Concession Street Bridge
EA Schedule B Municipal
Class Environmental
Assessment

Project File Report

Prepared for:
Region of Waterloo

Prepared by:
Stantec Consulting Ltd.

March 2021
Sign-off Sheet

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1.0 Introduction

The Region of Waterloo (Region) retained Stantec Consulting Ltd. to complete a Schedule B Municipal Class Environmental Assessment (Class EA) Study to identify options for the rehabilitation of the watermain that extends from Water Street West, across the Concession Street Bridge, to Grand Avenue South.

Following an extended period of extreme temperatures (above and below normal temperatures) and rain in late January/early February 2018, snow within the Grand River watershed rapidly melted causing the water level in the Grand River to rise. The unusual weather caused an ice jam to form upstream of the Galt area, which suddenly released when temperatures rose, causing the highest water levels in the Galt area in several years. As a result, flowing chunks of ice and debris damaged the Concession Street Bridge Watermain (CSBWM), and segments of the watermain dropped into the Grand River (See Figure 1). The Region was able to isolate the watermain at both ends of the bridge; however, it was not possible to replace the missing segments of the watermain and return the watermain to service.

The existing 600 mm diameter ductile iron watermain was installed in 1977 along the north side of the structure during construction of the bridge. The watermain extends from Water Street West, across the Concession Street Bridge, to Grand Avenue South. The length of the section of watermain suspended from the bridge is approximately
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90 m. The watermain connects to the transmission watermain network on the west and east side of the river along Grand Ave and Water Street, respectively.

There is a floodwall on each side of the Grand River under the bridge. Which extends below grade. On the southwest bank, there is a berm, which acts as flood protection along the river.

1.1 Study Area

The approximate limits of the study area are shown in Figure 2.

Figure 2: Study Area

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2.0 Planning Process

2.1 Municipal Class Environmental Assessment Process

All municipalities in Ontario are subject to the provisions of the *Environmental Assessment Act* (EA Act), which mandates the completion of an EA before constructing municipal infrastructure projects. The environments included under the EA Act encompass social, cultural, natural, and economic aspects of Ontario. The Ministry of the Environment, Conservation and Parks (MECP) is responsible for administration of the EA Act.

The Municipal Engineers Association (MEA) *Municipal Class Environmental Assessment* document (October 2000, as amended in 2007, 2011, & 2015), provides guidelines approved under the EA Act which protect the environment during the completion of municipal road, sewage and water infrastructure projects. The undertakings are considered pre-approved provided the mandatory environmental planning process as set out in the Class EA document is completed. The MEA Class EA document provides municipalities with a five-phase planning process approved under the EA Act to plan and undertake all municipal infrastructure projects in a manner that protects the environment.

Key components of the Class EA planning process include:

- Consultation with potentially affected parties early and throughout the process;
- Consideration of a reasonable range of alternative solutions;
- Systematic evaluation of alternatives;
- Clear and transparent documentation; and
- Traceable decision-making.

The MEA Class EA document provides a framework by which projects are classified as Schedule A, A+, B, or C based on a variety of factors including the general complexity of the project, level of investigation required, and the potential impacts on the natural, social, cultural, and economic environments that may occur. Each schedule classification requires a different level of documentation and review to be compliant with the EA Act and satisfy the requirements of the Class EA. The proponent is responsible for identifying the appropriate schedule for any given project and reviewing the applicability of the schedule at multiple stages throughout the project.
Schedule A projects are limited in scale with minimal anticipated environmental impacts. They are pre-approved and may be implemented without undertaking public consultation or following the planning process as outlined in the Class EA. Examples of Schedule A projects include on-going maintenance activities, normal operation of sewage treatment plants, and increasing pumping station capacity by adding or replacing equipment where new equipment is located within an existing building or structure.

Schedule A+ projects are similarly pre-approved but require that proponents notify potentially affected parties prior to implementation. An example of a Schedule A+ project includes retiring a water infrastructure facility, or retrofitting a facility for improvements.

Schedule B projects have the potential for some adverse environmental and social impacts. Proponents are thus required to undertake a screening process involving mandatory contact with potentially affected members of the public, Indigenous communities, and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. Schedule B projects require the completion of Phases 1 and 2 of the Class EA planning process, which is documented in a Project File and submitted for a mandatory 30-day comment period.

Schedule C projects have the potential for significant environmental impacts and must follow the full planning process specified in the Class EA document, including Phases 1 through 4. The project is documented in an Environmental Study Report (ESR), which is then filed for public, agency, and Indigenous community comment. Projects generally include the construction of new facilities, and major expansions to existing facilities.

### 2.1.1 Planning Process

Figure 3 illustrates the Class EA planning process and identifies the steps considered mandatory for compliance with the requirements of the EA Act. An overview of the five-phase planning process is provided below.

In accordance with the Municipal Class EA document, this study is being planned as a Schedule B undertaking, which will include the completion of Phases 1 and 2 of the MCEA study process.
Figure 3: MEA Municipal Class EA Planning and Design Process

2.1.2 Part II Order Process

Interested persons may provide written comments to the Region of Waterloo for a response using the following contact information:

Kevin Dolishny, P. Eng., Senior Engineer
Water Services, Region of Waterloo
519-575-4400 extension 3862
kdolishny@regionofwaterloo.ca

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

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

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

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

and

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

Requests should also be sent to the Region of Waterloo.

2.2 Policy Context

2.2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) is issued under Section 3 of the Planning Act and came into effect on May 1, 2020. Section 3 of the Planning Act states decisions affecting planning matters “shall be consistent with” the PPS. The consistency of the proposed improvements (defined as “infrastructure” in the PPS) with the relevant Infrastructure and Public Service Facilities policies included in Section 1.6.6 of the PPS is summarized as follows:

Planning for sewage and water services shall:

a) accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing:

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1. municipal sewage services and municipal water services; and

2. private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available or feasible;

b) ensure that these systems are provided in a manner that:

1. can be sustained by the water resources upon which such services rely;

2. prepares for the impacts of a changing climate;

3. is feasible and financially viable over their lifecycle; and

4. protects human health and safety, and the natural environment;

c) promote water conservation and water use efficiency;

d) integrate servicing and land use considerations at all stages of the planning process; and

e) be in accordance with the servicing hierarchy outlined through policies 1.6.6.2, 1.6.6.3, 1.6.6.4 and 1.6.6.5. For clarity, where municipal sewage services and municipal water services are not available, planned or feasible, planning authorities have the ability to consider the use of the servicing options set out through policies 1.6.6.3, 1.6.6.4, and 1.6.6.5 provided that the specified conditions are met.

2.2.2 Region of Waterloo Water Supply and Distribution Operations Master Plan

The Water Supply and Distribution Operations Master Plan (2015) documents the short- and long-term strategies for optimization of the operating efficiency of the Integrated Urban System (IUS) for water supply in the Region of Waterloo. The Region is responsible for supplying potable water throughout the Tri-Cities and surrounding area through the IUS and various individual rural systems. Potable water is delivered to the customer through a two-tier system; the Region provides wholesale water to each area municipality within the Integrated Urban System, and each area municipality is responsible to distribute water to the consumers.

Demand forecasting for the Region was updated to quantify the future storage, supply, and source requirements of the Tri-Cities up to the year 2031. Historical demand data based on average and maximum day, along with the allocation of demands as per the hydraulic model, were reviewed for area municipalities, including Cambridge where the Study Area is located. Demand forecasting completed as part of the Master Plan determined that under average day conditions, the forecasted demand for 2031 can
increase by up to 58 megalitres/day (ML/D) beyond the forecasted demand before exceeding projected system capacity (219 ML/D) and a reconfiguration to the Integrated Urban System for Cambridge was proposed.

The Concession Street Bridge EA will have regard for the Water Supply and Distribution Operations Master Plan and review the recommendations in the context of the Concession Street Bridge watermain solution(s) as they are available.

### 2.2.3 City of Cambridge Official Plan

The City of Cambridge 2018 Consolidated Official Plan is a policy document providing direction for general land use in the City. The Plan supports long-term growth and development in order to meet the community's needs. It also provides a way to manage issues related to land use, while still meeting the interests of the City, and achieving conformity with the Region of Waterloo Official Plan and the Provincial Growth Plan for the Greater Golden Horseshoe.

In the City’s Official Plan, the Class EA study area falls within lands designated under Map ‘1A’ as Built-up area, Urban Growth Centre, and Regeneration Area, as well as under Map ‘2’ as Community Core Area, Low-Medium Density Residential, and Recreation, Cemetery, and Open Space. The Grand River and the valley lands within the study areas are designated as significant valleys (Map 9) and the City will collaborate with the Region and the GRCA in an effort to maintain Canadian Heritage River national recognition of the Grand and Speed Rivers by identifying, conserving, interpreting and enhancing cultural heritage resources of recreational and scenic value. The study area is also located within the GRCA regulatory storm floodplain area (Map 10).

Concession Street is identified as an Arterial Road on Map 7a. Arterial Roads are designed having a capacity for two to six lanes usually undivided, with access to the right-of-way anticipated to be restricted wherever possible to intersections at grade with other arterial or collector roads and, where not possible, to individual driveways where access, in the opinion of the Region can be safely provided, serving local and Regional transportation needs and bicycle lanes with appropriate landscaping will be encouraged.

The Class EA study has examined the significant environmental features and their related ecological function, focusing on avoiding and mitigating potential impacts to these features, consistent with the protection policies in the Official Plan.

### 2.2.4 City of Cambridge Zoning By-law

The City of Cambridge Zoning By-law No. 150-85, as amended, regulates the use of land, and provides regulations for the location of buildings and structures (sheds and decks), building height, density, parking facilities and landscaping to ensure orderly
development. There are five different zone categories within the Study Area: 1) Residential – RS1; 2) Residential RM1; 3) Residential RM4; 4) Commercial – C1; 5) Open Space – OS1.

The primary purpose for the Residential – RS1 zone is for semi-detached one-family dwellings. The Residential RM zones accommodate for apartment residential buildings – RM4 accommodating apartment houses and other multiple unit residential buildings and RM1 accommodating apartment houses in the city centre. The Commercial – C1 accommodates commercial uses in the city centre and the Open Space – OS1 accommodates uses in environmentally significant and conservation areas. The uses and permissions enacted by the City of Cambridge Zoning By-law No. 150-85 will need to be considered when considering EA alternative solution(s).

2.2.5 City of Cambridge Noise By-law

As per the City of Cambridge Noise By-law, sound or noise arising from the use of material handling equipment is prohibited between the hours of 8:00 p.m. Saturday and 7:00 a.m. Monday, except in the case of emergency. Work undertaken as part of this EA Project will comply with this policy.

2.2.6 City of Cambridge Heritage Master Plan

The City’s Heritage Master Plan was prepared in 2008 to assist with the management of heritage resources. The key components of the master plan are to provide a broad assessment of the City’s heritage resources; identify areas of distinct heritage character within the city; provide recommendations for inventorying and evaluating heritage resources; and strategies and policy recommendations for better managing heritage resources. A Cultural Heritage Assessment Report was completed for the study area and is discussed in Section 5.8.

2.2.7 Grand River Conservation Authority

The City of Cambridge is located within the Grand River Conservation Authority (GRCA) jurisdiction and the lands within the study are subject to regulation policies, as the entire project study area is located within the GRCA Regulatory Area. The study area is also located within the GRCA Floodplain and GRCA Special Policy Area. To ensure that the regulatory policies associated with the GRCA Floodplain and the GRCA Special Policy Area are complied with, the Region will continuously consult GRCA throughout the timeline of this project.

2.2.8 Climate Change in the Environmental Assessment Process

Under clause 31(1)(e) of the Environmental Assessment Act, the Minister of the Environment, Conservation and Parks may gather, publish and disseminate information
with respect to the environment or environmental assessments for the purposes of the administration and enforcement of the Environmental Assessment Act and its regulations. A climate change consideration during the environmental assessment process results in an undertaking or project that has taken into account alternative methods to reduce its greenhouse gas emissions and negative impacts on carbon sinks.

For this project, the reason for the watermain repair could be attributed to climate change as increasing flood water elevations carrying the ice flow directly impacted the pipe attached to the bridge. The preferred mitigation strategy of installing the new watermain under the river eliminates the risk of a watermain break in the future since it can no longer be impacted by ice flows.
3.0 Consultation

This section provides a summary of the project consultation and communications.

3.1 Project Contact List

A project contact list was developed and maintained throughout the project (see Appendix A). The list included government agencies, Indigenous communities, groups and individuals that could be impacted or have interest in alternatives, potential stakeholders, and those who expressed interest in the Study through consultation with the Region. The list was updated throughout the project as requests from the public were received. Agencies included:

- The Ontario Ministry of the Environment, Conservation, and Parks (MECP)
- The Grand River Conservation Authority
- The City of Cambridge
- The Ministry of Natural Resources and Forestry
- Indigenous communities including: Six Nations of the Grand River Territory, Haudenosaunee Confederacy Council, and Mississaugas of the Credit First Nation
- Ministry of Heritage, Sport, Tourism, and Culture Industries

3.2 Project Notices

The Notice of Study Commencement, Notice of Public Consultation Centre, and Notice of Study Completion were sent to the project contact list, published on the Region’s website at www.regionofwaterloo.ca/water, and sent to those people who expressed an interest in this project throughout the duration of the study. A copy of each notice is provided in Appendix A.

3.3 Indigenous Communities Consultation

The Region identified potential interested Indigenous communities to be consulted as part of this study. These include:

- Six Nations of the Grand River Territory
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- Six Nations Haudenosaunee Confederacy Council
- Mississaugas of the Credit First Nation

The first point of contact for this project was the Notice of Study Commencement, which was sent via email to the above communities on October 28, 2020. All public material has been forwarded to the above communities, and follow-up phone calls/emails were completed to ensure that communities had sufficient information to determine consultation interests. All interested parties were notified and invited to the PCC and given the opportunity to express concerns and provide feedback through an invitation to meet and via telephone calls soliciting discussion.

The Indigenous Community Communication Log, emails sent to Indigenous Communities and correspondence from Indigenous Communities are provided in Appendix A.

To date, a letter dated October 21, 2020 was received via email from Mississaugas of the Credit First Nation (MCFN) requesting information about the project history and information about associated environmental and archaeological fieldwork. The letter highlighted the community’s interest in participation of Field Liaison Representatives in all environmental and archaeological fieldwork within the MCFN treaty territory, including Stage 2 through 4. A response was sent from ARA Archaeology indicating that the Stage 1 site visit was conducted on October 6, 2020 under PIF #P007-1151-2020.

3.4 Public Consultation Centre

A virtual PCC was hosted on the Region’s website from December 10, 2020 to January 15, 2021. The purpose of the PCC was to introduce the project and why it’s important, provide an overview of the Municipal Class EA study process, and to provide a description of the alternatives and preliminary recommendations for repair or replacement of the Concession Street Bridge Watermain. Two comments were received from members of the public. One comment was related to an interest in a designated heritage home in the study area and the other related to the Tour De Grand Cycling event in June 2021 and potential cycling route impacts due to construction. Road closures required near the end of the construction project will happen in 2022 and will not impact the event.

All input from the public, review agencies/ministries, and other stakeholders has been documented.
4.0 Problem and Opportunity Statement

Following an extended period of extreme temperatures and rain in late January/early February 2018, snow within the Grand River watershed rapidly melted causing the water level in the Grand River to rise. The unusual weather caused an ice jam to form upstream of the Galt area, which resulted in flowing chunks of ice and debris damaging the Concession Street Bridge Watermain (CSBWM). The Region was able to isolate the watermain at both ends of the bridge; however, it was not possible to replace the missing segments of the watermain and return the watermain to service.

There is an opportunity to not only rehabilitate the watermain that extends from Water Street West, across the Concession Street Bridge, to Grand Avenue South, but also opportunity to improve the overall water supply system in the area. The preferred design shall meet the evolving needs of the existing and future Cambridge residents, in alignment with the projections of the Region of Waterloo Water Supply and Distribution Operations Master Plan Final Report.
5.0 Existing Conditions

5.1 Technical Environment

5.1.1 Review of As-Built / Record Drawings

The existing 600 mm diameter insulated watermain is affixed to the north side of the Concession Street Bridge, along with an existing 150 mm diameter gas main. The existing watermain is affixed to the bridge using steel hangers. The bridge and watermain were originally constructed in 1977, and rehabilitation of the bridge deck occurred in 2013.

A flood control gate and earth berm on the east side of the Grand River were constructed in 1990. The flood level was identified at 266 metres above sea level (masl). The underside elevation of the watermain on the bridge is approximately 264 masl.

The project area spans the river with Water Street on the east side of the river and Grand Avenue South on the west side of the river.

West side of the Grand River:

- Small park is located south of Concession Street which includes an earth berm which connects to the flood wall adjacent to Concession Street.
- There is a flood wall and earth berm that were constructed in 1990 for flood protection.
- A pedestrian trail is located alongside the Grand River.
- South of the park, there are three residential houses on the east side of Grand Avenue South, and six residential houses on the west side of Grand Avenue South.
- There is a large surface parking lot at the southwest corner of Grand Avenue South and Cedar Street / Concession Street, which spans from Grand Avenue South to Richardson Street along Grand Avenue.
- North of Concession Street, there is a public utility building on the east side of Grand Avenue South.
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East side of the Grand River:

- There is a retaining wall along the east creek bank, and a pedestrian pathway parallel to Water Street.
- Condominiums line the east side of Water Street including Grand River Lofts and Riverfront Condominiums. Phase 1 of the Riverfront Condominiums has been constructed at the south end of Water Street, and Phase 2 has not yet been completed. The Phase 2 location is currently an undeveloped lot.
- On the west side of Water Street, there is a private parking lot for the adjacent office/medical building.

The bed of the Grand River was excavated by the GRCA in 1980, and is approximately 258 masl at this location. This is consistent with the 2015 bathymetry data provided by the GRCA.

A number of utilities have been identified along Concession Street, Grand Avenue South, and Water Street based on the available record drawings. Subsurface utility engineering (SUE) investigations are recommended to be completed to support the design efforts. A summary of utilities is provided below.

Concession Street Bridge:

- 600 mm insulated watermain affixed to the north side of the bridge.
- 150 mm diameter gas main affixed to the north side of the bridge.
- Streetlight cables embedded into both sides of the bridge deck.
- Communications ducts affixed to the bridge.

Water Street South:

- 300/375/450mm storm sewer at various alignments along Water Street South, approximately 2 m below grade.
- 100 mm gas main along the west boulevard.
- 900 mm sanitary sewer within the east side of the roadway.
- 450 mm watermain within the roadway.
- Bell Canada duct structure at various alignments within the right-of-way.
- Fiber optic cable along the west boulevard.
Grand Avenue South:

- 1200 mm sanitary sewer, approximately 3 m below grade, constructed in 1976. It is noted that drawing A68-9 shows a dead-end plug on the 600 mm watermain along Cedar Street at the west end of Grand Avenue South. Although the Concession Street watermain is known to continue to the west, the alignment could not be confirmed through record drawings review.

- 450 mm watermain on the west side of Grand Avenue South, connected to the 600 mm at the intersection of Grand Avenue South and Cedar Street.

- 300 mm local watermain on the east side of Grand Avenue South.

- Gas main and Bell line on the east side of Grand Avenue South.

5.1.2 Subsurface Conditions

The project team has completed a review of the following two previously completed geotechnical reports within the project area (Appendix B):


2. Geotechnical Investigation Main Street Reconstruction Wellington Street to Water Street Cambridge, Ontario for Regional Municipality of Waterloo, prepared by England Naylor Engineering Ltd., December 1997

Two boreholes, BH16-1 and BH16-2 (Golder, August 2016), are relevant to the Concession Street Bridge Watermain project given their location near the intersection of Water Street and Concession Street, as shown in Figure 4. Based on a review of the available geotechnical information in Golder’s report, the general ground conditions consist of very dense, cohesionless sand and gravel fills (Granular B backfill) and native sand and gravel, underlain by slightly weathered medium to medium strong Dolostone bedrock. The bedrock along Water Street is generally between 1.7 m to 3.7 m below the top of road grade. Groundwater levels vary from 2.6 to 3.8 mbgs (260.26 m to 261.5 m elevation).
Based on a review of record drawings, the west bank generally consists of a silty sand fill material in the area. Additional geotechnical investigation is recommended to provide further information.

5.1.3 Contamination and Waste Management

As part of the Concession Street Bridge Watermain Repair Assessment project, Stantec completed a review of potential contamination within the site and documented the results in a memorandum titled “Feasibility Study – Contamination and Waste Management – Concession Street Bridge Watermain Replacement Project, Cambridge, Ontario”, (Stantec, July 20, 2018). The memo included a review of the 2016 Golder report which identified soil and groundwater parameters that exceeded the limits of MECP Table 1 and/or Table 2 Site Condition Standards (SCS), including metals and inorganics, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs). The groundwater samples exceeded sodium and chloride concentrations in MECP Table 2 SCS, and the groundwater samples exceeded total suspended solids (TSS) for Waterloo Region Sewer Use By-laws. A rock sample was tested for synthetic precipitation leaching procedure (SPLP), which exceeded MECP Table 2 SCS, specifically for PAHs and PHCs. It is recommended that an Excess Material Management Plan be prepared.

It is noted that HDPE pipe is permeable to some organic solutions and further review will be required after completion of the geotechnical investigation to check for longevity issues concerning HDPE.

The project team will be working to develop Terms of Reference for additional geotechnical, hydrogeological, soil contamination, and subsurface utility engineering (SUE) investigations to support the design efforts.

5.1.4 Survey Data

A topographic and bathymetric survey of the area was completed in June 2020 by Automated Engineering Technologies Ltd. The bathymetric information indicates a river bed elevation of approximately 258 masl. This is consistent with the 2015 bathymetric
data provided by the GRCA as well as the record drawings from the bed excavation work completed by the GRCA in 1980.

5.2 Natural Environment

The reach of the Grand River below the Parkhill Dam supports warmwater fish species including Walleye (*Sander vitreus*), Smallmouth bass (*Micropterus dolomieu*), Northern pike (*Esox lucius*), Crappie (*Pomoxis sp.*), Rock bass (*Ambloplites rupestris*), Carp (*Cyprinus carpio*) and sunfish. The Parkhill Dam is a barrier to migration of fish species from Lake Erie (e.g., rainbow trout) and is promoted as a partition to keep such species from colonizing the river in reaches upstream of the dam (GRFMP, 1998).

The bed of the Grand River was excavated by the GRCA in 1980, as part of flood remediation works through the City of Cambridge. The river is approximately 70 m wide at the Concession Street bridge, and exhibits a steady flowing flat morphology. Substrates range from gravels to large cobbles overlain by thin deposits of silt.

A review of Species at Risk mapping on the Fisheries and Oceans Canada (DFO) website revealed species at risk that may potentially be in the vicinity of the Concession Street bridge. A summary of the species, and their respective federal and provincial status is provided below:

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Scientific Name</th>
<th>SARA Status (federal)</th>
<th>ESA Status (provincial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver shiner</td>
<td><em>Notropis photogenis</em></td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Black redhorse</td>
<td><em>Moxostoma duquesnei</em></td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Wavy-rayed lampmussel</td>
<td><em>Lampsilis fasciola</em></td>
<td>Special Concern</td>
<td>Threatened</td>
</tr>
</tbody>
</table>

The presence of these species was confirmed for this reach of the Grand River by GRCA when completing work related to the Parkhill Dam upstream of Concession Street. All three species were captured within and below the tailrace of the Parkhill Dam (GRCA, 2018) and are presumed to be present in the area of the Concession Street bridge.

Permitting requirements related to species at risk are discussed in **Section 8.0**. A copy of the report is provided in **Appendix F**.
5.3 Socio-Economic Environment

A site visit was conducted by the project team on June 6, 2020 at the onset of the project. The project team walked the length of the bridge and walked along Water Street and Grand Avenue South. The following observations were noted during the site visit:

- Vacant lot is present on the west side of Water Street which could serve as a staging location for the drilling operation.
- Parking lot is located to the east of Water Street, south of Concession Street, adjacent to the retaining wall along the sidewalk.
- Set of stairs is present along the east riverbank, just south of the bridge crossing which provides access to a trail along the riverbank, below on the river side of the retaining wall.
- Small park along Grand Avenue, south of Concession Street, which includes a flood control berm that connects to the floodwall crossing Concession Street. The park has some sparse trees and a pedestrian trail.
- Parking lot is present on the west side of Grand Avenue, directly south of Concession Street which spans from Grand Avenue South to Richardson Street. This parking lot could provide a pipe laydown or staging area.
- Staging area could be provided within the park if damage to the earth berm is avoided.

5.4 Cultural Environment

5.4.1 Built Heritage Resources

A Cultural Heritage Assessment Report (CHAR) was completed to identify heritage resources, including built heritage and cultural heritage landscapes, present within, and adjacent to, the Study Area. The Study Area consists of a 50 m buffer surrounding the potential alternative locations for proposed watermain replacement to encompass potential vibration effects resulting from the project. If a property boundary is within the buffer, resources on the property are required to be examined.

Where a potential heritage resource was identified within the Study Area, an evaluation of the cultural heritage value or interest (CHVI) of the property, or properties, was undertaken. Where potential CHVI was identified, a structure or landscape was assigned a cultural heritage resource (CHR) number and the property was determined to contain a heritage resource.

A copy of the CHAR is provided in Appendix C.
5.4.2 Archaeological Resources

Archaeological Research Associates Ltd. (ARA) was retained to complete a Stage 1 archaeological assessment for the study area. The Stage 1 site visit was conducted on October 6, 2020 under PIF #P007-1151-2020. The Stage 1 assessment determined that the entire study area has no archaeological potential. Specifically, deep land alterations associated with the demolition of the earlier structures, the construction of various flood control measures including a flood levee and the establishment of fills and subsequent landscaping have resulted in the removal of archaeological potential from all surficial and deeply buried contexts. Furthermore, the corridor traversing the Grand River is permanently wet and has been cleared of archaeological concerns by a marine archaeological assessment. It is recommended that no further assessment be required within the project lands. The Stage 1 report was submitted to the MHSTCI on November 23, 2020 and has been since entered into the register of archaeological reports.

A copy of the Stage 1 Archaeological Assessment report is provided in Appendix D.

5.4.3 Marine Archaeological Assessment

Scarlett Janusas Archaeology Inc (Scarlett) was retained to conduct a marine archaeological assessment of the Grand River in the area of the Concession Street bridge. A property inspection of the area was conducted on October 1, 2020.

The property inspection indicated that both banks of the Grand River have been modified to deal with continual flooding of the Grand River. The Study Area has low archaeological potential for any marine related archaeological resources, either prehistoric, Indigenous historic or Euro-Canadian historic. Flood waters would have eroded the banks taking with them any archaeological evidence that might have existed in these areas.

Based on the marine archaeological assessment (background research and property inspection), there are no archaeological concerns for this specific area of the Grand River.

A copy of the marine archaeological assessment report is provided in Appendix E.
6.0 Alternative Solutions

An assessment of alternatives for repair or replacement of the Concession Street Bridge watermain was completed by Stantec following damage incurred during a significant storm event in winter of 2018. The assessment of alternatives and recommendations are provided in the Concession Street Bridge Watermain Repair Assessment – Rehabilitation Assessment Report (Stantec, 2020), included in Appendix H.

A number of alternative solutions were considered for repairing or replacing the damaged watermain:

- Do nothing – This alternative involves leaving the existing watermain as-is (would remain offline). Areas to the west of the river would continue to be supplied water through interconnections, but there would be less system redundancy and security of supply to areas west of the River. This alternative was carried forward as a baseline for comparison against other options.

- Reinstall watermain on the bridge – This alternative would involve replacing/reinstalling the watermain on the Concession Street bridge. While this is a feasible option, the watermain would remain susceptible to ice damage during winter months and could potentially experience similar damage in the future.

- Construct a new watermain crossing under river – This alternative would involve the construction of a new watermain under the Grand River using trenchless technology. This alternative protects the watermain from damage as it is below grade, while protecting aquatic habitats within the river. This alternative is more costly than reinstalling on the bridge.

The following alignments for the repair and/or replacement of the Concession Street Watermain were considered.

1. Reinstallation of the watermain on the Concession Street bridge:
   - 1A. Install in the same location (upstream side of the bridge)
   - 1B. Install on the downstream side of the bridge

2. Installation of a new watermain under the Grand River using trenchless methods:
   - 2A. Horizontal directional drilling (HDD) north of the bridge
   - 2B. HDD south of the bridge
   - 2C. Microtunneling south of the bridge
6.1 Evaluation of Alternative Solution

A number of criteria were identified to evaluate environmental impacts of the project and alternatives in accordance with the EA process.

**Social/Cultural Environmental**: This group of criteria includes impacts on existing residences, businesses, and other planned land uses and developments; impacts to archaeological and cultural heritage resources, and health and safety considerations.

**Natural Environment**: This group of criteria includes impacts to environmental features, wildlife and species at risk, groundwater, streams, and rivers, and the consideration of climate change.

**Technical/Regulatory**: This group of criteria includes the requirement for property acquisition or easements, the ability to provide reliable service to meet existing and future needs, the alignment with planned infrastructure improvements, impacts to existing infrastructure, utilities, and other constructability considerations, and the ability to obtain appropriate permitting and approvals.

**Financial**: This group of criteria includes the consideration for both capital costs, and long-term operations and maintenance costs.

6.2 Recommended Alternative Solution

Based on the evaluation, a trenchless watermain installation south of the Concession Street bridge (Option 2B) using HDD was selected as the preferred option, based on the following:

- Least risk of damage from ice/flooding and least impact to the bridge
- Manageable safety concerns – work is confined to specific work locations away from traffic and pedestrians
- Less maintenance – watermain is not exposed to weather and is protected underground over the long-term
- Fewer traffic impacts during construction relative to other alternatives
- Comparative construction cost relative to other alternatives
- Longer lifespan (50+ years) relative to installing the watermain on the bridge (<40 years)
- Low lifecycle cost. re-installing the watermain on the bridge has between a 1% and 2% chance of incurring damage on any given year based on flow levels and weather conditions, which increases repair/replacement costs
7.0 Watermain Design

7.1 Design Criteria

The design of the watermain will adhere to the following standards and guidelines:

- Region of Waterloo and Area Municipalities, Design Guidelines and Supplemental Specifications for Municipal Services, January 2020
- Ontario Provincial Standards (OPSS and OPSD)
- ASTM F-1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings
- Second Edition Handbook of PE Pipe 2008 by the Plastics Pipe Institute (PPI)
- ASCE MOP 108 - Pipeline Design for Installation by Horizontal Directional Drilling

7.2 Design Basis

The following provides a summary of the design considerations for the preferred alternative (installing a new watermain under the Grand River using a trenchless method):

- It is anticipated that the drilling operation would commence on the east side of the river from the vacant lot east of Water Street.

- The length of the HDD crossing is estimated to be 150 m.

- It is anticipated that the drag section would be lain out and fused prior to being pulled through the bore. It is anticipated that the pipe laydown area would be west of the river, likely crossing through the parking lot south of Cedar Street and running along the south sidewalk.

- High-Density Polyethylene (HDPE) is the most commonly used material for HDD drilling of waterlines due to the low minimum bend radius, however Ductile Iron, Fusible PVC, Restrained PVC, and Steel are also available materials used for HDD installations. The final pipe material is to be reviewed and selected during detailed design.

- It is noted that hydrocarbons were identified in soil samples. HDPE is known to be permeable in some hydrocarbon solutions, and therefore additional review is warranted should HDPE be selected.
• Due to the presence of surficial cohesionless soils, it is anticipated that a conductor casing may be required along the entry tangent of the drill to prevent release of drilling fluid to the surface and to increase borehole stability. A conductor casing would be placed in advance of the HDD operation. The conductor casing would be selected to provide sufficient diameter to accommodate the largest reamer required and will be removed following installation of the carrier pipe.

• Due to the presence of a medium-to-hard solid bedrock, it is anticipated that a mud motor and hole-opener will be required to complete the bore.

• It is anticipated that the HDD operation will commence from the surface parking lot east of Water Street, and the pipe will be pulled from a staging area in the green space east of Grand Avenue South. A lane closure along Grand Avenue South will be required while the pipe is being fused and pulled into place (~12 hours). A temporary lay-down area may be required along private property on the west side of Grand Avenue South, south of Cedar Street.

• Entry angles are typically limited to 10 to 18 degrees, while exit angles are commonly specified within the range of 8 to 16 degrees, to simplify the lift plan and minimize back excavation required for tie-in.

7.3 Hydraulic Review

The existing watermain on the Concession Street bridge is a 600 mm diameter ductile iron watermain. A hydraulic analysis was completed as part of Stantec’s Assessment Report (2020) which indicated that the minimum internal diameter for the proposed replacement watermain is 450 mm.

Based on the Region’s July 2011 technical memorandum (TM) titled “Review of Temporary Watermain Requirements at Concession Street Bridge, Cambridge”, the current flow rates are 32 L/s (average day) and 37 L/s (max day). The peak hour flow used to calculate pipe size was 96 L/s. Minimum internal diameters were calculated using the Hazen-Williams equation as part of Stantec’s 2020 assessment for various pipe materials and for each material are provided below:

• Concrete Pressure Pipe (AWWA C303) – 450 mm ID
• Stainless Steel – 525 mm ID
• HDPE (Ductile Iron Pipe Size) – 450 mm ID
• Ductile Iron – 450 mm ID

The final pipe material and diameter are to be determined during detailed design.
7.4 Tendering Strategy

Because the HDD alignment is expected to drill through bedrock, it is recommended that a specialty contractor be retained with demonstrated previous experience with HDD bores through rock conditions. The project also includes some additional high-risk factors including the presence of the river and risk of hydraulic fracture, the presence of a retaining wall on the east bank, and the bridge piers. To reduce risk during construction, it is recommended that a prequalification process be considered prior to tendering of the project to provide a pre-screening of contractor qualifications and previous experience.
8.0 Potential Environmental Impacts, Proposed Mitigation and Approvals

8.1 Natural Environment

A summary of permits and approvals required for the project is provided below:

- If in-water work is required, consultation with Department of Fisheries and Oceans (DFO) will be required with respect to the federal *Species at Risk Act* (SARA) and the presence of Silver shiner and Black redhorse in the vicinity of the bridge. Both of these species are considered threatened federally and a permit under SARA would be required for in-water work. A SARA permit would not be required for Wavy-rayed lampmussel as it is ranked as Special Concern federally.

- Silver shiner, Black redhorse and Wavy-rayed lampmussel are all listed as threatened species under the provincial *Endangered Species Act* (ESA). Should in-water work be required, a permit from the Ministry of Environment, Conservation and Parks (MECP) would be required. MECP now administers the ESA.

- Depending on the location of bank disturbance related to boring pits, staging areas, etc., a permit under the ESA may be required given the presence of Silver shiner. The habitat protections related to Silver shiner under the ESA include the floodplain or riparian habitat adjacent to the occupied reach. If the pits for the HDD process are located within the floodplain, MECP should be consulted to determine if a permit is required. The floodplain in the area of the Concession Street bridge is quite wide and encompasses built-up areas and streetscapes; therefore, consultation with MECP is required to determine the practicality of including all of the floodplain area as Silver shiner secondary habitat.

- No terrestrial SAR were identified during the rehabilitation assessment for the bridge. Prior to construction any areas that require tree removals to accommodate construction should be examined to determine if nesting birds are present. The proposed crossing approach will utilize HDD, so no disturbance to the bridge is required. Should any disturbance to the bridge be required (i.e., removal of the existing watermain pipe), the bridge should be examined for any nesting birds and appropriate permitting approaches can be prescribed.
8.2 Built Heritage Resources

Fourteen cultural heritage resources were identified as assessed for potential impacts resulting from the project within the Study Area. Resources included former industrial properties, residential properties, commercial properties, and the Grand River. Two CHRs, a residence and former industrial building, are located within 50 m of the proposed alternative for watermain replacement and may be at risk for indirect impacts resulting from construction-related ground vibration.
APPENDIX A
Consultation Materials
APPENDIX B
Geotechnical and Environmental Studies
APPENDIX C
Cultural Heritage Assessment Report
APPENDIX D

Stage 1 Archaeological Assessment
APPENDIX E

Marine Archaeological Assessment
APPENDIX F
Rehabilitation Assessment Report