

Revised August 2023 - Environmental Study Report

University Avenue (Albert Street to Weber Street North), City of Waterloo, Municipal Class Environmental Assessment, Schedule “C”

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Executive Summary

The Region of Waterloo has undertaken a Municipal Class Environmental Assessment (Class EA) Study, Schedule 'C', to investigate alternative solutions required for improvement opportunities along the University Avenue corridor from Albert Street to Weber Street North, in the City of Waterloo, Ontario: the "Study Area". The 2018 Regional Transportation Master Plan identified this section of roadway for rehabilitation to address deteriorated pavement structure and provide active transportation and intersection improvements. The Transportation Master Plan identified the section of University Avenue from King Street to Weber Street for cycling infrastructure installation to complete the cycling network connectivity in this area. Also, the City of Waterloo's watermain and sanitary sewer systems have reached the end of their life and require replacement.

This project is being planned as a Schedule 'C' Class EA project which applies to larger, more complex projects with the potential for significant environmental impacts (natural, social, cultural, and economic) and requires multiple opportunities for public input. To support the evaluation process, background studies established a comprehensive inventory of existing site conditions and identified areas of concern related to potential impacts along the corridor. Studies include Traffic and Transportation, Natural Environment, Air Quality, Drinking Water Source Protection, Drainage and Stormwater Management, Noise Impact Assessment, Cultural and Built Heritage, Stage 1 Archaeological, Erosion and Sediment Control, and Geotechnical.

The Project Team reviewed several possible Alternative Solutions, which could address the opportunities for improvement along University Avenue. Alternative Solutions included on-road buffered bike lanes, and two variation of separated bike lanes with a raised physical barrier. In total, the Project Team considered four (4) Alternative Solutions (Exhibit 5-1 to Exhibit 5-4). The preliminary design alternatives were assessed against a set of evaluation criteria by the Project team, as to how they address the traffic and transportation needs in comparison to their potential environmental impacts. The evaluation criteria used includes Traffic Capacity, Operations and Safety; Natural Environment; Socio-Cultural Environment; and Economic Environment. The evaluation results are summarized in **Appendix F**.

Based on the evaluation of the design alternatives using the above noted criteria, Design Alternative No. 3a - Separated Bike Lanes with a Physical Barrier (Exhibit 7-1) was identified as the preferred design alternative by the Project Team and presented to the public for input.

Public Consultation Centre #1 (PCC #1) was held virtually between August 12, 2020 and October 2, 2020. The intended purpose of PCC #1 was to have interested stakeholders and the public learn about and provide input on the project development, including design alternatives considered and the process

of selection of the preferred alternative. Throughout the duration of PCC #1, the survey platform was visited 568 times, and results from the submitted surveys and comments further indicated that the most preferred alternative was Alternative 3a (Exhibit 7-1). A full list of comments and Project Team responses for PCC#1 can be found in the PCC#1 Summary report in **Appendix J**.

Public Consultation Centre #2 (PCC #2) was held virtually between March 8, 2022 and April 8, 2022. The intended purpose of PCC#2 was to present the Preliminary Preferred Design Alternative to the public. Throughout the duration of PCC #2, the survey platform was visited 92 times. The Project Team's response to each of the public comments received was consolidated and has been included in PCC#2 Summary Report in **Appendix J**.

The estimated cost for design and construction of the Project Team's Recommended Design Alternative is \$9.8 million. Detailed design and utility relocations are scheduled to be completed throughout 2022 and 2023, with construction to occur between 2024 and 2026.

1 Introduction and Background

The Region of Waterloo and their consultants IBI Group Professional Services (Canada) Inc. (IBI Group) have undertaken and completed a Municipal Class Environmental Assessment (Class EA) study following the Schedule 'C' process.

The related study is supported by associated preliminary design work for proposed future improvements within the University Avenue corridor from Albert Street to Weber Street North, in the City of Waterloo, Ontario.

The study investigates traffic capacity and intersection operations along the corridor where there is ongoing area development and community growth. The Study considers improvements to active transportation including walking and cycling facilities, and transit operations, vehicular capacity, intersections, and infrastructure. Included in those considerations are enhancements to the corridor for users of all ages and abilities and the overall impacts on existing and future services. The study considerations include active transportation facilities, trail connections, impacts on the natural environment, cultural heritage, archaeological resources, existing area drainage features, municipal infrastructure, and existing utilities.

1.1 Study Purpose

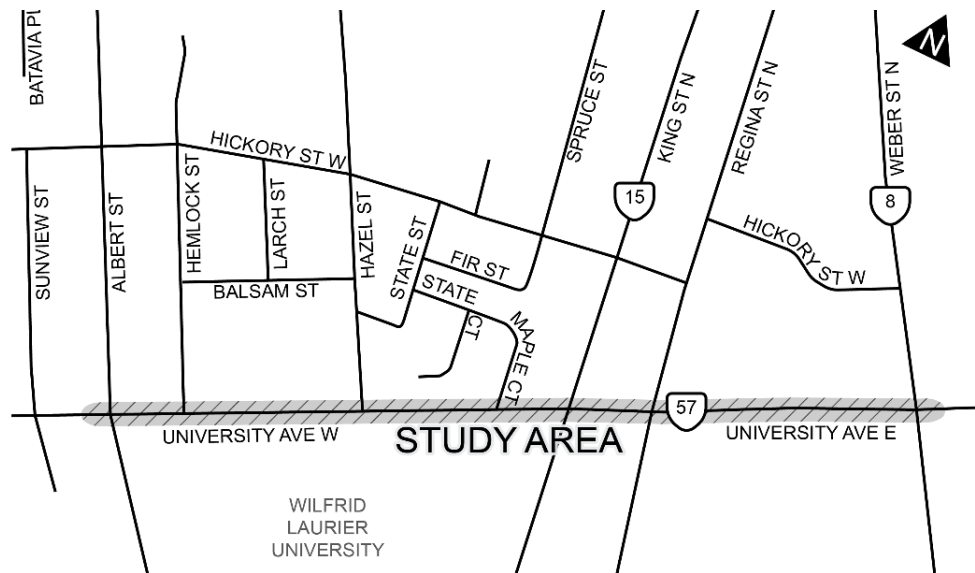
The purpose of the study was to investigate the need for capacity, safety and operational improvements to University Avenue between Albert Street and Weber Street North in the City of Waterloo.

1.2 Study Area

The study area includes University Avenue (Regional Road 57) and the immediately adjacent land, between Albert Street to Weber Street North in the

City of Waterloo (see **Exhibit 1-1**). The study area comprises of residential uses, the campus of Wilfrid Laurier University, green space, and clusters of commercial uses.

Exhibit 1-1: Study Area



1.3 Study Objectives

This study is being completed to develop an appropriate design for this section of University Avenue, with consideration given to potential social, economic and environmental impacts, and appropriate mitigation measures to prevent or minimize these impacts. This study has been conducted in accordance with the planning and design process for 'Schedule C' projects as outlined in the Municipal Engineers Association "Municipal Class Environmental Assessment" (October 2000, as amended in 2007, 2011 and 2015).

1.4 Problem and Opportunity

The Regional Municipality of Waterloo is undertaking a Municipal Class EA study for improvements to the University Avenue (Regional Road 57) corridor from Albert Street to Weber Street in the City of Waterloo. Improvements along University Avenue are being considered to improve roadway and underground infrastructure (watermain, storm sewer and sanitary sewer), active transportation facilities and traffic operations along the corridor.

The 2018 Regional Transportation Master Plan identified this section of roadway for rehabilitation to address deteriorated pavement structure and provide active transportation and intersection improvements. The Transportation Master Plan identified this section of University Avenue from King Street to Weber Street for cycling infrastructure installation to complete the cycling network connectivity in this area. Also, the City of Waterloo's watermain and sanitary sewer systems have reached the end of their life and require replacement.

1.5 Related Studies

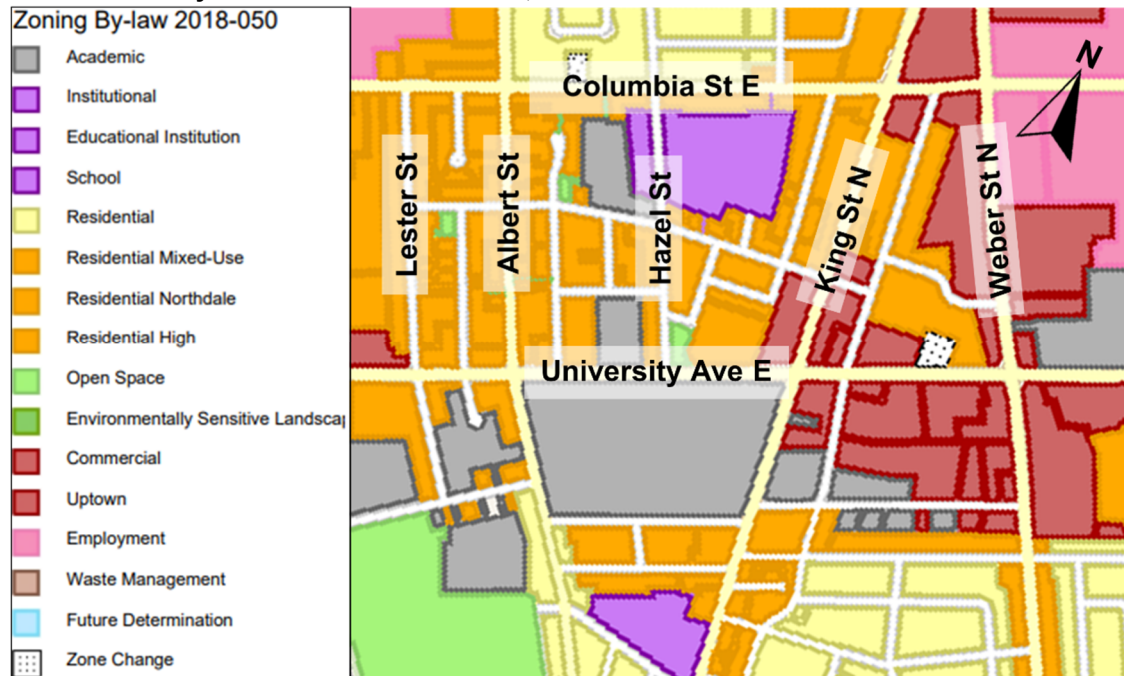
1.5.1 Region of Waterloo Official Plan

The Region of Waterloo Official Plan (ROP, 2015) designates University Avenue as an Existing Regional Road. The ROP also designates Existing University Avenue as a Planned Transit Corridor and a Planned Cycling Route. This designation means that University Avenue accommodates high frequency transit service. Additionally, the ROP requires that University Avenue implement Transit Oriented Development principles set out by Section 2.D.2, wherever feasible, in support of its designation as a Transit Corridor.

1.5.2 City of Waterloo Official Plan

The City of Waterloo Official Plan (2012) (Schedule 'A' Land Use) designates the lands south of University Avenue east of Albert Street and west of King Street North as Employment. The lands south of University Avenue, east of King Street North, and west of Weber Street North are designated Commercial. The Official Plan designates the lands north of University Avenue Mixed-Use Medium High Density Residential, Open Space, Commercial, and Mixed-Use High Density Residential. Land uses in the study area are illustrated in **Exhibit 1-2**.

Exhibit 1-2: City of Waterloo Official Plan, Schedule 'A' Land Use

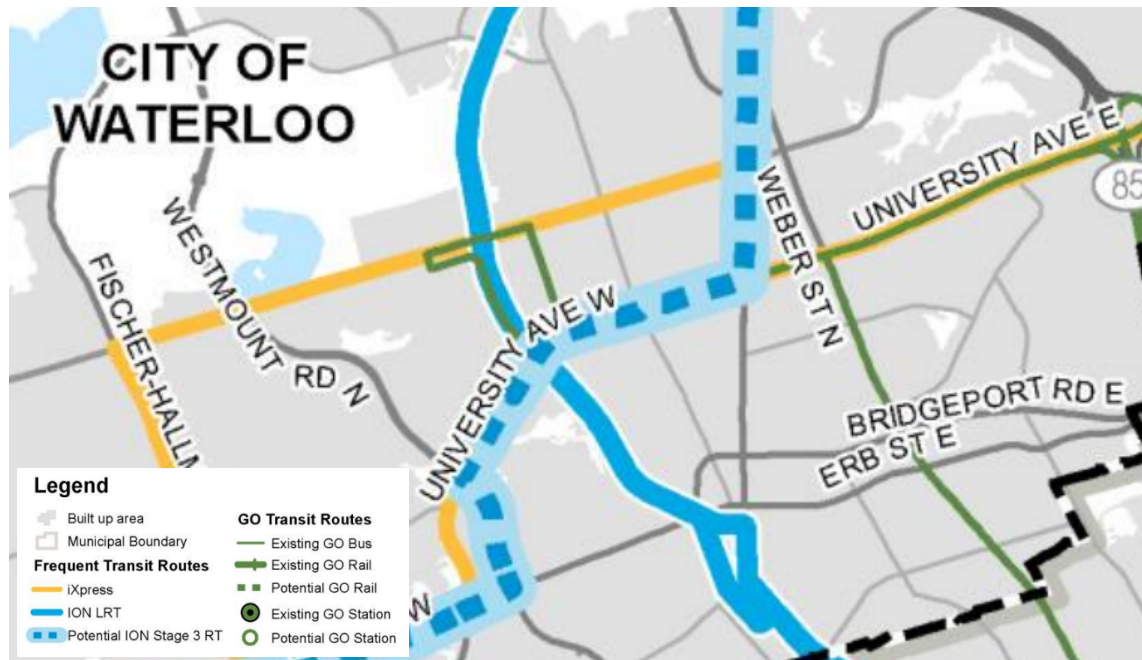


1.5.3 Region of Waterloo Transportation Master Plan

The 2018 Region of Waterloo Transportation Master Plan identifies the study area as being a GO Bus Route and an iXpress Route. The portion of the University Avenue study area between Albert Street and King Street North is also identified as a Potential ION Stage 3 RT Route (see **Exhibit 1-3**). ION

Stage 3 rapid transit would expand on the existing ION Light Rail Transit network to provide east-west connections in Kitchener and Waterloo. Depending on demand and development in the Region, this stage may feature Bus Rapid Transit or Light Rail Transit.

Exhibit 1-3: Regional Transportation Master Plan - Transit Corridors for Protection Beyond 2041 (Waterloo)



1.5.4 Clean Water Act

The Proponent must consider Drinking Water Source Protection in the context of the *Clean Water Act*, 2006. The applicable plan is the Grand River Source Protection Plan (2016). This plan contains policies to reduce existing and future threats to drinking water by addressing activities that have the potential to impact municipal drinking water systems.

1.5.5 Provincial Policy Statement

The Provincial Policy Statement (PPS), 2020 promotes densities and mixed land uses that support active transportation, transit, and the efficient movement of goods. The PPS requires that in planning matters, decisions “shall be consistent with” policy statements issued under the *Planning Act*.

One objective of the Region of Waterloo in planning for University Avenue improvements is to support these high-level strategic policies where possible.

The PPS also sets out the policy direction to guide land use planning and development in Ontario that support three key areas: building strong communities, wise use and management of resources, and protecting public health and safety.

The PPS promotes safe, energy efficient transportation systems that facilitate movement of people and goods and support projected needs. It highlights the importance of connectivity with and among transportation systems and modes, integration of transportation and land use planning to support sustainable transportation choices, and efficient use of existing infrastructure.

Section 1.6.7 (Transportation Systems) of the PPS details:

- Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods and are appropriate to address projected needs.
- Efficient use shall be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.
- As part of a multimodal transportation system, connectivity within and among 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.

Section 1.6.8 (Transportation and Infrastructure Corridors) details:

- Planning authorities shall plan for and protect corridors and rights-of-way for infrastructure, including transportation, transit and electricity generation facilities and transmission systems to meet current and projected needs.
- Planning authorities shall not permit development in planned corridors that could preclude or negatively affect the use of the corridor for the purpose(s) for which it was identified.
- New development proposed on adjacent lands to existing or planned corridors and transportation facilities should be compatible with, and supportive of, the long-term purposes of the corridor and should be designed to avoid, mitigate, or minimize negative impacts on and from the corridor and transportation facilities.

1.6 Municipal Class Environmental Assessment Process

This project is being planned in accordance with the requirements of the Municipal Class EA. The Municipal Class EA is a planning and decision-making process approved under the Ontario *Environmental Assessment Act* that is used by municipalities to plan public infrastructure projects so that potential environmental impacts are considered before a project is approved. The EA requires consultation with the public, involved stakeholders and agencies in consideration of alternatives and their impacts on the project environment. This

project is being planned as a Schedule 'C' Class EA project which applies to larger, more complex projects with the potential for significant environmental impacts (natural, social, cultural, and economic) and requires multiple opportunities for public input.

1.6.1 Phased Requirements

This study was conducted as a Municipal Class EA Schedule "C" project in accordance with the planning and design process outlined in the Municipal Engineers Association Municipal Class Environmental Assessment (as amended to 2015). The approved process is a five-phase planning process, mandated by the Ontario Environmental Assessment Act. The Class EA process defines four schedules of applicable projects based on scale and potential for adverse environmental impact, identifying which of the five phases are required (**Exhibit 1-4**)

The Municipal Class EA Process follows a five-phase planning procedure to ensure a consistent and inclusive process for decision making.

The Class EA process is broken down into five (5) phases:

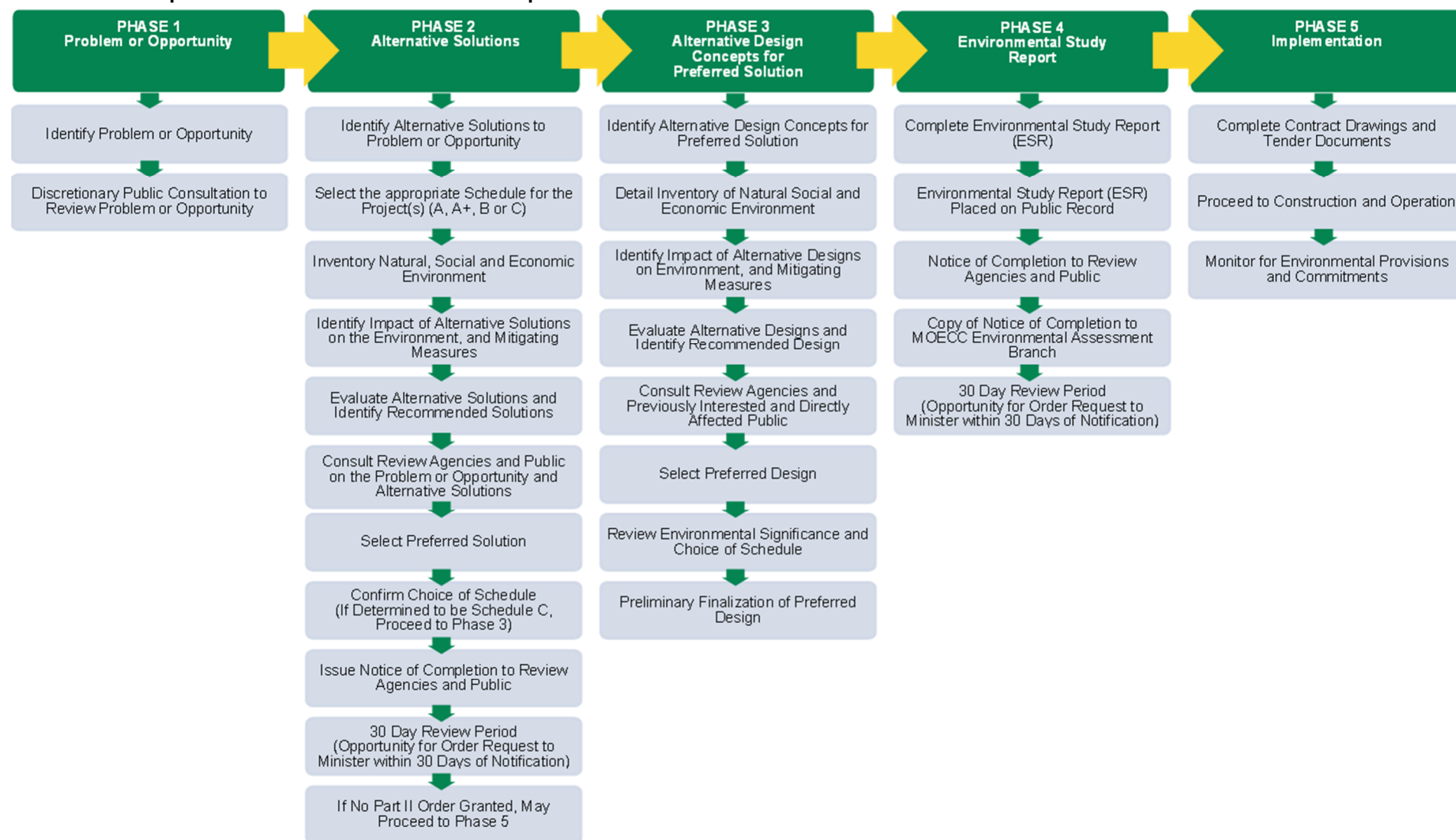
- **Phase 1** – Identify the problem or opportunity;
- **Phase 2** – Identify alternative solutions, evaluate, and select preferred solution;
- **Phase 3** – Identify alternative design concepts, evaluate, and select the preferred design concept;
- **Phase 4** – Document in an Environmental Study Report the rationale, planning, design, and consultation process and place it on public record;
- **Phase 5** – Project implementation, complete contract drawings and tender documents and proceed to construction and operation of the project. Implementation includes monitoring, which consists in assessing the environmental impacts and outcomes of the project compared to what was predicted in the earlier phases.

Exhibit 1-4: Municipal Class EA Project Schedules and Applicable Phases

		Phases				
		1	2	3	4	5
Schedule A	Minimal and predictable adverse environmental impacts – easily mitigated (i.e. emergency operational and maintenance activities)	✓				✓
	Pre-approved to proceed to Phase 5					
Schedule A+	Similar to Schedule A, but required to notify public prior to Phase 5	✓				✓
	No ability for public to request Section 16 order – comments directed to municipal council					
Schedule B	Some potential for adverse environmental impacts (i.e. improvements or minor expansions to existing facilities)	✓	✓			✓
	Must include evaluation of alternative solutions and public consultation					
Schedule C	Potential for significant environmental impacts (i.e. construction of new facilities and major expansion of existing facilities)	✓	✓	✓	✓	✓
	Must include evaluation of alternative solutions, evaluation of alternative designs for the preferred solution, and public consultation					

Each of the five phases have specific requirements (**Exhibit 1-5**). This study is Schedule C, which requires the completion of the first four phases, and leads into the fifth phase, following acceptance and approval of the Environmental Study Report by the Ministry of the Environment, Conservation and Parks (MECP). The Class EA process includes the requirement for consultation with the public and external agencies. This approach offers those persons and agencies who may be affected by, or have an interest in, the proposed project an opportunity to participate in the study.

Exhibit 1-5: Steps involved for each Phase of Municipal Class EA Process



1.6.2 Section 16 Process

As part of the Class EA process, it is suggested that all stakeholders (public, agencies, and authorities) work together to determine the preferred solutions to the problem or opportunity. If concerns regarding a project cannot be resolved in discussion with the proponent, members of the public, interest groups or technical review agencies may request the Ontario Minister of Environment, Conservation and Parks (MECP) to require a proponent comply with Section 16 of the *Environmental Assessment Act* before proceeding with the proposed undertaking. The MECP then decides whether to deny the request, refer the matter to mediation or require the proponent to comply with Section 16 of the *Environmental Assessment Act*.

The procedures for dealing with concerns are outlined as follows:

1. For Schedule 'C' projects, a person or party with a concern should bring it to the attention of the Region of Waterloo (the proponent) in Phase 4 of the planning process.
2. If a concern is not resolved through discussion with the proponent, the person or party raising the objection may request the Region of Waterloo to voluntarily elevate the Schedule 'C' project to an Individual Environmental Assessment.
3. If the Region of Waterloo declines, and the person or party with the concern wishes to pursue the matter, they may request the Minister to make an order. Section 16(6) of the Environmental Assessment Act says "*A person may request the Minister to make an order under this section only on the grounds that the order may prevent, mitigate or remedy adverse impacts on the existing aboriginal and treaty rights of the aboriginal peoples of Canada as recognized and affirmed in section 35 of the Constitution Act, 1982*". For a Schedule 'C' project, a request must be submitted to the Minister or delegate within the 30-day review period after the Notice of Completion has been issued.

1.7 Project Team

In 2018, the Region of Waterloo retained IBI Group to complete a Municipal Class EA for improvements to University Avenue between Albert Street and Weber Street North.

The study has been directed by a team of staff at the Region of Waterloo, led by the Region's designated Project Manager, Andrew Doman, P. Eng., Senior Engineer. As the lead consultant, IBI Group has supported this study with additional expertise and support from specialty sub-consultants Natural Resource Solutions Inc., Archaeological Services Inc., J.D. Barnes Limited, and Chung and Vander Doelen Engineering. The consultant team has been led by the Consultant Project Manager, Kelly Cobbe, P. Eng., and is supported by Project Engineer and Deputy Project Manager Julianna Arcese, P. Eng. A detailed organizational chart can be found in **Appendix A**.

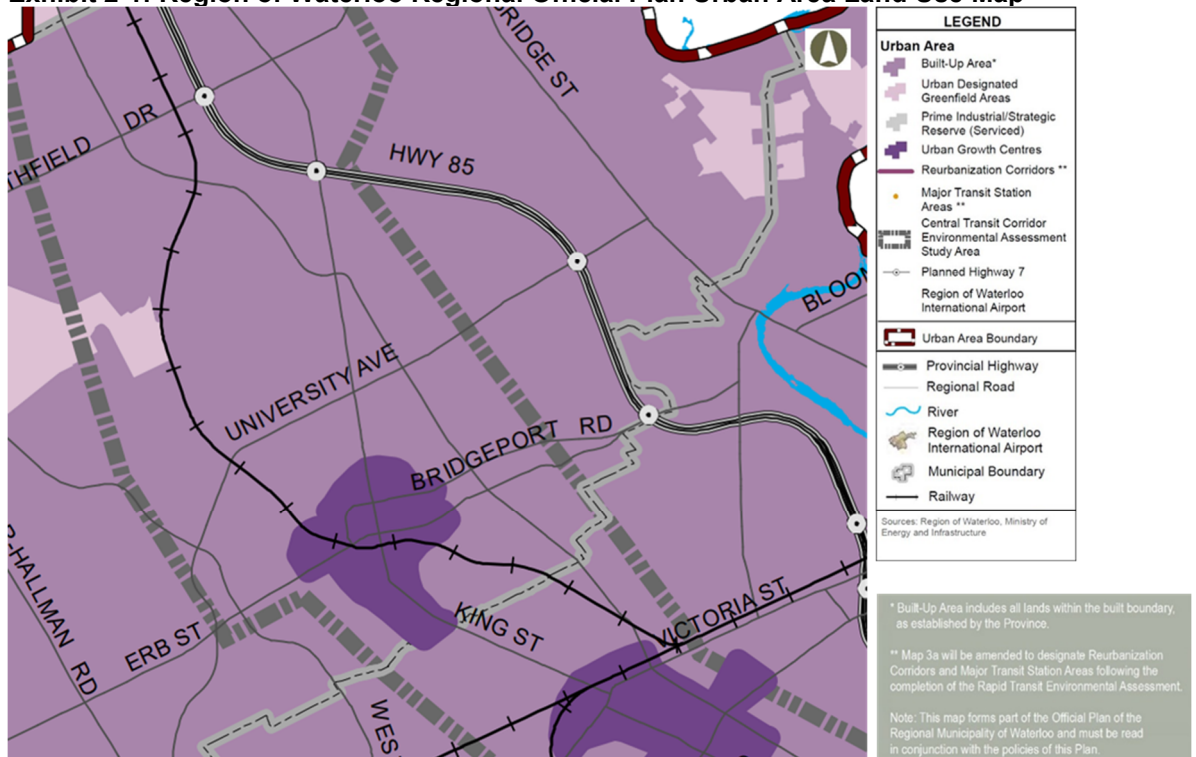
2 Inventory of Existing Conditions

2.1 Land Use

2.1.1 Region of Waterloo Official Plan (2015)

As illustrated in **Exhibit 2-1**, the Study Area falls within the Urban Area boundary in the Region of Waterloo Regional Official Plan (2015), with adjacent lands identified as Built-Up Area, and Urban Growth Centres to the south.

Exhibit 2-1: Region of Waterloo Regional Official Plan Urban Area Land Use Map

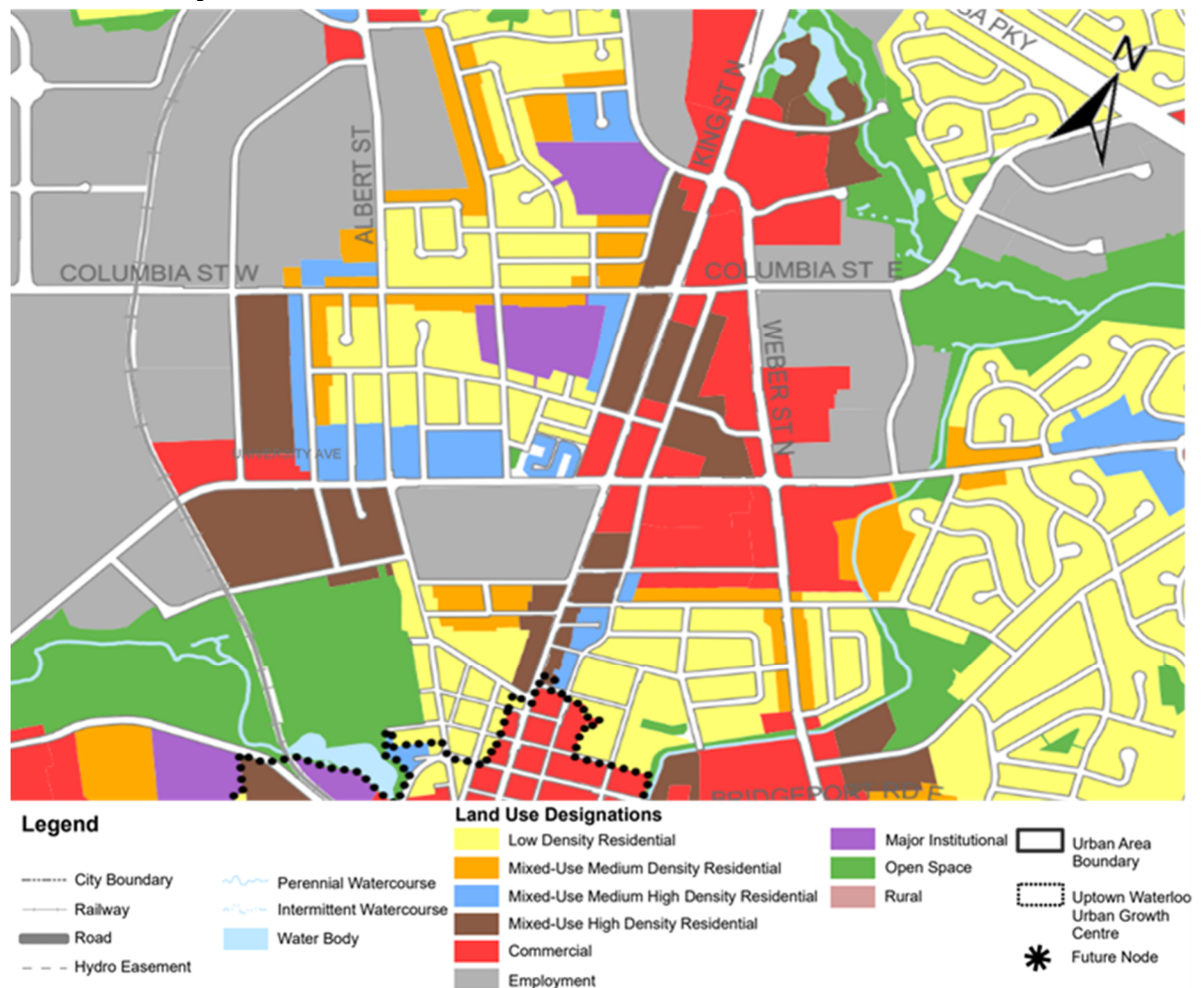


2.1.2 City of Waterloo Official Plan (2020)

The City of Waterloo Official Plan (2020) also identifies land uses in the Land Use Plan. As illustrated in

Exhibit 2-2, the Study Area is generally made up of Commercial, Mixed-Use High Density Residential, Mixed-Use Medium Density Residential, Employment, and Open Space.

Exhibit 2-2: City of Waterloo Official Plan Land Use Plan



2.2 Built Environment and Municipal Infrastructure

2.2.1 Roadway

University Avenue between Albert Street and Weber Street North is an urban four (4) lane road with two (2) lanes in each direction, which is classified as a Regional Road in the Region of Waterloo Transportation Master Plan (TMP) and

City of Waterloo TMP. Sidewalks exist on both the north and south sides of University Avenue with linkages to the campus of Wilfred Laurier University.

The intersection at Albert Street is signalized with northbound, southbound, eastbound, and westbound left-turn lanes on University Avenue and pedestrian crosswalks on all sides of the intersections.

A Grand River Transit (GRT) bus stop exists on the northeastern corner of University Avenue at Hemlock Street. Another bus stop exists immediately south of this bus stop which services these same routes in the westbound direction.

The intersection of University Avenue at Hazel Street/Mid Campus Drive is signalized with left-turn lanes and pedestrian crosswalks in all directions. A sheltered bus stop exists on the southeast corner of University Avenue at Hazel Street/Mid Campus Drive, adjacent to Veterans' Green. A bus stop for GO Bus services also exists at this corner. GRT bus stops in the northbound and southbound directions are located on Hazel Street slightly north of this intersection. The bus stop in the northbound direction features a shoulder. A sheltered GRT bus stop and GO bus stop exist slightly east of the intersection.

The intersection of University Avenue West at King Street North is also signalized with left-turn lanes and pedestrian crosswalks in all directions. Shoulders exist west of this intersection on the north and south sides of University Avenue to accommodate two (2) sheltered GRT bus stops. Another GRT bus stop exists west of Maple Court. A shoulder exists on King Street North, slightly south of the intersection with University Avenue, for a GRT bus stop in the southern direction. GRT bus stops are also located on the northwest and southeast corners of this intersection.

A signalized intersection with left-turn lanes and crosswalks in the north, south, east, and west directions exists at University Avenue and Regina Street North. GRT bus stops are located slightly east of this intersection on both the north and south sides of the road.

The intersection of University Avenue and Weber Street North features left-turn lanes in all directions and right-turn lanes in the east-bound and west-bound directions. Two (2) medians exist on the north side of University Avenue. Pedestrian crosswalks exist in all directions.

Existing on-road bike lanes exist from University Avenue at Albert Street to University Avenue at King Street North. The City TMP identified University Avenue at King Street North to University Avenue at Weber Street as proposed on-road bike lanes, however these bike lanes do not currently exist. The entire study area is identified by the City TMP as part of the Regionally approved on-road network for bike lanes.

2.2.2 Municipal Servicing

University Avenue between Albert Street and Weber Street North is serviced by existing sanitary sewer pipe that ranges in size from 200mm to 450mm diameter, the sanitary sewer flows from east to west towards Weber Street.

There is an existing 600mm diameter trunk sanitary sewer on University Avenue between Regina Street and Weber Street that is in good condition and is not intended to be replaced.

The existing watermain on University Avenue is located on the south side of the street from Albert Street past King Street, it crossing to the north side of University Avenue between King Street and Regina Street. It continues on the north side of the street until Weber Street. The watermain is cast iron and 300mm in diameter. The watermain will be replaced as part of this project.

2.2.3 Stormwater

The existing storm sewer on University Avenue ranges in size from 300mm diameter to 1050 storm sewer. The existing storm sewer flows from Albert Street towards Weber Street. There are 2 outlets to the system, the first is a 1500mm storm sewer crossing located mid-block between Regina Street and Weber Street, the second outlet is west of Weber Street.

2.2.4 Utilities

Waterloo North Hydro lines are situated on the north side of University Avenue, with overhead road crossings to service the properties on the south side of the road. On adjacent side streets hydro lines vary from both the east and west sides.

Enbridge Gas currently has a main running on the north side of University Avenue with road crossings. Natural gas transmissions mains were replaced within the study area at the King Street intersection as part of the King Street North improvement project.

Bell Canada currently has existing underground plant along both sides of University Avenue between Albert Street and Hazel Street, along the south side of University Avenue between Hazel Street and King Street, along with various road crossings between King Street and Regina Street. Between Regina Street and Weber Street all Bell lines appear to be aerial utilizing the hydro poles on the north side of the road.

Rogers currently has existing aerial plant on the hydro poles along the north side of University Avenue from Albert Street to Weber Street, along with buried fibre and coaxial cables intermittently from Regina Street to Weber Street on the north and south sides of the road.

2.3 Geotechnical and Hydrogeological Conditions

A geotechnical investigation was undertaken to review the existing pavement and underlying soil conditions along University Avenue. The following section is a summary of geotechnical conditions within the study area. See **Appendix B** for the full report.

2.3.1 Geotechnical

Fourteen (14) boreholes were drilled and sampled to depths of 6.55 metre below existing grades on alternating sides of University Avenue. The pavement is considered to be in fair condition.

2.3.2 Hydrogeology

Groundwater levels were estimated at depths between 1.5 metre to 4.85 metre below existing grades at eleven (11) of the fourteen (14) borehole locations at withdrawal of the drilling augers. The fifth borehole remained dry at withdrawal of the drilling augers.

2.3.3 Excess Soils

As of January 1, 2023, new excess soil reuse planning requirements were enacted by the Ministry of the Environment, Conservation and Parks. Ontario Regulation 406/19 "On-Site and Excess Soil Management" provides a framework for the beneficial reuse of excess soils, including the completion of an Assessment of Past Uses, development and implementation of a prescribed Sampling and Analysis Plan, Soil Characterization Report, Excess Soil Destination Assessment Report, and the implementation of a Tracking System.

The soil sampling and analysis work completed as part of this study may not meet all the requirements defined in the new regulation. Accordingly, additional work associated with excess soil management, including reporting and/or sampling, may be required prior to construction. The final requirements for the management of excess soil should be reviewed by a qualified person (QP) prior to the planned construction activities to ensure that excess soil management is conducted in compliance with the phased-in requirements of O.Reg. 406/19.

2.4 Natural Environment

The following section is a summary of the Natural Heritage features within the study area as identified through completion of a Natural Heritage Report. See **Appendix C** for the full report.

2.4.1 Designated Natural Heritage Areas

Two (2) natural features which have implications under the PPS were identified within the study area based on preliminary analysis:

- Potential habitat for endangered and threatened species (*Myotis lucifugus*, *Myotis septentrionalis*, *Perimyotis subflavus*); and
- Candidate Significant Wildlife Habitat: Special Concern and Rare Wildlife Species (Habitat for SCC).

The Region of Waterloo Official Plan identifies habitat for threatened and endangered species, and floodplain hazard lands within the study area. The City of Waterloo Official Plan identifies floodplain hazards within the study area.

A portion of the study area is within the Regulation Limit of the Grand River Conservation Authority (GRCA) as a Special Policy Area due to the floodplain of Laurel Creek. As such, permits from the GRCA must be obtained for proposed works within the Regulation Limit.

2.4.2 Vegetation

The number of trees inventoried within the study totalled 76. There were 23 species identified. Of the inventoried trees, 24% are native species and 76% are non-native species. A large portion of the trees were Norway Maple (*Acer platanoides*). The majority of the trees were in good to fair condition.

Data collected in 1976 by the Natural Heritage Information Centre (NHIC) indicated a record of Wild Licorice (*Glycyrrhiza lepidota*, S3). This species prefers open, sandy, or rocky riverbanks. It was speculated that suitable habitat for this species might be found along Laurel Creek. The undertaking in the study area is unlikely to impact the riparian zone of Laurel Creek. A comprehensive vascular plant inventory was not completed in the scope of work completed.

No wetland areas are present in the study area.

2.4.3 Wildlife

Suitable roost habitat was identified for three (3) Species at Risk (SAR) in buildings and/or trees within or adjacent to the study area:

- Little Brown Myotis (*Myotis lucifugus*);
- Northern Myotis (*Myotis septentrionalis*); and
- Tri-colored Bat (*Perimyotis sabflavus*).

A number of properties in the study area have been redeveloped in recent years to construct multi-level study residential buildings and Wilfred Laurier University's Lazaridis School of Business and Economics. Redeveloped buildings are less likely to have features which would allow access to interior roost sits. The proposed undertaking is not anticipated to impact the buildings that are adjacent to the study area.

Suitable roost trees were identified using survey protocols from the Ministry of Natural Resources and Forestry, which may be found in the report in **Appendix C**. Natural environment constraints to the road improvement network were also identified in this report to be incorporated into detailed design considerations.

2.4.3.1 Significant Wildlife Habitat

The potential for roosting habitat for SAR bats meets the Significant Wildlife Habitat (SWH) criteria for Special Concern and Rare Wildlife Species). If the selected design alternative for this undertaking is likely to impact trees with suitable habitat along University Avenue, additional study may be required to confirm the presence of SAR bats through exit surveys conducted during the bat maternity roost period in June.

Ontario Minister of Environment, Conservation and Parks (MECP), Species at Risk Branch, recommends that the potential roost trees for bats be removed outside the active season (i.e. avoid April 1 – September 30), if these trees cannot be retained.

2.4.4 Aquatic/Fisheries

There is no watercourse, wetland, or aquatic habitat present within the study area. The proposed undertaking is also unlikely to impact potential habitat nearby (i.e., the channel and riparian zone associated with Laurel Creek).

2.5 Drinking Water Source Protection

In consultation with the Region of Waterloo Risk Management Official (RMO), it was determined that the study area is located outside of the Regional Source Water Protection Areas. At the request of the RMO, the Region was consulted throughout the Class EA due to a small amount of potential overlap around Wilfred Laurier University.

2.6 Cultural Heritage Environment

The following section describes the existing conditions of the cultural heritage component of the environment. Cultural heritage resources include archaeological resources, built heritage resources and cultural heritage landscapes. See **Appendix D** for the full reports.

2.6.1 Archaeological Resources

A Stage 1 archaeological assessment (AA) (under Project Information Form number (PIF) P094-0305-2019) was undertaken on February 5, 2020, by Archaeological Services Inc. (ASI) for the study area. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, and contacting MCM to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 2-4) as necessary. The Stage 1 AA report is included in Appendix D.

Based on the results of the Stage 1 AA, the following recommendations are made:

- The Study Area does not retain archaeological potential on account of deep and extensive land disturbance. These lands do not require further archaeological assessment; and,
- Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

2.6.2 Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment July 2019 (Updated June 2023) Archaeological Services Inc. was undertaken to assess the preferred alternatives for known (previously recognized) or potential built heritage resources and cultural heritage landscapes (BHR/CHLs). Based on the report, it was determined that there is 3 known and potential BHR/CHL within the study areas:

- 240 Hemlock Street (built heritage resource);
- Veteran's Housing along Public Lane, Maple Court, and State Court (cultural heritage landscape); and
- Wilfred Laurier University Campus at 75 University Avenue West (cultural heritage landscape).

The preferred alternative is anticipated to result in direct impacts to one BHR and two CHLs; however, these impacts are not anticipated to adversely affect the heritage attributes or cultural heritage value of the BHR or CHLs. Potential vibration impacts as a result of the proposed construction work may result in indirect adverse impacts to the one BHR and two CHLs.

Based on the results of the assessment, the following recommendations have been developed:

1. Construction activities and staging should be suitably planned and undertaken to avoid unintended negative impacts to the identified BHR and CHLs. Avoidance measures may include, but are not limited to: erecting temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid the identified BHR and CHLs, etc. Where tree removals or the removal of soft landscaping or walkways is required, post construction rehabilitation with sympathetic plantings should be implemented.
2. Vibrations during construction activities may impact BHR 1 and CHL 1 – CHL 2 as a result of their location in close proximity to the proposed alignment. To ensure the structures are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design for the properties at:
 - 240 Hemlock Street (BHR 1);
 - 1-22 Maple Court; 2-11, 26-36, 242-256 State Court; 260-266 State Street (CHL 1); and,
 - 75 University Avenue West - Wilfrid Laurier University and Martin Luther University College Cultural Heritage Landscape (CHL 2).

Should this advance assessment conclude that the any structures will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.

3. Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.
4. The report should be submitted to heritage staff at the City of Waterloo and the Ministry of Citizenship and Multiculturalism for review and comment, and any other local heritage stakeholders that may have an interest in this project. The final report should be submitted to the City of Waterloo for their records.

The Cultural Heritage Report is included in Appendix D.

3 Transportation

3.1 Background Conditions

As part of the Schedule C Class EA study, a traffic safety analysis on University Avenue between Albert Street and Weber Street North was conducted. The safety analysis is documented in the University Avenue Environmental Assessment between Albert Street and Weber Street North – Safety Analysis memorandum, in **Appendix E**. The objective of the safety analysis is to review the historical safety performance of the study corridor and the anticipated safety effect of the EA designs, then provide recommendations for inclusion in future detailed designs. The recommendations detailed in the memorandum incorporate improved pedestrian and cyclist facilities while preserving an acceptable vehicular level of service.

The traffic safety analysis considered the following intersections along University Avenue, and the midblock segments between these intersections:

- Weber Street North at University Avenue East (signalized);
- Regina Street North at University Avenue East (signalized);
- King Street North at University Avenue (signalized);
- Hazel Street at University Avenue West (signalized);
- Midblock pedestrian signal (MPS) 140 metres west of Hazel Street at University Avenue West (signalized)
- Hemlock Street at University Avenue West (unsignalized); and
- Albert Street at University Avenue West (signalized).

3.2 Historical Data

During the five-year study period from January 2013 to December 2017 there were a total of 466 recorded collisions with a slightly increasing trend in the annual collision frequencies after 2014. The highest number of collisions occurred in the month of September and a higher number of collisions was observed during the period from November to February. The study reported that

hourly collision frequencies start to increase at 7 am, and gradually rise throughout the midday, coming to a peak around 5 pm. The most common collision impact types were rear-end collisions and turning movement collisions. Of the intersections analyzed in the study, the intersection of Weber Street North at University Avenue East had the highest number of collisions, followed by the intersection of King Street North at University Avenue. A summary of the findings from the collision data analysis and the field investigation for each intersection and midblock location within the study area can be found in Exhibit 3-8 in **Appendix E**.

3.3 Existing Issues

Key issues identified in the analysis are listed below:

- High proportion of turning movement collisions at intersections of major arterial roads;
- High proportion of angle collisions at some intersections;
- High proportion of pedestrian and cyclist involved collisions;
- Drivers generally drive faster and more aggressively during the PM peak hours;
- Narrow pedestrian crosswalks, forcing pedestrians to walk outside of the pedestrian crosswalks;
- Short "Flashing Don't Walk" time at crosswalks, creating potential conflicts between pedestrians and vehicles during the inter-green period (amber and all-red time);
- Limited street lighting at night at some locations along the corridor, particularly on the south side of University Avenue West;
- Absence of cycling facilities east of King Street North along University Avenue East; and
- Unusual northbound and southbound lane configurations at the intersection of University Avenue and King Street North, where southbound left-turn lane is directly facing northbound through lane.

A detailed list of the existing issues can be found in Exhibit 4-1 in **Appendix E**.

3.4 Alternative Solutions

Based on the analysis completed, four design concepts were created and reviewed from a road user safety perspective to determine if the existing issues have been addressed. The four design concepts are as follows:

- Design Concept No.1: Separated Bike Lane with Painted Buffer;
- Design Concept No.2: Separated Bike Lane with Raised Physical Barrier;
- Design Concept No.3: Off-Roadway Shared Multi-use Pathways; and

- Design Concept No.4: Separated Bike Lane with Physical barrier.

The main differences between the four design concepts are the separations between different types of road users at midblock locations and intersections, and the use of road median. A comparison of the four design concepts can be found in Exhibit 5-1 in **Appendix E**. Once the preferred design concept is selected, the missing countermeasures will be taken into consideration when developing the detailed design.

3.5 Recommendations for Detailed Design

The following recommendations for future detailed design are summarized for each study midblock segment and intersection below:

All signalized intersections and midblock segments

- It is recommended that lane width be reduced throughout the entire study area.

All signalized intersections

- It is recommended to improve intersection lighting, install left-turn guide lines for left-turn movements, update the Flashing Don't Walk times, implement leading pedestrian and cyclist intervals, and implement lagging protected left-turn phases.

Albert Street at University Avenue West, Hazel Street at University Avenue West, King Street North at University Avenue, and Regina Street North at University Avenue East

- It is recommended to incorporate "protected intersection" geometric design features and to extend the concrete median to the intersection. A protected intersection is designed to improve safety and comfort for all ages and abilities of people cycling and walking through intersections. This is achieved by increasing visibility, reducing exposure, shortening crossing distances, and improving yielding behaviour by motor vehicle drivers.

Weber Street North at University Avenue East

- It is recommended to incorporate "protected intersection" geometric design features and to extend the concrete median to the intersection.
- It is recommended to install farside bus bay or relocate the bus stop to nearside of the intersection.

Midblock between Albert Street and MPS west of Hazel Street

- It is recommended to install static warning signs before signals, move signal heads closer to the approaches, and reduce the grade.

Midblock between Regina Street North and Weber Street North, and between Hazel Street and King Street North

- It is recommended to consolidate driveways at midblock locations and to install concrete median.

4 Alternative Planning Solutions

Alternative solutions are planning options that could potentially address the identified problem and/or could lead to an opportunity. The following describes the alternative solutions considered to address the identified problem.

4.1 Do Nothing

As required by the Municipal Class EA process, the Do Nothing option was considered and evaluated against the other options. Aside from general maintenance of the road pavement, no improvements and no consideration for additional measures are included to address long-term project specific problems or opportunities on University Avenue. For part of the study area, there are no cycling facilities.

This solution was considered to provide a baseline upon which other alternatives were evaluated.

4.2 Divert Traffic to Alternate Routes

This alternative considered diversion of traffic currently using University Avenue to parallel corridors such as Erb Street and Columbia Street. As such, it would not address transportation choice on University Avenue or provide an opportunity to incorporate cycling facilities along the corridor. In addition, there is limited excess capacity available to accommodate the diverted traffic without creating additional operational and roadway deficiencies on these parallel corridors. This alternative would result in similar or significant out of the way travel and associated environmental impacts. As a result, this alternative was removed from further consideration.

4.3 Transportation Demand Management

Transportation Demand Management (TDM) initiatives would help to alleviate some of the impacts of traffic by encouraging a shift in the mode of travel (e.g., shift to transit, bike lanes, etc.) and/or shift in travel outside peak periods/work at home. The impact on natural, social, and cultural environments would be minimal with the introduction of TDM initiatives. TDM initiatives may help to reduce the corridor vehicle demand; however, these initiatives in themselves, while forming an important element in the Region's overall transportation plan, are not considered as a standalone solution for the University Avenue corridor. This alternative was subsequently incorporated as an element within the transportation analysis and improvement design alternatives for University Avenue.

4.4 Improvements to University Avenue

This alternative involves improvements to University Avenue for all users (autos, transit, cyclists and pedestrians), making it a "Complete Street". This alternative was carried forward with options for improvements as identified in Section 5 below.

5 Development and Evaluation of Design Alternatives

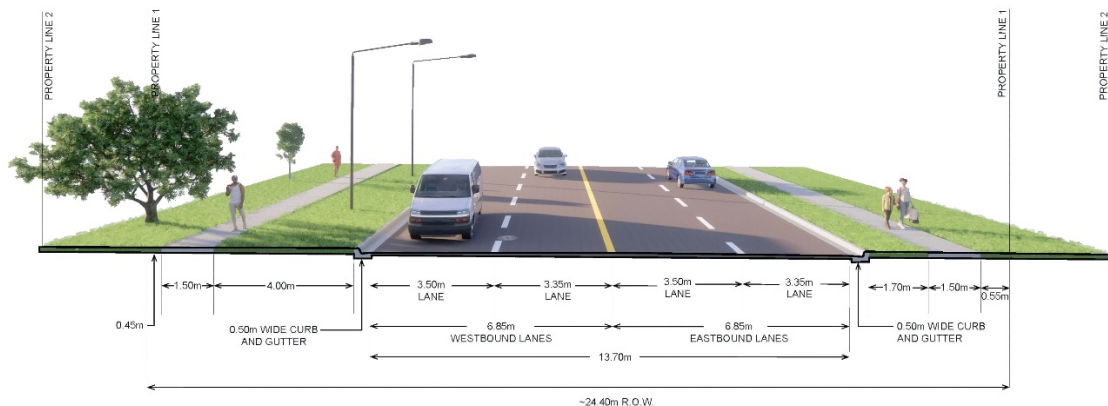
5.1 Design Alternatives Considered

Based on all identified needs and objectives for University Avenue between Albert Street and Weber Street, alternatives were developed by the Project Team, for improvements to University Avenue as follows:

5.1.1 Alternative 1: Do Nothing

This alternative would include reconstructing the road in its current cross-section configurations, as shown in **Exhibit 5-1**. The 1.5m wide sidewalk would be maintained on both sides of the road with a wide boulevard, and two lanes of traffic in each direction.

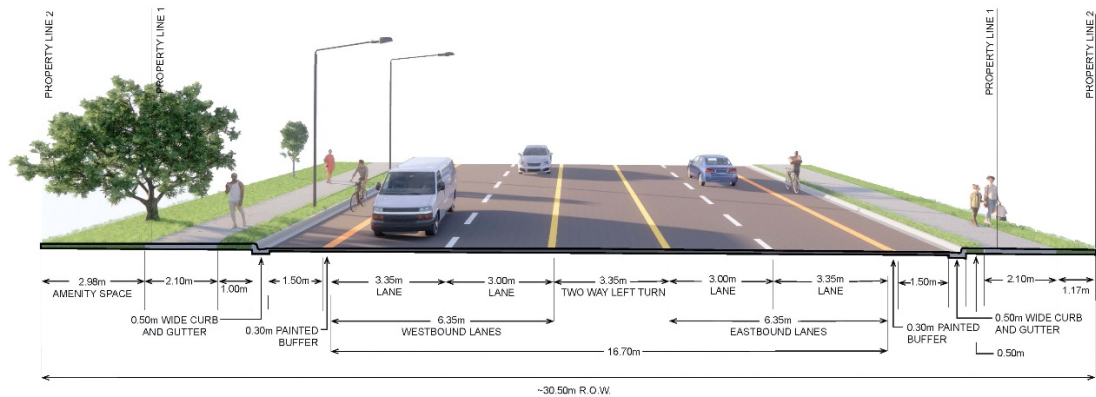
Exhibit 5-1: Alternative 1 Typical Cross-Section



5.1.2 Alternative 2: On-road Buffered Bike Lanes

This alternative maintains on-road bike lanes between Albert Street and King Street and adds bike lanes from King Street to Weber Street on both sides of the roadway, as shown in **Exhibit 5-2**. The difference between what current exists and what is being proposed is a 0.3m wide painted buffer between the outside lane of traffic and the bike lane, and the sidewalk would be widened to 2.1m from the existing 1.5m wide sidewalks.

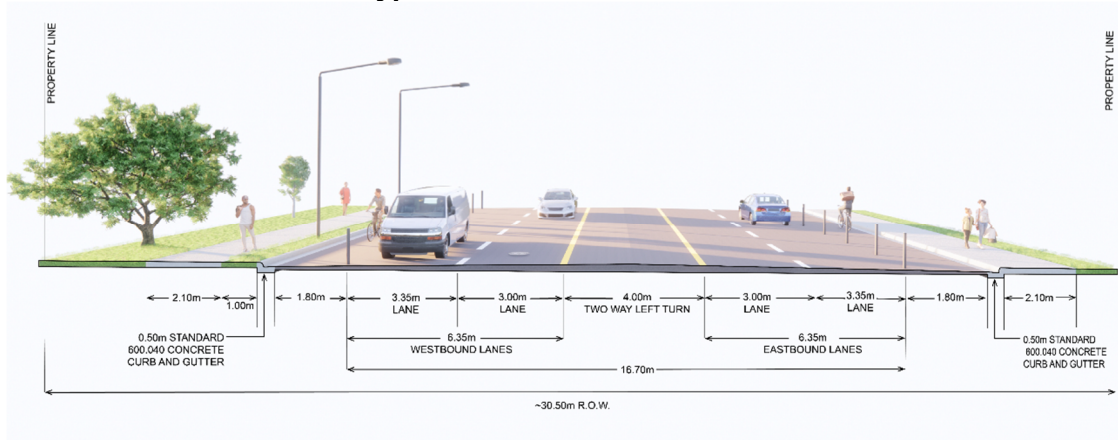
Exhibit 5-2: Alternative 2 Typical Cross-Section



5.1.3 Alternative 3: Separated Bike Lanes with a Raised Physical Barrier

This alternative would provide an enhanced 2.1m wide sidewalk where possible and bike lane facilities on both sides of the roadway that would be separated from the lane of traffic by flexible bollards, as shown in **Exhibit 5-3**.

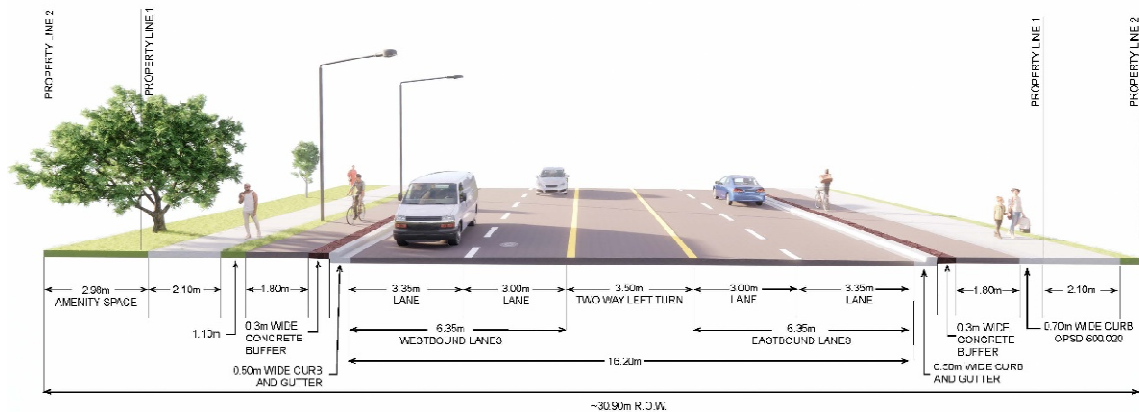
Exhibit 5-3: Alternative 3 Typical Cross-Section



5.1.4 Alternative 3a: Separated Bike Lanes with a Physical Barrier

This alternative would provide an enhanced 2.1m wide sidewalk where possible and separated bike lane facilities on both sides of the roadway, as shown in **Exhibit 5-4**. The bike lanes would be raised from the road level and separated by a curb.

Exhibit 5-4: Alternative 3a Typical Cross-Section



5.2 Evaluation Criteria for Design Alternatives

The preliminary design alternatives were assessed against a set of evaluation criteria by the Project team, as to how they address the traffic and transportation needs in comparison to their potential environmental impacts. The “reasoned Arguments” methodology was used to evaluate the alternatives for this EA. This involved identifying the advantages and disadvantages of each alternatives against a set of evaluation criteria representing social, natural and economic environments. The evaluation criteria used is shown below:

- **Traffic Capacity, Operations and Safety:** How well does the alternative manage traffic and network capacity, traffic speed, pedestrian needs, cyclist needs and transit access?
- **Natural Environment:** What impact does the alternative have on the natural environment features such as trees and wetlands, wildlife, aquatic habitat, and surface drainage?
- **Socio-Cultural Environment:** What impacts does the alternative have on existing established communities and businesses, property noise/vibration, potential cultural heritage, and visual character?
- **Economic Environment:** What is the comparative cost to construct each alternative, including utility location, capital, property and maintenance and operating costs?

The “Reasoned Arguments” methodology is intended to provide an objective, traceable response to each criterion for each alternative. To make the evaluation more concise and presentable not all features were included to the results. Features that could not differentiate one alternative from the other and would weigh equally on the preferred alternative selection were not included on the results, even though they are presented on this ESR. The evaluation results are summarized in **Appendix F**.

5.3 Preliminary Preferred Design Alternative

Based on the evaluation of the design alternatives using the above noted criteria, Design **Alternative No. 3a - Separated Bike Lanes with a Physical Barrier** was identified as the preferred design alternative by the Project Team and presented to the public for input.

6 Public Agency and Stakeholder Consultation

6.1 Consultation Process

Public, stakeholder and agency consultation are a key features of the Municipal Class EA process. Through an effective consultation program, the Region was able to generate meaningful dialogue between the Project Team and the agencies, stakeholders and the public, resulting in an exchange of ideas recorded in this Environmental Study Report, and the broadening of the information base leading to better decision making. Each point of contact offered an opportunity for the public to review information, ask questions, and/or provide comments. The input received through the consultation program was used to identify concerns, select the preferred solutions, and develop the preferred design alternative. All consultation materials discussed in this report are included in **Appendix G**.



EngageWR is the Region of Waterloo's online engagement site that allows users to contribute ideas and feedback on projects and studies. It provides a centralized site where users can find out about new and upcoming projects and studies, and provide feedback through a variety of tools, including online surveys, Q&As, and forums.

For more information please visit:
www.engagewr.ca

It is notable that during the early part of 2020 a global pandemic was announced and had a significant effect on the way that the world and this community went about its business. As a result of the pandemic and restrictions that were associated a new on-line approach to public communications was introduced and has since been adopted for numerous projects of a similar nature. The EngageWR website was utilized, and the communications approach is further described as follows.

6.2 Study Webpage

The Study website was hosted on EngageWR, the Region of Waterloo's online engagement site at <https://www.engagewr.ca/University-Ave>.

The Study webpage was active for the duration of the Study and was visited by over 1.8k people between February 2020 and July 2022.

Due to the impacts of the COVID-19 public meeting restrictions, the Public Consultation Centres (PCCs) were held online, hosted on the Study website.

6.3 Notice of Study Commencement

The Notice of Study Commencement was hand delivered, mailed, or emailed to adjacent property owners, tenants, businesses, authorities, agencies, and special interest groups, as well as advertised in the local newspapers: The Waterloo Region Record on August 6, 2019 and the Waterloo Chronicle on August 8, 2019. The notice provided residents and stakeholders with information on the project and inviting them to participate actively in the study. Public notices, including the Notice of Study Commencement, are included with this Environmental Study Report (**Appendix H**); the study agency and stakeholder contact list is also included (**Appendix I**).

The notice of study commencement invited the public to participate in the study and provided information on the:

- Study and its purpose;
- Study area and streets to be examined;
- Project being subject to the requirements of the Class EA Schedule 'C';
- Stages of the study, noting future PCCs and where notices would be published;
- Contact information for the Region, City, and consultant project leads;
- Study's webpage address; and
- How to participate actively in the study through the planned PCCs and/or requesting to be added to the project mailing list.

Various agencies and stakeholders were identified and provided all formal notices, as part of the consultation program for this Study and the full list can be found in **Appendix I**, including:

- Federal Agencies:
 - Department of Fisheries and Oceans
 - Transport Canada
- Provincial Agencies:
 - Ministry of the Environment, Conservation and Parks
 - Municipal Class EA (West Central Region), EA Notification
 - Ministry of Indigenous Affairs
 - Ministry of Natural Resources and Forestry
 - Ministry of Heritage, Sport, Tourism and Culture Industries
 - Infrastructure Ontario
 - Ministry of Transportation
- Local Agencies:
 - Region of Waterloo, Water Services
 - Region of Waterloo, Transportation and Environmental Services
 - Region of Waterloo, Transportation Capital Projects

- Region of Waterloo, Transportation and Environmental Services
 - Region of Waterloo, Traffic Engineering
 - Grand River Transit, Transit Development
 - Region of Waterloo - Pedestrian Charter Steering Committee
 - Active Transportation Advisory Committee
 - Ecological and Environmental Advisory Committee
 - Heritage Planning Advisory Committee
 - Grand River Accessibility Advisory Committee
 - Region of Waterloo Council
- City of Waterloo:
 - Development Engineering
 - City of Waterloo Council
- Indigenous Communities
 - Haudenosaunee Confederacy Chiefs Council – Development Institute
 - Mississaugas of the Credit First Nation
 - Six Nations of the Grand River
- Conservation Authority
 - Grand River Conservation Authority
- Emergency Services:
 - Region of Waterloo Paramedic Services
 - Waterloo Regional Police
 - City of Waterloo Fire Department
- Stakeholders:
 - Rogers Canada
 - Zayo
 - Enbridge Gas Inc.
 - Waterloo North Hydro Inc.
 - Wilfred Laurier University (WLU)
- Members of Parliament and Provincial Parliament
 - Member of Provincial Parliament
 - Member of Parliament
- School Boards:
 - Waterloo Region District School Board
 - Waterloo Catholic District School Board
- University/College:
 - University of Waterloo
 - Wilfred Laurier University

- Conestoga College
- Student Associations (2021/2022):
 - Waterloo Undergraduate Student Association
 - Wilfred Laurier University Students Union
 - Conestoga Students Inc.
- Churches:
 - Slate Church Waterloo
 - Evangelical Christian Church in Canada (Christian Disciples)
 - St. Michael's Catholic Church
 - Waterloo Pentecostal Assembly
 - St. Columba Anglican Church
 - Bethel Chapel
 - Verity Community Church
 - Christ Lutheran Church

6.4 Public Consultation Centre #1

As a result of the COVID-19 public meeting restrictions, Public Consultation Centre #1 (PCC #1) was held virtually between August 12, 2020 and October 2, 2020. The PCC was hosted on the Region's EngageWR website (<https://www.engagewr.ca/University-Ave>). The format of the PCC was an accessible video presentation, where interested parties could watch and listen to the 20 presentation boards, as well as the PCC #1 Information Package.

The intended purpose of PCC #1 was to have interested stakeholders and the public learn about and provide input on:

- The needs and opportunities for improvements on University Avenue;
- The project environment (natural, social, cultural/heritage, and economic);
- The alternatives for improvements being considered by the Project Team;
- How the alternatives for improvements will be evaluated and how a preferred alternative will be selected; and
- Future opportunities for public input.

Participants could provide their input through the PCC #1 Public Survey, location-based comments on the Study Area Map, the question and answer page, comment forms/emails, and by phone call. The contact information of the Regional and Consultant Project Managers was also provided to allow participants to ask questions, request to be added to the mailing list, or request further information about the Class EA.

Throughout the duration of PCC #1, the Study's EngageWR webpage was visited 568 times. Participants were mainly from Kitchener and Waterloo and featured a mix of residents, commuters, and students. Based on the submitted surveys and comments, the community's priorities include:

- Longer crossing times for pedestrians;
- Longer turning lanes for vehicles;
- Longer advanced turning signals for vehicles;
- Improvements to visibility at intersections;
- Improvements to lighting on sidewalks; and
- Traffic calming measures.

The results from the submitted surveys and comments further indicated that the most preferred alternative was Alternative 3a, which included a separated bike lane (off roadway) with a concrete curb and an enhanced sidewalk (2.1 metre where possible). Comments received were incorporated into the EA and development of design alternatives. A full list of comments and Project Team responses for PCC#1 can be found in the PCC#1 Summary report in **Appendix J**.

6.5 Public Consultation Centre #2

Public Consultation #2 (PCC) was held virtually on the Regions EngageWR website (<https://www.engagewr.ca/University-Ave>) between March 8, 2022 and April 8, 2022. The format of the PCC was an accessible Presentation, where interested parties could view slides about the project, it was accompanied by PCC#2 Information Package, and a drawing of the Recommended Design Alternative being presented.

The intended purpose of PCC#2 was to present the Preliminary Preferred Design Alternative to the public.

Participants could provide their input through the PCC#2 public survey, the questions and answers page, comment/forms/emails, and by phone call. The contact information of the regional and consultant Project Managers was also provided to allow participants to ask questions, request to be added to the mailing list, or request further information about the Municipal Class EA.

Throughout the duration of PCC#2, the Study's EngageWR webpage was visited 92 times. Participants were mainly from Kitchener and Waterloo and featured a mix of residents, commuters and students.

The Project Team responded to over 18 comments received during PCC#2 through the EngageWR website and by direct email to the Region's Project Manager and IBI Group's consulting team. The Project Teams response to each of the public comments received was consolidated and posted to the EngageWR website and has been included in PCC#2 Summary Report in **Appendix J**. Based on the submitted surveys and comments, participants were in agreement with the Project Team Recommended Design Alternative.

6.6 Agency Consultation

Technical agencies were notified of the commencement of this study and invited to review and provide input regarding the University Avenue Class EA (limits between Albert Street and Weber Street North) study approach, problems, and opportunities being addressed, background information and development of alternatives.

The following is a summary of agency consultation undertaken during the study. A full record of correspondence can be found in **Appendix K**.

6.6.1 Grand River Conservation Authority

In response to the circulated notice of the second public consultation centre, the GRCA provided a letter by email. It has been included in **Appendix K**.

6.6.2 Ministry of the Environment, Conservation, and Parks (MECP)

In response to the circulated Notice of Commencement, the MECP provided a letter identifying potentially interested Indigenous communities who the Region of Waterloo is required to consult for this EA. Information on rights-based consultation was also provided.

The MECP also indicated that a draft copy of the ESR should be provided to the EA/Planning Coordinator for the West Central Region, allowing at least 30 thirty days for technical review.

6.6.3 Ministry of Tourism, Culture, and Sport (MTCS)

The Ministry of Tourism, Culture and Sport was notified about the Study Commencement, and subsequent Public Consultation Centres. The MTCS did not provide a response.

6.6.4 Region of Waterloo – Drinking Water Source Protection

On November 16, 2020, the Manager of Hydrogeology and Source Water from the Region of Waterloo indicated that the study area is outside of the Source Water Protection Areas. However, the Region wished to continue to be notified of this EA, as a small amount of overlap around Wilfred Laurier University may exist.

6.7 Utility Consultation

The following is a summary of utility consultation undertaken during the study. A full record of correspondence can be found in **Appendix L**.

6.7.1 Waterloo North Hydro

Waterloo North Hydro was notified of the University Avenue Class EA on April 5, 2019. This agency was asked to provide information to IBI Group regarding any planned upgrades within the Study Area. Comments or questions related to the Class EA were requested at this time.

Waterloo North Hydro provided cost estimates from Wilfred Laurier University regarding the estimated cost of hydro burial distribution in the study area, as well as the allocation of this cost which may be covered by the university.

6.7.2 Rogers

Rogers was notified of the University Avenue Class EA on April 5, 2019. This agency was asked to provide information to IBI Group regarding any planned upgrades within the Study Area. Comments or questions related to the Class EA were requested at this time. Rogers did not provide a response to this inquiry.

6.7.3 Union Gas

Union Gas was notified of the University Avenue Class EA on April 5, 2019. This agency was asked to provide information to IBI Group regarding any planned upgrades within the Study Area. Comments or questions related to the Class EA were requested at this time.

Union Gas indicated that they required NPS feeder main along University Avenue from Albert Street to King Street North at minimum. It was requested that a location for this feeder main be incorporated into the recommended design of this Class EA.

Union Gas also indicated that NPS 5 PE were being installed in the study area as part of the King Street North improvement project. Crossings would likely also be added at the intersections of University Avenue at Hazel Street and University Avenue at King Street North. Required gas main relocations and upgrades would likely be completed one (1) year prior.

6.7.4 Bell

Bell was notified of the University Avenue Class EA on April 5, 2019. This agency was asked to provide information to IBI Group regarding any planned upgrades within the Study Area. Comments or questions related to the Class EA were requested at this time. Bell did not provide a response to this inquiry.

6.7.5 Zayo

Zayo was notified of the University Avenue Class EA on April 5, 2019. This agency was asked to provide information to IBI Group regarding any planned upgrades within the Study Area. Comments or questions related to the Class EA were requested at this time. Zayo did not provide a response to this inquiry.

6.8 Indigenous Consultation

Haudenosaunee Confederacy Chiefs of Council, Mississauga of the New Credit First Nation, and Six Nations of the Grand River were consulted via email which the MECP identified as being potentially affected by improvements to University Avenue. They were notified by email about the Study of Commencement, PCC#1 and PCC#2. A response from these Indigenous communities was not received.

7 Recommended Design Alternative

Based on a review of the technical information gathered for this project as well as a review of all public comments received, Alternative No. 3a - Separated Bike Lanes with a Physical Barrier was identified as the as the Recommended Design Alternative for University Avenue from Albert Street to Weber Street.

The Recommended Design Alternative includes:

- Maintaining 4 lanes of traffic (2 in each direction) and provision of left turn lane access to adjacent driveways where warranted;
- Curb and gutter and storm drainage system;
- Roadway illumination on both sides of the road;
- Bike lanes on both sides of the road behind a curb;
- Enhanced 2.1m wide sidewalks along the corridor; and
- Intersection improvements.

Roadway illumination will be provided on both sides of the road as per the Region's Illumination Policy for four-lane roads with transit. A typical cross-section of Alternative 3a is shown in **Exhibit 7-1** and preliminary design drawings for the recommended improvements are in **Appendix M**.

Exhibit 7-1: Recommended Design Alternative 3a



7.1 Satisfaction of the Study Objectives

At the outset of the study, it was confirmed that the study seeks to achieve the following objectives:

- Improve transportation needs for all users, including drivers, pedestrians, cyclists and transit users;
- Minimize undesirable impacts to the surrounding properties, natural environment, heritage and scenic landscape, socio-economic activity, and existing infrastructure;

- Improve intersection operations and provide safe and efficient facilities for all users;
- Consider adjacent land uses and community growth to develop effective and sustainable recommendations for improvement; and
- Engage with the public and stakeholders to receive input on potential impacts to ensure appropriate criteria are used to select the preferred alternative solution.

Through the careful consideration of impacts and evaluation of the various design alternatives, it is believed that each of the study objectives has been satisfied and that the proposed future improvements have been adequately presented to the public, providing sufficient information to understand the proposed works and adequate time to provide comment on the study findings and recommendations.

7.2 Estimated Project Costs

The cost of this project will depend on the necessary infrastructure relocations, replacements, utility relocations and property acquisitions. The estimate of costs for the recommended design alternative is \$9.8M excluding HST based on 2022 public sector reconstruction project unit costs. This cost may be subject to significant cost increases going forward considering the recent inflation costs and supply and demand challenges being experienced in Ontario and across Canada. Funding in the amount of approximately \$10.98 M for the improvements on University Avenue was included in the Region's 2021 Transportation Capital Program. A copy of the Preliminary Cost Estimate is included in **Appendix N**, a summary of estimated project cost is summarized in

Exhibit 7-2.

Exhibit 7-2: Preliminary Cost Estimate

ITEM DESCRIPTION	ESTIMATED VALUE
General Requirements	\$ 324,500.00
Removals	\$ 427,160.00
Roadworks	\$ 2,977,325.00
Storm and Sanitary Sewers	\$ 1,494,950.00
Watermain	\$ 952,000.00
Streetlighting and Traffic Signals	\$ 1,560,000.00
General Landscaping	\$ 76,880.00
Sub-total – Construction*	\$ 7,812,815.00
Contingency Allowance (25%)	\$ 1,954,000.00
Total Including Contingency	\$ 9,766,815.00
Property Acquisition	\$ 497,200.00
Utility Relocations	\$ 90,000.00

Sub-Total Project Cost (excl. HST)	\$ 10,354,015.00
Engineering (15%)	\$ 1,553,102.25
Total Including Engineering and Contingencies	\$ 11,907,117.25
HST (13%)	\$ 1,547,925.24
Total Project Cost Including HST	\$ 13,455,042.49

8 Detailed Design and Construction Considerations

8.1 Construction Staging

Given the scope of work required, it will be difficult to complete construction of the proposed work in one construction season and construction will need to be staged over two construction seasons. Each season of construction would be staged through multiple phases.

Given that the majority of the roadway drains from west to east (sewer outlets are in the eastern portion of the project), construction from Weber Street to Regina/King Street will need to be part of the first phase of construction. The remainder of the project, Regina/King to Albert Street would be completed in the following year.

During consultation, the Region expressed a strong preference to maintain traffic through the University Avenue corridor during construction to minimize disruption to the public. The design of detailed work staging plans (including any required temporary works) will be completed during the detailed design phase of the project to provide for two-way travel throughout construction.

8.2 Road Design Criteria

University Avenue and the associated infrastructure should be designed and constructed per current Region of Waterloo and Ontario Provisional Standards.

In terms of dimensions of the facilities, the following is proposed:

- Design Speed: 60 kph
- Curb Lanes: 3.35 m (to accommodate transit)
- Inside lanes: 3.25 m
- Turn lanes: 3.25 m
- Two-way turn lanes: 3.25m
- Bus Bays: 3.00 m
- Vertical Curve: Crest curve K = 11 min, sag curve K = 18
- Intersection Curb: 12 m radius

- Bike Lanes: 1.80 m
- Buffer Space: 0.30 m minimum
- Sidewalk: 2.10 m
- Grass Boulevard: 1.00 m minimum

8.3 Municipal Infrastructure

8.3.1 Storm system

The existing local storm system on University Avenue will be replaced as it has reached the end of its useful life.

8.3.2 Sanitary system

The existing sanitary sewer on University Avenue will be replaced as part of this project. The condition of the existing 600mm diameter trunk sewer between Regina Street and Weber Street will be evaluated during detailed design and will be replaced if required.

8.3.3 Watermain

The watermain along University Avenue will be replaced as part of this project.

8.4 Stormwater Management

The final design will include replacement of catchbasins and storm sewers to convey runoff to each existing outlet location, catchment areas will remain the same. Oil-grit separator units will be installed at the Regina Street outlet location to provide stormwater quality to an Enhanced Protection Level. This provides a level of stormwater quality control that currently does not exist on University Avenue.

During detailed design, the specific models, size, and location of the OGS units will be determined, further calculations will demonstrate how each unit meets MECP and Canada ETV criteria.

Sediment and erosion control measures will be required during construction to prevent silt laden runoff from entering the natural environment.

8.5 Bike Lanes

Separated bike lanes are proposed along each side of University Avenue roadway. The bike lanes are proposed to be 1.8m in width and will be separated from the roadway by a full height curb. A 0.30m wide buffer between the bike lane and sidewalk will provide separation of cyclists and pedestrians.

8.6 Geotechnical – Pavement Requirements

A geotechnical investigation was undertaken as part of this study. **Exhibit 8-1** outlines the pavement structure considered suitable for this Neighbourhood

Connector - Avenue roadway, and **Exhibit 8-2** outlines the recommended pavement structure for the bicycle lane.

Exhibit 8-1: Recommended Pavement Thickness for Roadway

Pavement Component	Component Thickness
HL3 Surface Asphaltic Concrete	50 mm
HL4 Binder Asphaltic Concrete	45 mm
HL4 Binder Asphaltic Concrete	45 mm
Granular "A" Base Course	150 mm
Granular "B" Sub-base Course ²	600 mm
Granular Base Equivalency (GBE)¹	830 mm

Note:

1. GBE denotes Granular Base Equivalency which is calculated using factors of 2 for asphaltic concrete, 1 for Granular "A" base and 0.67 for Granular "B" sub-base
2. Region of Waterloo Specification

The following SuperPave mixes can be adopted in place of the HL asphaltic concrete.

Mixes	Traffic Category	Lift Thickness
SuperPave 12.5	C	40 mm
SuperPave 19.0	C	2 layers of 50 mm
Total		140 mm

Exhibit 8-2: Recommended Pavement Thickness for Bicycle Lane

Pavement Component	Component Thickness
HL3 Surface Asphaltic Concrete	50 mm
Granular "A" Base Course	150 mm
Granular "B" Sub-base Course (Region of Waterloo Granular "B" gradation specification)	200 mm
Granular Base Equivalency (GBE)	384 mm

8.6.1 Groundwater Control

The groundwater table will likely be encountered during the servicing replacement and construction works. It is anticipated that groundwater is expected to be controllable by pumping from several filtered pump pits if the groundwater table at the time of construction is located above 0.6m above the required excavation level. It is further noted that the groundwater is impacted with VOC's, metals and chloride and will need to be treated prior to being released into the storm water system. Further details about the groundwater table can be found in the Geotechnical Report in **Appendix B**.

8.7 Utilities

The preliminary design determined that the utilities (hydro, communications and gas) are generally not in conflict with the proposed reconstruction and improvements. During the final design stage, any potential conflicts should be reviewed, and if conflict with underground utility is suspected, daylighting of the utility should be completed to confirm location and depth. Further, utility companies should be circulated the design and requested to review any plant upgrades for new plant construction that may be required so that it can be coordinated with the road works.

9 Environmental Impacts, Mitigation and Commitments

9.1 Natural Heritage

There are direct and indirect impacts that have potential to occur as a result of the road improvements. **Exhibit 9-1** summarizes these impacts and project considerations and commitments for features identified as constraints.

There is no watercourse, wetland, or aquatic habitat present within the study area. The proposed undertaking is also unlikely to impact potential habitat nearby (i.e., the channel and riparian zone associated with Laurel Creek).

Any development proposed within the GRCA regulated area will require prior permission from the GRCA in the form of a permit pursuant to Ontario Regulation 150/06. For the permit application, the final plans showing the extent of development (including grading) and any proposed profile changes within the floodplain are required. If significant grading is proposed, a grading plan showing existing and proposed grades should be provided

Exhibit 9-1: Summary of Natural Feature Constraints

Natural Feature Constraint	Regulatory and Permitting Considerations	Project Considerations
Significant Wildlife Habitat and Habitat for Provincially Endangered and Threatened Species	- Provincial Policy Statement - Region of Waterloo Official Plan - City of Waterloo Official Plan	- No SWH have been confirmed within the study area. 1 Candidate SWH has been identified: Special Concern and Rare Wildlife Species (habitat for SCC). - This Candidate SWH type is associated with trees having suitable roosting sites for SAR bats. These trees are within or near to the study area and corresponding limits of impact from proposed road improvements. - If the detailed design of the preferred alternative indicates direct impacts to the trees with suitable roosting habitat identified as candidate SWH, additional survey work may be required to confirm the significance of these features.
Riverine Flooding Hazard	GRCA Ont. Reg. 150/06	- Development and site alteration within watercourses and their associated floodplain areas are prohibited unless permitted by the GRCA. - Stormwater management design associated with the preferred alternative design to ensure that flows to watercourse are maintained
Notable Trees	City of Waterloo's Urban Forest Policy	- The City of Waterloo aims to maintain and expand the publicly owned urban forest: "The Urban Forest must be considered an equal partner in the community infrastructure at the time of planning. Construction near trees and woodlots will be planned so as to ensure the long-term health of those trees and woodlots, for the preservation of the Urban Forest" (City of Waterloo 1998). - Design alternatives shall include options that minimize damage to existing trees and mitigate impacts where disruption is unavoidable. Such measures will include tree protection fencing at a minimum.

9.2 Socio-Cultural Environment

9.2.1 Archaeology

A Stage 1 archaeological assessment (AA) (under Project Information Form number (PIF) P094-0305-019) was undertaken on February 5, 2020, by Archaeological Services Inc. for the study area.

Based on the results of the Stage 1 AA, the following recommendations are made:

- The Study Area does not retain archaeological potential on account of deep and extensive land disturbance. These lands do not require further archaeological assessment; and,
- Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

The Stage 1 AA report is included in Appendix D.

Should the proposed work extend beyond the study area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

Should previously undocumented archaeological resources be discovered, they may indicate a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological assessment, in compliance with Section 48 (1) of the Ontario Heritage Act.

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11, the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism (MCM) should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

9.2.2 Built Heritage and Cultural Heritage Landscapes

Based on the results of the Cultural Heritage Report produced by ASI in July, 2019 (Updated June, 2023), the following recommendations have been developed:

- Construction activities and staging should be suitably planned and undertaken to avoid unintended negative impacts to the identified BHR and CHLs. Avoidance measures may include, but are not limited to: erecting temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid the identified BHR and CHLs, etc. Where tree removals or the removal of soft landscaping or walkways is required, post construction rehabilitation with sympathetic plantings should be implemented.
- Vibrations during construction activities may impact BHR 1 and CHL 1 – CHL 2 as a result of their location in close proximity to the proposed alignment. To ensure the structures are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design for the properties at:
 - 240 Hemlock Street (BHR 1);
 - 1-22 Maple Court; 2-11, 26-36, 242-256 State Court; 260-266 State Street (CHL 1); and,
 - 75 University Avenue West - Wilfrid Laurier University and Martin Luther University College Cultural Heritage Landscape (CHL 2).

Should this advance assessment conclude that the any structures will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.

- Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.
- The report should be submitted to heritage staff at the City of Waterloo and the Ministry of Citizenship and Multiculturalism for review and comment, and any other local heritage stakeholders that may have an interest in this project. The final report should be submitted to the City of Waterloo for their records.

9.3 Air Quality

Construction related air emissions can be expected. Two major types of emissions are namely those of dust from various material handling operations, and combustion emissions from construction equipment which is typically powered by diesel engines. Such emissions will be of a temporary nature and the impact is not predicted to move far from the immediate vicinity of the construction activities along University Avenue.

In order to limit construction impacts on air quality, the following mitigation measures are proposed:

- Watering to limit dust emissions from surfaces;
- Covering of excavated materials or fill materials stored on site; and
- Street cleaning to limit tracking of materials.

To minimize the potential impacts from diesel powered construction equipment, the following mitigation measures are proposed:

- locating truck staging zone away from potential receptors; and
- Minimizing idling time for all diesel-powered equipment operation on the site.

Other of measures that can be applied by the contractors and site inspectors to ensure that the impacts of combustion source exhaust and fugitive dust emissions are controlled during construction. For combustion related emissions and impacts, the following measures can be considered:

- Selecting construction equipment to be used on site based upon low emission factors and high energy efficiency;
- Ensuring that all construction equipment is tuned and maintained in accordance with the manufacturer's specifications;
- Using only ultra-low sulphur fuel for diesel engines and ensuring that such equipment is equipped with diesel particulate matter traps to reduce particulate matter emissions;
- Utilizing electric or diesel-powered equipment, in lieu of gasoline powered engines, where feasible;

- Ensuring that construction plans include a statement that work crews will shut off equipment when it is not in use;
- During smog alerts (May through October), measures should be taken to ensure that diesel equipment use is optimized to reduce the emissions of smog forming substances;
- Whenever possible, time the construction activities to not interfere with peak hour traffic and minimize obstruction of through traffic lanes adjacent to the site. If necessary, a flag person should be retained to maintain safety adjacent to existing roadways; and,
- Support and encourage ride sharing and transit use for the construction crew.

There are a number of additional measures that can be employed to reduce the amount of fugitive dust released from construction activities. Generally, the objective should be to employ the best available control measures to ensure that such dust does not remain visible in the atmosphere beyond the property line of the emission source. These measures include dust suppression techniques such as:

- Water active sites daily;
- All trucks hauling dirt, sand, soil, or other loose materials should be covered;
- All adjacent streets should be cleaned by the contractor if visible soil materials are present due to the project's operations; and,
- Install wheel washers where vehicles enter and exit the work site onto public roads.

Air quality mitigation measures will be confirmed during detail design.

9.4 Drinking Water Source Protection

In consultation with the Region of Waterloo Risk Management Official (RMO), it was determined that the study area is located outside of the Regional Source Water Protection Areas.

9.5 Erosion and Sediment Control Plan

The following erosion and sedimentation control practices will serve to guide the design and implementation phase of the Erosion and Sedimentation Control Plan prior to the commencement of construction:

- Limit size of disturbed area;
- Limit duration of soil exposure,
- Retain existing vegetation where feasible,
- Limit slope, length, and gradient of disturbed areas,

- Preserve overland sheet flow and micro-drainage (avoid concentrated channel flow),
- Break and redirect flows to lower gradients,
- Design and implement staged stripping,
- Prevent disturbance of previously stripped and stabilized parcels, and
- Stabilize stripped parcels with temporary vegetative controls.

9.6 Climate Change

In 2017, the MECP released a document entitled "Considering Climate Change in the Environmental Assessment Process" (2017) that provides guidance relating to the ministry's expectations for considering climate change during the environmental assessment process.

In general, climate change concerns relate to the increased concentration of greenhouse gases in the atmosphere which can result in a rise in the global mean surface temperature. Increased temperatures worldwide are creating changes in climate that is resulting in extreme weather events. The rise of greenhouse gas emissions is influencing climate patterns, hydrology, ecosystems and ocean chemistry. There are two approaches to address climate change. These include reducing a project's impact on climate change (climate change mitigation) and increasing the local ecosystem's resilience to climate change (climate change adaptation).

9.6.1 Potential for Project to Impact Climate Change

The University Avenue improvements project is a transportation project, and as such, the impacts to climate change can be considered in terms of vehicular greenhouse gas emissions. The reconstruction and widening of University Avenue will serve to improve the level of service along the corridor. With the added lane through the road widening, it is anticipated that traffic delays will be reduced upon completion of the project and that the emission of greenhouse gases will also be reduced when compared to existing conditions. The recommended design alternative also includes infrastructure improvements for all modes of transportation, including active transportation. The provision of a continuous multi-use trail and cycling network will encourage more sustainable modes of transportation within the corridor, contributing to a reduction in vehicular greenhouse gas emissions.

Another way to reduce greenhouse gas levels is through carbon sequestration. Carbon sequestration is the process of capturing, securing, and storing carbon dioxide from the atmosphere. The idea is to stabilize carbon in solid and dissolved forms (trees, for example) so that it doesn't cause the atmosphere to warm. On average, forests store twice as much carbon as they emit, while an estimated 25% of global carbon emissions are sequestered alongside forests in other vegetative forms, such as grasslands or rangelands (fields, prairies,

shrublands etc.). This process shows tremendous promise for reducing the human "carbon footprint".

The recommended widening alternative (Alternative 3a) provides a high level of carbon sequestration, as is the least disruptive widening alternative in terms of impacts to existing areas of forestry and established vegetation.

The recommended alternative design cross-section includes wide grass boulevards, which provide ample space for planting new street trees along the corridor. Planting of new street trees is a positive step forward in this regard and will be an improvement over existing conditions. The extent of street tree planting will be confirmed during detailed design.

9.6.2 Potential for Climate Change to Impact this Project

Climate change has the potential to result in increased storm events that can lead to flooding. The existing stormwater infrastructure, that has been identified as being at the end of its lifecycle, will be replaced as part of this project. Low Impact Development (LID) measures for increased quantity and quality control may be considered during detailed design which will assist in reducing impacts. This undertaking is expected to make the area less vulnerable to climate change.

9.7 Traffic Management and Control

Traffic impacts and neighbourhood disruption will be minimized during construction. A detailed traffic management plan that provides work zones, roadway lane closure extents, and times will be prepared. The traffic management plan will be reviewed by the City to ensure that all traffic disruptions are minimized, and congestion is within manageable and tolerable levels.

9.8 Noise

The contractor is required to ensure that factory recommended mufflers are maintained on all construction equipment. Sound emissions from all construction equipment should comply with MECP Guideline NPC-115 "Sound Levels from Construction Equipment". An exemption should be obtained from the City of Waterloo if nighttime work or work on Sundays is required.

10 Implementation Schedule

After consideration of all technical information completed and public input received, the Project Team presented a recommendation to regional Council in January 2023 for approval of the study and its recommendations. Council approved the study for filing in accordance with the Class Environmental Assessment and MECP requirements and this ESR was completed for that purpose.

Detailed design and utility relocations are scheduled to be completed throughout 2022 and 2023, with construction to occur between 2024 and 2026.

10.1 Monitoring

In the Class EA process, Phase 5 includes the Monitoring Phase. This phase is an essential part of the overall process and involves ongoing monitoring and follow-up activities after the implementation of a project.

The monitoring phase focuses on assessing the actual environmental impacts and outcomes of the project compared to what was predicted in the earlier phases. Its primary objective is to ensure that the project's environmental performance aligns with the commitments and conditions outlined in the approved Environmental Assessment.

Recommended monitoring for this project includes monitoring to ensure compliance with permit conditions, and effectiveness monitoring to evaluate the performance of mitigation measures. Monitoring will also include:

- Monitoring success and growth of new plantings and trees planted as part of road construction;
- Construction monitoring by an independent environmental monitor to determine if any wildlife has been inadvertently trapped or are found within construction areas during construction;
- Construction monitoring by an independent environmental monitor to ensure implementation and adherence to permit conditions;
- Monitoring effectiveness of sediment and erosion control; and
- Monitoring re-establishment of salvaged plantings that have been relocated during construction.

11 Study Completion

11.1 Region of Waterloo Council Approval

The Region's Planning and Works Committee considered staff Report EES-DCS-23-001 for the approval of the Recommended Design Alternative for University Avenue from Albert Street to Weber Street North at the March 7, 2023 meeting. The staff report and Minutes of the Region's Planning and Works Committee meeting on March 7, 2023, as well as final Council approval of the Recommended Design Alternative at the March 22, 2023, meeting, are included in the Environmental Study Report (**Appendix O**).

11.2 Notice of Study Completion

A Notice of Study Completion was published on May 4, 2023 in The Record and Waterloo Chronicle. A copy of the Notice was also sent to agencies and stakeholders including First Nations Communities the week of May 4, 2023.

Public notices, including the Notice of Study Completion, are included with this Environmental Study Report (**Appendix H**); the study agency and stakeholder contact list is also included (**Appendix I**).

11.3 Notice of Revised ESR

A Notice of Revised ESR was published on August 9, 2023. Correspondence confirming a revised ESR was also sent to agencies and stakeholders including First Nations Communities the week of August 9, 2023. Public notices, including the Notice of Revised ESR, are included with this Environmental Study Report (**Appendix H**).

Appendix A – Organizational Chart of Project Team

Appendix B – Geotechnical Report

Appendix C – Natural Environment Report

Appendix D – Cultural Heritage Resource Assessment and Stage 1 Archaeological Assessment Reports

Appendix E – Transportation Report

Appendix F – Evaluation Table

Appendix G – Consultation Materials

Appendix H – Public Notices

Appendix I – Study Agency and Stakeholder Contact List

Appendix J – Consultation Comments and Responses for PCC #1 and PCC #2

Appendix K – Agency Consultation

Appendix L – Utility Consultation

Appendix M – Preliminary Design Drawings

Appendix N – Preliminary Cost Estimate

Appendix O – Regional Staff Report for Approval of Design Alternative