as follows:
  - B109132: 49m;
  - C109123: 44m;
  - B109133: 39m; and
  - B109134: 35m.
- As per the general arrangements the gabion baskets will be removed and replaced at B109133 and B109134 during construction. Opportunity to restore the banks to more natural conditions (instead of replacement with gabion) will be reviewed at detail design. The erosion protection methods employed have been largely adequate to protect the abutments. It is recommended that bank protection measures be considered at B109132 and C109123 compared to the assessed meander belt and erosion rates. Also, some of the existing abutments (at all four crossings) to be removed with the works are located below the bankfull channel width and opportunity to restore the banks and bed to more natural conditions will be reviewed at detail design.
- Overall based on the fluvial assessment the proposed spans should be acceptable provided appropriate bank erosion protection is applied at all four crossing given the proposed narrow spans compared to the meander belt widths and calculated erosion rates.

5.6 Hydrogeological Assessment

The site is located in a rural setting, surrounded primarily by agricultural farm fields and rural residences with some commercial businesses. The Village of Arthur is located to the northwest of the site. Natural features of the site include the Conestogo River, tributaries and wooded areas. The Hydrogeological Investigation report was prepared to determine if a Water Taking Environmental Activity and Sector Registry (EASR) or Permit to Take Water would be required for the proposed construction replacing the 4 bridges along the existing road. The Hydrogeological Investigation report can be found in **Appendix J**.

There are two Permits to Take Water (MECP, 2020) within approximately 1 km of the site, as summarized in **Table 5-2**.

Table 5-2: Permits to Take Water

Permit Number	Permit Holder Name	Purpose	Maximum Taking (L/day)	Source Type
8202-9DNKD3	The Corporation of the Township of Wellington North	Water Supply	2,261,000	Groundwater
8202-9DNKD3	The Corporation of the Township of Wellington North	Water Supply	2,261,000	Groundwater

Additionally, there is one water taking Environmental Activity and Sector Registry (EASR) located within 1 km of the site, summarized in **Table 5-3**.

Table 5-3: Water Taking Environmental Activity and Sector Registry

Approval Number	Business Name	Approval Type	Status	Maximum Water Takings Limit
R-009-4110383907	The Corporation of the City of Kitchener	EASR – Water Taking – Construction Dewatering	Registered	400,000 L/day

The PTTW's are located with the Village of Arthur for the municipally water supply. The water taking EASR is located along the for temporary construction dewatering.

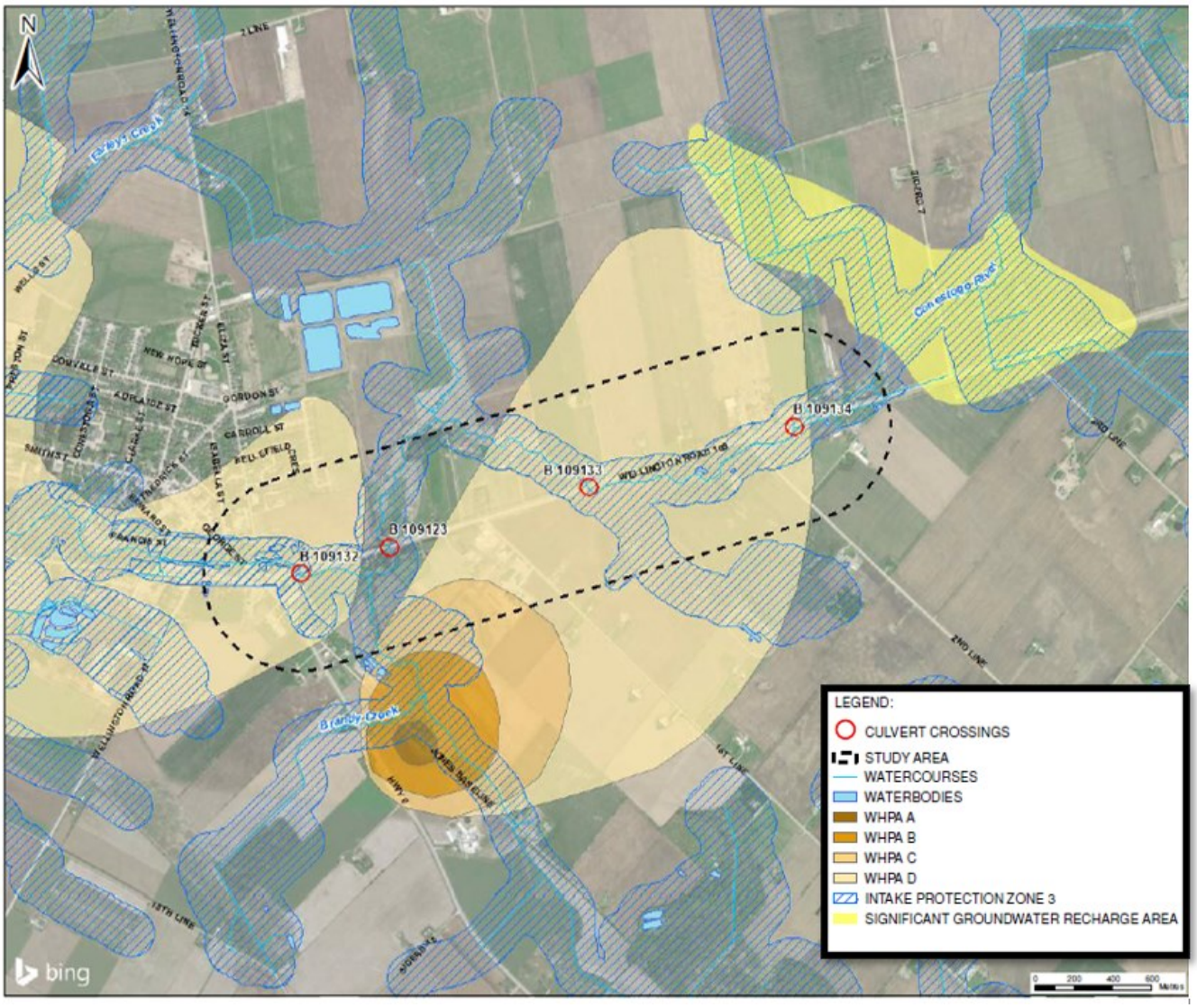
5.6.1 Source Water Protection

The site is located in the Grand River Source Water Protection Area and is located within a Wellhead Protection Area – D (WHPA-D) with a score of 2 and 4, and Intake Protection Zone -3 (IPZ-3) with a score of less than 4 and a Significant Groundwater Recharge Area (SRGA) is located adjacent to the northeast edge of the study area (MECP, 2022). Source water protection areas are shown in **Figure 5-2**.

"The Town of Arthur is currently serviced by three municipal production wells: 7B, 8A and 8B. The wells are completed in a deep overburden aquifer at approximately 46m below ground surface. The upper surficial Quaternary geology is mapped as clayey silt to silt till (Tavistock Till) which covers a large part of the area surrounding Arthur. Well 7B is located west of Arthur along Highway 109; Wells 8A and 8B are located to the south of Arthur in a rural setting" (LERSPC, 2022). Wells 8A and 8B are located approximately 1km south of the site, and the site is in the WHPA-D for all three wells (including the well to the west of Arthur). WHPA-D's are defined as the 25-year time of travel capture zone, which are delineated by groundwater modelling. Vulnerability scores were determined based on aquifer vulnerability classifications and transportation pathway assessments; scores of 2 have low vulnerability and a score of 4 has medium vulnerability for WHPA-D. Most of the site has a score of 2 (low) with the exception of a small area by the Wellington Road 109 and Baseline Jones intersection which has a score of 4 (medium) because of transport pathways. Given the depth of the wells, the distance from the site and the low vulnerabilities no impacts are anticipated.

Based on the Source Water Protection Threats Tool (2021) there are no threats for these source water protection areas (WHPA-D with a score of 2 and 4, IPZ-3 with a score of 4 and SGRA).

Figure 5-2: Source Water Protection



5.6.2 Dewatering Assessment

Potential construction dewatering rates was assessed for the proposed new bridges. Based on the calculated construction groundwater dewatering rates a water taking Environmental Activity and Sector Registry (EASR) is recommended for the entire 4 bridge project.

As per O. Reg. 63/16 Part III 7. (5) Subsection (1) does not apply in respect of the taking of ground water in relation to one or more dewatered work areas within a construction site if,

- with respect to an area of influence that does not overlap with another area of influence, the taking on any single day from that area of influence is more than 400,000 litres of ground water per day; or
- with respect to an area of influence that overlaps with one or more other areas of influence, the combined volume of ground water taken from the overlapping areas of influence on any single day is more than 400,000 litres of ground water per day. O. Reg. 300/21, s. 9 (4).

Therefore, one EASR can be obtained for the entire project provided no more then 400,000L/day is dewatered. The 4 bridge ZOIs (including both the east and west abutments) do not overlap.

The EASR must be obtained prior to the start of construction dewatering to accommodate all construction groundwater dewatering anticipated to be required for this project. Storm water discharge quality would also be subject to the monitoring requirements of the EASR. An environmental monitoring and mitigation plan to be implemented during construction activities.

5.6.3 Impacts on Receptors

A dewatering settlement analysis must be completed if a water taking EASR is requested.

Temporary construction dewatering is anticipated to be required at the excavations. Once these items are constructed, construction dewatering will no longer be required, and groundwater levels will return to pre-construction conditions.

No natural environment impacts are anticipated as the dewatering is anticipated to be temporary and provided the recommended Monitoring, Mitigation and Discharge Plan is adhered to.

No impact is anticipated for nearby private water well users, as the dewatering is anticipated to be minor and temporary.

No Source Water Protection impacts are anticipated at the site as dewatering is anticipated to be temporary and no source water protection areas are located in the vicinity of the site.

No adverse contaminant movement is anticipated to be a result of this dewatering as the dewatering rates are anticipated to be temporary. However, the monitoring, mitigation and discharge plan should be implemented during the construction period.

5.6.4 Best Practices

During any phase of the construction activities, due care should be exercised to avoid fuel, lubricant and fluid spills, including concrete wash water and dewatering discharge water in contact with curing concrete. Spill and contamination prevention practices should be implemented to avoid potential environmental hazards and clean-ups. Where practical, activities such as refueling should not be undertaken in areas with high susceptibility to groundwater contamination, as well as within 30 m of surface watercourses.

5.6.5 Monitoring, Mitigation and Discharge Plan

The following environmental monitoring, mitigation and discharge measures will need to be conducted during construction for both groundwater and stormwater:

1) If the taking of water is intended to continue for more than 365 days, the person proposing to engage in the activity has given written notice that includes the information set out below to the following:

a) the upper-tier and lower-tier municipalities or the single-tier municipality, as the case may be, within whose area of jurisdiction the proposed water taking is located, and

b) any conservation authority within whose area of jurisdiction the proposed water taking is located.

i) The name of the person proposing to engage in the activity.

ii) The dates on which the activity is to occur.

iii) An identification of the method of transfer or discharge referred to in paragraph 4 of subsection (2) that is to be implemented.

iv) If the method of transfer or discharge referred to in paragraph 3 is discharge to land, the location of the discharge. O. Reg. 300/21, s. 10.

2) Work within or immediately adjacent to any body of water or regulated area, including construction dewatering, sediment and erosion controls, will occur in accordance too any applicable permits as administered by applicable regulatory agencies, including the Ontario Ministry of the Environment, Conservation and Parks.

3) Construction dewatering rates (active pumping only) will be documented on a daily basis on all days when pumping of water or any type of dewatering occurs, at all sources, during all works, through co-operation with the site Contract Administrator. Construction dewatering rates through active pumping will be measured using a flow metre. Daily dewatering rates will be provided to the Contract Administrator on a monthly basis and reported annually to the MECP by March 31st. **Dewatering discharge rates cannot exceed 400,000 L/day.**

4) A dewatering discharge sample must be collected prior to discharge at each source to confirm compliance to the applicable water quality criteria described below. Additional discharge samples must be collected if a change in visible water quality is observed (sheen, odour, color).

5) Construction period dewatering discharge water, including groundwater seepage collected through passive drainage, will be managed and released as follows:

a) It is expected that the construction dewatering discharge will be treated on-site to meet PWQO (1999) including sufficient removal of suspended sediment, and be released to the Conestoga River, 30 m from the watercourse;

b) If the construction dewatering discharge does not meet PWQO it is expected to meet O. Reg. 153/04 (as amended) Table 2 criteria, including sufficient removal of suspended sediment, and the water will be released to ground surface, that is not within an area identified as WHPA-A, to re-infiltrate in such a manner to avoid excessive erosion scouring;

i) As per O.Reg. 63/16 Section 8 (5) (4) If the recommended method of discharge is discharge to surface land not enclosed in a building or discharge to a storm sewer the following must be completed **by a qualified person retained by the contractor**:

1) a statement that, in the opinion of the person who prepared the discharge report, the discharge of the ground water and storm water will not cause an adverse effect to the environment;

1) an identification of any treatment and control measures required to minimize erosion, flooding, scouring and sedimentation from occurring as a result of the discharge; and

2) an identification of any treatment and control measures required to address the quality of the discharge to ensure that the discharge will not cause an adverse effect to the environment.

c) Should the water not meet the criteria, it will be contained and taken off-site to a MECP licensed facility for treatment and disposal.

3) In co-operation with the site Contract Administrator, the clarity, presence of sheen, odour and/or precipitate, and turbidity will be recorded at least twice daily for the dewatering discharge at each source. Visual observations will be reported to the Contract Administrator on a monthly basis. With respect to any groundwater or storm water, or both, that is discharged to land, there shall be no visible petroleum hydrocarbon film or sheen present.

4) With respect to any groundwater or storm water, or both, that is discharged to land that is within 30 m of a water body, turbidity of the discharge shall not exceed eight Nephelometric Turbidity Units above the background levels of the nearest water body.

5) Any groundwater/surface water interference complaints or incidents will be promptly investigated. An alternative water supply will be provided to any water user in the area whose water supply has been adversely affected by construction activities (dewatering, chemical spills, sediment release, rock breaking and pile driving). Nearby residents will be provided with a responsible contact, to which any complaints may be reported, throughout the construction period.

6) Erosion and Sediment Control (ESC) best practices will be applied during the construction, clean-up, and restoration, to prevent sediment-laden runoff from entering any surface water course and/or designated environmentally sensitive area. **A comprehensive ESC Plan will be developed and presented for review and approval prior to the start of construction.** Any erosion, flooding, scouring, sediment and total suspended solids control measures identified in the discharge report shall be used, operated and maintained in a manner that satisfies the recommendations of the manufacturer of the control measures or as directed in the discharge report if no such recommendations exist. All control measures referred to above and all materials collected or trapped by those measures shall be recovered and disposed of when the person is no longer engaging in the activity.

7) Vehicle refueling and maintenance will not take place within 30 m of a watercourse, unless done in a specially designed area, and manner, to contain potential leaks or spills.

8) Any spills or incidents will be promptly reported and immediately investigated as necessary to protect surrounding water users and natural receptors. **An environmental spills response plan must be established prior to beginning work and shall be promptly implemented as required.**

9) If the taking of water is no longer needed, within 30 days after the day the person has ceased to engage in the activity, they shall give notice to the MECP that the water taking is complete by filing that information in the MECP's electronic system. O.Reg. 300/21, s.10.

10) A person who engages in the water taking activity shall ensure that each of the following records with respect to the taking of groundwater, storm water or both is created and retained for a period of five years from the day it is required to be created:

    a) The dates on which the person engaged in the activity.

    b) For each day on which groundwater, storm water or both was taken, the average rate at which it was taken from each dewatered work area in litres per second.

    c) The volume of groundwater, storm water or both taken from each dewatered work area each day in litres.

    d) A record of the following information with respect to each complaint:

        i) The date and time the complaint was received.

        v) A copy of the complaint, if it is a written complaint.

        vi) A summary of the complaint, if it is not a written complaint.

        vii) A summary of measures taken, if any, to address the complaint.

    e) A record of any precipitation on the construction site.

    f) A copy of any information or documents that demonstrate written notice was provided in accordance with the protocol set out in a water taking report.

    g) A copy of the records related to the monitoring plans referred to in paragraphs 3 and 9 of subsection 9.1 (2).

        i) 9.1(2) 3. A water monitoring plan shall be implemented in accordance with the plan set out in the water taking report, if the applicable circumstances arise.

        viii) 9.1(2) 9. A monitoring plan for the discharge shall be implemented in accordance with the plan set out in the discharge report, if the applicable circumstances arise.

5.6.6 Proposed Contingency Plan

If an adverse impact is observed through the monitoring program, a spill occurs, a complaint is received, or if the MECP determines that unacceptable interference is occurring, the following response would need to be initiated:

1) All appropriate stakeholders will be notified as required, including the construction manager responsible for onsite activities, the MECP Spills Hotline (1-800-268-6060) and Grand River Conservation Authority;

2) Mitigation measures will be initiated to prevent further damage or inconvenience, in consultation with property owners and regulatory agencies, as applicable;

3) Water taking/construction may be stopped until the problem is fixed, as circumstances allow;

4) If it is determined that the construction work is causing increased level of suspended sediment in treated dewatering discharge water, or site runoff, above the upset limit of eight Nephelometric Turbidity Units, and / or resulting in turbidity levels in downstream surface water which are noticeably higher than background turbidity conditions, the contractor should modify dewatering methodology to correct the

problem as necessary. This may be accomplished by adding additional treatments (adding filter bags, sediment traps, Enviro-tanks, etc.) or modifying the discharge methodology (i.e. lower pumping rate, move filter bag location, etc.);

5) If water quality of dewatering discharge water is observed to have an unusual appearance or odor, indicative of an adverse impact, dewatering discharge shall be stopped if circumstances allow, the water will be tested to determine the nature of the impact. Appropriate water treatment will be added as necessary, or water will be contained to haul to a suitable off-site and MECP-licensed facility where the water can be treated and discharged;

6) During the work program, should any incidents occur resulting in damages to adjacent natural environments, private properties, structures, or infrastructure beyond the construction limits, the damages will be cleaned up / repaired / compensated to the satisfaction of the property owner and / or regulatory agencies as applicable; and

7) If it is found that construction activities are causing an adverse impact to a private water well user, or if a complaint is received:

a) The complaint will be inspected within 24 hours;

h) Regulatory agencies will be notified (MECP); and

i) A temporary water supply will be provided to the resident, until either the water supply or quality returns to pre-construction conditions, or it is determined that the issue is not related to construction.

In the event that the adverse water quality or quantity conditions persist beyond three months, a permanent mitigation plan will be developed in co-operation with the property owner, with input from regulatory agencies as required.

5.7 Hydrology and Hydraulics Assessment

A hydrologic analysis was completed to determine the peak flows, as well as the hydraulic analysis for the preferred option for all four bridges using a HEC-RAS hydraulic model which was compiled based on a detailed cross section and structure survey upstream and downstream of the site.

The 2-year through 100-year as well as the Regulatory Storm events were analyzed in HEC-RAS; the 50-year storm event is the design storm for the structure replacement. The results of the hydraulic assessment indicate that the existing structures B109132 and C109123 meet all design criteria while B109133 meet all criteria except for the soffit clearance. Bridge B109134, does not meet any of the design criteria under existing conditions except for the relief flow criteria.

Under proposed conditions structures B109132 and C109123 meet all design criteria. Bridges B109133 and B109134 meet all design criteria except for the soffit clearance due to downstream constraints. All proposed structures meet the Navigable Water Act. The Hydrology and Hydraulics Report can be found in **Appendix K**.

5.8 Climate Change

From a Greenhouse gas (GHG) perspective on climate change, the contaminates of concern from motor vehicle emissions are carbon dioxides (CO2), methane (CH4), and nitrous oxide (N2O). These GHGs can be further

classified according to their Global Warming Potential. The Global Warming Potential is a multiplier developed for each GHG, which allows comparison of the ability of each GHG to trap heat in the atmosphere, relative to carbon dioxide.

Though traffic volumes are expected to increase in the future, emission rates are also predicted to go down due to improvements in technology. Therefore, total emissions, including greenhouse gas emissions, are expected to be similar between the existing and proposed configurations.

Bridge replacement Option 3 met the MTO Highway Drainage Design Standards and is hydraulically more efficient than the existing bridge. There will be no flooding impact on the upstream and no overtopping on Wellington Road 7 during the Regional Storm event. Therefore, hydraulic performance for the proposed replacement bridge options for the Bosworth Bridge (B007028) on Wellington Road 7 will be designed considering climate change impacts in the detail design phase.

5.9 Air Quality

Construction activities have the ability to impact localized air quality through increased particulate matter from fugitive dust and from combustion by-products through equipment mobilization. The construction activities associated with the Project includes the construction of structures. Air emissions associated with construction activities typically include:

- Total Suspended Particulates (TSP), particulate matter with a diameter of 10 microns or less (PM10), and particulate matter with a diameter of 2.5 microns or less (PM2.5) resulting from:
  - Stockpiling of soils and other friable material;
  - Granular material loading and unloading activities;
  - Transportation of soils and other friable materials via dump trucks;
  - Soil excavation and filling activities;
  - Movement of heavy and light vehicles on paved and unpaved roads; and,
  - Cutting of existing concrete.
- Emissions resulting from the combustion engines of construction equipment.

Construction activities are exempt from air regulatory requirements in Ontario due to their temporary nature. Nuisance fugitive dust (coarse particulate such as TSP and PM10) is the primary air quality impact during the construction phase of the Project. Nuisance fugitive dust can be managed through a Construction Air Quality Management Plan (CAQMP) for fugitive dust following the recommendations outlined in the Environment and Climate Change Canada (ECCC) guidance document “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities”, dated March 2005. Air Quality Management Plans should ensure that dust from construction and demolition activities do not impact surrounding environmentally sensitive areas such as aquatic habitats and fisheries, terrestrial vegetation, and faunal communities, as well as residential properties in proximity to work areas.

To mitigate construction activities, a CAQMP should be developed to address construction equipment vehicle exhaust, potential traffic disruptions and congestion, fugitive dust, and odour. Potential mitigation measures that may be incorporated in the CAQMP include:

- Dust suppression measures (e.g., application of water wherever appropriate, or the use of approved non-chloride chemical dust suppressants, where the application of water is not suitable);
- Use of dump trucks with retractable covers for the transport of soils and other friable materials;

- Minimize the number of loadings and unloading of soils and other friable materials;
- Minimize drop heights, use enclosed chutes, and cover bins for debris associated with deconstruction of affected structures;
- Washing of equipment and/use of mud mats where practical at construction site exits to limit the migration of soil and dust off-site;
- Stockpiling of soil and other friable materials in locations that are less exposed to wind (e.g., protected from the wind by suitable barriers or wind fences/screens, or covered when long-term storage is required) and away from sensitive receptors to the extent possible;
- Reduction of unnecessary traffic and implementation of speed limits;
- Permanent stabilization of exposed soil areas with non-erodible material (e.g., stone or vegetation) as soon as practicably possible after construction in the affected area is completed;
- Ensuring that all construction vehicles, machinery, and equipment are equipped with current emission controls, which are in a state of good repair; and,
- Dust-generating activities should be minimized during conditions of high wind.

In addition to the CAQMP, construction activities should be monitored by a qualified environmental inspector who will review the effectiveness of the mitigation measures and construction best management practices to confirm they are functioning as intended. If mitigation is found to not be effective, revised mitigation measures designed to improve effectiveness will be implemented. Dust levels should be monitored daily by the contractor and frequently by the environmental inspector to assess the effectiveness of dust suppression measures and adjust as required. Monitoring should continue throughout the construction phase until activities are complete, the exposed soils have been stabilized, and the construction waste has been removed from site. A complaint response protocol should be established for nuisance effects, such as dust, for residents to provide feedback. Regular inspections of dust emissions should be carried out by the contractor (frequency to be defined prior to project construction) to confirm dust control watering frequency and rates are adequate for control. Competent site supervisors should monitor the site for wind direction and weather conditions to ensure that high-risk dust generating activities are reduced when the wind is blowing consistently towards nearby sensitive receptors. The site supervisor should also monitor for visible fugitive dust and take action to determine and correct the cause. Specific details regarding monitoring should be included in the CAQMP.

5.10 Structure Deficiencies

All four structures included in this study are nearing the end, or have reached the end, of their design service life. A summary of the major deficiencies is outlined in **Table 5-4** and shown for the individual structures in **Figure 5-3** through **Figure 5-6.**

Table 5-4: Existing Conditions - Structure Deficiencies

Structure Number	Name	Major Deficiencies
B109132	Conestogo River Bridge #6	• Railings are in poor condition with severe deterioration and do not meet current standards • Severe scaling and disintegration at south corner of west abutment • Severe scaling/erosion at base of east abutment with exposed reinforcing steel • Wide vertical crack and two medium cracks in west abutment • Collapse of southwest retaining wall • Erosion noted on northwest and southwest embankments • Scour along west abutment exposing up to 0.6 m of footing • Severe corrosion of deck drains • Wide crack and scaling along abutment and NW wingwall joint
C109123	Conestogo River Bridge #5	• Railings are in poor condition with severe deterioration and do not meet current standards. Temporary concrete barrier required due to railing condition –reducing roadway width • Severe spall at base of arch at the south east corner • The underside of the barrel has honeycombing, wet pattern cracks, several longitudinal cracks, some leaching with efflorescence and/or rust stains • Very severe scaling/disintegration in south coping • Medium pattern cracking, leachate cracks, spalls and scaling on wingwalls • Severe scaling/disintegration along joint between the end of barrel and wingwall at northeast and southeast corners • Severe erosion of northwest bank • Numerous cracks and spalls on fascia • Mis-alignment in railing suggests rotation of retaining wall and potential stability concerns
B109133	Conestogo River Bridge #4	• Railings are in poor condition with severe deterioration and do not meet current standards • South fascia has several rust stains, cracks and scaling/ disintegration • Severe scaling at mid span of south fascia / soffit adjacent to patch • Gabion wall at the south west corner appears to have shifted slightly into the river -possible undermining • Scour along west abutment exposing up to 0.7m of top of footing • Exposed corroded rebar on south curb
B109134	Conestogo River Bridge #10	• Railings are in poor condition with severe deterioration and do not meet current standards • Narrow cracks and two medium to wide vertical cracks on abutments and some leaching cracks at the northeast and southwest corners • severe scaling/disintegration at southeast corner • Mis-alignment in railing suggests rotation of retaining wall and potential stability concerns • South fascia showing leaching cracks and concrete spalls throughout with severe scaling and disintegration

Structure Number	Name	Major Deficiencies
		• north fascia has cracks and spalls throughout • Medium pattern cracks on southwest wingwall • Scaling and spalls throughout and transverse cracks in sidewalk • History of settlement at bridge approach

Figure 5-3: Existing Conditions - Structure B109132

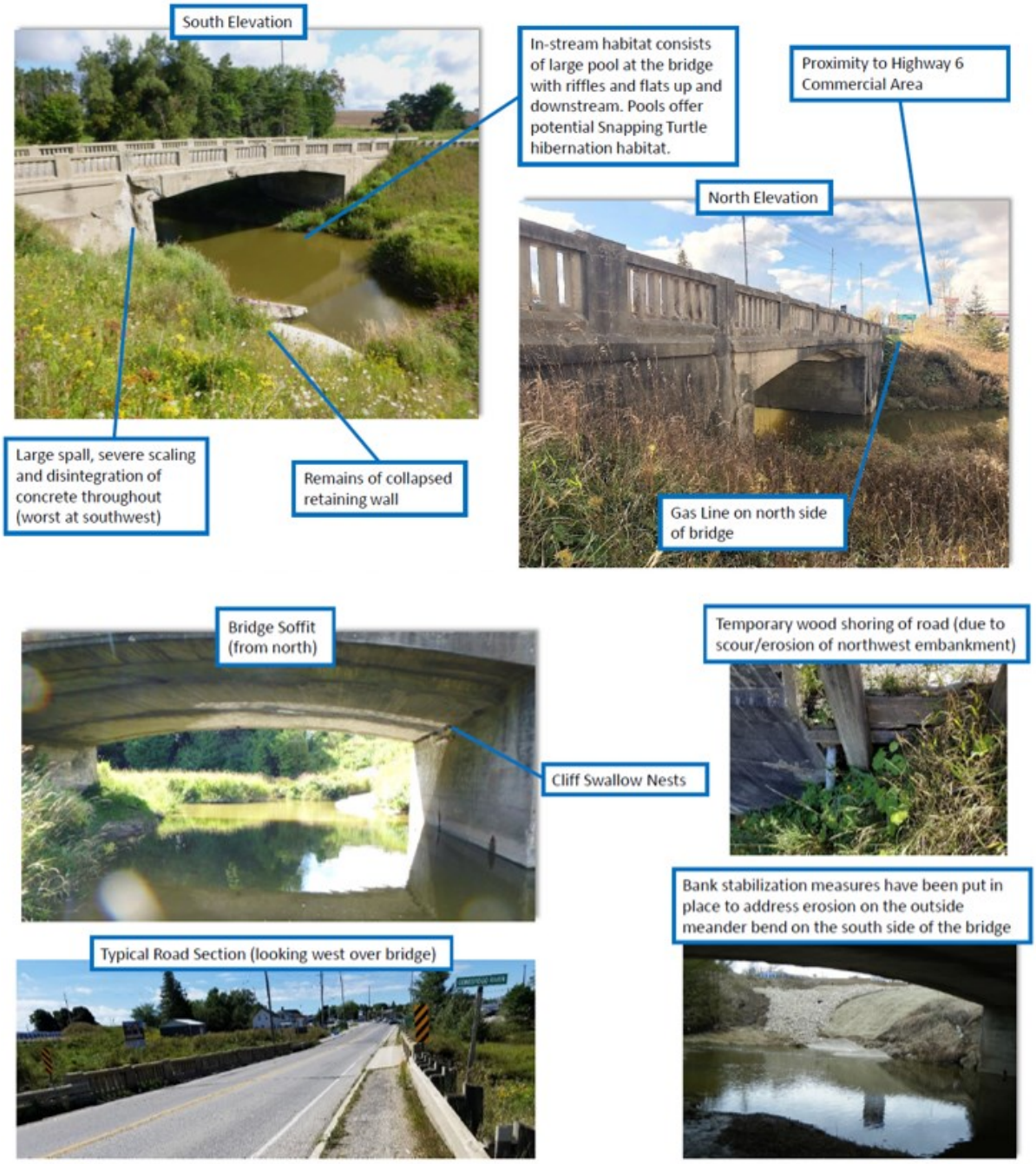


Figure 5-4: Existing Conditions - Structure C109123

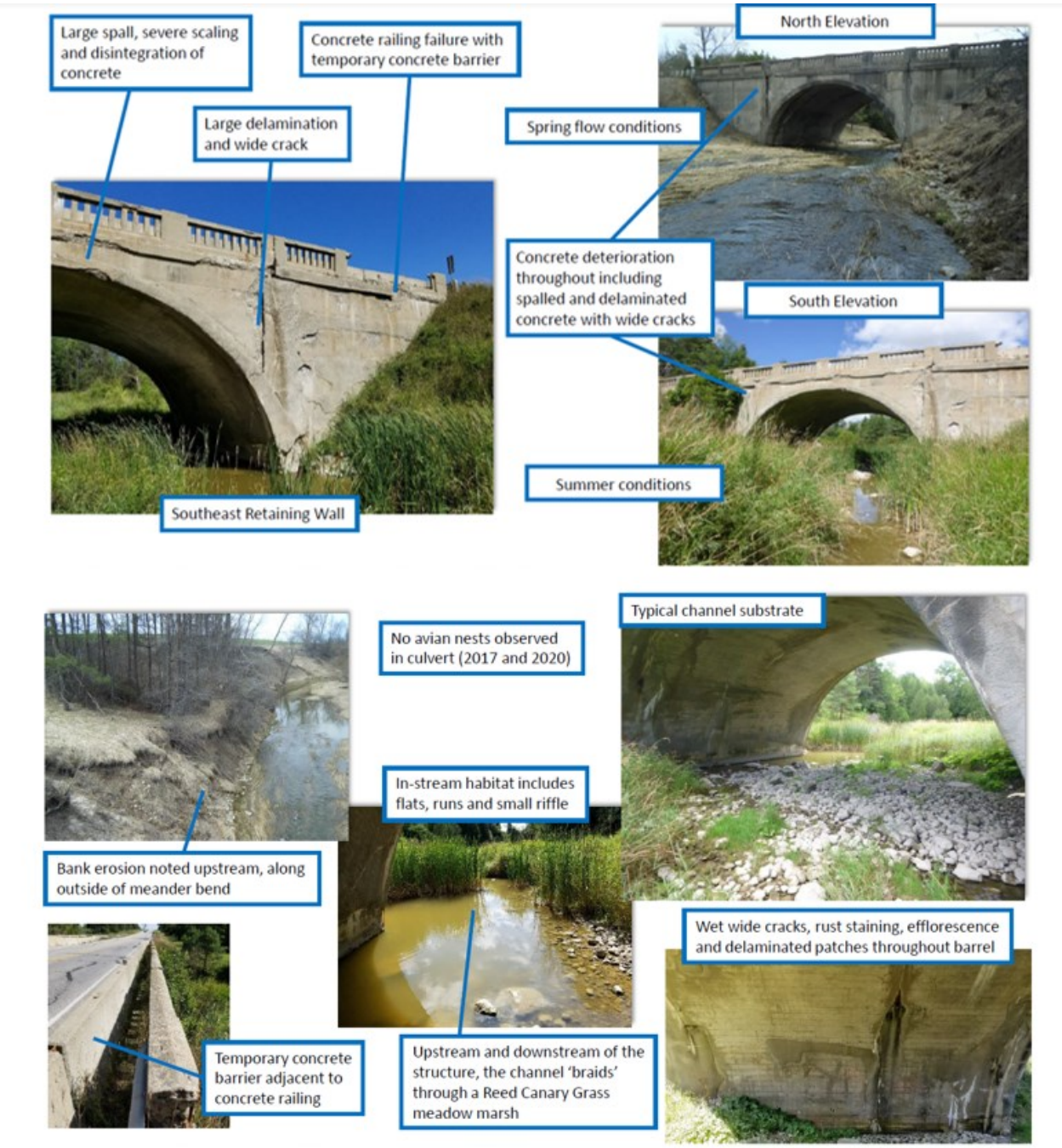


Figure 5-5: Existing Conditions - Structure B109133

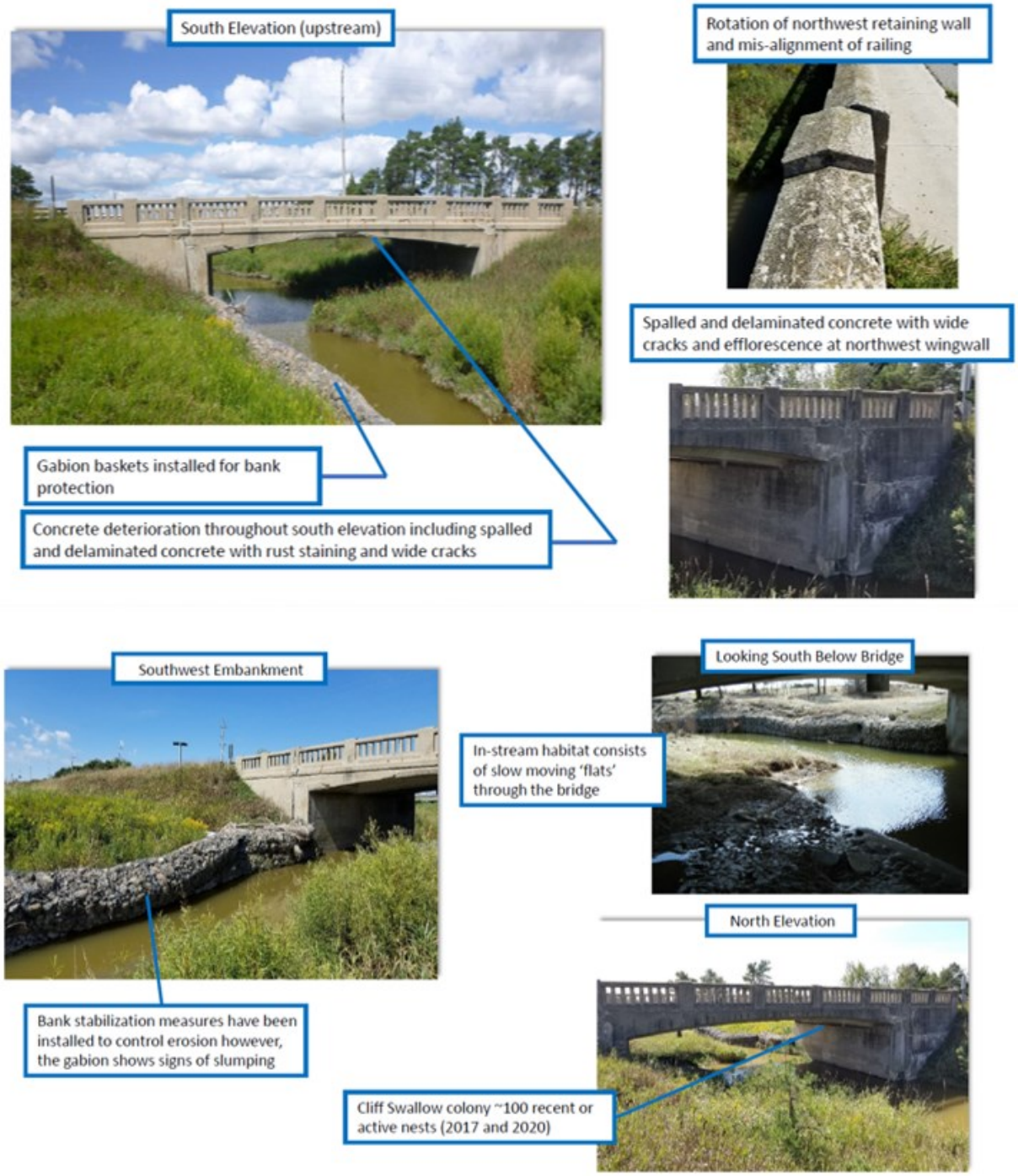


Figure 5-6: Existing Conditions - Structure B109134

5.11 Transportation

Wellington Road 109 is an important east-west transportation route serving local and regional traffic. The average annual daily traffic (AADT) is 8060 vehicles per day (2018) and with assumed baseline growth is expected to increase to 8570 vehicles per day by 2025. Truck traffic accounts for about 17% of the daily traffic volumes. It is understood that large farm equipment and horse drawn carriage also rely on WR109 for access across the study area.

Walking and cycling activity occurs but is relatively limited within the study limits. Three of the existing structures include a 1.5 m raised sidewalk on the north side. The Wellington County Active Transportation Plan identifies proposed signed cycling routes within Arthur and a proposed spine off-road cycling route, north of WR109. Cycling facilities have not been identified for WR109 since demand is low and the WR109 is primarily intended to move higher vehicular traffic volumes.

5.11.1 Utilities

There is an Enbridge gas pipe on the South side of the WR109, and an overhead hydro line and an overhead bell utility line on the North side. The overhead hydro line crosses over the road over the bridge B109132. The hydro pole on the West side of B109132 needs to be relocated to the North side of the road to eliminate the crossing over the road over the bridge and accommodate the construction staging. The Enbridge gas and bell utilities are to be maintained and protected during construction.

5.11.2 Traffic Conditions

The following points summarize the key study findings and recommendations arising from a review of existing and future operating performance and an evaluation of passing lane requirements along Wellington Road 109 between Harriston and the boundary between Wellington and Dufferin Counties.

Existing Conditions

- All individual movements at the signalized Wellington Road 109 intersections with Highway 23, Wellington Road 7 and Highway 6 operate with volume-to-capacity ratios below 0.60. All study area intersection movements operate at levels-of-service C or better during the weekday morning and afternoon peak hours. There are currently no operating constraints at the nine study area intersections included in this assessment and, therefore, the traffic analysis has not identified the need for any improvements to intersection lane geometry or traffic control in this regard.
- Mainline operating performance reflects a level-of-service C or better throughout the study area during all analysis periods with the exception of the Friday afternoon of the holiday long weekend. Conditions between Harriston and Teviotdale during this period reflect a level-of-service D under existing conditions.
- Passing lane justification criteria are currently satisfied in the eastbound direction between Harriston and Teviotdale on the basis of the long weekend Friday afternoon and Saturday morning peak hour travel demand. Demand does not exceed the lane obsolescence threshold and, therefore, levels of service can be expected to improve with a passing lane.
- Passing lane justification criteria are currently satisfied in the westbound direction between Harriston and Teviotdale on the basis of the long weekend Friday afternoon peak hour travel demand. However, demand is much greater than the lane obsolescence threshold and, therefore, levels of service cannot be improved with a passing lane.

- Passing lane justification criteria are currently satisfied in the eastbound direction between Arthur and the County boundary on the basis of the long weekend Friday afternoon peak hour travel demand. Demand does not exceed the lane obsolescence threshold and, therefore, levels of service can be expected to improve with a passing lane.
- Passing lane justification criteria are currently satisfied in the westbound direction between Arthur and the County boundary on the basis of the long weekend Friday afternoon peak hour travel demand. Demand is only marginally greater than the lane obsolescence threshold and, therefore, levels of service may be improved with a passing lane.
- Despite potential level of service improvements, recommendations for passing lanes are not typically made on the basis of long weekend traffic impacts. If the County were to consider passing lane improvements on the basis of this analysis, it may be desirable to assess typical weekend peak hour impacts for comparison.

Collision History

- Apart from a greater proportion of single motor vehicle collisions between Arthur and the County boundary, no one single initial impact type appears to be over-represented across the study area. A review of the data for the 19 single motor vehicle collisions between Arthur and the County boundary confirms that there is no indication of any trend or collision prone conditions within the study limits.
- The distribution of the environmental condition characteristics for Wellington Road 109 does not appear to over-represent any one particular condition. The review of road surface and light condition characteristics reflects similar findings.
- The distribution of collision severity for Wellington Road 109 does not appear to over-represent any one particular classification (property damage only, personal injury, fatality).

Future Conditions

- Mainline operating performance reflects a level-of-service C or better throughout the study area during all analysis periods with the exception of the Friday afternoon and Saturday morning of the holiday long weekend. Conditions between Harriston and Teviotdale during the Friday afternoon and Saturday morning peak hours reflect levels-of-service E and D, respectively. The Friday afternoon peak hour level of service is only marginally an E as the projected demand is close to the level-of-service D threshold. Conditions between Arthur and the County boundary during the Friday afternoon peak hour reflect a level-of-service D. On the basis that these level-of-service impacts reflect long weekend conditions only, the future impacts can be considered manageable in this regard.
- Sensitivity analysis demonstrates that the addition of eastbound passing lanes between Harriston and Teviotdale and between Arthur and the County boundary, despite potential improvement in level of service, will not result in a change in the levels of service (from E to D or from D to C) as defined by the corresponding thresholds.
- The warrant for an eastbound passing lane between Harriston and Teviotdale on the basis of the current travel demand during the holiday long weekend is bolstered by the adherence to warrants on the basis of typical weekday conditions by 2034.

- An eastbound passing lane between Arthur and the County boundary (warranted on the basis of the existing holiday long weekend afternoon peak hour demand on a Friday) becomes marginally obsolete with traffic growth to 2034, but will provide a level of service improvement under the holiday long weekend conditions on a Friday for nearly 20 years.
- A westbound passing lane between Arthur and the County boundary, although marginally obsolete under existing holiday long weekend afternoon peak hour conditions on a Friday, would become more obsolete by 2034 and, therefore, provide no level of service benefit under these conditions. Despite this, both eastbound and westbound passing lanes become warranted (by 2034) during the typical weekday afternoon peak hour and the holiday long weekend morning peak hour on a Saturday and level of service improvements could be expected with volumes not exceeding the lane obsolescence thresholds.
- Despite satisfying the justification criteria for a westbound passing lane between Harriston and Teviotdale, the future (and existing) travel demand far exceeds the lane obsolescence threshold and a passing lane could be expected to provide no level of service improvement.
- An eastbound passing lane only becomes warranted between Teviotdale and Arthur by 2034 on the basis of the holiday long weekend afternoon peak hour travel demand on a Friday. While the criteria are not strictly satisfied in the westbound direction, conditions are marginal and it is our opinion that a westbound passing lane is also warranted.
- The traffic analysis supports a recommendation for future consideration of eastbound passing lanes between Harriston and Teviotdale and between Arthur and the County boundary on the basis that typical weekday peak hour volumes are expected to satisfy the justification criteria. The traffic analysis also supports a recommendation for future consideration of a westbound passing lane between Arthur and the County boundary on the same basis.
- The justification criteria for passing lanes between Teviotdale and Arthur are only satisfied on the basis of the projected long weekend (Friday afternoon in this case) travel demand and despite the potential level of service improvements during this period, recommendations for passing lanes are not typically made on the basis of long weekend impacts. If the County were to consider passing lane improvements on the basis of this analysis, it may be desirable to assess typical weekend peak hour impacts for comparison.

6.0 IDENTIFICATION AND EVALUATION OF ALTERNATIVE SOLUTIONS

6.1 Introduction

The focus of Phase 2 of the Class EA process is the identification and evaluation of various solutions to the problems identified in above sections of this report. The following sections outline the process that was followed to review and evaluate potential solutions.

A full range of alternative solutions as described below are identified and compared to the “do nothing” (base case) alternative. The alternatives are assessed using screening criteria, such as compatibility with County’s and Provincial objectives and policies, ability to serve planned developments, ability to accommodate future travel demand and provide strategic multi-modal connections linking future planned destinations, impact on public safety, potential impacts on natural environment (Vegetation and Wildlife, Water Resources, Species-at-Risk and Fisheries), and capital costs.

The Class EA planning process requires that various reasonable and feasible solutions to the identified problem be examined. A matrix format is used to show how each alternative rate on each screening criterion to compare alternative solutions.

The Class EA process recognizes that there are many ways of solving a particular problem and requires various alternative solutions to be considered. The five alternative solutions for consideration in this study are described in **Table 6-1.**

Table 6-1: Alternative Planning Solutions

Planning Alternative Solutions		Description
Alternative 1	Do Nothing	No improvements would be made to the structures. Each structure would continue to be monitored / inspected. Through time, it is expected that load restrictions and eventually, bridge closures would occur as conditions worsen.
Alternative 2	Rehabilitation	Rehabilitation includes local repairs to railings, curbs, sidewalks, soffit and substructure repairs, deck and superstructure repairs, repairs to erosion and scour at bridge abutments where necessary.
Alternative 3	Replacement	Replacement involves removal of the existing structures and construction of new structures at or close to the existing locations. The proposed structure replacement type and construction / traffic staging methods would be determined in the next Phase of the EA process.
Alternative 4	New Road Alignment	Realignment of WR109 to avoid or reduce the number of Conestogo River crossings. This solution may eliminate the need for ongoing and future maintenance, rehabilitation and replacements of the four structures, in the long term.

6.2 Evaluation Framework and Criteria

An evaluation framework was developed as presented in **Table 6-2**, including technical considerations and environmental components that address the board definition of the environment as described in the Environmental Assessment Act (EAA) and those based on comments received from relevant agencies.

A detailed assessment of each alternative was completed based on the described evaluation components. A descriptive qualitative evaluation was used to consider the suitability and feasibility of alternative solutions and design concepts. Trade-offs considering the advantages or disadvantages of each alternative to address the problem and opportunity statement with the least environmental effects and the most technical benefits forms the rationale for the identification of the preferred solution.

A comparative evaluation in a matrix format was prepared and is shown in **Table 6-3**. A description and evaluation of each alternative solution is outlined and summarized in **Table 6-4**.

Table 6-2: Criteria Evaluating Alternative Solutions

Component	Evaluation Criteria
Socio-Economic Environment	• Consistency with Official Plans and policies • Potential property requirements • Impacts to residents and business (operations and access) • Impacts to agricultural lands and operations
Cultural Heritage	• Archeological Resources • Cultural Heritage Resources
Surface and Groundwater	• Management of road runoff • Protection of surface water features and watercourse crossings • Flood conveyance • Protection of groundwater resources
Natural Environment	• Potential indirect and direct impacts to terrestrial and aquatic species and habitats • Potential impacts to Species at Risk and their habitat
Technical	• Structural condition and deficiencies • Design requirements and construction constraints / complexity
Transportation	• Consistency with transportation planning and policy documents • Traffic operations and efficiency
Cost Estimate	• Life Cycle Cost Analysis • Capital costs estimate for high-level comparison purposes

Table 6-3: Comparative Evaluation Matrix for Alternative Planning Solutions

Category	ALTERNATIVE SOLUTION 1: Do Nothing	ALTERNATIVE SOLUTION 2: Rehabilitation	ALTERNATIVE SOLUTION 3: Replacement	ALTERNATIVE SOLUTION 4: New Road Alignment
Socio-Economic	• No immediate changes to existing conditions however, as structural conditions decline, significant socio socio-economic impacts would arise from load restrictions and bridge closures.	• No impacts outside of existing right right-of -way • Temporary alteration of travel/ commuter routes and impact to adjacent/alternative route(s) during construction • Temporary impact to local commercial, industrial and farm businesses during construction	• Potential minor impacts to adjacent properties during construction (e.g. construction easements) • Noise and dust and other associated inconveniencies during construction • Disruption to local businesses, farm operations and residences during construction –disruption during construction season over multiple years may be experienced	• Would require new property for the alignment • One new residence located near the Highway 6 intersection would be directly impacted • Alignment would bisect properties including farm parcels therefore impacting operations and operable land area • Existing highway commercial access and frontage on WR109 would be eliminated and access would be provided via sideroads • Existing access to rural residences would be changed-access would be provided via sideroads
	○	●	◐	○
Cultural Heritage	• No potential archaeological impacts • No impacts to potential heritage resources	• Limited potential archaeological impacts • Bridges are of heritage interest and while rehabilitation may maintain the bridges in the short-term, key features may change as a result of necessary rehabilitation works	• All four structures are of heritage interest • Mitigation includes documentation and photographic record prior to removal • Some potential to disturb archaeological resources during construction–appropriate assessments will be undertaken in advance of construction	• Several potential heritage resources, including built heritage and cultural heritage landscapes, would be impacted • New alignment would be subject to extensive archaeological assessment
	●	◔	◐	◔
Surface and Groundwater	• No changes to existing conditions • Flood conveyance deficiencies would not be addressed	• No changes to existing conditions • Flood conveyance deficiencies would not be addressed	• Ensures all structures will meet flood design criteria • Limited other changes to surface water/drainage and groundwater sensitivities	• May reduce overall roadway length within the floodplain • New bridge at Brandy Creek would be appropriately sized to meet current design criteria • Extensive new drainage design required for new roadway, including ditch outlets • Roadway would be closer to wellhead protection area • Potential impacts to private wells would need to be examined
	◐	◐	●	◔
Natural Environment	• No immediate changes to existing conditions	• Potential for indirect impacts (e.g., debris and sediment release with rehabilitation works) can be managed using appropriate mitigation measures (e.g., proper erosion and sediment controls, use of in-water work timing window). • No permanent impacts on the aquatic habitat of the Conestogo River	• Temporary in-stream works associated with removal of existing abutments and installation of new foundation and abutments –work zone can be isolated from river • Minor direct impacts to common roadside and riparian vegetation, and temporary bank alteration above the waterline –areas to be restored following construction • The minor direct impacts and potential indirect impacts (e.g., construction related debris and sediment release) can be managed using appropriate mitigation and restoration measures (e.g., proper erosion and sediment controls, use of timing window).	• New road alignment would involve a new crossing of Brandy Creek • Potential for direct and indirect impacts to Brandy Creek are similar to the bridge replacement option -however impacts would be associated with a new crossing rather than replacement of existing i.e. new impact in new area • Other woodlands/wetlands are largely avoided • Several hedgerows would be impacted
	●	●	◔	◐

Category	ALTERNATIVE SOLUTION 1: Do Nothing	ALTERNATIVE SOLUTION 2: Rehabilitation	ALTERNATIVE SOLUTION 3: Replacement	ALTERNATIVE SOLUTION 4: New Road Alignment
Technical	• Structural conditions would worsen until more drastic measures would have to be taken such as bridge load reduction or closure in order to manage risk to the public	• Provides short term solution to structural deficiencies however does not ultimately address the limited design life and does not address design deficiencies • Only defers but does not avoid eventual structure replacement • If the scope of rehabilitation were to be expanded to address design issues as well as structural deficiencies, the cost would become similar to the Replacement option	• Provides a long-term solution to addresses all structural and design deficiencies on WR109 • Opportunity to address localized erosion conditions • Construction will likely involve multiple construction seasons • Opportunity to carefully examine rapid replacement techniques and other means of optimizing construction to manage impacts	• Three existing WR109 bridges would be taken out of commission • One WR109 bridge to remain for residential access and one new bridge on Brandy Creek -means only a net reduction of two structures for long-term management • New road can be constructed offline with little disruption to traffic on WR109, except when tiering into Highway 6 intersection
	○	◔	◔	◔
Transportation	• No immediate changes • Long term impacts would arise as travel would become limited or close, in the long-term	• Some short-term traffic impacts during rehabilitation works (e.g. lane closures or temporary detours)	• Maintains WR109 in its current location in the long-term • Construction would involve traffic management for each bridge including possible lane restrictions, road closures and temporary detours • Local and regional traffic may experience delays during construction • Based on preliminary analysis, traffic delays are expected to be manageable	• Not reflected in County transportation plans/strategies –realignment in this area has not been previously considered or identified as a strategy • Results in slightly longer road length and therefore slightly longer travel time • Ties in to existing Highway 6 intersection
	○	◔	◐	◐
Cost Estimate	• No capital costs • minor costs for inspections	• Capital Costs = $1,600,000	• Capital Costs = $16,540,000	• Capital Costs = $23,000,000
Conclusion	Not Recommended	Not Recommended	**Recommended**	Not Recommended

LEGEND	○	◔	◐	◔	●
	Least Preferred / Most Impact				**Most Preferred / Least Impact**

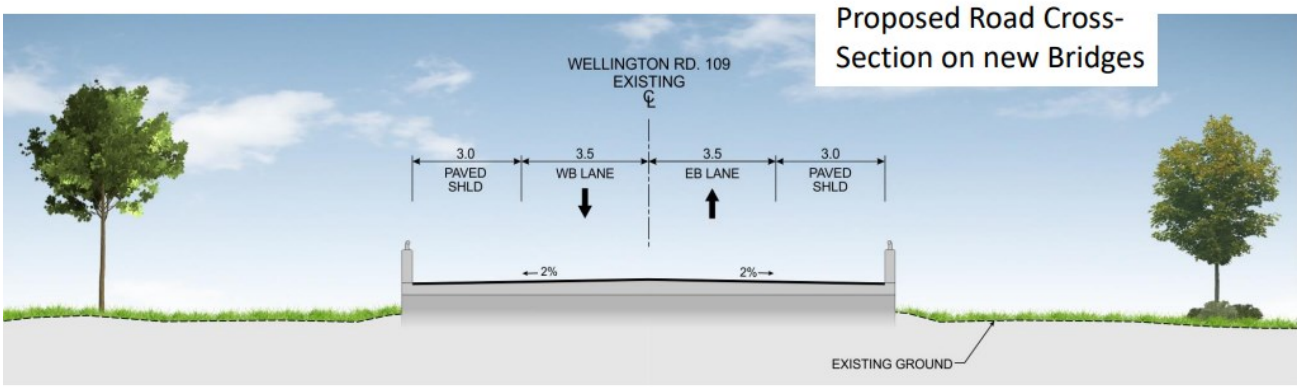
Table 6-4: Alternative Planning Solutions Summary

Alternative Planning Solution	Assessment Summary	Conclusion
Do Nothing	• Not a reasonable alternative because significant structural deficiencies would not be addressed. • Would lead to load restrictions and eventually, road closure.	• Does not address the problem and therefore is not considered an acceptable alternative. Therefore, this alternative is not recommended.
Rehabilitation	• Extensive and ongoing rehabilitation would be required. • Rehabilitation would have limited additional service life to the bridges. • Only defers/delays a longer-term solution.	• Addresses some of the structural deficiencies but would not address design deficiencies or flood conveyance requirements. Therefore, this alternative is not recommended.
Replacement	• Existing bridge would be removed and new foundation / abutments would be installed. • All design criteria would be met. • Traffic delays will occur over multiple construction seasons. Construction staging and traffic management can ease disruption. • Rapid replacement to be considered in next study phase.	• Addresses the structural and functional deficiencies and has fewer impacts to socio-economic, natural and cultural environments than the New Road Alignment option. • Initial capital costs and lifecycle costs are lower than the New Road Alignment option. **Recommended**
New Road Alignment	• New road would be constructed 'off-line' and then opened to traffic once complete. • Substantial impacts to property, residences, business, agricultural operations compared to other options. • Not consistent with / does not align with existing land use or transportation plans and policies.	• Potential benefits do not outweigh the socio-economic, cultural and natural environmental impacts. • Both initial capital costs and lifecycle costs are substantially higher than the Replacement option. • Therefore, this alternative is not recommended.

6.3 Typical Cross-Section at the Bridges

The recommended future road cross-section consists of 3.5m travel lanes and 3m shoulders on the bridges and at the approaches, consistent with design standards based on the posted speed, design speed and the vehicle volumes and percentage of truck traffic. **Figure 6-1** depicts the road cross-section on new bridges.

Figure 6-1: Proposed Road Cross-Section at the Bridges



6.4 Construction Methods

The County's primary objectives are to achieve a cost-conscious and efficient construction process that seeks to minimize disruption to road users. Construction methods will have a direct influence on all of these aspects. Consideration of construction methods also brings to light:

- Potential property and utility impacts
- Site access requirements, temporary construction work zone and easement requirements
- Need for temporary road closures
- Potential temporary impacts to the surrounding environment that must be mitigated

6.4.1 Accelerated Bridge Construction (ABC)

ABC uses different methods of project delivery and construction to reduce the project schedule, on-site construction time, and public impact. ABC methods include for example:

- Prefabricated elements
- Lateral slide or temporary bridge (see next slide)
- Extended working hours with additional crews/resources
- Completion of activities in parallel/replacing multiple structures simultaneously

Accelerating the schedule may increase the cost of the project. However, the increased project delivery cost can be offset by reduced impacts to residents, businesses and travel. The application of Accelerated Bridge Construction (ABC) is consistent with the County's objectives and these practices will be considered generally.

6.5 Types of Construction Methods

6.5.1 Traditional Staging

Bridge replacement occurs by removing the existing structure and building the new structure in the same place. This may be achieved through full road closure or through temporary lane restrictions with traffic staging, where

traffic is maintained / staged on half of the bridge while the other half is demolished and replaced, then flipped to complete the other half.

Benefits

- Lowest cost
- No property impacts
- Typically avoids utility impacts (some relocations may be expected)
- No temporary structures/road realignment
- Typically, less intrusion into adjacent valley areas and natural features
- Very common construction method

Challenges

- Longest construction duration (typically two construction seasons)
- Greatest traffic impacts (anticipate single lane in alternating directions with temporary traffic signals) for duration of construction

6.5.2 Traditional construction in conjunction with a Temporary Bridge

In this method a temporary structure is installed adjacent to the existing structure site to carry traffic during the demolition and in-place replacement of the permanent structure. Temporary foundation and abutments are installed to support the temporary structure. Roadway tie-ins and lane shifts are employed to create a seamless transition from the roadway approaches onto the temporary bridge.

For the Conestogo River crossings, it is anticipated that the temporary bridge would be a portable single span bailey bridge that could be utilized at each of the four locations.

Benefits

- Shortest construction duration
- Temporary bridge can be configured to maintain one or two-way traffic during construction, minimizing traffic impacts
- If the Temporary Bridge is purchased by the County, it can be utilized following construction therefore high initial costs are amortized over continued use

Challenges

- Initial one-time cost for the temporary bridge
- Requires adequate space adjacent to the existing bridge for the new bridge, abutments and road widening.
- May temporarily encroach into private property which may require working easement or purchase.
- Encroach into adjacent valley areas and sensitive habitat will require protection and mitigation measures

6.5.3 Lateral Slide

Bridge placement using lateral sliding (ABC method) where the entire superstructure is constructed in a temporary location and is moved into place over a night or weekend. This method is typically used for bridge replacement of a primary roadway where the new superstructure is constructed on temporary supports adjacent and parallel to the bridge being replaced.

Once the superstructure is fully constructed, the existing bridge structure is demolished, and the new bridge is moved transversely into place.

Benefits

- Shorter construction duration relative to traditional methods
- Can construct partial or full width of proposed structure to reduce temporary footprint.
- Can maintain one or two-way during most of the construction except for short-term closures when the new bridge is slid into place

Challenges

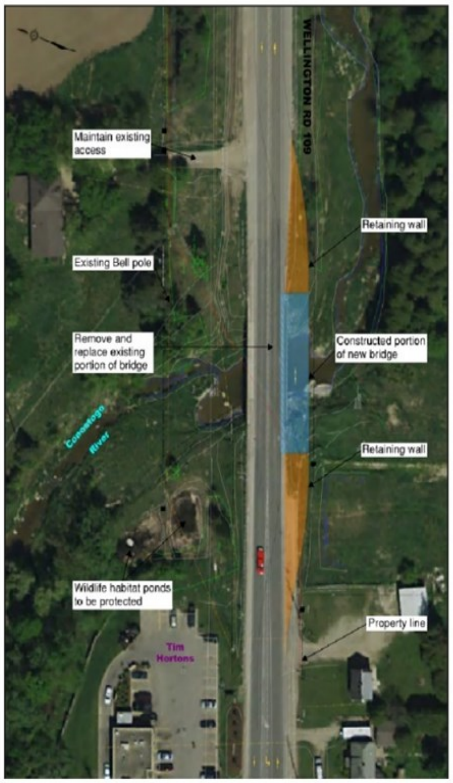
- A short-term full road closure required to slide the bridge (24-48 hrs)
- Higher cost associated with each site
- Requires greater space adjacent to the existing bridge in order to construct the new bridge, typically larger work zone than the temporary bridge with similar or greater encroachment impacts to the temporary bridge.
- More challenging when crossing watercourse with varying width or on a meander bend

6.6 Schematic Representation of the Construction Methods

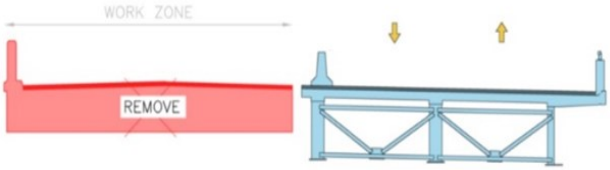
This section schematically presents the key components of the construction methods as being considered at each of the four sites. The evaluation summary, with recommendations, of the construction methods relevant to the respective structures, is given in **Table 6-5.**

6.6.1 B109132

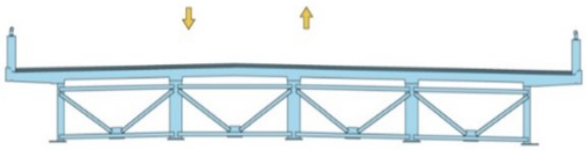
B109132- Traditional Staging with Overbuilt Width



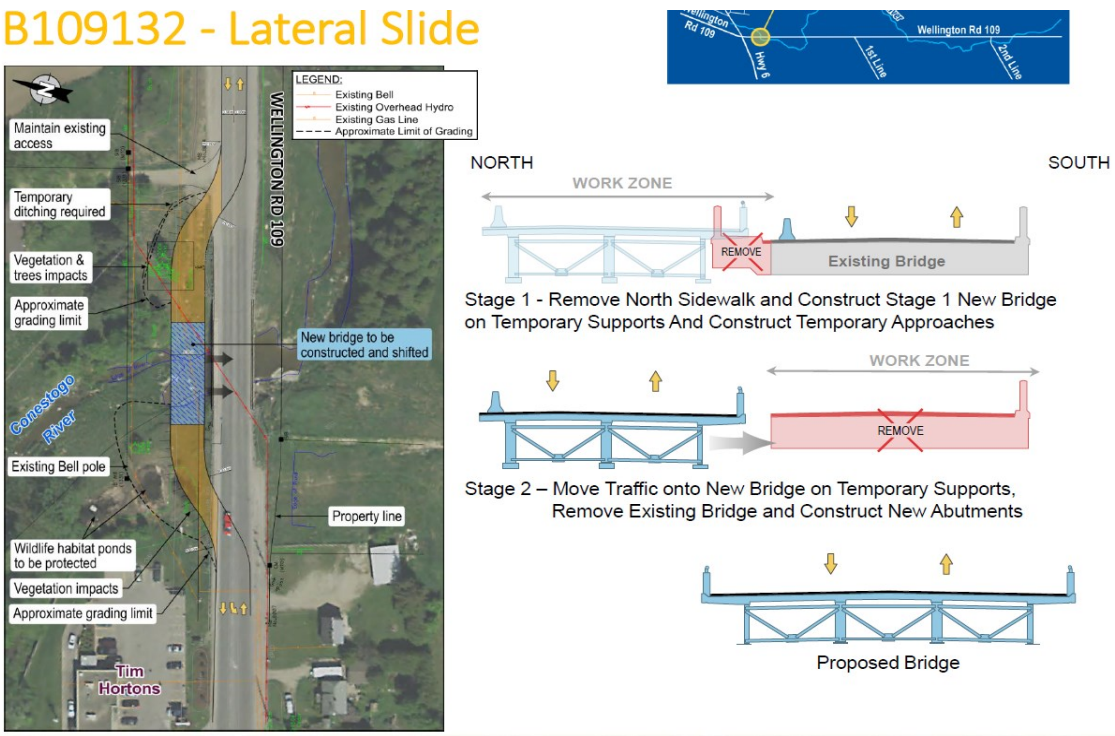
Stage 1 - Remove South portion of the structure to accommodate construction of Southern portion of new Bridge and Temp. approaches



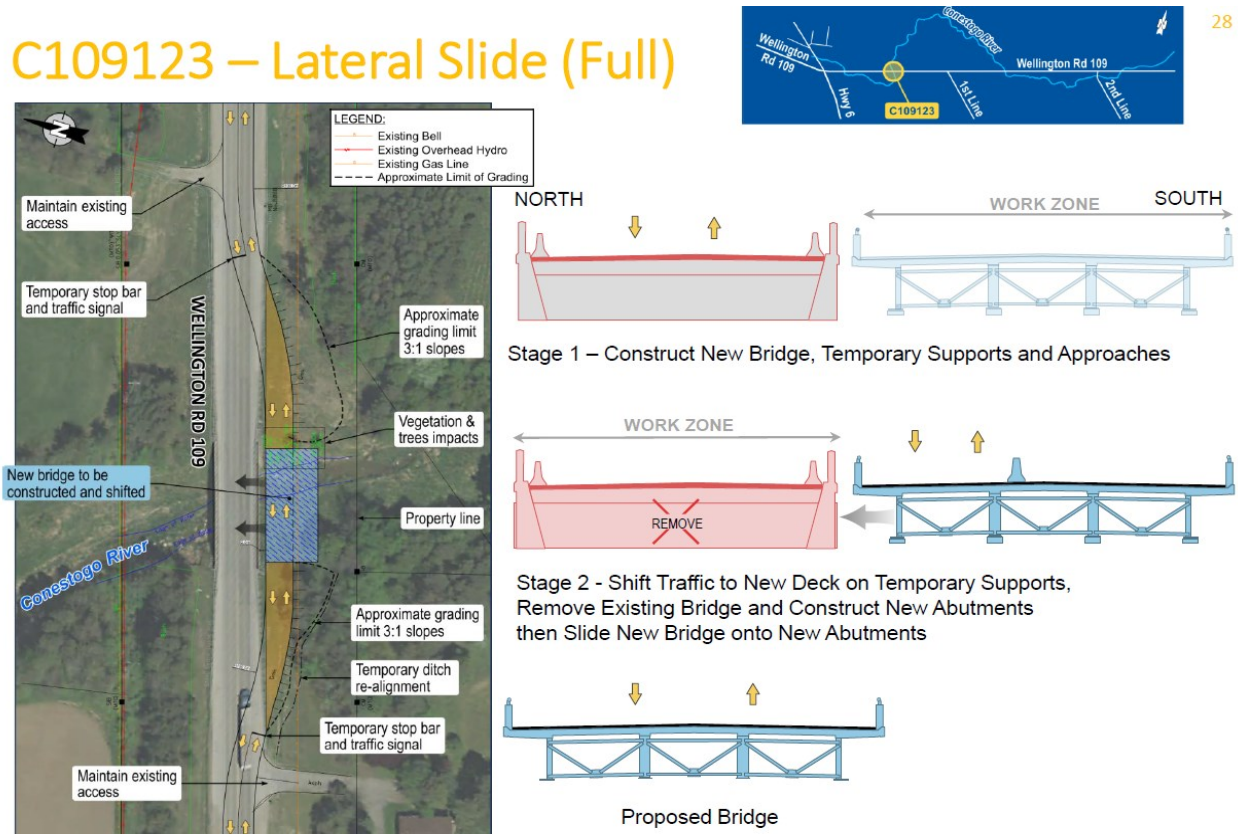
Stage 2 - Move traffic onto New Bridge, remove Existing Bridge, and Construct New Abutments



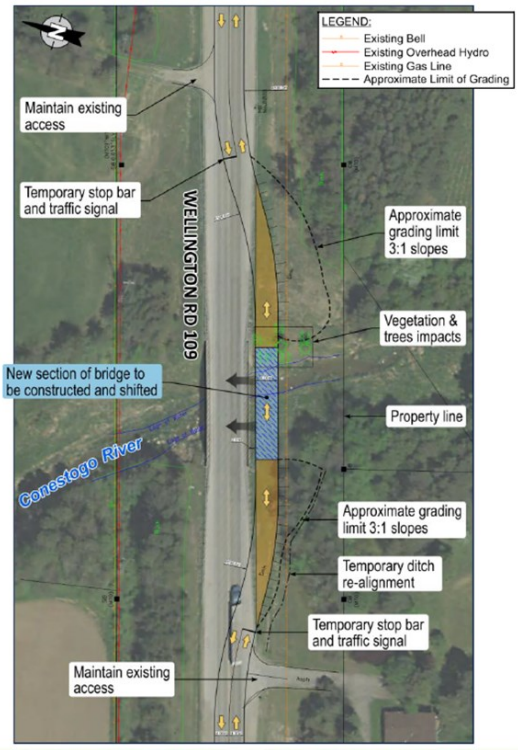
Proposed Bridge

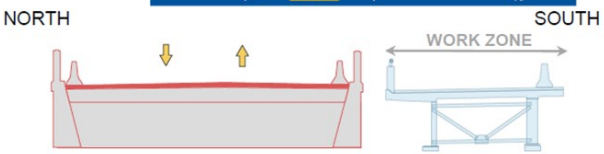

B109132 - Lateral Slide
LEGEND:
Existing Bell
Existing Overhead Hydro
Existing Gas Line
Approximate Limit of Grading
WELLINGTON RD 109
Maintain existing access
Temporary ditching required
Vegetation & trees impacts
Approximate grading limit
New bridge to be constructed and shifted
Conestogo River
Existing Bell pole
Property line
Wildlife habitat ponds to be protected
Vegetation impacts
Approximate grading limit
Tim Hortons
Wellington Rd 109
Hwy 6
1st Line
2nd Line
NORTH
SOUTH
WORK ZONE
REMOVE
Existing Bridge
Stage 1 - Remove North Sidewalk and Construct Stage 1 New Bridge on Temporary Supports And Construct Temporary Approaches
WORK ZONE
REMOVE
Stage 2 – Move Traffic onto New Bridge on Temporary Supports, Remove Existing Bridge and Construct New Abutments
Proposed Bridge

6.6.2 C109123

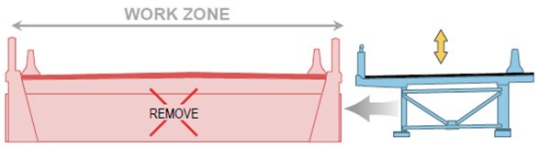

C109123 – Lateral Slide (Full)
28
Wellington Rd 109
Conestogo River
Hwy 6
C109123
1st Line
2nd Line
LEGEND:
Existing Bell
Existing Overhead Hydro
Existing Gas Line
Approximate Limit of Grading
WELLINGTON RD 109
Maintain existing access
Temporary stop bar and traffic signal
Approximate grading limit 3:1 slopes
Vegetation & trees impacts
New bridge to be constructed and shifted
Property line
Conestogo River
Approximate grading limit 3:1 slopes
Temporary ditch re-alignment
Temporary stop bar and traffic signal
Maintain existing access
NORTH
WORK ZONE
SOUTH
Stage 1 – Construct New Bridge, Temporary Supports and Approaches
WORK ZONE
REMOVE
Stage 2 - Shift Traffic to New Deck on Temporary Supports, Remove Existing Bridge and Construct New Abutments then Slide New Bridge onto New Abutments
Proposed Bridge

C109123 – Lateral Slide (Half)

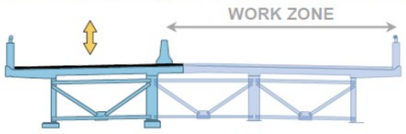




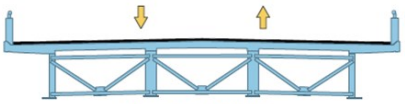
Stage 1 – Construct Portion of New Deck On Temporary Supports



Stage 2 – Shift Traffic to New Deck on Temporary Supports, Remove Existing Bridge and Construct New Abutments



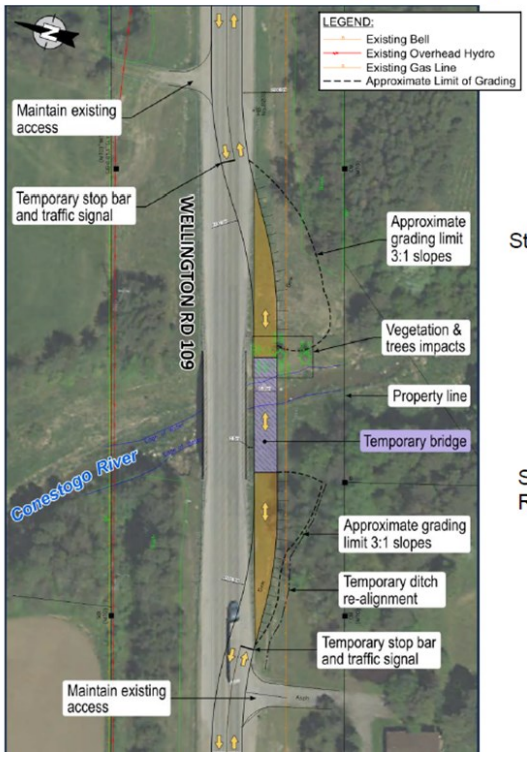
Stage 3 – Slide New Deck Onto New Abutment, Shift Traffic and Construct Remainder of New Deck

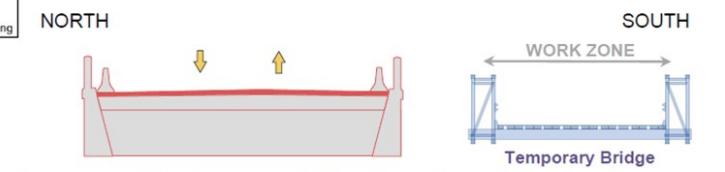


Proposed Bridge

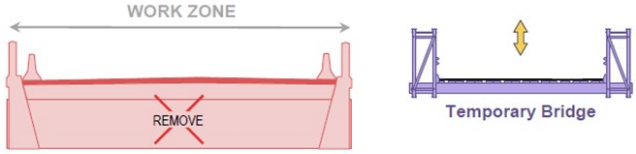
C109123 – Temporary Bridge

30

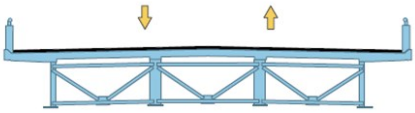




Stage 1 – Construct Temporary Bridge, Supports and Temporary Approaches



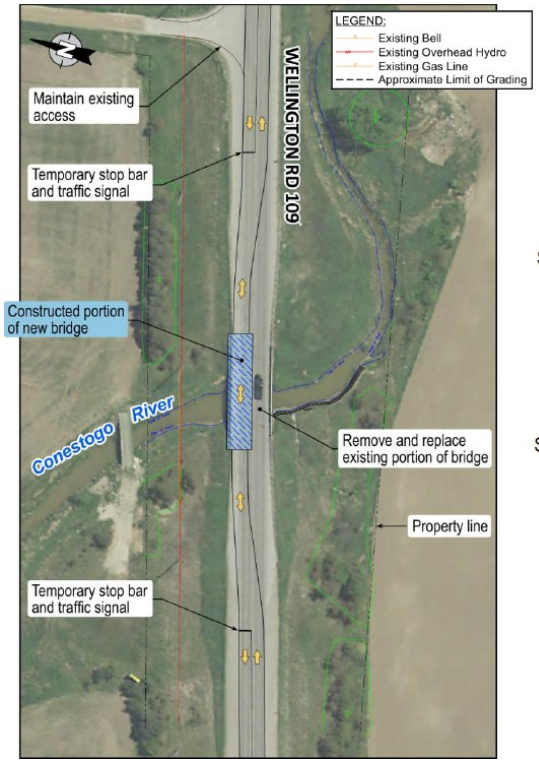
Stage 2 – Shift Traffic onto Temporary Bridge,
Remove Existing Bridge and Construct New Bridge

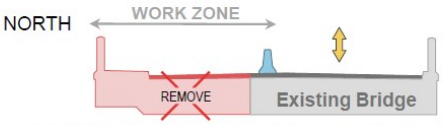


Proposed Bridge

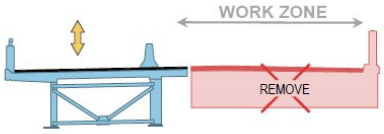
6.6.3 B109133

B109133 – Traditional Staging

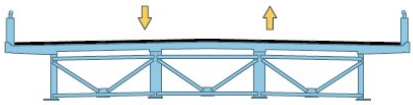




Stage 1 – Shift Traffic to South, Remove and Replace North Side of Bridge



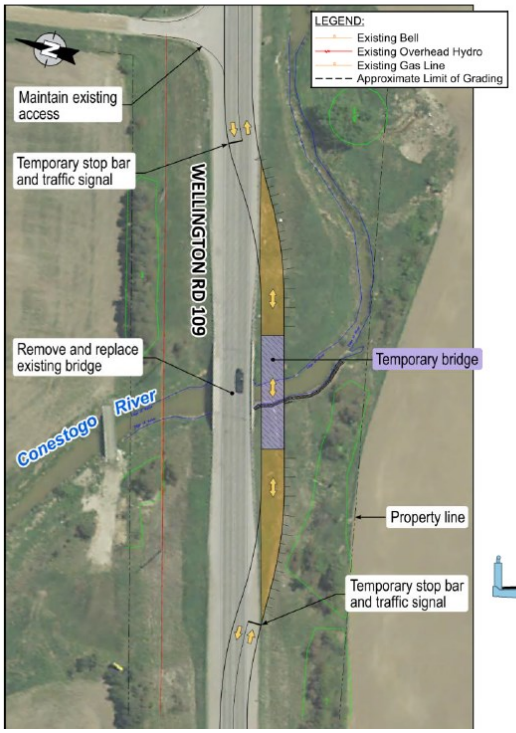
Stage 2 – Shift Traffic to North, Remove and Replace South Side of Bridge

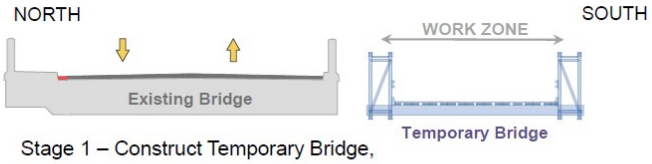


Proposed Bridge

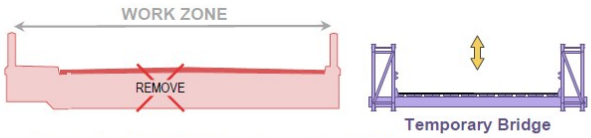
B109133 – Temporary Bridge

32

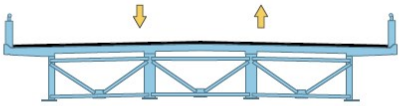




Stage 1 – Construct Temporary Bridge, Supports and Temporary Approaches



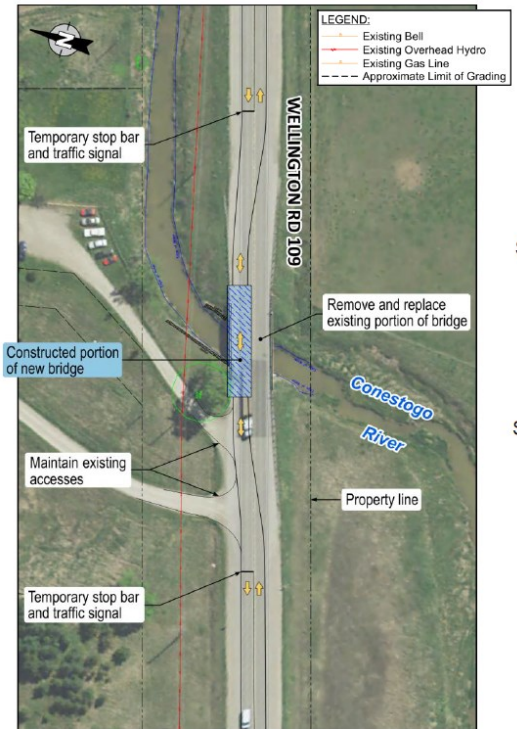
Stage 2 – Shift Traffic to Temporary Bridge, Remove Existing and Construct New Bridge

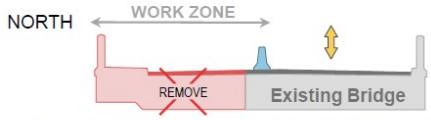


Proposed Bridge

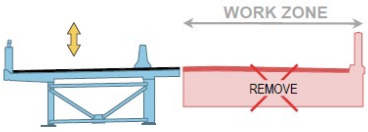
6.6.4 B109134

B109134 – Traditional Staging

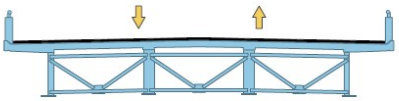




Stage 1 – Shift Traffic to South, Remove and Replace North Side of Bridge

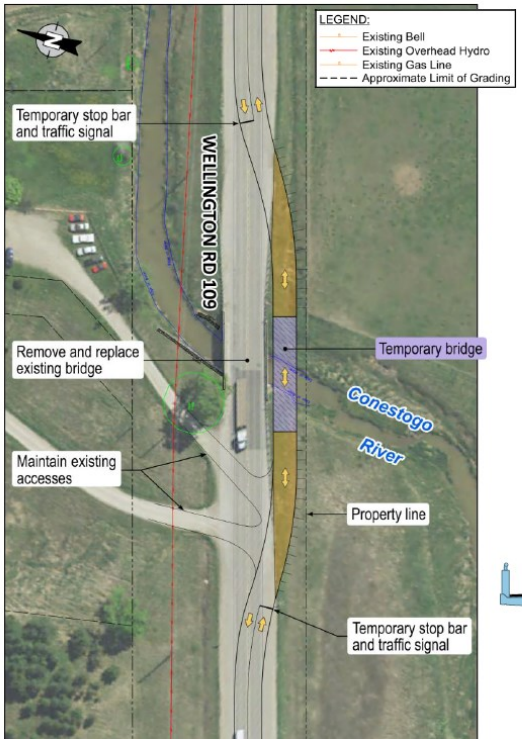


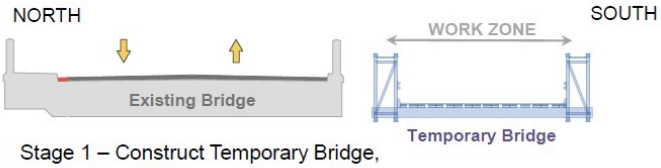
Stage 2 – Shift Traffic to North, Remove and Replace South Side of Bridge



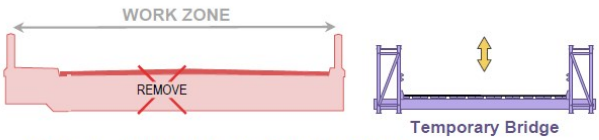
Proposed Bridge

B109134 – Temporary Bridge

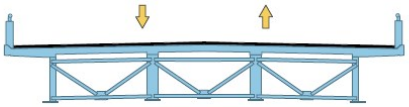




Stage 1 – Construct Temporary Bridge, Supports and Temporary Approaches



Stage 2 – Shift Traffic to Temporary Bridge, Remove Existing and Construct New Bridge



Proposed Bridge

Table 6-5: Construction Methods Evaluation Summary

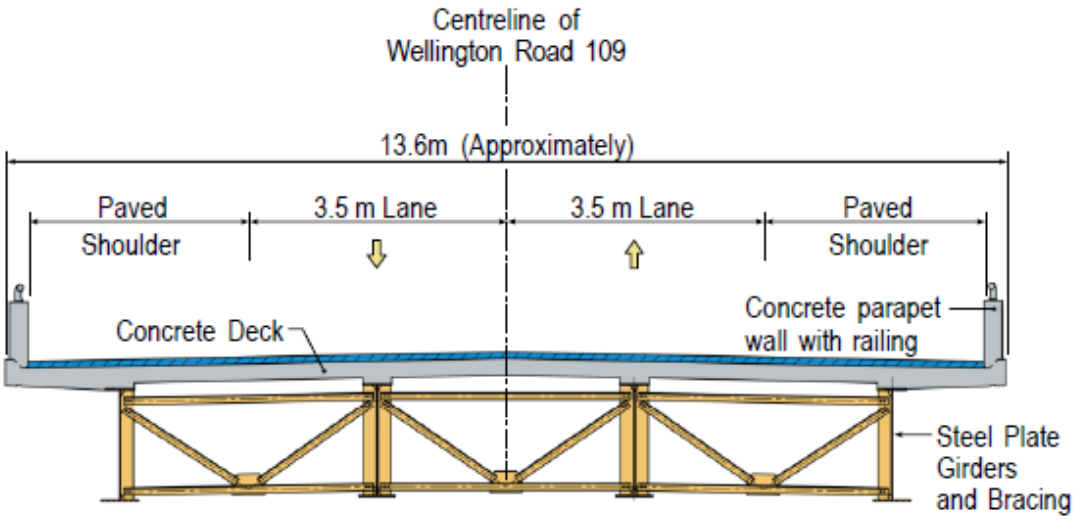
Structure Number	Traditional Staging	Temporary Bridge	Lateral Slide
B109132	The bridge is in close proximity to the Wellington Rd. & Hwy 6 intersection. For smooth operation of this intersection, two travel lanes through the bridge are therefore needed throughout construction. Traditional staging method with an overbuilt deck meets this objective. The overbuilt deck also has the potential to facilitate any future widening of the Wellington Road. This option is being recommended for this site.	Temporary bridge on this project is a single lane structure. Therefore, with this option, accommodating two travel lanes during construction will be challenging. It would require another method of construction, such as traditional staging, to be used in parallel that shall provide accommodation for the second lane. Furthermore, temporary arrangements will have a cost premium and potential impact to property, utilities and natural environment.	This option is feasible but not preferred. Implementing it will be challenging due to the skewed highway alignment. Furthermore, this option has a similar cost premium, and impact to property, utilities and natural environment as the temporary bridge option.
C109123	Not preferred due to the geometry of the existing structure. The arch of the existing bridge will limit access along the closure strip between the construction stages. Stage 2 removals will be challenging in the vicinity of the new structure that is constructed in Stage 1.	This is a preferred option for this site. With this method, traffic can be maintained throughout construction, while bridge replacement is carried out with traditional construction methods in a continuous operation. The temporary bridge can be reconfigured for other sites and therefore has a residual value as well.	This option is feasible but not preferred. Implementing it will be challenging due to the skewed highway alignment. Furthermore, this option has a similar cost premium, and impact to property, utilities and natural environment as the temporary bridge option. However, it is relatively more uneconomical because costs cannot be amortized over multiple sites.
B109133	Preferred option due to lower cost, and opportunity to minimize impact to natural environment, properties and utilities. However, only a single lane of traffic can be maintained on the bridge during construction.	If temporary bridge is purchased for C109123, this option can be utilized at these sites. However, construction schedule will be a factor as only one temporary bridge is available.	Impact to property, utilities and natural environment as the temporary bridge option, however it is less economical because costs cannot be amortized over multiple sites.
B109134			

6.7 Structure Design Alternatives

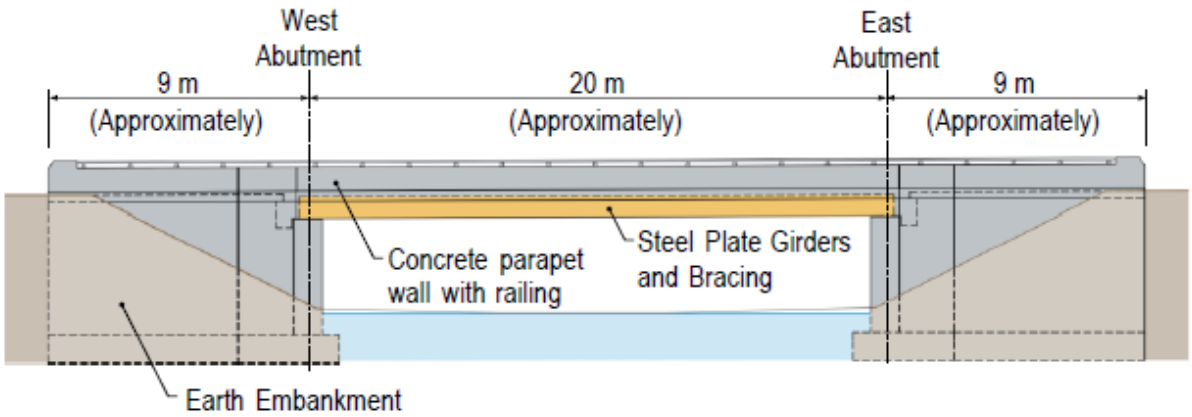
Four basic bridge types have been considered as potential design alternatives and have been evaluated in this section. These alternatives are schematically presented in the sub-sections below, approximately representing Structure No. C109123, B109133, and B109134. Structure No. B109132 has a 17m wide deck and a 23.5m long span. It has additional girder lines due to the wider deck compared to the other three structures. With these adjustments made, the sketches in the sub-section below are applicable to Structure No. B109132 as well.

The structure design alternatives evaluation summary is shown in **Table 6-6.**

6.7.1 Option 1: Welded Plate Girder Bridge

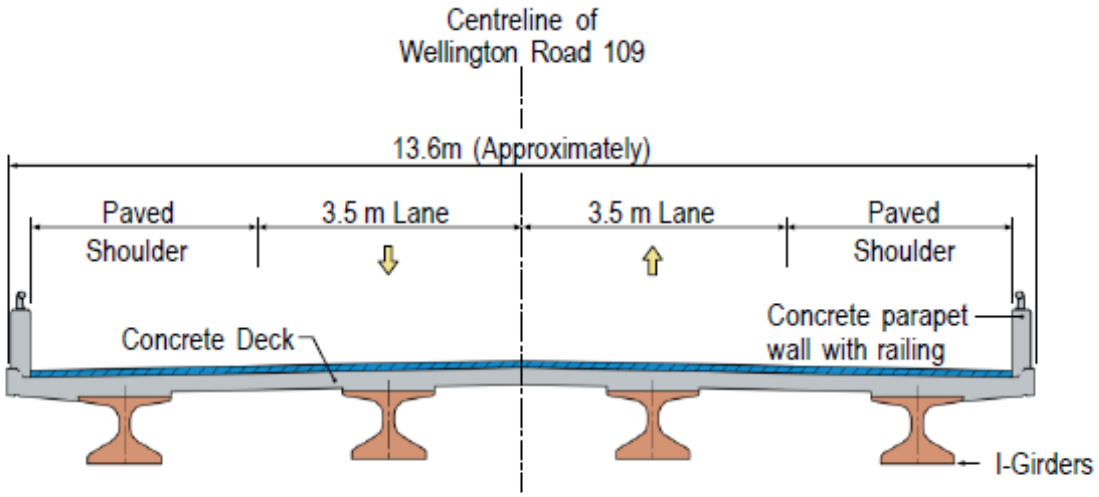


Cross-Section

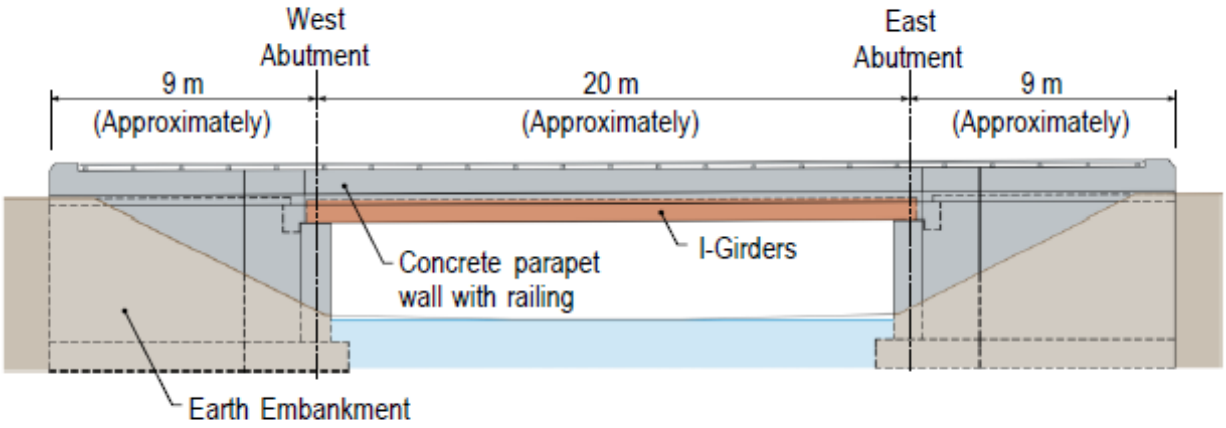


Elevation

6.7.2 Option 2: I-Girder Bridge

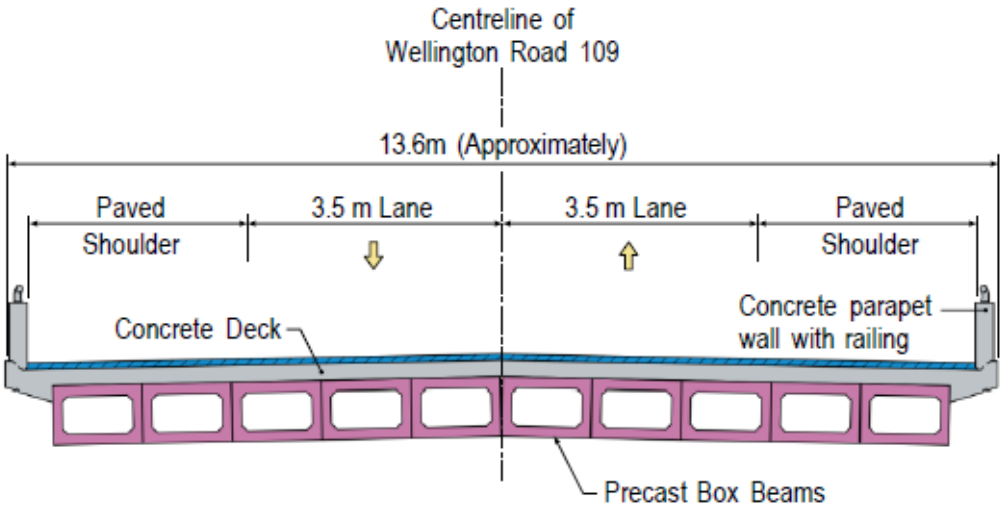


Cross-Section

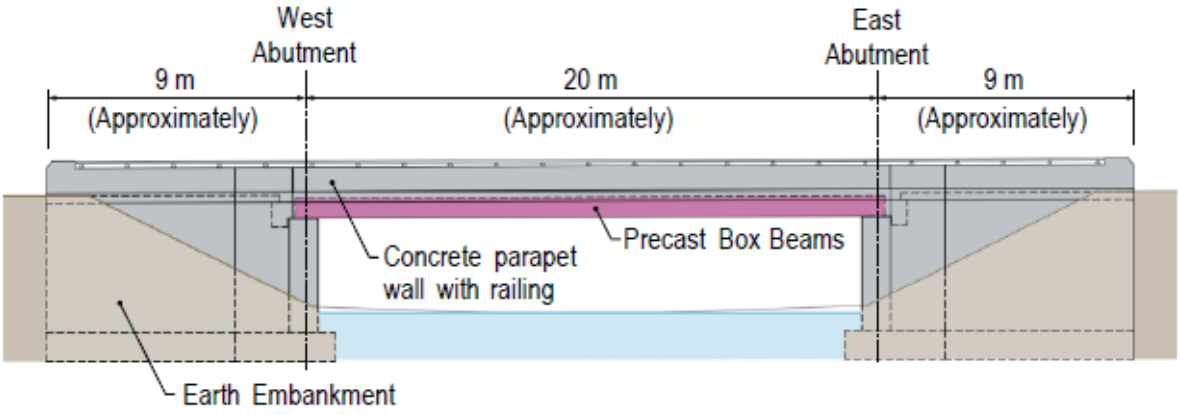


Elevation

6.7.3 Option 3: Concrete Box Girder Bridge

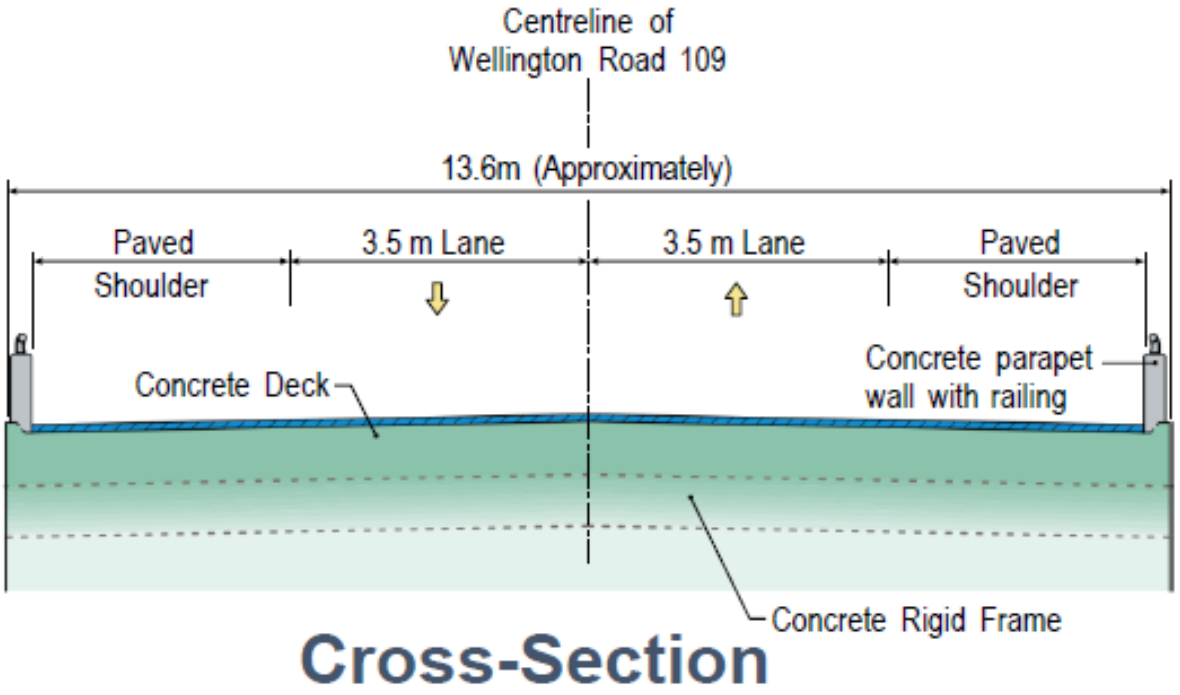


Cross-Section

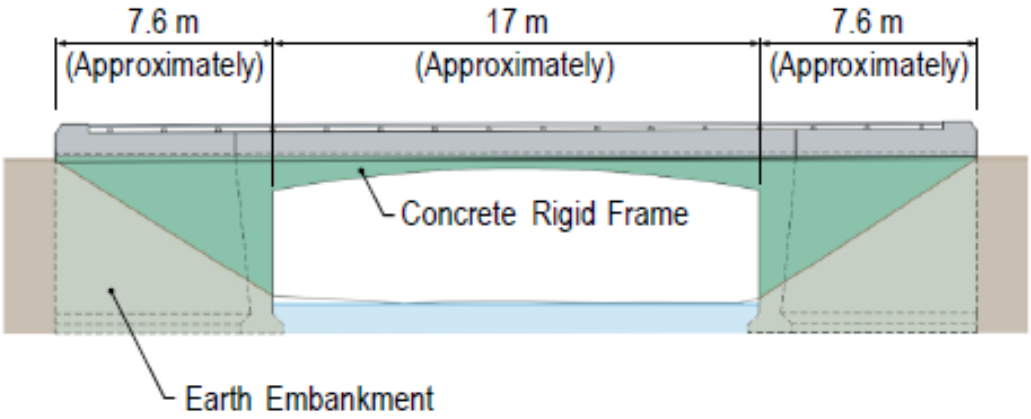


Elevation

6.7.4 Option 4: Concrete Rigid Frame Bridge

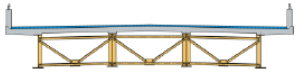
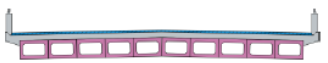


Cross-Section



Elevation

Table 6-6: Structure Design Alternatives Evaluation Summary

	Option 1 Welded Plate Girder	Option 2 Concrete I-Girder	Option 3 Concrete Box Girder	Option 4 Concrete Rigid Frame
				
Benefits	• Lowest cost • Low construction complexity • Easiest girder erection due to light weight • Ideal for Lateral Slide • Accommodates potential future widening • Reduced fabrication lead time and construction duration.	• Lower cost • Low construction complexity	• Low construction complexity • Accelerates construction by eliminating deck formwork for deck slab • Higher hydraulic capacity	• Low construction complexity • Matches existing hydraulic performance • Most durable and stable • Least maintenance required among alternatives • Higher hydraulic capacity
Challenges	• Higher maintenance cost due to corrosion issues and therefore may require a more stringent maintenance plan. • More susceptible to damages from ice and/or floating debris during storm events. • Reduced hydraulic capacity (marginal) • Subject to fluctuating commodity (steel) prices • Construction duration can be long depending on fabrication lead time.	• Long fabrication lead time • Heavier equipment/cranes for girder transportation and erection • More susceptible to damage from ice and/or floating debris during storm events • Reduced hydraulic capacity (marginal) • Longer construction duration	• Longest fabrication lead time • Heavier equipment/cranes for girder transportation and erection • Higher cost	• Cast-in-place concrete potential for reduced quality • Heavy deck not practical for rapid replacement method • Temporary shoring below bridge will reduce capacity of watercourse during construction. • Higher cost • Longer construction duration

6.8 Preferred Solution

Each alternative considered in this evaluation has its own benefits and challenges with some examples being presented in **Table 6-6**. In evaluating the preferred solution, however emphasis have been given to the overall construction cost, construction duration, hydraulics, and the complexity of construction. Based on these factors, Option 1 and Option 2 have been found to be comparable and preferable compared to the other alternatives.

Option 1 is most economical with the lowest estimated construction cost among all the options, as presented in **Section 7**. Option 1 is anticipated to have a shorter duration of construction compared to Option 2. Therefore, Option 1 (Welded Plate Girder) is being recommended as the preferred solution for all the four structures.

6.9 Project Schedule Selection

The structures can be constructed in one of three ways:

- Simultaneous Construction – All structures are constructed simultaneously together.
- Sequential Construction – Structures are constructed in a sequential order one by one.
- Hybrid Model – Combination of simultaneous and sequential construction.

The overall construction time frame will be shortest for the simultaneous construction and longest for the sequential construction. Accordingly, the disruption to traffic is least anticipated with simultaneous construction. However, simultaneous approach will be less economical as additional resources and temporary arrangements will be required.

For a balanced solution, the hybrid model has been considered for this project. In **Table 6-7,** the construction schedule as being proposed for the construction of the four bridges is presented.

Table 6-7: Construction Schedule Summary

Structure No.	Construction Years	Construction Approach
B109132	2025 2026	Simultaneous
C109123		
B109133	2027 2028	Simultaneous
B109134		

A preliminary construction schedule is presented in **Appendix N.**

7.0 DESCRIPTION OF PREFERRED DESIGN

7.1 Major Features of the Recommended Plan

The General Arrangement (GA) drawings for each of the four new bridge structures based on the proposed method of construction and the preferred structural option are presented in **Appendix L**.

7.2 Traffic Management

7.2.1 Structure B109132

The Structure B109132 is located in close proximity to the intersection of Wellington Road and Highway 6. Therefore, for smooth operation of this intersection, maintaining two-way traffic through the bridge will be essential. The proposed design, utilizing a wider bridge deck, can accommodate two travel lanes on the bridge during construction, therefore impact on traffic will be minimal, as practically possible. The proposed arrangement will also permit access to properties throughout construction.

The bridge will be constructed using the traditional construction stage method with traffic control. Traffic control will be implemented in accordance with the Ontario Traffic Manual, Book 7.

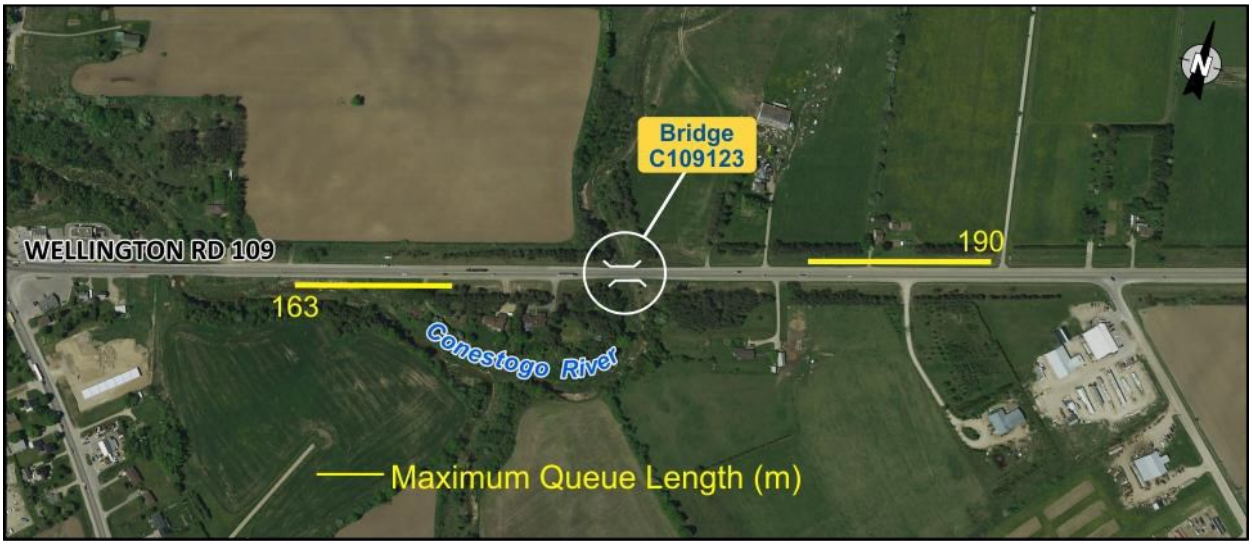
7.2.2 Structure C109123

Structure C109123 is likely to be constructed in a manner that involves either temporary bridge or lateral slide methods. One-way traffic will be staged on a singe lane and controlled by temporary traffic signals. There is potential to maintain two-way traffic depending on final construction plan. Posted speed limits will be reduced through and adjacent to construction zones. **Figure 7-1** depicts the maximum traffic lengths that could be expected at the second structure from the west.

- Four driveways and at least one farm entrance are located within the estimated work zone.
- The eastbound and westbound maximum queues are not expected to extend to the upstream roadways but may interfere with a farm entrance and several driveways.

Access to properties will be maintained throughout construction.

Figure 7-1: Potential Queues at C109123



7.2.3 Structure B109133 and B109134 (East)

One-way traffic will be staged on a singe lane and controlled by temporary traffic signals. The staging and signal timing will follow the Ontario Traffic Manual. Traffic operations for the single-lane work zone were modeled to understand expected traffic delays. Traffic volumes were forecasted to 2025 and no detours were considered, as a conservative approach. Traffic volumes on both eastbound and westbound are shown in **Table 7-1**.

Table 7-1: Traffic Volumes on Eastbound and Westbound Direction

Direction	Peak Hour Volumes (4:45 -5:45)	Truck Percentages	
		Medium	Heavy
Eastbound	316 Vehicles	5%	9%
Westbound	355 Vehicles	9%	7%

Based on the analysis, it is expected that eastbound and westbound traffic will operate with an average delay of approximately one minute. The maximum traffic queue lengths for the eastbound and westbound directions are 163 metres and 190 metres, respectively. **Figure 7-2** and **7-3** depict the maximum traffic lengths that could be expected at the easterly structures.

For B109133

- One driveway and at least one farm entrance are located within the estimated work zone.
- The eastbound and westbound maximum queues are not expected to extend to the upstream roadways but may interfere with a driveway and farm entrances.

For B109134

- One driveway is located within the work zone
- The eastbound maximum queue is expected to extend to Second Line. In addition, there is potential for traffic queues to interfere with nearby driveways.

Access to properties will be maintained throughout construction.

Figure 7-2: Potential Queues at B109133

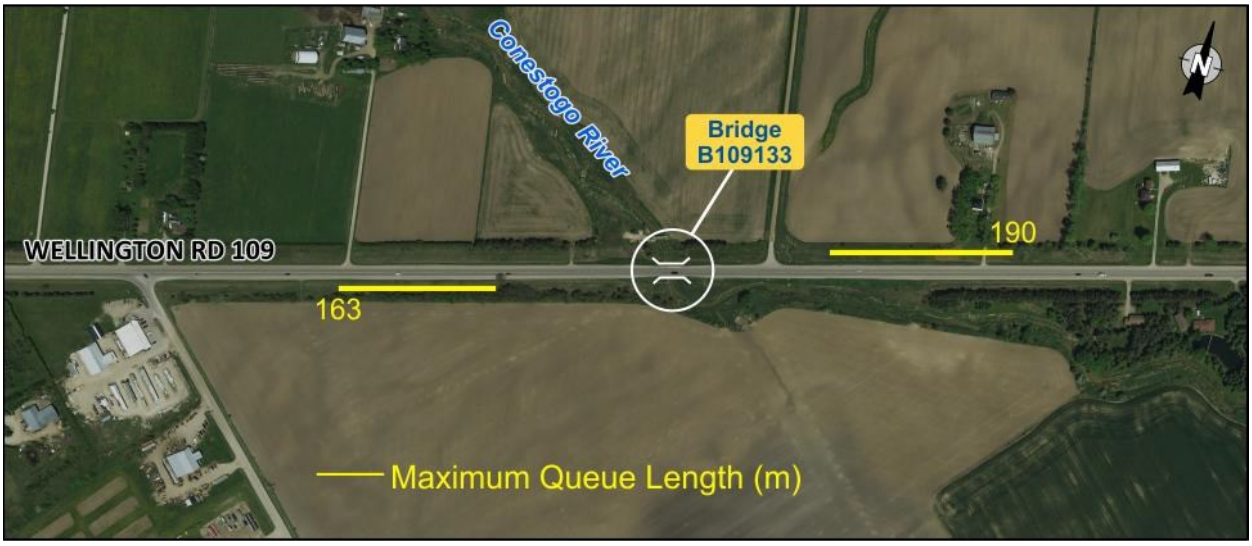
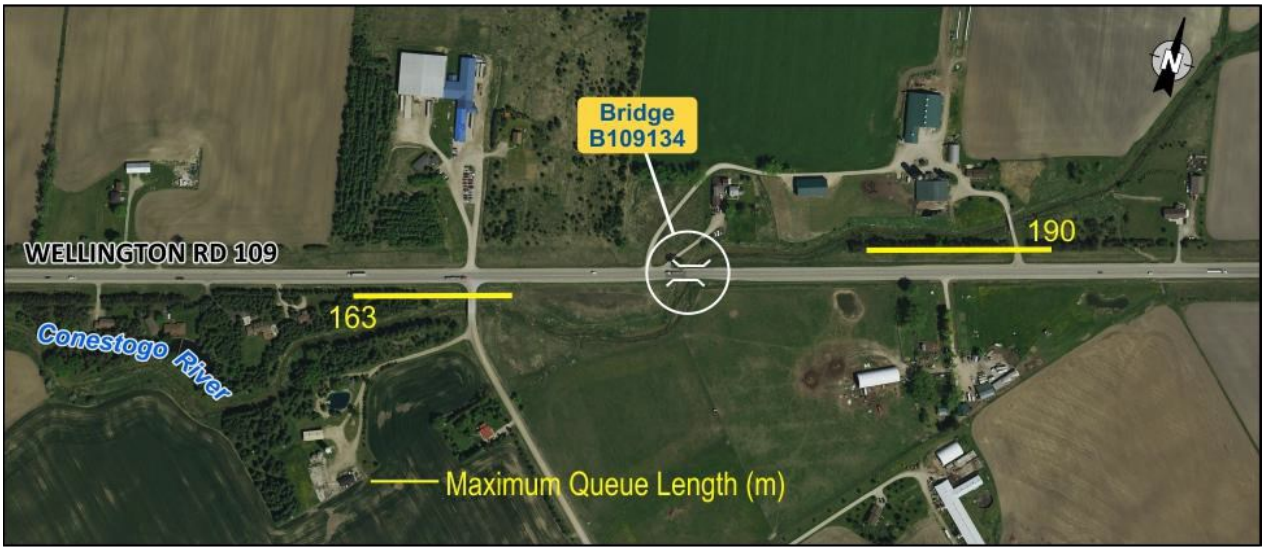


Figure 7-3: Potential Queues at B109134



7.3 Preliminary Capital Costs

The preliminary cost estimate for structure design alternatives are provided in **Table 7-2**. The estimate cost for works reflect initial capital cost (2024 dollars) and do not include property or utility relocations. All costs include initial capital cost plus 20% contingency. The preliminary cost estimate is provided in **Appendix M** – Preliminary Cost Estimate.

Table 7-2: Preliminary Cost Estimate

Structure Number	Option 1 Welded Plate Girder	Option 2 Concrete I-Girder	Option 3 Concrete Box Girder	Option 4 Concrete Rigid Frame	Additional Cost* for ABC Methods
B109132	$4.2 Million	$4.2 Million	$5.3 Million	$4.9 Million	-
C109123	$3.5 Million	$3.5 Million	$4.2 Million	$4.6 Million	$0.67 Million
B109133	$3.1 Million	$3.2 Million	$3.8 Million	$3.9 Million	$0.34 Million
B109134	$3.8 Million	$3.8 Million	$4.5 Million	$4.4 Million	$0.34 Million

*Estimated premium cost associated with Accelerated Bridge Construction techniques assuming initial purchase of TMB for B109132 only and subsequent re-use.

The overall preliminary cost estimate for the recommended design have been provided and is shown in **Table 7-3**.

Table 7-3: Overall Preliminary Cost Estimate for the Recommended Design

Structure Number	Construction Type**	Structure Type	Traffic Management	Preliminary Cost Estimate
B109132	Traditional Staging Method with an overbuilt deck.	Welded Plate Girder or I-Girder Bridge	Two-way traffic to be maintained due to close proximity to the Highway 6 intersection.	$4.2 Million
C109123	Temporary Bridge proposed.	Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to maintain two-way traffic depending on final construction plan.	$4.2 Million*
B109133	Traditional Staging Method	Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to use ABC methods to reduce duration of work.	$3.4 Million
B109134		Welded Plate Girder or I-Girder Bridge	One-way traffic to be maintained through temporary traffic signals. Potential to use ABC methods to reduce duration of work.	$4.1 Million

*Includes additional ABC costs

** For additional details on the recommended construction type, refer to Table 6-5.

8.0 POTENTIAL IMPACTS, RECOMMENDED MITIGATION MEASURES AND COMMITMENTS TO FUTURE WORK

8.1 Natural Environment

8.1.1 Proposed Works

As described in **Section 7**, the preferred alternative for WR 109 involves the replacement of the four existing bridges (Bridge B109132, Bridge C109123, Bridge B109133 and Bridge 109134), all of which cross Conestogo River as shown on Figure H.1 and H.2 (**Appendix H**). The General Arrangement (GA) drawings for each of the four new bridge structures are found in **Appendix L**.

The impacts of the Preliminary Design and the recommended mitigation measures to address those impacts are outlined the following sections. This preliminary impact assessment and the associated recommended mitigation measures will be refined during the detailed design stage, at which point the mitigation measures will be incorporated into the contract documents.

8.1.2 Designated Natural Areas

There are no PSWs, ANSIs, ESAs or mapped SWH features found in the vicinity of the structures, however, Conestogo River (and its riparian area) is located within the 'Core Greenlands' in the County of Wellington Official Plan (2019) and the GRCA Regulations Limits (see Figure H.1, **Appendix H**). Impacts on the features within these designated areas are discussed in the following sections

8.1.3 Aquatic Habitat and Fisheries

As noted, the preferred alternative involves the replacement of the four bridge structures along WR 109 within the study area. These replacements will impact Conestogo River, a watercourse that flows through all four of the bridge structures / crossings.

The existing fisheries and aquatic habitat conditions of these watercourses are found in Section 5.4.2.1, and the locations are shown on Figure H.1 and H.2 (**Appendix H**).

The following sections present the proposed works and impacts at each of the bridge crossing locations, which are discussed generally with regard to the preliminary design. These impacts will be further detailed and refined at the detailed design phase.

8.1.3.1 Potential Direct and Indirect Impacts

Bridge B109132 at Conestogo River

Proposed Bridge Replacement Works

The existing bridge structure crossing of Conestogo River (constructed in 1931) at Wellington Road 109 is a single-span concrete rigid frame bridge structure with a 17 m span length. The total structure width is 11.6 m and the structure has no skew. The roadway width is 8 m and accommodates two through lanes of traffic. There is a pedestrian sidewalk located on the north side of the structure.

The proposed works involve the replacement of the existing structure with a new, single-span steel plate 'I' girder superstructure with a 225 mm thick composite concrete deck on conventional abutments skewed at 10 degrees to better accommodate the river channel. The length of the proposed bridge span is 23.5 m and the rise is 117.5 mm. The total clear opening will be 22.3 m in width between the face of the abutments, which will completely span the bankfull channel width of the river channel. The proposed

bridge deck will be 17.6 m wide to accommodate two lanes of traffic. No sidewalk will be provided along the structure. The reinforced concrete abutments will be founded on shallow foundation footings.

It should be noted that the proposed structure is much wider than the existing to accommodate traffic staging during construction. As such, a retaining wall (located outside of the bankfull channel) is required at the south-east and south-west quadrants of the structure to address a large grade difference and to avoid impacts to the watercourse and surrounding riparian habitat. The retaining wall will be a Retained Soil System (RSS) wall. Further back, the road embankments approaching the bridge will be re-graded.

The footprint of the new structure abutments will be located above the bankfull width of the channel. Once the existing structure abutments are removed, new banks will be angled back and restored to a more natural condition as further detailed below.

See the General Arrangement (GA) drawing in **Appendix L**, and the aquatic habitat mapping in **Appendix H**.

Potential Direct Impacts at Bridge B109132

The bridge replacement works will be confined to the ROW of WR 109 at the crossing, therefore potential impacts to fish and aquatic habitat will be localized to this area of Conestogo River. The total span (clear opening) of the new clear-span bridge structure will be increased by approximately 5.3 m over the span of the existing bridge structure and will remove the footprint of the existing bridge abutment (west side) from within the bankfull channel.

Although it may be possible to construct the new bridge substructure without disturbance to the existing river channel, the existing bridge removal (e.g., partial removal of the abutments to 500 mm below finished grade of restored banks, and removal of the super structure) will require some instream works on the west side since this abutment is located partially within the bankfull channel. Once the existing abutments are removed, there is opportunity to restore the banks and bed to more natural conditions as further detailed below. The restoration should include overbank areas / ledges to enhance wildlife movement opportunities (presently limited on the west side), which will be investigated further at detailed design.

Direct impacts of the structure replacement, including removal of the existing abutments should be limited to:

- Localized removal of riparian vegetation associated with the wider structure and approaches and construction access.
- Alteration of the channel bank and bed along the west side resulting from the removal of the existing west abutment (within the bankfull channel) and subsequent restoration.

Impacts of the bridge replacement are relatively minor with the implementation of standard and site-specific mitigation measures outlined in Section 8.3, which include measures to prevent entry of debris into the watercourse (e.g., cofferdams for isolation of the west abutment removal and subsequent restoration works). Measures to isolate the construction of the new sub structure / abutments should initially include cofferdams that utilize the existing abutments to work behind if possible.

There will be some minor additional shading from the increased width of the new structure, which may reduce the vigour of the riparian vegetation along the banks in this area. There will also be some minor

vegetation removal with the increased grading limits as discussed in Section 8.1.4.1. These are considered minor effects on fish habitat.

The new bridge abutments will be constructed well back from the existing abutments and will be located outside of the bankfull width of the channel. The existing west abutment (part of which is located within the bankfull channel) and the east abutment (which is located outside of the bankfull width of the channel) will be removed and the new banks below the bridge (and a small area of the bed on the west side) will be angled back and restored to a more natural condition using mixed sizes of rounded or sub-rounded stone (e.g., Ontario Provincial Standard Specification [OPSS] 1005). This will be reviewed further at detailed design. The stone used below the bankfull channel width should be embedded to match the existing profile of the river channel found further upstream and downstream of the works.

In the vicinity of the bridge works and ROW, the aquatic habitat conditions include a pool dominant morphology. Substrates found within the bridge ROW consist of a mix of rubble, gravel, sand and occasional boulders, with rubble becoming more dominant (50%) just downstream of the large pool. The sand substrates could be susceptible to downstream transport, however this can be managed using appropriate mitigation measures as those outlined in Section 8.3. Impacted vegetation communities in the vicinity of the bridge ROW generally consists of Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2) further upstream and downstream of the bridge as further detailed in Section 8.1.4.1.

Potential Indirect Impacts at Bridge B109132

Potential construction related indirect impacts of the proposed bridge replacement works, which includes local disruption during the works, entry of debris from the bridge structure during removal and construction, and potential for erosion and downstream sediment transport during periods of higher flow, can be addressed with the use of the mitigation measures outlined in Section 8.3.

Bridge C109123 at Conestogo River

Proposed Bridge Replacement Works

The existing bridge structure crossing of Conestogo River (constructed in 1930) at Wellington Road 109 is a single-span concrete barrel arch structure with a 14 m span length. The total structure width is 11.7 m and has no skew. The roadway width is 9.5 m and accommodates two through lanes of traffic. No pedestrian sidewalks exist on the structure.

The proposed works involve the replacement of the existing structure with a new, single-span steel plate ‘I’ girder superstructure with a 225 mm thick composite concrete deck on conventional abutments skewed at 10 degrees to better accommodate the river channel. The length of the proposed bridge span is 19.5 m and the rise is 97.5 mm. The total clear opening will be 18.3 m in width between the face of the abutments, which will completely span the bankfull channel width of the river channel. The proposed bridge deck will be 13.6 m wide to accommodate two lanes of traffic. No sidewalk will be provided along the structure. The reinforced concrete abutments will be founded on shallow foundation footings.

A temporary modular bridge (TMB) accommodating one lane of traffic will be brought on site during construction and will be placed adjacent to the structure’s south side. The replacement structure will be fully closed during construction and signalised traffic will be detoured across the TMB. The temporary bridge will span the bankfull channel of the watercourse.

The road embankments approaching the bridge and temporary bridge will also be re-graded.

Once the existing structure abutments are removed, new banks will be angled back and restored to a more natural condition as further detailed below.

See the General Arrangement (GA) drawing in **Appendix L**, and the aquatic habitat mapping in **Appendix H**.

Potential Direct Impacts at Bridge C109123

The bridge replacement and temporary bridge works will be confined to the ROW of WR 109 at the crossing, therefore potential impacts to fish and aquatic habitat will be localized to this area of Conestogo River. The total span (clear opening) of the new clear-span bridge structure will be increased by approximately 4.3 m over the span of the existing bridge structure and will remove the footprint of the existing bridge abutments from within the bankfull channel.

Although it may be possible to construct the new bridge substructure without disturbance to the existing river channel, the existing bridge removal (e.g., partial removal of the abutments to 500 mm below finished grade of restored banks, and removal of the super structure) will require some instream works since both abutments are located partially within the bankfull channel. Once the existing abutments are removed, there is opportunity to restore the banks and bed to more natural conditions as further detailed below. The restoration should include overbank areas / ledges to enhance wildlife movement opportunities (presently limited on the west side), which will be investigated further at detailed design.

Direct impacts of the structure replacement, including removal of the existing abutments should be limited to:

- Localized removal of riparian vegetation associated with the wider structure and approaches as well as in the vicinity of the temporary bridge, and construction access.
- Alteration of the channel bank and bed along the resulting from the removal of the existing abutments (within the bankfull channel) and subsequent restoration.

Impacts of the bridge replacement are relatively minor with the implementation of standard and site-specific mitigation measures outlined in Section 8.3, which includes measures to prevent entry of debris into the watercourse (e.g., cofferdams for isolation of the abutment removal and subsequent restoration works). Measures to isolate the construction of the new sub structure / abutments should initially include cofferdams that utilize the existing abutments to work behind if possible.

There will be some minor additional shading from the increased width of the new structure, which may reduce the vigour of the riparian vegetation along the banks in this area. There will also be some minor vegetation removal with the increased grading limits and in the area of the temporary bridge as discussed in Section 8.1.4.1. These are considered minor effects on fish habitat.

The new bridge abutments will be constructed well back from the existing abutments and will be located outside of the bankfull width of the channel. The temporary bridge abutments will also be located back and outside of the bankfull channel. The existing abutments (partially located within the bankfull width of the channel) will be removed and the new banks below the bridge (and a small area of the bed) will be angled back and restored to a more natural condition using mixed sizes of rounded or sub-rounded stone (e.g., Ontario Provincial Standard Specification [OPSS] 1005). The stone used below the bankfull channel

width should be embedded to match the existing profile of the river channel found further upstream and downstream of the works. Once the temporary bridge is removed, the area will be restored back to the original site conditions. This will be reviewed further at detailed design.

In the vicinity of the bridge works and ROW, the aquatic habitat conditions include a small riffle followed by a flat and pool morphology. Substrates found within the bridge ROW consist of rubble (60%), gravel (25%), sand (10%) and boulders (5%) with a more even mix on the upstream side. The sand substrates could be susceptible to downstream transport however this can be managed using appropriate mitigation measures as outlined in Section 8.3. Impacted vegetation communities in the vicinity of the bridge ROW generally consists of Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankment and Reed Canary Mineral Meadow Marsh (MAM2-2) as further detailed in Section 8.1.4.1.

Potential Indirect Impacts at Bridge C109123

Potential construction related indirect impacts of the proposed bridge replacement works, which includes local disruption during the works, entry of debris from the bridge structure during removal and construction, and potential for erosion and downstream sediment transport during periods of higher flow, can be addressed with the use of the mitigation measures outlined in Section 8.3.

Bridge B109133 at Conestogo River

Proposed Bridge Replacement Works

The existing bridge structure crossing of Conestogo River (constructed in 1931) at Wellington Road 109 is a single-span concrete rigid frame bridge structure with a 13.8 m span length. The total structure width is 11.5 m and has no skew. The roadway width is 9.5 m and accommodates two through lanes of traffic. There is a pedestrian sidewalk located on the north side of the structure.

The proposed works involve the replacement of the existing structure with a new, single-span steel plate ‘I’ girder superstructure with a 225 mm thick composite concrete deck on conventional abutments with no skew. The length of the proposed bridge span is 18.5 m and the rise is 92.5 mm. The total clear opening will be 17.3 m in width between the face of the abutments, which will completely span the bankfull channel width of the river channel. The proposed bridge deck will be 13.6 m wide to accommodate two lanes of traffic. No sidewalk will be provided along the structure. The reinforced concrete abutments will be founded on shallow foundation footings.

Traditional staging during construction (one side of the structure closed while the other side is in operation) is suitable for the replacement structure. A temporary modular bridge could also be used to detour traffic during the replacement, however this is not being proposed at this stage.

Once the existing structure abutments are removed, new banks will be angled back and restored to a more natural condition as further detailed below. The road embankments approaching the bridge will also be re-graded.

Also, the existing gabion wall found within the SW quadrant will be removed and replaced, however opportunities to restore the bank to more natural conditions will be reviewed at detailed design. The gabion wall is located within the bankfull width of the channel.

See the General Arrangement (GA) drawing in **Appendix L**, and the aquatic habitat mapping in **Appendix H**.

Potential Direct Impacts at Bridge B109133

The bridge replacement works will be confined to the ROW of WR 109 at the crossing, therefore potential impacts to fish and aquatic habitat will be localized to this area of Conestogo River. The total span of the new clear-span bridge structure will be increased by approximately 3.5 m over the span of the existing bridge structure and will remove the footprint of the existing bridge abutment (west side) from within the bankfull channel.

Although it may be possible to construct the new bridge substructure without disturbance to the existing river channel, the existing bridge removal (e.g., partial removal of the abutments to 500 mm below finished grade of restored banks, and removal of the super structure) and the removal of the gabion wall in the SW quadrant, will require some instream works on the west side since this abutment and gabion wall are located partially within the bankfull channel. Once the existing abutments and the gabion wall are removed, there is opportunity to restore the banks and bed to more natural conditions as further detailed below. The restoration through the new bridge should include overbank areas / ledges to enhance wildlife movement opportunities (presently limited on the west side), which will be investigated further at detailed design.

Direct impacts of the structure replacement, including removal of the existing abutments and the gabion wall should be limited to:

- Localized removal of riparian vegetation associated with the wider structure and approaches and construction access.
- Alteration of the channel bank and bed along the west side resulting from the removal of the existing west abutment and gabion wall (both partially within the bankfull channel) and subsequent restoration.

Impacts of the bridge replacement are relatively minor with the implementation of standard and site-specific mitigation measures outlined in Section 8.3, which includes measures to prevent entry of debris into the watercourse (e.g., cofferdams for isolation of the west abutment and gabion wall removal and subsequent restoration works). Measures to isolate the construction of the new sub structure / abutments should initially include cofferdams that utilize the existing abutments to work behind if possible.

There will be some minor additional shading from the increased width of the new structure, which may reduce the vigour of the riparian vegetation along the banks in this area. There will also be some minor vegetation removal with the increased grading limits and in the area of the gabion wall as discussed in Section 8.1.4.1. These are considered minor effects on fish habitat.

The new bridge abutments will be constructed well back from the existing abutments and will be located outside of the bankfull width of the channel. The existing west abutment and the gabion wall (part of both being located within the bankfull channel) and the east abutment (which is located outside of the bankfull width of the channel) will be removed and the new banks (and a small area of the bed on the west side) will be angled back and restored to a more natural condition using mixed sizes of rounded or sub-rounded stone (e.g., Ontario Provincial Standard Specification [OPSS] 1005). This will be reviewed at detailed design. The stone used below the bankfull channel width should be embedded to match the existing profile of the river channel found further upstream and downstream of the works. This will be reviewed at detailed design.

In the vicinity of the bridge works and ROW, the aquatic habitat conditions include a flat and pool dominant morphology. Substrates found within the bridge ROW consist of a mix of rubble, gravel, sand and occasional boulders. The sand substrates could be susceptible to downstream transport, however this can be managed using appropriate mitigation measures as outlined in Section 8.3. Impacted vegetation communities in the vicinity of the bridge ROW generally consists of Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2).

Potential Indirect Impacts at Bridge B109133

Potential construction related indirect impacts of the proposed bridge replacement works (including the gabion wall removal and restoration), which includes local disruption during the works, entry of debris from the bridge structure during removal and construction, and potential for erosion and downstream sediment transport during periods of higher flow, can be addressed with the use of the mitigation measures outlined in **Section 8.3**.

Bridge B109134 at Conestogo River

Proposed Bridge Replacement Works

The existing bridge structure crossing of Conestogo River (constructed in 1934) at Wellington Road 109 is a single-span concrete rigid frame bridge structure with a 12 m span length. The total structure width is 11.4 m and has no skew to better accommodate the river channel. The roadway width is 9.5 m and accommodates two through lanes of traffic. There is a pedestrian sidewalk located on the north side of the structure.

The proposed works involve the replacement of the existing structure with a new, single-span steel plate ‘I’ girder superstructure with a 225 mm thick composite concrete deck on conventional abutments with a skew of 15 degrees. The length of the proposed bridge span is 18.5 m and the rise is 92.5 mm. The total clear opening will be 17.3 m in width between the face of the abutments, which will completely span the bankfull channel width of the river channel. The proposed bridge deck will be 13.6 m wide to accommodate two lanes of traffic. No sidewalk will be provided along the structure. The reinforced concrete abutments will be founded on shallow foundation footings.

Traditional staging during construction (one side of the structure closed while the other side is in operation) is suitable for the replacement structure. A temporary modular bridge could also be used to detour traffic during the replacement, however this is not being proposed at this stage. A grade raise is required at this structure to accommodate the minimum navigation window measuring 1.5 m tall. The grade raise on the structure will require retaining walls (which are located outside of the bankfull channel width) at the north-east and south-west quadrants of the structure, which will help avoid impact to the watercourse and surrounding riparian habitat. The retaining walls will be conventional cast-in-place concrete cantilever walls.

Once the existing structure abutments are removed, new banks will be angled back and restored to a more natural condition as further detailed below.

The road embankments approaching the bridge will be re-graded and in the SW quadrant a retaining wall will be used to limit impacts to the watercourse and surrounding vegetation.

Also, the existing gabion wall found within the SW quadrant will be removed and the bank will also be restored to a more natural condition as further detailed below. This gabion wall is located within the bankfull width of the channel. Two other sections of gabion basket are located in the NW and NE quadrants and will also be removed and replaced, however these are located outside of the bank full channel. Opportunities to restore these other sections of gabion to more natural bank conditions will be reviewed at detailed design.

See the General Arrangement (GA) drawing in **Appendix L**, and the aquatic habitat mapping in **Appendix H**.

Potential Direct Impacts at Bridge B109134

The bridge replacement works will be confined to the ROW of WR 109 at the crossing, therefore potential impacts to fish and aquatic habitat will be localized to this area of Conestogo River. The total span of the new clear-span bridge structure will be increased by approximately 5.3 m over the span of the existing bridge structure and will remove the footprint of the existing bridge abutment (west side) from within the bankfull channel.

Although it may be possible to construct the new bridge substructure without disturbance to the existing river channel, the existing bridge removal (e.g., partial removal of the abutments to 500 mm below finished grade of restored banks, and removal of the super structure) and the removal of the gabion wall in the SW quadrant, will require some instream works on the west side since this abutment and gabion wall are located partially within the bankfull channel. Once the existing abutments and the gabion wall are removed, there is opportunity to restore the banks and bed to more natural conditions as further detailed below. The restoration through the new bridge should include overbank areas / ledges to enhance wildlife movement opportunities (presently limited on the west side), which will be investigated further at detailed design.

Direct impacts of the structure replacement, including removal of the existing abutments and the gabion wall should be limited to:

- Localized removal of riparian vegetation associated with the wider structure and approaches and construction access.
- Alteration of the channel bank and bed along the west side resulting from the removal of the existing west abutment and gabion wall (both partially within the bankfull channel) and subsequent restoration.

Impacts of the bridge replacement are relatively minor with the implementation of standard and site-specific mitigation measures outlined in Section 8.3, which includes measures to prevent entry of debris into the watercourse (e.g., cofferdams for isolation of the west abutment and gabion wall removal and subsequent restoration works). Measures to isolate the construction of the new sub structure / abutments should initially include cofferdams that utilize the existing abutments to work behind if possible.

There will be some minor additional shading from the increased width of the new structure, which may reduce the vigour of the riparian vegetation along the banks in this area. There will also be some minor vegetation removal with the increased grading limits and in the area of the gabion walls as discussed in Section 8.1.4.1. These are considered minor effects on fish habitat.

The new bridge abutments will be constructed well back from the existing abutments and will be located outside of the bankfull width of the channel. The existing west abutment and the gabion wall (part of both being located within the bankfull channel) and the east abutment along with two other sections of gabion wall (which are located outside of the bankfull width of the channel) will be removed and the new banks (and a small area of the bed on the west side) will be angled back and restored to a more natural condition using mixed sizes of rounded or sub-rounded stone (e.g., Ontario Provincial Standard Specification [OPSS] 1005). This will be reviewed further at detailed design. The stone used below the bankfull channel width should be embedded to match the existing profile of the river channel found further upstream and downstream of the works.

In the vicinity of the bridge works and ROW, the aquatic habitat conditions include a flat dominant morphology with some pooling. Substrates found within the bridge ROW consist of rubble (50%), gravel (40%) and sand (10%). The sand substrates could be susceptible to downstream transport; however this can be managed using appropriate mitigation measures as outlined in Section 8.3. Impacted vegetation communities in the vicinity of the bridge ROW generally consists of consists Dry-Moist Old Field Meadow (CUM1-1) species along the roadway embankments and Reed Canary Mineral Meadow Marsh (MAM2-2).

Potential Indirect Impacts at Bridge B109134

Potential construction related indirect impacts of the proposed bridge replacement works (including the gabion wall removal and restoration), which includes local disruption during the works, entry of debris from the bridge structure during removal and construction, and potential for erosion and downstream sediment transport during periods of higher flow, can be addressed with the use of the mitigation measures outlined in Section 8.3.

Conestogo River Fishery

Conestogo River is classified as a warmwater watercourse that supports a diverse range of the baitfish and sportfish / top predator species including Northern Pike and Smallmouth Bass.

There should be no permanent / long term impacts from the four bridge replacements noted above and a net loss of fish habitat is not anticipated at this stage. The wider spans and the location of the new bridge abutments (outside of the bankfull width of the channel), along with subsequent restoration of the banks to more natural conditions, will improve the fish habitat conditions in the areas of the new bridges over the existing condition and improve wildlife movement through the structures. The wider span width of the new bridges should also result in an improvement to hydraulics. Therefore, harmful effects or serious harm to fish are not anticipated at this stage (preliminary design).

Further review of the impacts on Conestogo River at all four bridge crossings will occur at detailed design, along with submission of the bridge replacement works to DFO as a Request for Review.

8.1.4 Vegetation Communities and Flora

The vegetation communities that will be impacted by the footprint of the preferred alternative (i.e., four bridge replacements) are located in the immediate vicinity of each crossing (Bridge B109132, Bridge C109123, Bridge B109133, and Bridge B109134) and consist of tolerant natural / semi – natural and cultural communities that exhibit signs of anthropogenic disturbance. No SAR flora are found within the bridge replacement areas. The anticipated direct and indirect impacts are discussed in the following sections.

8.1.4.1 Potential Direct Impacts

A total of approximately 0.771 ha of natural / semi-natural vegetation are anticipated to be removed for the replacement of the four bridge structures that cross WR 109. This preliminary assessment of vegetation removals is based on the footprint (i.e., preliminary grading limits) of the impacted areas of the four bridge replacements. These limits were then over-laid on the vegetation community boundaries (see Figure H.2, **Appendix H**). It should be noted that these vegetation community boundaries are not surveyed limits, therefore impacted area calculations should be considered approximate. More refined vegetation impacts (e.g., based on final grading limits) will be confirmed at detailed design.

The direct vegetation removals are primarily comprised of Dry-Moist Old Field Meadow (CUM1-1) communities within the ROW, as well as Reed Canary Grass Mineral Meadow Marsh (MAM2-2) communities along the watercourses, some of which have inclusions of Cattail Mineral Meadow Marsh (MAS2-1). These communities are all common, tolerant vegetation communities, with low or moderate botanical quality, are well represented in the area generally, and have been culturally influenced to varying degrees. None of the treed vegetation communities are anticipated to be impacted. A breakdown of the preliminary vegetation removal assessment by community type is provided in **Table 8-1** below, and the removal areas are shown on Figure H.2 (**Appendix H**). Standard mitigation measures to protect retained vegetation features are outlined in Section 8.3.

Table 8-1: Anticipated Direct Impacts to Vegetation Communities

Unit	Community Classification	Anticipated Direct Impacts	Recommended Mitigation Measures
B109132			
1a	Reed-canary Grass Mineral Meadow Marsh (MAM2-2) / Cattail Mineral Shallow Marsh (MAS2-1)	~0.001 ha.	Standard mitigation measures (Section 8.1.7)
n/a	Dry- Moist Old Field Meadow (CUM1-1)	~0.103 ha	Standard mitigation measures (Section 8.1.7)
C109123			
1b	Reed-canary Grass Mineral Meadow Marsh (MAM2-2)	~0.003 ha	Standard mitigation measures (Section 8.1.7)
1c	Reed-canary Grass Mineral Meadow Marsh (MAM2-2) / Cattail Mineral Shallow Marsh (MAS2-1)	~0.004 ha	Standard mitigation measures (Section 8.1.7)
n/a	Dry- Moist Old Field Meadow (CUM1-1)	~0.109 ha	Standard mitigation measures (Section 8.1.7)
B109133			
11a 11b	Reed-canary Grass Mineral Meadow Marsh (MAM2-2)	~0.001 ha	Standard mitigation measures (Section 8.1.7)
n/a	Dry- Moist Old Field Meadow (CUM1-1)	~0.245 ha	Standard mitigation measures (Section 8.1.7)
B109134			

Unit	Community Classification	Anticipated Direct Impacts	Recommended Mitigation Measures
B109132			
11a 11b	Reed-canary Grass Mineral Meadow Marsh (MAM2-2)	~0.002 ha	Standard mitigation measures (Section 8.1.7)
n/a	Dry- Moist Old Field Meadow (CUM1-1)	~0.203 ha	Standard mitigation measures (Section 8.1.7)
Total Anticipated Vegetation Removal		~0.771 ha	

8.1.4.2 Potential Indirect Impacts

As with all construction activities, there is always potential for indirect impacts to adjacent retained vegetation features during and following construction including, but not limited to, the following:

- Release of construction-generated sediment to adjacent habitats
- Vegetation clearing / damage beyond the working area / ROW
- Spills of contaminants, fuels and other materials that may reach natural areas
- Damage to adjacent natural vegetation from roadway maintenance activities such as salting and sanding, structure / culvert repairs, ditch cleanout;
- Loss of vegetation vigour, and, in extreme cases, vegetation dieback and spread of salt tolerant flora (i.e., halophytes) resulting from salt runoff and salt spray into vegetation areas;
- Changes in drainage patterns (groundwater and/or surface runoff flow) that can impact dependent vegetation / wetland areas located either upgradient or downgradient of the ROW. Blocking of existing surface / subsurface drainage patterns can result in upstream and downstream vegetation dieback / condition changes. An increase in downstream runoff can result in erosion impacts on receiving vegetation;
- Spread of invasive species from within or off-site due to un-clean construction equipment.

These potential indirect impacts to vegetation and habitat features can be managed through implementation of standard mitigation measures, as outlined in **Section 8.3**. However, some indirect impacts may be unavoidable and can only be partially mitigated (e.g., potential loss of vegetation vigour due to salt-spray).

8.1.5 Wildlife and Wildlife Habitat

Potential impacts on wildlife habitat are generally similar to those discussed for the vegetation communities, consisting of direct / indirect impacts to lower quality wildlife habitats associated with culturally influenced vegetation communities, and temporary construction-related disturbance effects.

The vegetation communities that occur within the footprint of the preferred alternative (four bridge replacement areas) provides habitat for common, disturbance-tolerant wildlife species; however, potential impacts for more sensitive wildlife habitats and / or SAR species and habitats have also been identified in

vicinity of the proposed works (i.e., at Bridge B109132 and Bridge C109123) as further detailed in Section 8.1.6.2 below.

8.1.5.1 Potential Direct Impacts

At Bridge B109132, potential SWH for turtle wintering and a Special Concern species (Snapping Turtle) occurs adjacent to the road ROW, north of roadway in the northwest quadrant (see Figure H.2, Plate 1, **Appendix H**). The small ponding areas are deemed potential SWH since the pond appears to have been constructed for storm water control from the adjacent parking lot (i.e., Tim Hortons parking lot). If this the case (i.e., the pond is a constructed SWM pond), these turtle wintering areas would not qualify as SWH. GRCA has been contacted via email (see agency consultation in **Appendix B**) to confirm if these ponds were constructed for stormwater, however a reply has not been received at the time of writing. Regardless, there be no direct impacts to this potential SWH from the works (see Figure H.2, **Appendix H**) and any indirect impacts can be managed through implementation of standard mitigation measures, as outlined in Section 8.1.7.4.

At Bridge C109123, candidate SWH for bat maternity colonies / potential SAR bat maternity habitat occurs in the mixed swamp community adjacent to and within the road ROW, in the southwest quadrant. However, as seen on Figure H.2 (**Appendix H**), these trees will not be impacted (i.e., removed) with the works (i.e., grading).

The structures in the study area also provide potential nesting habitat for migratory birds. Migratory birds may also nest within trees or other vegetation within the road ROW and work areas. Migratory bird nesting was confirmed on three structures within the study area during the WSP 2017 and 2020 field surveys as follows:

- Bridge B109132:
  - 2017: 2 active Cliff Swallow nests
  - 2020: 21 active Cliff Swallow nests
- Bridge B109133:
  - 2017: 61 active Cliff Swallow nests
  - 2020: 100 active Cliff Swallow nests
- Bridge B109134:
  - 2017: 42 active Cliff Swallow nests
  - 2020: 27 active Cliff Swallow nests.

Cliff Swallow nests are protected under the Migratory Birds Convention Act (MBCA). Other migratory birds, including SAR such as Barn Swallow, may also nest on the structures within the study area during future years. Therefore, potential impacts could include disturbance to bird nesting activity or possibly loss of any nests that are present in the year of construction, depending on timing and nature of the structure works and tree / vegetation removals.

Given the presence of a riparian corridor at each crossing location, there is also potential for various wildlife (e.g., turtles, snakes, small mammals, etc.) to wander through the proposed work areas during

construction. Furthermore, turtles may hibernate within the ROW reaches or attempt to nest along the road shoulders or in recently graded areas in proximity to watercourse or wetland features. Potential impacts to wildlife SAR and/or their habitats are further outlined in Section 6.5 below.

This assessment of impacts to wildlife and wildlife habitats should be confirmed and / or re-evaluated at the detailed design phase. Any changes to the current proposed design which result in intrusions to the habitats within and the beyond the road ROW may result in impacts to wildlife and SWH features.

Impacts to wildlife and wildlife habitat can be managed through implementation of standard mitigation measures, as outlined in Section 8.3 below.

8.1.5.2 Potential Indirect Impacts

Construction activities can have indirect effects on area wildlife and habitat. Physical disturbance, noise, vegetation clearing and wildlife access to construction areas can all affect wildlife to varying degrees depending on intensity, season, and duration of works. Good construction practices, contractor education, consultation and implementation of specific wildlife mitigation measures can reduce these impact risks to acceptable levels, as described further in Section 8.3 below.

8.1.6 Species At Risk

8.1.6.1 Aquatic SAR Potential Impacts

As noted, there are no SAR identified on DFO SAR mapping, however, MNRF and indicated that Bridle Shiner (Special Concern under the ESA and SARA) are found in Conestogo River. However, given the lack of preferred habitat for this species (i.e., instream vegetation and abundant fine substrates) found in vicinity of the four bridge locations, it is unlikely that this species would be found in those areas.

Furthermore, after additional consultation with MNRF with regard to the location of Bridle Shiner in Conestogo River, MNRF determined that there was no information on the location of this species in Conestogo River (which was also confirmed by MECP) and they could not confirm the accuracy of these findings. MNRF also noted that the Grand River Fisheries Management Plan (1998) does not mention this species and that this location (Conestogo River / Brandy Creek) is outside of the known distribution range for Bridle Shiner.

Regardless, the overall habitat conditions at the bridge sites will be maintained and enhanced with the new bridge replacements, and stringent mitigation measures with effective erosion and sediment controls and use of appropriate timing windows to protect sensitive spawning periods for warmwater fish species, are recommended to minimize impacts, as outlined in Section 8.3.

8.1.6.2 Terrestrial SAR Potential Impacts

As outlined in Section 5.4.8.2, 15 wildlife SAR have been identified as occurring or having potential to occur within the study area based on the WSP field surveys and the background information review. Of these, 13 SAR are reasonably expected to occur within the vicinity of the proposed bridge replacement works, and thus to be potentially impacted, as outlined below:

- **Bank Swallow** (*Threatened*) – No Bank Swallows were observed within the study area during the field surveys; however, potentially suitable breeding habitat for this species was observed along the steep riparian banks of the Conestogo River, beyond the ROW, approximately 90 m north of structure C109123. The current footprint for the proposed works at this location (which includes

installation of a temporary bridge on south side of the structure) is not anticipated to impact the potential breeding habitat for this species which occurs north of the existing structure.

- **Barn Swallow** (*Threatened,* to be down listed to *Special Concern in January 2023*) – Barn Swallow was confirmed foraging over agricultural lands within the study area during the field surveys. Although no Barn Swallow nests or evidence were observed on the existing structures, it is possible that this species might nest on the structures (where works are proposed) in the future. Therefore, potential impacts could include disturbance to nesting activity or possibly loss of any nests if present in the year of construction, depending on timing and nature of the structure works. However, impacts are not anticipated with the use of appropriate mitigation measures outlined in Section 8.3 (e.g., use of bird exclusion measures). No impacts to individuals foraging over fields and wetlands are anticipated as the works are confined to or immediately adjacent to the ROW and foraging habitat is abundant within the local landscape.
- **Chimney Swift** (*Threatened*) – This species was not recorded during the field survey. Suitable breeding habitat exists in the deciduous and mixed forest communities beyond the ROW at Bridge B109132, and partially within and beyond the ROW at Bridge C109123, however tree removals in these areas are not anticipated. Generally, tree removals have potential to disturb nesting birds, including potential loss of young and nests, if removals are conducted during the bird breeding season (i.e., April 1 to August 31). Although tree removals and impacts to this species are not anticipated at this stage, this should be confirmed at detail design and as such the use of appropriate mitigation measures are included in Section 8.3 (e.g., use of breeding bird timing restrictions for tree removals).
- **Eastern Ribbonsnake** (*Special Concern*) – No Eastern Ribbonsnakes or evidence of snake hibernacula were observed within the study area during the field surveys; however, the riparian habitat at each crossing provides potential habitat for this species. Therefore, the proposed works at each structure have potential to directly harm individuals if they wander through the construction site during the active season. However, impacts are not anticipated with the use of appropriate mitigation measures outlined in Section 8.3 (e.g., use of exclusion fencing).
- **Eastern Wood Pewee** (*Special Concern*) – One Eastern Wood-pewee was documented with 'possible' breeding evidence in the forested community adjacent to Bridge C109123 during the 2017 field surveys. Suitable breeding habitat for this species exists in the deciduous and mixed forest communities beyond the ROW at Bridge B109132 and partially within and beyond the ROW at Bridge C109123. However, tree removals in these areas are not anticipated. Although tree removals and impacts to this species are not anticipated at this stage, this should be confirmed at detail design and as such the use of appropriate mitigation measures are included in Section 8.3 (e.g., use of breeding bird timing restrictions for tree removals).
- **Monarch** (*Special Concern*) - One adult butterfly was observed within the study area and the primary host plant (Milkweed) for breeding was documented in the study area, within and beyond the ROW. The proposed works are expected to have minor impacts on Monarch habitat, wherever milkweed is disturbed and/or removed. However suitable habitat will remain within the broader landscape and all disturbed areas will be restored with native species (including milkweed) as outlined in Section 8.3 below.

- **Red-headed Woodpecker** (*Endangered*) – This species was not recorded during the field surveys; however, suitable breeding habitat exists in all treed communities within and beyond the ROW at each of the structures. However, tree removals in these areas are not anticipated. Although tree removals and impacts to this species are not anticipated at this stage, this should be confirmed at detail design and as such the use of appropriate mitigation measures are included in Section 8.3 (e.g., use of breeding bird timing restrictions for tree removals).
- **SAR Bats** (Endangered) – No targeted surveys for bats were completed; however, potentially suitable habitat for SAR bats occurs within the deciduous and mixed Swamp ELC communities (SWD4-1, SWM1-1) and other forested communities associated with Bridge B109132 and Bridge C109123. At Bridge C109123, the SWM1-1 community on the south side of the road extends well into the ROW, however the footprint for a temporary bridge at Bridge C109123 (and required grading) does not remove any trees at the forest edge at Bridge C109123 or at the Bridge B109132 site.

Generally, tree removals have potential to harm and/or disturb Endangered Bats (i.e., **Eastern Small-footed Bat, Little Brown Bat, Northern Long-eared Bat and Tri-coloured Bat**) if removals are conducted during the bat maternity season (i.e., April 1 to September 30). Although tree removals and impacts to these species are not anticipated at this stage, this should be confirmed at detailed design and as such, the use of appropriate mitigation measures (e.g., use of SAR bat timing widow restrictions for tree removals) are included in Section 8.3, if only a small number of SAR bat trees are removed at that time.

- **Snapping Turtle** (*Special Concern*) – One (1) Snapping Turtle was observed in a wetland feature within the ROW adjacent to Bridge B109132 during early spring emergence surveys in 2017. Conestogo River (and associated riparian wetlands) within the study area provide suitable habitat for this species. Although no ideal turtle nesting habitat occurs within the study area, this species may attempt to nest along gravel road shoulders or open disturbed areas adjacent to the watercourse crossings within the study area. There is also potential to impact hibernating turtles in the river if in-water works occur during the hibernation period, and there is some potential for harm to Snapping Turtles if they wander through the construction site during the active season. However, impacts are not anticipated with the use of appropriate mitigation measures outlined in Section 8.3 (e.g., use of turtle timing window restrictions for in-water works, use of exclusion fencing and incidental encounter protocols).
- **Wood Thrush** (*Special Concern*) – This species was not recorded during the field surveys; however, suitable breeding habitat exists in the deciduous and mixed forest communities within and beyond the ROW at Bridge B109132 and Bridge C109123. However, tree removals in these areas are not anticipated with the works. Although tree removals and impacts to this species are not anticipated at this stage, this should be confirmed at detail design and as such the use of appropriate mitigation measures are included in Section 8.3 (e.g., use of breeding bird timing restrictions for tree removals).

Although **Bobolink** (*Threatened*) and **Eastern Meadowlark** (*Threatened*) were documented within the study area during the field surveys, ‘possible’ breeding evidence for these species was recorded within the pasturelands and hayfields >100 m beyond the ROW and the current proposed works are not anticipated to impact any potential breeding habitat for these species.

This SAR assessment will be updated at the detailed design phase. Any changes to the current proposed design which results in different or additional impacts to the habitats (e.g., tree removals) within or beyond the ROW may result in other SAR being impacted by the works. Furthermore, by the time construction begins, there may be changes in: (i) provincial legislative requirements for the protection of SAR (i.e., the *Endangered Species Act*), (ii) changes in the conservation status of species (new species added, others delisted), (iii) changes in environmental conditions or habitat suitability, (iv) changes in environmental priorities and (v) changes (likely improvements) in mitigation technology. At that future time, decisions concerning SAR habitat protection, mitigation, and potential permitting requirements will need to be made in consultation with agency staff.

8.2 Principles

Based on the preferred design concept it is recognized that the Project will result in some impacts on the existing environment. In order to address the effects, the following approach was taken:

- Avoidance: The first priority is to prevent the occurrence of adverse environmental effects associated with the implementation of the Project;
- Mitigation: Where adverse environmental effects cannot be avoided, it will be necessary to develop the appropriate mitigation strategies and measures to eliminate or reduce the negative effects associated with implementing the alternative; and
- Enhancement or Compensation: In situations where appropriate mitigation measures are not available, cannot be implemented, or significant net adverse effects will remain, enhancement or compensation measures may be required to offset the negative effect through replacement in kind, or provision of a substitute or reimbursement.

8.3 Mitigation Measures

The following sections outline a series of mitigation measures that are recommended to address the potential impacts of the four bridge replacements within the study area. These measures will be further developed and refined during detailed design.

Table 8-2: Mitigation Strategies

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
1.0	Natural Environment	MECP MNRF DFO	Design Related Mitigation Measures	
			1.1	The following measures are recommended for incorporation into the design of the four new bridges (and the temporary bridge at C109123) at the detailed design stage to minimize impacts to fish, fish habitat and wildlife: • Completely span the bankfull channel of the river. • Drain the permanent structures such that deck drains that outfall directly to the river are not required. • Restoration of the channel banks and small portions of the bed, in the areas where the existing bridge abutments are removed, to more natural conditions, and development of overbank / ledge areas to enhance wildlife movement opportunities. The new banks and bed restoration areas will consist of mixed sizes of rounded or sub-rounded rock including larger rock sized to withstand scouring and smaller rock (down to pea size gravel) to fill in the voids as per the Ontario Provincial Standard Specification - OPSS 1005. To be reviewed further at detailed design. • Wildlife fencing to funnel wildlife into the four new bridge crossings should also be investigated at detailed design, in consultation with Wellington County and GRCA.
			Construction Related Mitigation Measures – Erosion and Sediment Control	
			1.2	• A comprehensive erosion and sediment control plan will be developed and implemented by the Contractor to prevent migration of sediment laden runoff (or other contaminants) from the construction zone to the watercourse, until final cover is established. These measures include but are not limited to the following elements: - Temporary erosion and sediment control measures will be installed prior to construction and maintained throughout to prevent / control erosion and prevent migration of sediment to watercourse or terrestrial features. - The erosion and sediment control measures will be routinely inspected, including after storms, and repaired as required. • Isolation of the near-water construction zones using standard perimeter silt fencing of the general construction zone up and downstream. Additional protection (e.g., two rows of standard silt fencing) will be used where needed for disturbed areas that drain to the watercourse.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				• All in-water works will be isolated using appropriate techniques to be approved by the GRCA, (e.g., clean gravel bags, sheet pile) to maintain clean flow downstream of construction. Measures to isolate the construction of the new sub structure / abutments should initially include cofferdams that utilize the existing abutments to work behind if possible. If pumping is required, flow withdrawal hoses will be sited to avoid entrainment of fine sediment off the bed, and discharge hoses sited to prevent bed erosion and downstream sediment transport. • Any hoses required to withdraw water from the watercourse (e.g., during temporary flow management) will be screened to prevent fish entrapment. The design opening of the screen material (or screen size) cannot exceed 2.54 mm and the contractor must refer to the Fisheries and Oceans Canada (DFO) Code of Practice https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html to further identify the requirements relating to the shape, installation and maintenance for end-of-pipe fish protection screens. If outflow from dewatering is directed on to the land, the discharge station shall be located a minimum of 30 m from the channel edge into a vegetated area and supplemented with a filtration device (e.g., filter sock). • Protection over the river at all crossing locations if mass demolition of the existing bridge deck is required during the removal process (e.g., temporary platform), so that no debris or deleterious substances enter the watercourse. • All exposed surfaces will be stabilized and re-vegetated following construction.
			General Site Containment	
			1.3	• The extent of the disturbed areas at the four crossing sites will be kept to a minimum and monitored to minimize the extent of construction-related disturbance. Defined construction access areas will be delineated to prevent unnecessary disturbance. • The Contractor will develop and implement appropriate spills prevention measures and a spills management plan, including spill control and absorbent materials, instructions regarding their use and notification procedures. The plan will be maintained on-site at all times, and all personnel will be familiar with its implementation. No storage, maintenance or refueling of equipment will be permitted near the watercourse. These measures will encompass: - Vehicle maintenance and fueling will be carried out at the maintenance areas in the works yards or at commercial garages whenever possible. - Refueling will only be carried out by trained personnel. Care will be taken to prevent the release of fuels to the environment when refueling small equipment in the field. - Refueling will not be permitted within 30 m of any woodland, wetland or watercourse, or the top of bank areas. - Vehicles will be maintained to minimize leaks. When detected, leaks will be repaired immediately.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				- The Contractor will have a Fuel and Hazardous Material Spill Contingency Plan in place and emergency spill equipment will be maintained on site. Any spilled product shall be contained and cleaned-up in accordance with the Spills Response Contingency Plan. - All spills will be immediately controlled and reported to the authorities having jurisdiction and the Owner's Representative. - Any potentially hazardous materials will be stored and handled according to applicable Regulations and all products shall be properly labeled. - Equipment will be generally free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the area. - In dust-sensitive areas, dust will be controlled through the use of water. - All temporary storage of debris / excess materials generated from construction will be properly sited and contained to prevent migration offsite and specifically entry to the watercourse. - Storage sites will be inspected periodically for compliance with these requirements.
			General Vegetation Protection	
			1.4	Recommended mitigation measures to minimize effects to the local vegetation communities and their associated wildlife habitat functions include: • The contractor shall install temporary erosion and sediment control measures prior to construction and maintain in an effective, functioning, stable condition. • Vegetation that does not require removal for purposes of the construction will be protected through the installation and maintenance of temporary vegetation and tree protection measures (e.g., temporary fencing). • Appropriate vegetation clearing techniques will be used (e.g., felling trees away from retained natural areas and watercourses). • Cut and grubbed material shall be disposed of through chipping or other appropriate means. • Avoid all unnecessary traffic, dumping and storage of materials over tree root zones adjacent to natural / semi-natural areas. • Dust control shall be completed using water, not chemical suppressants. • All exposed surfaces will be stabilized and re-vegetated following construction. Disturbed areas will be re-seeded with a native seed-mix. Native plantings suitable to the site conditions will also be used if Landscape Plans are required at the detailed design stage.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				• Invasive and Noxious Vegetation that is removed shall be handled and disposed of in such a manner as to prohibit its spread (i.e., burning, burying with approx. 1 m of fill, or disposal of off-site at a waste facility equipped to handle it). For detailed recommendations on preventing spread, it is recommended that the Contractor follows the Ontario Invasive Plant Council's Clean Equipment Protocol for Industry document (Holloran et al. 2013) to prevent the spread of invasive species along the road corridor within and between construction projects. Available at https://www.ontarioinvasiveplants.ca/resources/technical-documents/ • If a Landscape Plan is required at detailed design, the Landscape Plan will provide enough coverage to offset vegetation losses and will include general landscaping recommendations as well as recommendations for the use of native species (including species that are suitable for Monarch habitat). • The need for a Tree Inventory and Tree Protection Plan will be reviewed at detailed design.
			General Wildlife and Wildlife Habitat (including SAR) Protection	
			1.5	The mitigation measures outlined above to minimize effects to vegetation and protect adjacent retained natural areas will also serve to protect the associated wildlife habitat. However, it is also necessary to ensure the protection of nesting migratory birds as well as all wildlife (including SAR) that may utilize the areas where construction is proposed. The contractor is responsible to protect migratory birds and to be in compliance with the Migratory Birds Convention Act (1994) and Regulations. The "Regional Nesting Period" for this area is April 1 – August 31, as identified on the Environment Canada website by "nesting zone" C: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc0. For more information on reducing risk to migratory birds, the contractor should consult Environment Canada's website at: https://www.canada.ca/en/services/environment/wildlife-plants-species/migratory-birds.html. • Under no circumstances will active nests of migratory birds, or these birds or their young or eggs, protected under the Migratory Birds Convention Act, 1994 (MBCA), be knowingly disturbed or harmed. If an active nest is found in the construction area, construction will cease until the young have fledged (to be determined by a qualified ecologist) and the CA has been notified. • No vegetation clearing (including grubbing and removal of trees, shrubs, grasses, plants and brush piles) will be conducted during the 'Regional Nesting Period' (April 1 – August 31). The Contractor will be made aware that occasionally bird species will precede or exceed the approximate nesting period or breeding bird window. • It is recommended that bird nesting exclusion measures are installed on each of the bridge structures prior to April 1st and maintained until August 31st during the year(s) of construction. If a migratory bird builds a new nest on a

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				structure while works are occurring, construction must cease until the young have fully fledged or the nest is no longer active. • The temporary ESC fencing that will be installed around the in-water and/or near-water construction zones to protect the adjacent watercourse habitats, can also function generally as exclusion fencing for turtles (or other small animals) that might 'wander' inadvertently into the construction areas. • Temporary ESC fencing adjacent to watercourse and wetlands should follow recommendations for general turtle / snakes provided in the MECP best practices guide (https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing) • The construction zones will be inspected prior to construction start-up each morning during the active period for turtles and snakes (approximately April 1 through October 1) to ensure none has become trapped inside the fencing. Any equipment parked overnight in the area will also be inspected to ensure no snakes have climbed into or under it. • The use of nylon or plastic mesh-reinforced silt fencing must be avoided due to the risk of snake entanglement in this fencing material. • Any wildlife incidentally encountered during construction will not be knowingly harmed and will be allowed to move away on their own. If they do not, the environmental inspector will capture and release any small wildlife (e.g., amphibians) stranded within the construction zone. If the animal is injured, a wildlife rehabilitator will be contacted. • It is recommended that opportunities for improving wildlife passage through the new bridge structures be considered during detailed design. This could include the use of wildlife fencing to funnel wildlife into the four watercourse crossings and by providing overbank bench areas through the new structures to provide terrestrial movement opportunities for wildlife. Regarding turtles, in-water works must be avoided between September 1 and April 1 to protect hibernating turtles, unless the aquatic work areas can be isolated from turtle entry (e.g., cofferdams) prior to September 1. • In the event that a turtle is encountered while nesting, all activities within 30 m shall cease until the turtle has finished nesting and left the area on its own accord (this may take several hours). Any turtle nests laid within the construction zone shall be protected with a 10 m buffer and a Ministry of Natural Resources and Forestry (MNRF) authorized local wildlife rehabilitator shall be contacted immediately (https://www.ontario.ca/page/find-wildlife-rehabilitator) to relocate the nest to a suitable location outside the construction zone or collect the nest for ex situ incubation under an approved permit. • Although at this stage there are no SAR bat trees being impacted by the works, at the detailed design stage potential SAR bat habitat should be further assessed once the areas of impact (e.g., grading limits) are finalized. If

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				there are impacts to SAR Bat trees at that time, further consultation with MECP should be conducted to determine if additional survey requirements (e.g., cavity tree survey and / or acoustic monitoring) will be required for SAR bats. If only a few SAR bat trees are impacted, the removal of the trees within the study area will be conducted outside of the bat active period (April 1 to September 30). • In the event that a SAR or possible SAR is found in the construction area, all construction that could potentially harm the animal will cease immediately and the Contract Administrator will be notified. The Contract Administrator will: - Confirm species identity, using a qualified ecologist if required, and notify MECP if the animal is a SAR or potential SAR. - Allow the animal to move away on its own. - Use a trained individual to move species that are not specifically protected under the ESA using accepted handling and relocation procedures. - The Contract Administrator will contact the MECP SAR Biologist for direction on relocation of SAR protected under the ESA (2007). • SAR and SAR potential will be reviewed at detailed design to address any species that may have been uplisted.
			General Fish and Aquatic Habitat Protection	
			1.6	• The use of a warmwater timing window (in-water construction allowed from July 1 to March 31 of the following year) is recommended by MNRF at the four crossings of Conestogo River based on the thermal classification and fish community (see July 25, 2017 letters in **Appendix B**). That is, there will be no in-water activity between April 1 and June 30 of any year to protect the sensitive life stages of the warmwater fishery. This timing window will be confirmed with GRCA at detailed design. • A fish salvage / rescue will be undertaken in the zones isolated for the bridge replacement works (e.g., the removal of the south abutment). Fish will be captured using appropriate techniques by a qualified person and transferred unharmed to a downstream location. A License to Collect Fish for Scientific Purposes permit from the MNRF will be required for this work. • No equipment shall ford or otherwise enter the watercourse except as outlined above and stipulated in the Contract documents to construct the specified works. • If scour / rock protection is required for the areas around the bridge structure and/or for bank and bed restoration (e.g., abutment removal areas), it will be designed and installed so as to minimize alteration of the channel form and profile (e.g., inset to match the existing bank and bed grades found further up and downstream). The rock

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				used will consist of mixed sizes of rounded or sub-rounded rock including larger rock sized to withstand scouring and smaller rock (down to pea size gravel) to fill in the voids (e.g., OPSS 1005). • Additional geomorphological assessments should be completed at detailed design, at the four bridge crossings to further document existing conditions, make recommendations (e.g., wildlife overbank areas) and provide appropriate designs. A geomorphologist should also be onsite for implementation of the designs.
			Debris And Materials	
			1.7	• All construction-related debris and excess materials will be removed and properly disposed of following construction.
			Inspection	
			1.8	• All construction activities and mitigation measures will be inspected and monitored on a regular basis (i.e., minimum daily). An environmental inspector will be responsible for ensuring the erosion and sediment control measures are functioning and all of the mitigation measures are being properly implemented and maintained, and that no wildlife are trapped within the inside of the fencing. • A geomorphologist should be onsite during the bank restoration works, to ensure the work and transition areas are completed according to the future detailed design drawings.
			Restoration	
			1.9	• All exposed surfaces will be stabilized and re-vegetated following construction. Native tree and shrub plantings will follow the recommendations of Landscape Plans once they are further developed at detailed design.
			Natural Environment Commitments at Detailed Design are Listed Below	
			1.10	• Ongoing consultation with GRCA and the relevant technical agencies (e.g., DFO and MECP) to address any respective surveys, permitting or clearance requirements. • Document any changes in the terrestrial and aquatic habitat features at detailed design at the four crossing locations, to ensure the preliminary design measures are still appropriate. • SAR and SAR potential will be reviewed at detailed design to address any species that may have been uplisted since completion of the ESR.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				• The bridge replacement work footprint areas should be reviewed at detailed design to confirm that the identified SAR that have reasonable potential to occur, are not present and to confirm if any habitat removals (i.e., tree removals) have changed since the preliminary design. • Wildlife fencing to funnel wildlife through for four bridge crossings should also be further investigated at detailed design, in consultation with the Wellington County and GRCA. • Restoration of the channel banks and small portions of the bed in the areas where the existing bridge abutments are removed, to more natural conditions, and development of overbank / ledge areas to enhance wildlife movement opportunities. The new banks and bed restoration areas will consist of mixed sizes of rounded or sub-rounded rock including larger rock sized to withstand scouring and smaller rock (down to pea size gravel) to fill in the voids as per the Ontario Provincial Standard Specification - OPSS 1005. Opportunities to restore the areas of existing gabion (to more natural bank conditions), that require replacement at Bridges B109133 and B109134, will also be reviewed at detailed design. Furthermore, when the temporary bridge which was required to construct Bridge C109123 is removed, the site will be restored back to the original condition. • Review the terrestrial and aquatic impacts of the proposed bridge replacements and the associated mitigation measures, which will be refined and finalized at detailed design. The environmental mitigation measures will be integrated into the construction documents. • The need for a Landscape Plan will be determined at detailed design. If required, the Landscape Plan will provide enough coverage to offset vegetation losses and will include general landscaping recommendations as well as recommendations for the use of native species (including species that are suitable for Monarch habitat). All exposed surfaces will be stabilized and re-vegetated where appropriate following construction. • The need for a Tree Inventory and Tree Protection Plan will be determined at detailed design. • Additional geomorphological assessments should be completed at detailed design, at the four bridge crossings to further document existing conditions, make recommendations (e.g., wildlife overbank areas) and provide appropriate designs. A geomorphologist should also be onsite for implementation of the designs and to ensure the work and transition areas are completed according to the future detailed design drawings.
2.0	Cultural Environment	MCM	2.1	• All four (4) Bridges should be recorded through a Documentation and Salvage Report containing measured drawings, a thorough photographic record and written description of the bridge as well as recommendations for elements worthy of salvage prior to demolition (i.e., steel truss members, commemorative bridge plaque). Given that these bridges have a contextual relationship to each other and Wellington Road 109, being built around the same time by the DHO, WSP recommends that the documentation of each bridge be combined into one report. This report should be shared with the County of Wellington and the County of Wellington Museum & Archives. The

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				bridge(s) should be documented to the standard outlined according to section 6.3.1.4 of the MTO Environmental Guide for Built Heritage and Cultural Heritage Landscapes (2007), and according to the Historic American Engineering Record (HAER) guidelines.
			2.2	• Commemoration opportunities should be explored for the bridge with community input.
			2.3	• The construction of new bridges should be designed in a manner that draws from the design inspiration and materials of the extant bridge while maintaining legibility. Design considerations should explore the incorporation of the scale, massing, rhythm and finishes of the original bridge, where possible and feasible. Specifically, the arched concrete design, the placement and design of the concrete railings, and siting at the same location over the Conestogo River should be considered in the final design for the replacement structure.
2.0	Archaeology	MCM	3.1	• Based on the results of the Stage 1 archaeological assessment, the study areas have been determined to be subject to deep and intensive disturbance. Areas of visually confirmed disturbance include the roadway, bridge berms, roadway ditches, underground infrastructure, and cut slopes. These areas no longer retain archaeological potential and a Stage 2 archaeological assessment is not required.
			3.2	• Should human remain discovered, all activities will cease immediately and the police or coroner will be notified.
			3.3	• If previously undocumented archaeological resources be discovered, work will cease and a licensed archaeological will carry out an archaeological assessment. The appropriate Indigenous Communities and agencies will be contacted for direction.
4.0	Hydrogeology (Groundwater and Stormwater)	MECP	4.1	• If the taking of water is intended to continue for more than 365 days, the person proposing to engage in the activity has given written notice that includes the information set out below to the following: - The upper-tier and lower-tier municipalities or the single-tier municipality, as the case may be, within whose area of jurisdiction the proposed water taking is located, and - Any conservation authority within whose area of jurisdiction the proposed water taking is located. - The name of the person proposing to engage in the activity. - The dates on which the activity is to occur. - An identification of the method of transfer or discharge referred to in paragraph 4 of subsection (2) that is to be implemented. - If the method of transfer or discharge referred to in paragraph 3 is discharge to land, the location of the discharge. O. Reg. 300/21, s. 10.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
			4.2	• Work within or immediately adjacent to any body of water or regulated area, including construction dewatering, sediment and erosion controls, will occur in accordance too any applicable permits as administered by applicable regulatory agencies, including the Ontario Ministry of the Environment, Conservation and Parks.
			4.3	• Construction dewatering rates (active pumping only) will be documented on a daily basis on all days when pumping of water or any type of dewatering occurs, at all sources, during all works, through co-operation with the site Contract Administrator. Construction dewatering rates through active pumping will be measured using a flow metre. Daily dewatering rates will be provided to the Contract Administrator on a monthly basis and reported annually to the MECP by March 31st. **Dewatering discharge rates cannot exceed 400,000 L/day.**
			4.4	• A **dewatering discharge sample must be collected prior to discharge at each source** to confirm compliance to the applicable water quality criteria described below. **Additional discharge samples must be collected if a change in visible water quality is observed** (sheen, odour, color).
			4.5	• Construction period dewatering discharge water, including groundwater seepage collected through passive drainage, will be managed and released as follows: - It is expected that the construction dewatering discharge will be treated on-site to meet PWQO (1999) including sufficient removal of suspended sediment, and be released to the Conestoga River, 30 m from the watercourse; - If the construction dewatering discharge does not mee PWQO it is expected to meet O. Reg. 153/04 (as amended) Table 2 criteria, including sufficient removal of suspended sediment, and the water will be released to ground surface, that is not within an area identified as WHPA-A, to re-infiltrate in such a manner to avoid excessive erosion scouring; As per O.Reg. 63/16 Section 8 (5) (4) If the recommended method of discharge is discharge to surface land not enclosed in a building or discharge to a storm sewer the following must be completed **by a qualified person retained by the contractor**: (1) a statement that, in the opinion of the person who prepared the discharge report, the discharge of the ground water and storm water will not cause an adverse effect to the environment; (2) an identification of any treatment and control measures required to minimize erosion, flooding, scouring and sedimentation from occurring as a result of the discharge; and (3) an identification of any treatment and control measures required to address the quality of the discharge to ensure that the discharge will not cause an adverse effect to the environment.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
				• Should the water not meet the criteria, it will be contained and taken off-site to a MECP licensed facility for treatment and disposal.
			4.6	• In co-operation with the site Contract Administrator, the clarity, presence of sheen, odour and/or precipitate, and turbidity will be recorded at least twice daily for the dewatering discharge at each source. Visual observations will be reported to the Contract Administrator on a monthly basis. With respect to any groundwater or storm water, or both, that is discharged to land, there shall be no visible petroleum hydrocarbon film or sheen present.
			4.7	• With respect to any groundwater or storm water, or both, that is discharged to land that is within 30 m of a water body, turbidity of the discharge shall not exceed eight Nephelometric Turbidity Units above the background levels of the nearest water body.
			4.8	• Any groundwater/surface water interference complaints or incidents will be promptly investigated. An alternative water supply will be provided to any water user in the area whose water supply has been adversely affected by construction activities (dewatering, chemical spills, sediment release, rock breaking and pile driving). Nearby residents will be provided with a responsible contact, to which any complaints may be reported, throughout the construction period.
			4.9	• Erosion and Sediment Control (ESC) best practices will be applied during the construction, clean-up, and restoration, to prevent sediment-laden runoff from entering any surface water course and/or designated environmentally sensitive area. **A comprehensive ESC Plan will be developed and presented for review and approval prior to the start of construction.** Any erosion, flooding, scouring, sediment and total suspended solids control measures identified in the discharge report shall be used, operated and maintained in a manner that satisfies the recommendations of the manufacturer of the control measures or as directed in the discharge report if no such recommendations exist. All control measures referred to above and all materials collected or trapped by those measures shall be recovered and disposed of when the person is no longer engaging in the activity.
			4.10	• Vehicle refueling and maintenance will not take place within 30 m of a watercourse, unless done in a specially designed area, and manner, to contain potential leaks or spills.
			4.11	• Any spills or incidents will be promptly reported and immediately investigated as necessary to protect surrounding water users and natural receptors. **An environmental spills response plan must be established prior to beginning work and shall be promptly implemented as required.**

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
			4.12	• If the taking of water is no longer needed, within 30 days after the day the person has ceased to engage in the activity, they shall give notice to the MECP that the water taking is complete by filing that information in the MECP's electronic system. O.Reg. 300/21, s.10.
			4.13	• A person who engages in the water taking activity shall ensure that each of the following records with respect to the taking of groundwater, storm water or both is created and retained for a period of five years from the day it is required to be created: • The dates on which the person engaged in the activity. • For each day on which groundwater, storm water or both was taken, the average rate at which it was taken from each dewatered work area in litres per second. • The volume of groundwater, storm water or both taken from each dewatered work area each day in litres. • A record of the following information with respect to each complaint: i) The date and time the complaint was received. ii) A copy of the complaint, if it is a written complaint. iii) A summary of the complaint, if it is not a written complaint. iv) A summary of measures taken, if any, to address the complaint. • A record of any precipitation on the construction site. • A copy of any information or documents that demonstrate written notice was provided in accordance with the protocol set out in a water taking report. • A copy of the records related to the monitoring plans referred to in paragraphs 3 and 9 of subsection 9.1 (2). i) 9.1(2) 3. A water monitoring plan shall be implemented in accordance with the plan set out in the water taking report, if the applicable circumstances arise. ii) 9.1(2) 9. A monitoring plan for the discharge shall be implemented in accordance with the plan set out in the discharge report, if the applicable circumstances arise.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
			Proposed Contingency Plan	
			4.14	• All appropriate stakeholders will be notified as required, including the construction manager responsible for onsite activities, the MECP Spills Hotline (1-800-268-6060) and Grand River Conservation Authority;
			4.15	• Mitigation measures will be initiated to prevent further damage or inconvenience, in consultation with property owners and regulatory agencies, as applicable;
			4.16	• Water taking/construction may be stopped until the problem is fixed, as circumstances allow;
			4.17	• If it is determined that the construction work is causing increased level of suspended sediment in treated dewatering discharge water, or site runoff, above the upset limit of eight Nephelometric Turbidity Units, and / or resulting in turbidity levels in downstream surface water which are noticeably higher than background turbidity conditions, the contractor should modify dewatering methodology to correct the problem as necessary. This may be accomplished by adding additional treatments (adding filter bags, sediment traps, Enviro-tanks, etc.) or modifying the discharge methodology (i.e. lower pumping rate, move filter bag location, etc.);
			4.18	• If water quality of dewatering discharge water is observed to have an unusual appearance or odor, indicative of an adverse impact, dewatering discharge shall be stopped if circumstances allow, the water will be tested to determine the nature of the impact. Appropriate water treatment will be added as necessary, or water will be contained to haul to a suitable off-site and MECP-licensed facility where the water can be treated and discharged;
			4.19	• During the work program, should any incidents occur resulting in damages to adjacent natural environments, private properties, structures, or infrastructure beyond the construction limits, the damages will be cleaned up / repaired / compensated to the satisfaction of the property owner and / or regulatory agencies as applicable;
			4.20	• If it is found that construction activities are causing an adverse impact to a private water well user, or if a complaint is received: - The complaint will be inspected within 24 hours; - Regulatory agencies will be notified (MECP); and - A temporary water supply will be provided to the resident, until either the water supply or quality returns to pre-construction conditions, or it is determined that the issue is not related to construction.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
			4.21	• In the event that the adverse water quality or quantity conditions persist beyond three months, a permanent mitigation plan will be developed in co-operation with the property owner, with input from regulatory agencies as required.
5.0	Air Quality	MECP County of Wellington	5.1	• Dust suppression measures (e.g., application of water wherever appropriate, or the use of approved non-chloride chemical dust suppressants, where the application of water is not suitable).
			5.2	• Use of dump trucks with retractable covers for the transport of soils and other friable materials.
			5.3	• Minimize the number of loadings and unloading of soils and other friable materials.
			5.4	• Minimize drop heights, use enclosed chutes, and cover bins for debris associated with deconstruction of affected structures.
			5.5	• Washing of equipment and/use of mud mats where practical at construction site exits to limit the migration of soil and dust off-site.
			5.6	• Stockpiling of soil and other friable materials in locations that are less exposed to wind (e.g., protected from the wind by suitable barriers or wind fences/screens, or covered when long-term storage is required) and away from sensitive receptors to the extent possible.
			5.7	• Reduction of unnecessary traffic and implementation of speed limits.
			5.8	• Permanent stabilization of exposed soil areas with non-erodible material (e.g., stone or vegetation) as soon as practicably possible after construction in the affected area is completed.
			5.9	• Ensuring that all construction vehicles, machinery, and equipment are equipped with current emission controls, which are in a state of good repair.
			5.10	• Dust-generating activities should be minimized during conditions of high wind.
6.0	Noise and Vibration	MECP	6.1	• Both future operation (road traffic) and construction noise at the noise sensitive receptors will be reviewed for the preferred option during the detailed design.

ID #	Potential Environmental Effects	Concerned Agencies	ID #	Mitigation Measures/Commitments to Future Work
		County of Wellington	6.2	• The preferred plan alignment and the relative orientation of the houses (Noise Sensitive Receivers) indicates the outdoor living areas are shielded from traffic noise. Their compliance will be verified for any residual impact and control to include in the design.
			6.3	• If noise control is required, additional investigation will be carried out for their feasibility and details will be included in the detailed design.
			6.4	• Assessment of construction for both day and night construction will be completed and any additional control requirements will be determined and recommended.
			6.5	• If required, such control may include but is not limited to: - Silencers - Limiting hours of work - Community Notifications - Scheduling, etc.
			6.6	• A conceptual Noise Management Plan for the construction will also be provided during the detailed design.

9.0 PERMITS AND APPROVALS

To implement the Preferred Design, a number of approvals and permits are required from the provincial, federal, municipal and utility companies. During detail design phase of the work, the County of Wellington will work with relevant authorities to ensure that the proposed works are acceptable and to obtain the required permits.

Following the successful completion of the Municipal Class EA process documented in this ESR, all EA requirements will have been met. Other approval requirements will be addressed for the project during detailed design which may include:

- Prior to the bridge replacement works, a Request for Review (RfR), which will be submitted to DFO for each the four new bridge structures (Bridge B109132, Bridge C109123, Bridge B109133 and Bridge B109134).
- Permitting, Registration or Approvals under the ESA have not been confirmed. Once further field investigations are completed to confirm presence / absence and potential impacts, consultation with MECP will be required at detailed design to confirm requirements for species protected under the ESA.

10.0 MONITORING AND MAINTENANCE

A general monitoring program will be developed during detailed design which shall be implemented during construction to measure and monitor any potential project impacts on watercourses, including identifying contingency measures to mitigate or minimize the impact, if any.

During construction, the Contractor and on-site Contract Administrator will ensure that implementation of mitigating measures and key design features are consistent with the contract and external commitments (e.g. permit conditions/requirements and EA commitments). Mitigation measures shall be implemented and maintained by the Contractor who will ensure that the natural, social, and economic environments are not impacted by the construction activities and/or that impacts are minimized.

In addition, the effectiveness of the environmental mitigating measures will be assessed to ensure that:

- Individual mitigation measures are providing the expected control and/or protection; and
- Additional mitigation measures are provided, as required, for any unanticipated environmental issues that may develop during construction.

The Contractor will ensure that the environmental measures outlined in this ESR (Section 8) and further developed during detailed design are carried out. In an event that issues arise, appropriate agencies will be contacted to provide further input. If the impacts of construction are different than anticipated, or if the method of construction is such that there are greater than anticipated impacts, the Contractor's methods of operation will be changed or modified to reduce those impacts.

The Contractor will also ensure that items such as sedimentation controls and appropriate signage are maintained throughout construction. Appropriate signage shall be implemented to identify detour routes at the time of temporary roadway/sidewalk closures. In addition, closure events and restricted access to local residents and/or businesses shall be planned to accommodate vehicle and pedestrian movement during construction.

Signature Page

WSP Canada Inc

Behnaz Bakhit, MES (Pl.)
Senior Environmental Planner

Christine Vazz, MCIP, RPP
Environmental Planner

Nima Mahmoudi, P. Eng.
Project Manager, Bridges

CV/BB/NM/sp

APPENDIX A

Notification Materials

APPENDIX B

Consultation-Correspondence

APPENDIX C

Public Information Centre #1
Display Panels

APPENDIX D

Public Information Centre #2
Display Panels

APPENDIX E

Cultural Heritage Evaluation Report

APPENDIX F

Heritage Impact Assessment Report

APPENDIX G

Stage 1 Archaeological Assessment Report

APPENDIX H

Natural Environment

APPENDIX I

Fluvial Geomorphology

APPENDIX J

Hydrogeological Assessment

APPENDIX K

Hydrology and Hydraulics Report

APPENDIX L

General Arrangements

APPENDIX M

Preliminary Cost Estimate

APPENDIX N

Construction Schedule

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