



City of Guelph

Feasibility Study Report

Eramosa Road Cycling Improvements

April 2023

Table of Contents

Acronyms, Abbreviations, Definitions

Executive Summary

1.0	Introduction	9
1.1	Study Purpose and Objectives	10
1.2	Exemption from the Environmental Assessment Process	12
2.0	Consultation and Engagement	13
2.1	Early Engagement Activities	13
2.1.1	Walking Workshop	13
2.1.2	Key Informant Interviews	13
2.2	Routine Engagement	14
2.2.1	Contact List	14
2.2.2	Social Media	15
2.2.3	Project Webpage	15
2.3	Notice of Commencement	15
2.3.1	Map the Routes Survey	16
2.4	Project Update Newsletter	16
2.5	Stakeholder Follow-up Meetings	16
2.6	Public Open House	17
2.7	Engagement with Indigenous Communities	18
2.8	Notice of Correction	18
3.0	Existing Conditions	19
3.1	Engineered Environment	19
3.1.1	Transportation	19
3.1.2	Traffic	22

3.1.3	Water Resources.....	25
3.1.4	Structures	26
3.1.5	Utilities	27
3.2	Natural Environment.....	28
3.2.1	Aquatic Ecosystems.....	28
3.2.2	Terrestrial Ecosystems	29
3.3	Socio-Economic Environment	29
3.3.1	Relevant Planning Policies	29
3.3.2	Community Demographics	30
3.3.3	Commuting Patterns	30
3.3.4	Existing Land Use and Future Development	30
3.4	Cultural Environment	31
3.4.1	Archaeological Resources.....	31
3.4.2	Built Heritage and Cultural Heritage Resources.....	32
4.0	Alternative Design Options	33
4.1	Key Elements of AAA Cycle Facility Design.....	33
4.2	Development of Design Options.....	35
4.2.1	Option 1: Protected Bike Lanes	35
4.2.2	Option 2: Multi-Use Pathways	36
4.2.3	Option 3: Cycle Tracks.....	39
4.3	Evaluation of Design Options	41
4.4	Key Constraints	47
5.0	Preferred Design Options	49
5.1	Woolwich Street to Arthur Street	49
5.1.1	Major Features of the Conceptual Design.....	49
5.1.2	Estimated Capital Cost	52
5.1.3	Additional Design Considerations	52

5.1.4	Impacts and Mitigation	53
5.1.5	Implementation Plan	59
5.2	Arthur Street to Victoria Road	59
6.0	Recommended Future Work	61
6.1	Woolwich Street to Arthur Street	61
6.1.1	Additional Recommended Studies	61
6.1.2	Consultation	62
6.1.3	Anticipated Permits and Approvals	62
6.1.4	Construction Monitoring	62
6.2	Arthur Street to Victoria Road	63
Figures		
Figure 1: Project Location		9
Figure 2: Cycling Spine Network and Study Corridor (adapted from Guelph TMP)		11
Figure 3: Design Option 1 Example between Arthur Street and King Street		36
Figure 4: Design Option 2.2 Example between Mitchell Street and Delhi Street		38
Figure 5: Design Option 3 Example between Arthur Street and King Street		40
Figure 6: Photo of Eramosa Road at Mitchell Street, Looking North		47
Figure 7: Conceptual Layout of Potential New Neighbourhood Bikeways (imagery source: Google Maps)		60
Tables		
Table 1: City of Guelph Mode Choice Based on 2016 Census Data Compared to Target Mode Shares for Eramosa Road		30
Table 2: Recommended Elements of AAA Cycle Facility Designs		33
Table 3: Evaluation Summary		42
Table 4: Anticipated Impacts and Recommended Mitigation Measures		54

Appendices

A	Engagement Summary Report
B	Public & Agency Comments and Project Team Responses
C	Notice of Correction
D	Cycling Master Plan Schedule 1: Proposed Cycling Network
E	Existing Drainage Conditions and Low Impact Development (LID) Opportunities Memo
F	Grand River Source Protection Plan Schedules
G	Utilities Existing Conditions Memo
H	Environmental Impact Study
I	Socio-Economic and Land Use Existing Conditions Memo
J	Stage 1 Archaeological Assessment
K	Cultural Heritage Report
L	Alternative Design Concepts
M	Detailed Evaluation Tables
N	Conceptual Design Drawings
O	Class 'C' Cost Estimate for Eramosa Road, Woolwich Street to Arthur Street
P	Implementation Phasing Strategy
Q	Eramosa Road Traffic Study

Acronyms, Abbreviations, Definitions

AAA – All Ages and Abilities

AM – Ante Meridiem (morning)

CSD – Census Subdivision

EA – Environmental Assessment

EAA – Environmental Assessment Act

EIS – Environmental Impact Study

EMS – Emergency Medical Service

ESA – Endangered Species Act

ESR – Environmental Study Report

GCAT – The Guelph Coalition for Active Transportation

GRSPP – Grand River Source Protection Plan

km/h – Kilometres per Hour

LID – Low Impact Development

LOS – Level of Service

m – Metre(s)

MCEA – Municipal Class Environmental Assessment

MUP – Multi-use pathway

OHA – Ontario Heritage Act

PM – Post Meridiem (afternoon/evening)

ROW – Right-of-Way

SAR – Species at Risk

SARA – Species at Risk Act

TCT – Trans Canada Trail

TMP – Transportation Master Plan

VRU – Vulnerable Road User

WHPA – Wellhead Protection Area

Executive Summary

The City of Guelph (City) retained Dillon Consulting Limited (Dillon), in partnership with Mobycon, to complete a feasibility study for All Ages and Abilities (AAA) cycling facilities on Eramosa Road from Woolwich Street to Victoria Road. This report documents the study process, findings, the recommended conceptual design, and next steps.

This study builds on the recommendations of the Guelph Transportation Master Plan (TMP, 2022), which identifies the Eramosa Road study corridor as a component of the City's "Cycling Spine Network." The Cycling Spine Network consists of AAA cycling facilities that will provide access to major destinations throughout the network and support the City's mode share target of 10 percent of all daily trips in Guelph to be made by bike.

Design options for cycling facilities were developed and assessed to determine the feasibility and preferred approach to implement AAA facilities along the corridor. Potential impacts to the natural, socio-economic, cultural, and engineered environments were considered as part of the assessment.

Only the southern segment of Eramosa Road, from Woolwich Street to Arthur Street, is considered feasible to proceed to detailed design at this time, due to technical challenges and physical constraints throughout the remainder of the corridor.

The preferred design option for the southern segment of Eramosa Road from Woolwich Street to Arthur Street is protected bike lanes, with a protected intersection at Woolwich Street and a new signalized intersection at Arthur Street. This is a short but strategically significant segment of the study corridor because it intersects with two existing east-west active transportation routes (Arthur Street and the Trans Canada Trail) and will serve as a major connection to downtown Guelph and future cycling facilities on Wyndham Street.

The proposed works are exempt from the Ontario *Environmental Assessment Act* (EAA). Despite being exempt from the EAA, this Feasibility Study approximately followed the MCEA process, including consultation with agencies, Indigenous communities, stakeholders, and the public throughout the study for transparency.

Based on the conceptual design, the estimated capital cost to construct AAA cycling facilities from Woolwich Street to Arthur Street is \$2.3 million.

Overall, minimal environmental impacts are anticipated based on the preferred design for the southern segment. Utility impacts are anticipated, including relocation of light standards, hydro poles, and traffic lights. A Stage 2 archaeological assessment is required prior to any ground disturbing activities within Kimberley Park (Guelph Cenotaph) or along the Speed River.

A preferred design option has not been identified for the northern segment of the study corridor, from Arthur Street to Victoria Road, at this time. Significant additional investigation work would need to be completed before feasibility can be confirmed. Emergency services indicated that a minimum three lane cross-section is required on Eramosa Road to facilitate timely access to the Guelph General Hospital. It is not possible to accommodate either of the preferred design options (cycle tracks or protected bike lanes) while maintaining a three-lane cross-section due to the following key constraints:

- Along Eramosa Road from Arthur Street to Delhi Street, geometric constraints, retaining walls, and the presence of heritage properties abutting the roadway preclude a three-lane cross section.
- The section from Delhi Street to Meyer Drive generally has larger building setbacks, but includes a retaining wall north of Delhi Street and a number of heritage properties.
- From Meyer Drive to Victoria Road, there are few heritage properties and generally more space in the ROW, but the additional space has been allocated to streetscaping, and a large retaining wall north of Callander Drive restricts available space.

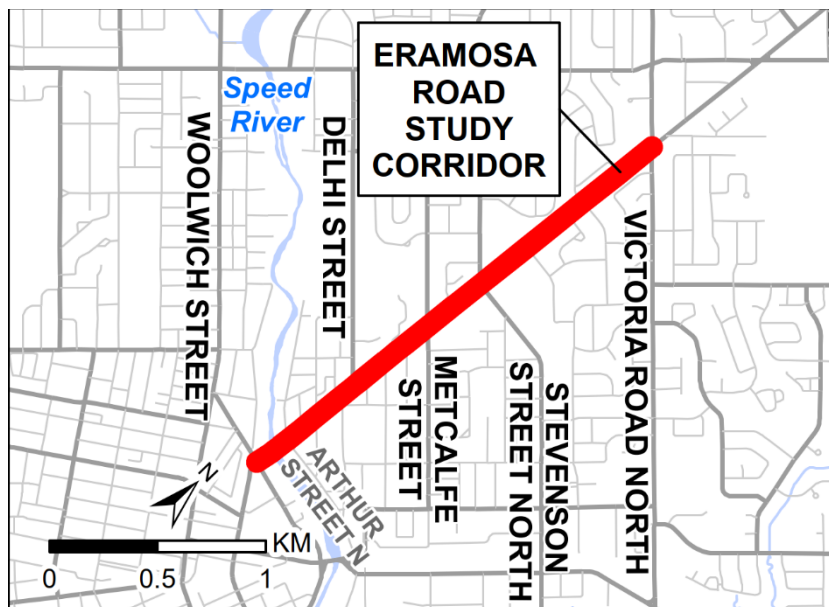
As a result, no cycling improvements are recommended on Eramosa Road from Arthur Street to Victoria Road at this time. However, development of a local network of neighbourhood bikeways is recommended to be included in the Cycling Master Plan update to improve cycling connectivity to key destinations along Eramosa Road.

1.0

Introduction

The City of Guelph (City) retained Dillon Consulting Limited (Dillon), in partnership with Mobycon, to complete a feasibility study for All Ages and Abilities (AAA) cycling facilities on Eramosa Road. The study limits extend from Woolwich Street in the south to Victoria Road North in the north, as shown in **Figure 1**.

Figure 1: Project Location



The corridor is a key transportation link within Guelph. It is the only direct connection to downtown within the northeast quadrant of the City and the main arterial access to Guelph General Hospital. The segment of Eramosa Road between St Catherine Street and Meyer Drive is also identified for future intensification and includes a key commercial node.

At present, there are no cycling facilities on Eramosa Road. Cyclist access to key points along the corridor is provided via adjacent local roadways and bike lanes on Stevenson Street. As there are no existing parallel routes to Eramosa Road, travel distances between key destinations are substantially longer along local roadways than along Eramosa Road.

The City recognizes the cyclist connectivity and safety benefits that providing dedicated AAA cycle facilities on Eramosa Road would provide. However, the implementation of these facilities is particularly challenging given the corridor's narrow road right-of-way (ROW), the presence of steep grades, substantial retaining walls, and a significant number of heritage properties that directly abut the ROW.

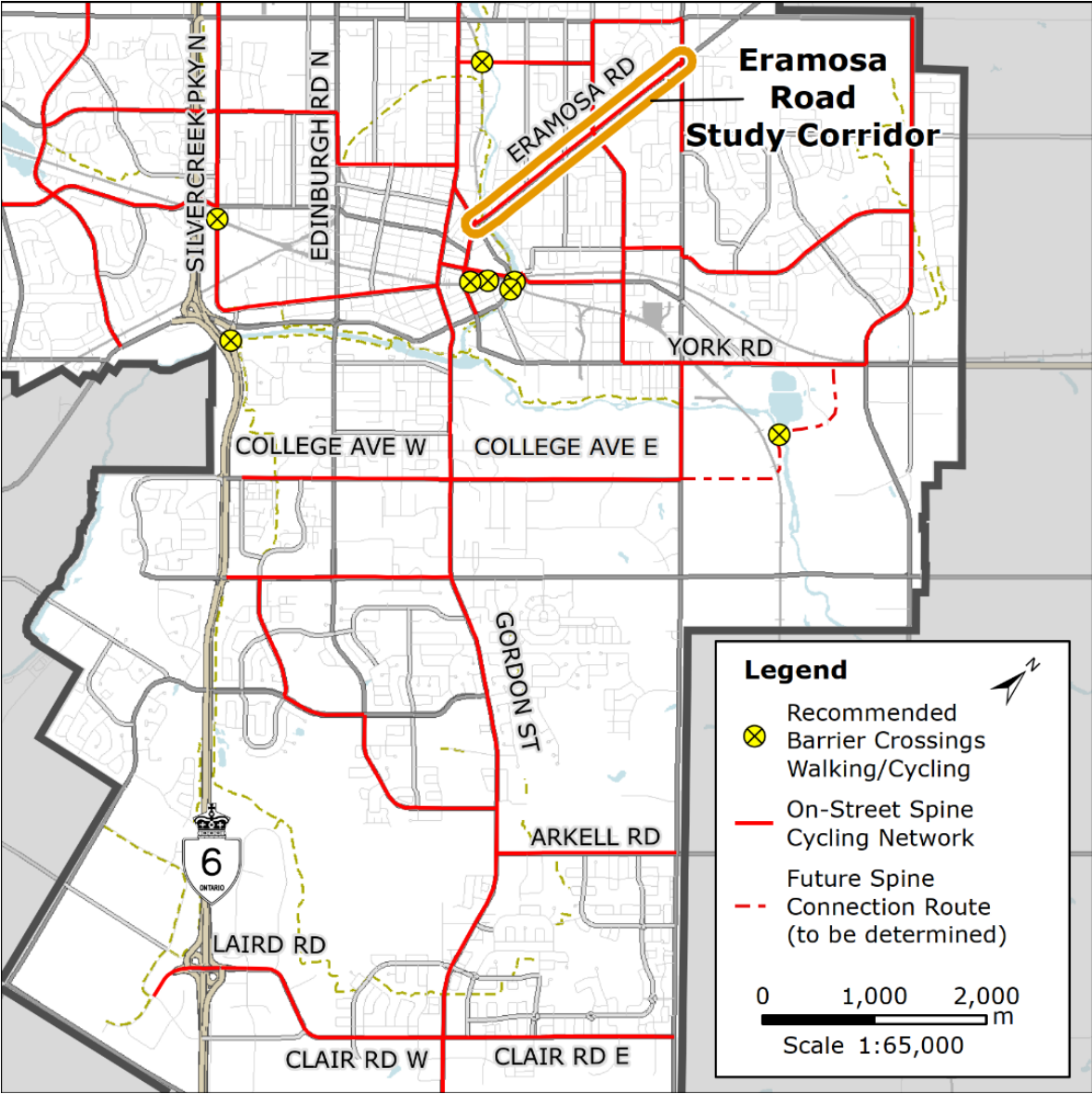
This report documents the study process used to determine whether implementation of AAA cycle facilities along Eramosa Road between Woolwich Street and Victoria Road is feasible. The study roughly followed the Municipal Class Environmental Assessment (MCEA) process, though was not subject to it. The study process included:

- An examination of the existing transportation, natural, socio-economic, and cultural heritage conditions;
- Development and evaluation of design options;
- Consultation on a recommended design option; and
- Identification of anticipated impacts, mitigation measures, and next steps.

1.1 Study Purpose and Objectives

Through completion of the 2022 Guelph Transportation Master Plan (TMP) Update, the Eramosa Road study corridor has been identified as a component of the City's priority "Cycling Spine Network" (**Figure 2**). The Cycling Spine Network consists of AAA cycling facilities that will provide access to major destinations throughout the network and support the City's mode share target of 10 percent of all daily trips in Guelph to be made by bike.

Figure 2: Cycling Spine Network and Study Corridor (adapted from Guelph TMP)



Key objectives of this study include:

- Create the foundations of a coherent, well-connected AAA cycling network;
- Determine the feasibility of providing physically separated space for all ages and abilities of cyclists on Eramosa Road in a fiscally responsible way;
- Balance the needs of pedestrians, cyclists, transit users, goods movement, and drivers;

- Address the TMP goal to increase the percentage of individuals cycling throughout Guelph, with a focus on the inner suburbs and the University of Guelph area;
- Implement the Official Plan policies calling for an accessible transportation system that meets the needs of all members of the community, including safe and comfortable cycling facilities; and
- Avoid or mitigate impacts to the natural, social-economic, cultural, and built environments where possible.

1.2 Exemption from the Environmental Assessment Process

Based on the nature of the proposed works, this project is exempt from the Ontario *Environmental Assessment Act* (EAA). Under the MCEA (2023), the project is considered “reconstruction where the reconstructed road will be for the same purpose, use, and vehicular capacity, and will be at the same location as the existing road.” This type of project is exempt from the EAA in accordance with activity 21 in Appendix 1, Table A (Municipal Road Projects) of the MCEA.

At the outset of this study, it was unclear what the MCEA requirements would be, if anything. As such, the City of Guelph opted to approximately follow the MCEA planning and design process for traceability and transparency purposes. The City issued project notices and collected feedback from stakeholders and the public throughout the study.

Going forward, the City will be responsible for addressing concerns raised with respect to the project, as appropriate. The City will also be responsible for obtaining the required permits, approvals and authorizations for this project as it moves towards construction.

2.0 Consultation and Engagement

This section provides an overview of consultation and engagement completed throughout the study.

Further information on activities, comments, responses, and how feedback influenced the designs is provided in the Engagement Summary Report (**Appendix A**; Dillon, December 2022). Consultation and engagement for this project was bundled with coincident projects on Gordon Street and College Avenue through the Guelph Protected Cycling Network Study. The Engagement Summary Report documents the results for all three study corridors, including overarching feedback as well as comments specific to each corridor.

A detailed summary of comments received throughout the study regarding College Avenue specifically, and how they were addressed by the project team, is provided in **Appendix B**.

2.1 Early Engagement Activities

2.1.1 Walking Workshop

At the beginning of the study, a walking workshop was held with staff from key departments at the City and the consulting team to become familiar with the existing conditions of the study corridor. The workshop was held on September 27, 2021. During the workshop, staff and consultants walked key sections of the corridor and discussed challenges, opportunities, and ideas. Comments and responses regarding how they were addressed, where applicable, are outlined in **Appendix B**.

2.1.2 Key Informant Interviews

Key informant interviews were held early in the study to establish open lines of communication, answer questions, get initial feedback, and discuss the community engagement process. Interviews were held with the following stakeholder groups:

- The Guelph Coalition for Active Transportation (GCAT; December 15, 2021);
- The University of Guelph (December 15, 2021);
- The Guelph Cycling Club (January 17, 2022); and
- The City of Guelph Accessibility Advisory Committee (February 15, 2022).

The stakeholder groups provided input regarding the study and communication methods, and offered to support with advertising engagement opportunities as well as encouraging participation. GCAT inquired whether the improvements on Eramosa Road could be limited to a portion of the study corridor, which the project team advised was a possibility depending on the results of the study. The Accessibility Advisory Committee expressed safety concerns regarding the combination of different transportation modes including pedestrians with disabilities on multi-use pathways. These concerns were considered by the project team during the assessment of design options as documented in **Section 4.0**.

2.2 Routine Engagement

Notifications for this study were completed in consultation with City staff and in accordance with the typical approach for communications on MCEA studies in Guelph. While the recommended solution for Eramosa Road is exempt from the MCEA process, the EA process was approximately followed for consistency and transparency.

2.2.1 Contact List

The study contact list was compiled through a screening of potentially impacted stakeholders in consultation with City staff. The contact list is included in the Engagement Summary Report (**Appendix A**) and includes the following groups:

- Elected officials;
- Provincial ministries;
- City staff;
- Indigenous communities;
- Local agencies and institutions;
- Community and advocacy groups;
- Employment/business organizations;
- Accessibility advocates;
- Senior and youth groups;
- Immigration organizations; and
- Equity seeking groups.

Notifications were sent to the contact list to provide information and advertise opportunities to get involved as the study progressed. Notifications were also sent to individuals who signed up for the mailing list on the project webpage.

2.2.2 Social Media

The City used its social media pages on Facebook and Twitter to promote the study and notify followers about upcoming meetings and engagement opportunities throughout the study.

2.2.3 Project Webpage

A dedicated webpage for the overall Protected Cycling Network Study (including Eramosa Road, Gordon Street, and College Avenue) was hosted on the City’s website (<https://guelph.ca/cyclingnetwork>). This project page contains information and communications including timelines, background documents and resources, study process and funding, and details on engagement activities. The website was updated throughout the study.

A dedicated page on the City’s community engagement platform, ‘Have Your Say’, was also created for the study (<https://www.haveyoursay.guelph.ca/cycling-network-study>). This page served as the main hub for engagement and a one-stop location for information and communications about the study.

2.3 Notice of Commencement

A Notice of Commencement was developed to introduce the study objectives and provide an initial opportunity for engagement. The Notice included a link to the project website where recipients could find more information about the study and participate in the ‘Map the Routes’ survey described below.

The Notice of Commencement was first published in the local newspapers and posted on the project webpage during the week of December 2, 2021. The Notice was distributed to the study contact list during the week of December 2, 2021, and was re-sent to contacts not originally included in the study contact list on April 19, 2022 along with the project update newsletter (**Section 2.4**). A copy of the Notice of Commencement is included in the Engagement Summary Report (**Appendix A**).

2.3.1 Map the Routes Survey

An online survey was used early in the study to gather feedback from the community on existing challenges and opportunities for the Eramosa Road corridor. The survey included an interactive map where participants could use pins to identify key destinations, safety concerns, accessibility issues, important connections, design ideas, and other comments or concerns.

The map survey was available from November 30, 2021 to January 10, 2022. A total of 107 comments regarding the Eramosa Road corridor were placed on the map. Concerns were raised regarding cyclist safety in light of steep slopes and high volumes and speeds of vehicular traffic on Eramosa Road, as well as traffic impacts to neighbouring streets if vehicular lanes are removed. Improvements to the Speed River crossing and the Trans Canada Trail (TCT) crossing were also suggested. Comments and responses regarding how they were addressed, where applicable, are outlined in **Appendix B**.

2.4 Project Update Newsletter

A Project Update Newsletter was circulated in April 2022 to provide an update on input received through the Notice of Commencement and Map the Routes survey. The newsletter also summarized how the input was being used to inform the development of alternative design options. The newsletter was distributed to the study contact list and posted on the project webpage.

2.5 Stakeholder Follow-up Meetings

Following the development and evaluation of design options, follow-up meetings were held with the stakeholders that were interviewed at the beginning of the study (**Section 2.1.2**):

- The City of Guelph Accessibility Advisory Committee (July 5, 2022);
- The University of Guelph (July 21, 2022);
- GCAT (week of July 18, 2022); and
- The Guelph Cycling Club (week of July 18, 2022).

The purpose of the follow-up meetings was to share the conceptual designs and collect feedback prior to the Public Open House. The following comments were received regarding the conceptual design for Eramosa Road:

- If the Mitchell Street crosswalk is relocated, it was suggested it would be better on the north side of Arthur Street to discourage cut-through traffic;
- Signage to assist with mid-block crossings (i.e., “signalized crossing 200 m ahead”) was suggested; and
- It was suggested to consider relocating the cenotaph at the intersection of Eramosa Road and Woolwich Street.

The comments were considered by the design team. The conceptual design includes relocation of the existing signalized pedestrian crossing at Mitchell Street to Arthur Street (**Section 5.1.1**). Signage will be considered during the future detailed design stage. This study is not recommending the cenotaph be relocated.

2.6 Public Open House

A Public Open House was held on July 27, 2022 to gather feedback on study progress to date and the preferred conceptual design for Eramosa Road between Woolwich Street and Arthur Street. To advertise the event, a Notice of Consultation was circulated to the study contact list and published in local newspapers as well as the project website.

Approximately 45 people attended the in-person event. To provide additional opportunities for review and comment, materials were also posted online for two weeks prior to and following the in-person event for a total of one month.

Participants expressed concerns about conflicts with vehicular traffic, including parking garages and how TCT users will cross Eramosa Road. Other comments included suggestions for improved lighting at Arthur Street, extending the design further north to Delhi Street or Stevenson Street, and adding signage to assist with mid-block crossings.

Comments and responses regarding how they were addressed, where applicable, are outlined in **Appendix B**. Comments and concerns regarding the preferred conceptual design should be reviewed during the future detailed design stage.

2.7 Engagement with Indigenous Communities

The City communicated with the following Indigenous communities via email and telephone throughout the project:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River; and
- Haudenosaunee Confederacy.

Communications with Indigenous communities included sending notifications via email for engagement opportunities, offering to meet and discuss the study, and sending the Stage 1 Archaeological Assessment Report for review and comment. No concerns were raised by Indigenous communities regarding the study or the Archaeological Assessment Report. Mississaugas of the Credit First Nation and Six Nations of the Grand River expressed interest in being involved in the recommended Stage 2 Archaeological Assessment.

2.8 Notice of Correction

Towards the completion of the study, it was determined that the project is exempt from the MCEA process, as noted in **Section 1.2**. A Notice of Correction was first issued on December 1, 2022 to inform residents and community members of this change (**Appendix C**). The Notice was posted on the project 'Have Your Say' webpage and in local newspapers in December 2022, and was circulated to the study contact list in March 2023.

3.0 Existing Conditions

The following sections provide an overview of existing conditions within and adjacent to the study corridor.

3.1 Engineered Environment

3.1.1 Transportation

3.1.1.1 General Overview

Eramosa Road is a north-south Urban Arterial Road with a four-lane cross-section and an assumed posted speed of 50 kilometres per hour (km/h). Auxiliary lanes are currently provided at the intersections with Woolwich Street, Stevenson Street, and Victoria Road. The corridor has a linear horizontal alignment and a rolling vertical alignment. There are significant grades in three locations (grades are estimated based on contour line data):

- An 8 percent uphill (northbound) grade for a distance of more than 200 metres (m) between approximately Arthur Street and Queen Street;
- A 6 percent downhill (northbound) grade over a 175- to 200-m distance from north of Ardmay Crescent to St Catherine Street; and
- A 6 percent uphill (northbound) grade over a 350- to 400-m distance from north of Meyer Drive to north of Callander Drive.

The significant grades are problematic in terms of travel speed differentials between pedestrians, cyclists, and vehicles on downhill segments; challenging climbs for cyclists on uphill segments; and reduced visibility over crests. Due to the study area's naturally rolling topography, there are also several segments of Eramosa Road that include steep retaining walls.

The ROW width varies over the length of the study area. Between the Speed River and Stephenson Road, the ROW is generally less than 22 m wide. North of Stephenson Road, the ROW widens to approximately 25 m. Within the narrow segment south of King Street, residential buildings are located immediately on, or across, the ROW limits. This narrow ROW is barely sufficient to accommodate the existing four

vehicular lanes (14 m), curb and gutter (0.5 m each side), overhead utilities, and narrow sidewalks (1.5 m each side). While the ROW widens north of Stevenson Road, the additional space has been allocated for streetscaping. As such, there is inadequate space to implement AAA cycling without reducing the number of vehicular lanes on this narrow section of Eramosa Road.

There are numerous private and commercial accesses directly onto Eramosa Road between the Speed River and Meyer Drive. The segment located south of Metcalfe Street to north of Stevenson Street North is also identified as a Mixed-Use Corridor and includes several anchor stores and services. The presence of numerous driveways, particularly high-volume commercial driveways, is a safety concern for cyclists.

There is no on-street parking permitted along the corridor, which also serves as a primary Emergency Medical Service (EMS) route for servicing the Guelph General Hospital.

3.1.1.2 Active Transportation Facilities and Network

Standard width sidewalks are located either immediately behind the curb or within the boulevard. There are currently no cycling facilities along the corridor.

Cycling facilities intersecting with Eramosa Road currently exist on the TCT/Downtown Trail (along the Speed River near Woolwich Street) and on Stevenson Street North (painted bike lane).

3.1.1.3 Planned Future Transportation Conditions

The Guelph TMP (May 2022) sets out goals for the future share of trips by the various transportation modes throughout the City and in particular areas. These goals are described further in **Section 3.3.3**.

Based on 2016 Transportation Tomorrow Survey (TTS) data, 3 percent of individuals in Guelph travel by bicycle. The TMP aims to increase the percentage of trips taken via bicycle to 3 percent city-wide, 3 percent in the outer suburbs, 5 percent in the inner suburbs, and 15 percent around the University of Guelph and downtown. These targets emphasize the importance of cycling improvements throughout the city, and particularly along cycling spines.

Future transportation network changes in and near the study area have been identified within the City's 2022 TMP, 2012 Cycling Master Plan, and the 2021 Transit Ridership Forecast. The TMP identifies Eramosa Road as part of the Cycling Spine Network, as well as Wyndham Street (southern continuation of Eramosa Road) and three intersecting roads: Woolwich Street, Stevenson Street, and Victoria Road.

As outlined in the City's 2012 Cycling Master Plan, upgrades for intersecting routes are planned for Wyndham Street North and Woolwich Street (painted bike lanes), Arthur Street (signed bike route), Meyer Drive (signed bike route), and Victoria Road (painted bike lanes). The locations of these intersecting routes are illustrated in Schedule 1 of the Cycling Master Plan, which is included in **Appendix D**.

The recommended cycling facility types for connecting routes may need to be revisited due to evolving best practices. It is imperative that intersection upgrades and proper transitions at those decision points be examined during future design stages to support safe and intuitive movements for cyclists traveling between Eramosa Road and the connecting cycling routes.

Quality Transit Network

The Guelph TMP recommends a "Quality Transit Network" (QTN), which identifies corridors for operational improvements as well as transit priority measures. The QTN includes the full length of the Eramosa Road study corridor.

The QTN is to be implemented using a staged approach, where first service frequency is increased and performance for all routes is optimized. Where buses continue to experience significant delays following this first step, transit priority measures are to be implemented, followed by widening/land conversion where warranted. As part of the QTN, the TMP indicates that lane conversions would potentially be applied to Eramosa Road, Victoria Road, and Speedvale Avenue.

The 2021 Guelph Transit Future Ready Action Plan identifies a new route operating from downtown, proceeding northbound along Eramosa Road and then westbound along Speedvale Avenue before ending at the West End Community Centre. Route 13 service would be removed from Eramosa Road north of Stevenson Street to be replaced by the new Route 98, with 20 minute frequency increasing to higher frequency service in

future. The Route 13 will be complemented in future by Route 23 running in the opposite direction.

This study assessed the feasibility of, and preferred approach for, implementing AAA cycling facilities within the existing Eramosa Road study corridor. Further studies would be required to consider the needs of transit, if and when transit operations indicate a need for transit priority.

3.1.2 Traffic

A traffic study was completed using Synchro to determine the feasibility of reducing the number of through lanes within the study limits on Eramosa Road. As previously discussed, lane reductions would be required to support implementation of AAA cycling along the corridor due to limited ROW width. Analysis was completed for existing conditions, future baseline conditions at a 2031 horizon, and future conditions at a 2031 horizon with lane reductions applied on Eramosa Road. Detailed simulation results are included in the traffic study **Appendix Q**.

3.1.2.1 Existing Conditions

Morning (AM) peak hour flow rates consistently have a pronounced peak during the 15-minute period prior to 9:00AM with short term flow rates reaching between 800 and 1,000 vehicles per hour. The afternoon/evening (PM) peak period flow rates are more consistent, with between 500 and 700 vehicles per hour in most sections and higher in the southern section of the corridor.

The existing conditions analysis showed that all of the intersections between Woolwich Street and Victoria Road operate at Level of Service (LOS) C or better. Most individual movements operate at LOS D or better with the following exceptions:

- At Woolwich Street:
 - The southbound left turn operates at LOS E; although this movement has sufficient capacity, it experiences relatively high delays due to the fully protected left turn signal phasing. The southbound left turn queue also extends beyond the available storage into the adjacent through lane.

- At Victoria Road:
 - The northbound left turn operates at LOS E to F, corresponding to high levels of delay. This is a high-volume movement that is currently at capacity, with a queue that extends beyond the available storage into the adjacent through lane.

3.1.2.2 Projected 2031 Volumes (Baseline)

Projected traffic volumes were estimated by applying a 1.5 percent annual growth rate over a 10-year period (2021-2031) which was established in consultation with City staff. The increased traffic volumes were first applied to the existing traffic network as a “do-nothing” case.

Under the projected 2031 volumes and the existing road configuration, the intermediate signalized intersections along the corridor are projected to continue operating at a good overall level of service (LOS A to B), but the level of service is anticipated to decline at the main boundary intersections (Woolwich Street and Victoria Road).

3.1.2.3 Projected 2031 Volumes (with Lane Reductions)

A second future scenario was established to consider the impact associated with reallocation of roadway space to facilitate the installation of cycling facilities as follows:

- The same 2031 volume forecasts were applied as in the 2031 “baseline” conditions;
- Between the north side of Woolwich Street and the south side of Victoria Road, Eramosa Road was assumed to be reduced to a three-lane cross-section and all northbound and southbound approach cross-sections were assumed to consist of a dedicated left turn lane and a shared through/right turn lane;
- At the intersection with Stevenson Street, the west and east legs were similarly assumed to be reconfigured to have three-lane cross-sections, with a dedicated left turn lane and a shared through/right turn lane on both the westbound and eastbound approaches. This condition reflects the opportunity to extend existing bicycle lanes on Stevenson Street easterly to connect to the new Eramosa Road facility.
- Traffic signal timings were assumed to be unchanged (recognizing that pedestrian intervals may change depending on the ultimate configuration of the intersection and cycling facilities).

Overall, without further interventions, Woolwich Street and Victoria Road would see the greatest decline in LOS as a result of the through lane reductions, with both intersections operating at an overall LOS of E or F. At the other signalized intersections, the overall intersection levels of service are anticipated to decline to LOS C to D during the AM peak hour, and LOS B to C during the PM peak hour.

To reduce the traffic impacts related to lane reductions, the following additional design changes were recommended by the traffic study:

- Provide separate right turn lanes on the southbound approach at Woolwich Street and the northbound approach at Victoria Road;
- Provide a continuous two-way left turn lane, or back-to-back left turn lanes, in the southern and central parts of the corridor (i.e., between Woolwich Street and Meyer Drive);
- Consider a second northbound lane along the uphill grade north of Meyer Drive;
- Explore opportunities to provide bus bays for the existing and anticipated future bus stops near Meyer Drive; and
- Implement signal timing adjustments, including increasing the AM and PM peak period cycle length to 110 seconds at Victoria Road and to 90 seconds at all other intersections north of Woolwich Street.

The proposed reconfiguration and mitigation measures result in comparatively minor operational impacts. This includes operations at the two boundary intersections, which are anticipated to operate at LOS C or D under both the four and two through lane scenarios. The overall intersection delay increases from approximately 5 to 15 seconds and peak hour travel time increases by roughly 1 to 2 minutes in the peak directions.

It is also assumed that peak hour demands in the corridor do not change as a result of the change in configuration of Eramosa Road and therefore represent a worst-case scenario. While the overall increase in anticipated delay is not significant, there is additional sensitivity related to the proximity of the Guelph General Hospital, as discussed in **Section 4.4**.

3.1.2.4

Collision History – Vulnerable Road User Safety

Available vulnerable road user (VRU) safety data was reviewed to identify specific areas of concern within the Eramosa Road study area. In the six-year period of the data (2016-2021) there were 3 collisions involving cyclists and 9 collisions involving pedestrians, resulting in non-fatal injuries and property damages. The collisions and causes can be summarized as follows:

- Cyclist-related:
 - Turning vehicle and stopped cyclist (1);
 - Vehicle turning left and cyclist turning right (1); and
 - Vehicle turning right and cyclist going straight through (1).
- Pedestrian-related:
 - Turning vehicle that failed to yield right-of-way to crossing pedestrian (6);
 - Pedestrian “crossing without right-of-way;” an indication of pedestrian crossing demand (1);
 - Transit vehicle slowing or stopping with no indication of pedestrian action (1); and
 - Vehicle driving properly with no indication of pedestrian action (1).

To alleviate the risks and severity of these collisions, dedicated cycling facilities separate from motorized traffic and compact protected intersection designs on Eramosa Road are recommended. Additional safety improvements should consider:

- Reviewing pedestrian accessibility to bus stops across the street at uncontrolled intersections; and
- Adding pedestrian crossovers/cross-rides at strategic locations.

3.1.3

Water Resources

3.1.3.1

Drainage and Stormwater Management

Drainage and stormwater management conditions are documented in the Existing Drainage Conditions and Low Impact Development (LID) Opportunities Memo (**Appendix E**; Dillon, March 2023).

The Eramosa Road corridor is an urban cross-section fronted by residential and commercial properties. This road follows the local topography, which is generally hilly in nature; however, the northern portion of this road is relatively flat within the study

limits. Where sags exist, double catch basins have been installed to increase stormwater runoff capture rate. While the City has identified a desire to implement LID features along the corridor, anticipated challenges include the existence of retaining walls, residential and commercial buildings located near the edge of the road, mature trees, and longitudinal road grades greater than 2 percent.

3.1.3.2 Source Water Protection

The Grand River Source Protection Plan (GRSPP; February, 2022) was reviewed to identify source protection policies that apply to the Eramosa Road study corridor. The applicable Schedule from the GRSPP are included in **Appendix F**.

The entire study corridor is within Wellhead Protection Area (WHPA)-B, as illustrated in Schedule C of the GRSPP. A WHPA is defined in Volume I Appendix A as “an area that is related to a wellhead and within which it is desirable to monitor drinking water threats.” WHPA-A is within the closest proximity to the wellhead, whereas WHPA-B and WHPA-C are less closely related to the wellhead.

The GRSPP assigns Vulnerability Scores, which categorize the relative vulnerability of a particular area to contamination. Areas with higher scores are considered more vulnerable, with 10 being the highest score. The segments of Eramosa Road between King Street and Metcalfe Street, as well as north of Callander Drive have Vulnerability Scores between 2 and 6. The portion of the corridor between Woolwich Street and King Street (adjacent to the Speed River), as well as between Skov Crescent and Lincoln Crescent have a score of 10, with directly adjoining areas having of a Vulnerability Score of 8 (Schedule C).

Areas with Vulnerability Scores of 8 and above are particularly vulnerable to certain drinking water threats, including: road salt, snow storage and fuel. Specific construction, operation and maintenance procedures should be developed to limit exposure to any of these threats as a result of any new or reconstructed infrastructure.

3.1.4 Structures

The Eramosa Road study area includes a four lane, single span concrete bridge over the Speed River. The bridge is identified as a potential heritage resource in the Cultural Heritage Report completed as part of this study (**Appendix K**; LHC Heritage Planning & Archaeology Inc., 2023).

There are also several segments of concrete retaining walls at the following locations within the study area:

- King Street to Queen Street (approximately 150 m);
- Delhi Street to Stuart Street (approximately 170 m); and
- Callander Drive to Orchard Crescent (approximately 220 m).

The segment of retaining walls between Callander Drive and Orchard Crescent are particularly high. The road segment between Lincoln Crescent (east) and Callander Drive is higher than adjacent properties, with retaining walls below the road grade.

Given the potential heritage value associated with the Speed River bridge, and the significant cost associated with replacement of the existing retaining walls, modification of these features was avoided during the design process.

3.1.5 Utilities

Existing utility infrastructure within the study area was reviewed at a high-level as part of this study, with the review documented in the Utilities Existing Conditions Memo (**Appendix G**; Dillon, 2022). The following utilities were identified within the study area:

- Alectra Utilities (hydro);
- Bell (telecommunications);
- Enbridge (gas); and
- City underground water, storm, and sanitary services.

There are significant overhead utilities along both sides of the ROW, with the majority of utility poles located on the east side. The overhead pole lines south of Metcalfe Street and north of Meyer Drive are primarily located immediately behind the back of the curb, creating a significant constraint to modifying the space along the edge of the roadway. Poles have been relocated beyond the sidewalk between Metcalfe Street and Meyer Drive.

Bell infrastructure is typically located within the east boulevard and consists of both buried cable and conduit. However, Bell infrastructure is located on both sides of the ROW from Arthur Street to King Street and Metcalfe Street to north of Stevenson Street.

Enbridge infrastructure is consistently within the east boulevard. Additional gas line infrastructure is located in the west boulevard between Woolwich and Delhi Street and

Metcalfe Street to Stevenson Street North. There are no high-pressure Enbridge pipelines located within the Eramosa Road study limits.

Overall, the watermain, storm, and sanitary gravity sewers do not remain in a consistent location within the Eramosa Road ROW. As a general overview (with the exception of private drain lateral connections along the study area), watermain, storm and sanitary gravity sewers are within the centre of the roadway (middle two drive lanes) between Arthur Street and Queen Street. North of Delhi Street, the sanitary and storm sewers end and new ones begin north of Stuart Street. North of Stuart Street, sewers are within the outer most drive lanes, with extension into the boulevards. This orientation continues until north of Callander Street, where sanitary and storm sewers are discontinued until immediately south of Victoria Road North.

3.2 Natural Environment

Existing natural environment conditions are documented in the Environmental Impact Study (EIS; **Appendix H**; Dillon, December 2022); key findings are summarized in the following sections.

In general, Eramosa Road study corridor is highly urbanized, with exception of the crossing of the Speed River, Kimberley Park – also known as the Cenotaph (at Woolwich Street), Skov Park (at Victoria Road), and various street trees and other vegetation along the corridor.

Eramosa Road crosses the Speed River between Woolwich Street and Arthur Street. At this crossing, the Speed River comprises a number of Natural Heritage System (NHS) features, as designated in the City of Guelph Official Plan. NHS features in this area include Cool Water Fish Habitat and Significant Wildlife Habitat for Waterfowl Overwintering Areas. The Speed River and surrounding riparian areas are identified as Significant Valleylands – Undeveloped Portions of the Regulatory Floodplain.

3.2.1 Aquatic Ecosystems

The Speed River is one of the major rivers in the Grand River watershed (Grand River Conservation Authority, 2014), and it supports a diverse community of fish and aquatic species. As Eramosa Road crosses the Speed River within the historic Guelph downtown core, the area is heavily urbanized with development and infrastructure established

along the river banks. The infrastructure of the Eramosa Road bridge is established directly in portions of the river.

The Fisheries and Oceans Canada online Aquatic Species at Risk (SAR) mapping tool, and the Natural Heritage Information Centre online records tool, were reviewed for the portions of the Speed River that overlap the Eramosa Road study area. The review did not identify any SAR fish or mussels or any Critical Habitat for aquatic SAR as listed under the federal *Species at Risk Act* (SARA) or the provincial *Endangered Species Act* (ESA). Occurrence records were identified for Snapping Turtle (*Chelydra serpentina*) and Northern Map Turtle (*Graptemys geographica*), both of which are listed as Special Concern under both SARA and the ESA. As Special Concern species, neither the species nor their habitat are subject to the legal protections of the ESA or SARA.

3.2.2 Terrestrial Ecosystems

There are no terrestrial ecosystems located beyond the limits of the Speed River NHS within the limits of the Eramosa Road study area. Kimberley Park and Skov Park, located at the south and north study limits respectively, are manicured open spaces with mature trees.

3.3 Socio-Economic Environment

A Socio-Economic and Land Use Existing Conditions Memo (**Appendix I**; Dillon, October 2022) was prepared as part of this study. The memo documents existing and future socio-economic and land use characteristics, relevant provincial and municipal planning policy, and future development within a 1-kilometre study area surrounding the study corridor.

3.3.1 Relevant Planning Policies

The study area is subject to the following relevant provincial and municipal planning policies. Applicability of these policies to the current project are highlighted with the Socio-Economic and Land Use Existing Conditions Memo.

- Provincial Policy Statement (Ministry of Municipal Affairs and Housing (MMAH));
- A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Province of Ontario);
- City of Guelph Official Plan; and
- City of Guelph Transportation Master Plan.

3.3.2 Community Demographics

According to 2016 Statistics Canada Census Profiles, Guelph Census Subdivision (CSD) has a population of 131,794 which is 8.3 percent higher compared to the 2011 population. The median age in Guelph is 38.3. A total of 35,060 households are owned, while 17,030 are rented (Statistics Canada, 2017).

In 2016, a total of 60,400 households held a postsecondary certificate, diploma or degree. Approximately 66 percent of the population was employed, with 4 percent unemployed and 30 percent not in the labour force. The median total income (before tax) of households during the same period was \$37,540. This was below the Canadian average income of single earner households over the same period, reinforcing the importance of providing equitable transportation in the city.

3.3.3 Commuting Patterns

As a component of the 2022 Guelph TMP Update, work was completed to identify current and potential future mode share throughout the city using Census, Transportation Tomorrow Survey (TTS), and Streetlight™ data. Current city-wide mode choice based on the 2016 Census data, as well as the target mode choice for portions of Eramosa Road, are presented in **Table 1**.

Table 1: City of Guelph Mode Choice Based on 2016 Census Data Compared to Target Mode Shares for Eramosa Road

Mode Choice	Percentage of Individuals Currently Using the Mode	Target Mode Share Percentage: Woolwich Street to Stevenson Street	Target Mode Share Percentage: Stevenson Street to Victoria Road
Walking	5.9	20	10
Cycling	1.6	5	3
Public Transit	7.1	15	12
Automobile	84.5	60	75

3.3.4 Existing Land Use and Future Development

The Guelph General Hospital is a key land use within the study corridor, spanning west from Eramosa Road along Delhi Street. There are a number of low-rise commercial uses between St Catherine Street and Meyer Drive, including two grocery stores. The

majority of the corridor consists of residential dwellings, which primarily front onto Eramosa Road south of Stevenson Street and back onto Eramosa Road north of Stevenson Street.

The Official Plan (City of Guelph, 2021) provides for the following land uses along Eramosa Road:

- Low Density Residential;
- Mixed Office/Commercial;
- Major Institutional;
- Open Space and Park;
- Neighbourhood Commercial Centre; and
- Significant Natural Areas & Natural Areas.

A segment of Eramosa Road is also designated as a Mixed-Use Corridor from south of Metcalfe Street to north of Stevenson Street North. The approved Downtown Secondary Plan intersects with the corridor at the Eramosa Road and Woolwich Street intersection.

3.4 Cultural Environment

3.4.1 Archaeological Resources

A Stage 1 Archaeological Assessment (**Appendix J**; LHC Heritage Planning & Archaeology Inc., 2022) was completed as part of this study to assess the archaeological potential of the Eramosa Road study corridor. The study area included lands within 10 m of the Eramosa Road ROW. The study found that the following portions of the study area exhibit archaeological potential and therefore require Stage 2 archaeological assessment prior to any ground disturbing activities:

- North-west corner of Eramosa Road and Woolwich Street;
- East side of Eramosa Road on both sides of Speed River; and
- West side of Eramosa Road between Victoria Road and Orchard Crescent.

The Stage 1 Archaeological Assessment Report was entered into the Ontario Public Register of Archaeological Reports on May 11, 2022.

Built Heritage and Cultural Heritage Resources

A Cultural Heritage Report (**Appendix K**; LHC Heritage Planning & Archaeology Inc., 2023) was completed as part of this study to identify built heritage resources and cultural heritage landscapes within the study area. Preliminary impact assessment was also completed as part of the Cultural Heritage Report; the results of that assessment are summarized in **Section 5.1.4**. The study area included lands within 40 m of the Eramosa Road ROW.

The report identified the following built heritage resources and cultural heritage landscapes along Eramosa Road, primarily between Woolwich Street and St Catherine Street:

- 4 properties (414 Eramosa Road, 147-159 Wyndham Street North, 83 King Street, and 25 Mitchell Street) designated under Section 29 Part IV of the *Ontario Heritage Act* (OHA);
- 39 properties listed on the Municipal Heritage Register under Section 27 Part IV of the OHA; and
- 40 properties included on the Couling Architectural Inventory (neither listed nor designated, but part of a known inventory).

4.0 Alternative Design Options

4.1 Key Elements of AAA Cycle Facility Design

All Ages and Abilities (AAA) cycle facilities should be designed to meet the recommendations outlined in **Table 2**.

Table 2: Recommended Elements of AAA Cycle Facility Designs

Design Element	Recommended Condition
Comfortable Cycle Facility Width and Separation from Vehicular Traffic	<ul style="list-style-type: none"> • Facility widths should be designed in accordance with the recommendations of Ontario Traffic Manual Book 18. • Cycling facilities should be physically separated from motor vehicles. The extent of horizontal and vertical separation required is dependent on adjacent motor vehicle speeds and volumes.
Cycling Access to Key Destinations	<ul style="list-style-type: none"> • Safe, accessible cycling facilities should be provided between key destinations along both sides of the corridor. • Crossing locations should be clearly delineated, with cyclist priority provided over vehicular traffic.
Steep Sections Should be Limited or Avoided	<ul style="list-style-type: none"> • Road elevation change should generally be less than 5 percent to allow for sustained cycling speeds and reduced weaving. • Steeper segments should be limited to: <ul style="list-style-type: none"> ○ Less than 500 m in length, for grades between 5 percent and 7 percent; ○ Less than 150 m in length (about a block), for grades between 7 percent and 8 percent; and ○ Less than 30 m in length, for grades above 8 percent.

Design Element	Recommended Condition
Enhanced Rider Safety	<ul style="list-style-type: none"> ● Risks associated with conflicts with motor vehicles should be reduced through: <ul style="list-style-type: none"> ○ Minimizing the operating speed differential between vehicles and cyclists, particularly at intersections and entrances; and ○ Reducing the number of contraflow conflicts with turning vehicles; and ○ Implementing mitigation measures to limit the number of right hook conflicts (i.e. through restricting right on red). ● Risks associated with cyclist conflicts with transit vehicles should be reduced through physical separation of operating spaces. ● Risks associated with conflicts with pedestrians should be reduced through: <ul style="list-style-type: none"> ○ Separation of cyclists and pedestrians, particularly where high volumes of either are anticipated; ○ Minimizing the operating speed differential between cyclists and pedestrians on shared facilities; and ○ Avoiding sudden path narrowing. ● Facility should be designed and maintained to be clear of obstructions, including: <ul style="list-style-type: none"> ○ Surface debris (i.e. leaves); ○ Surface inlet catch basins and gutters; and ○ Snow/ice to enable all season operation of the facility.
Cohesion	Consistent design throughout the corridor.

4.2 Development of Design Options

Four design options for AAA cycling facilities were developed and assessed to determine their feasibility for implementation on Eramosa Road. As consistency is an important facet of AAA cycle facility design, all alternative design options considered application of only one of the following options:

- Option 1: Protected Bike Lanes;
- Option 2.1: Multi-Use Pathway, One Side;
- Option 2.2: Multi-Use Pathways, Both Sides; and
- Option 3: Cycle Tracks.

Additional details pertaining to each of the design options are provided in the following sections.

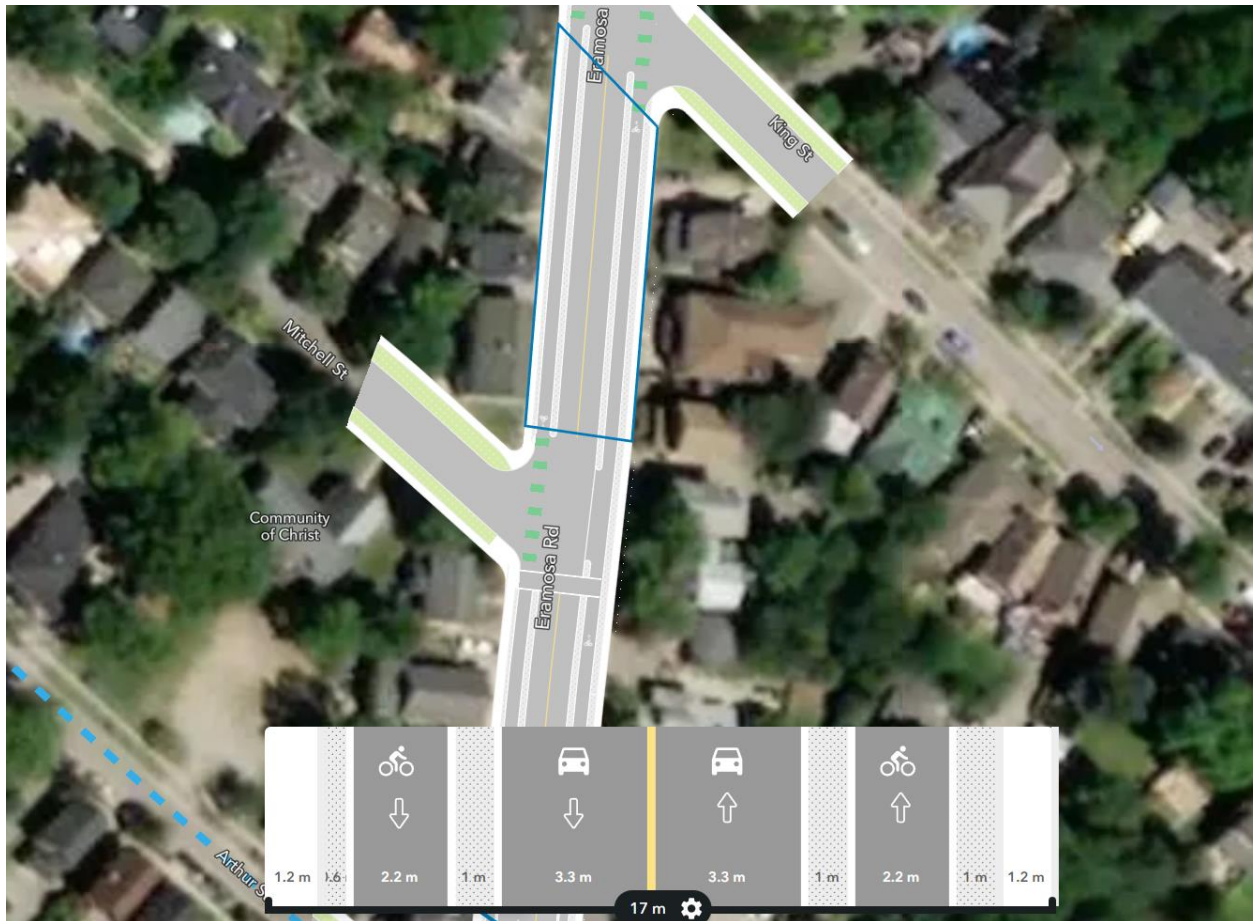
4.2.1 Option 1: Protected Bike Lanes

Protected bike lanes are one-way, on the same level as the roadway, with physical separation between people riding bikes and motor vehicle traffic. Physical separation may include the use of painted buffers, curbs, bollards, and planter boxes.

As illustrated in **Figure 3** and **Appendix L**, design Option 1 for Eramosa Road generally includes the following elements, which are intended to be implemented between the existing curbs:

- 1.5 to 2.2 m wide bike lanes on either side of the roadway. Narrower lanes were implemented at intersections that required turned lanes. Wider lanes were used in sections with steep grades where weaving and higher speed differentials between beginner and confident riders could be anticipated.
- 1.0 m wide physical separation between cyclists and vehicles. Breaks in the barrier would be provided at entrances and could be made mountable.
- 3.3 m wide vehicular through lanes with 2.8 m wide turn lanes.

Figure 3: Design Option 1 Example between Arthur Street and King Street



Implementation of Option 1 would generally preclude provision of centre left turn/two-way-left-turn lanes throughout the length of the corridor. Exceptions include the segment between Woolwich Street and Arthur Street and the segment between Skov Crescent and Meyer Drive. Fire and Emergency Services raised concerns regarding emergency access through the narrow (6.6 m) two lane sections associated with Option 1.

4.2.2 Option 2: Multi-Use Pathways

Multi-use pathways (MUPs) are two-way shared pedestrian and cycling facilities, physically separated from motor vehicle traffic. They are most often located similarly to a sidewalk, but are wider to accommodate both pedestrians and cyclists.

Two options were developed that include MUPs. Option 2.1 involves implementation of a single MUP on the west side, while Option 2.2 involves implementation of MUPs on

both sides of Eramosa Road. Space for the MUPs would be obtained through removal and reallocation of space from one or more of the existing sidewalks and vehicular lanes.

As illustrated in **Figure 4** and **Appendix L**, design Options 2.1 and 2.2 for Eramosa Road generally include the following elements, which would require relocation of the existing curbs on one or both sides of the roadway:

- 4.0 m MUP on one side (Option 2.1) or 3.0 m MUPs on both sides (Option 2.2) for the entire length of the corridor;
- Minimal 0.5 m horizontal separation provided between cyclists and vehicles by standard curb and gutter; and
- 3.5 m wide vehicular through lanes, with 3.3 m wide turn lanes.

Figure 4: Design Option 2.2 Example between Mitchell Street and Delhi Street



Both Options 2.1 and 2.2 maintain space for centre left turn/two-way-left-turn lanes throughout the length of the corridor. However, the MUPs are generally located immediately behind the back of curb with very limited (if any) ROW remaining for streetscape elements. Additionally, within the highly constrained southern segment of the study area, implementation of both a centre turn lane and MUPs on both sides is anticipated to have significant impacts on adjacent heritage buildings.

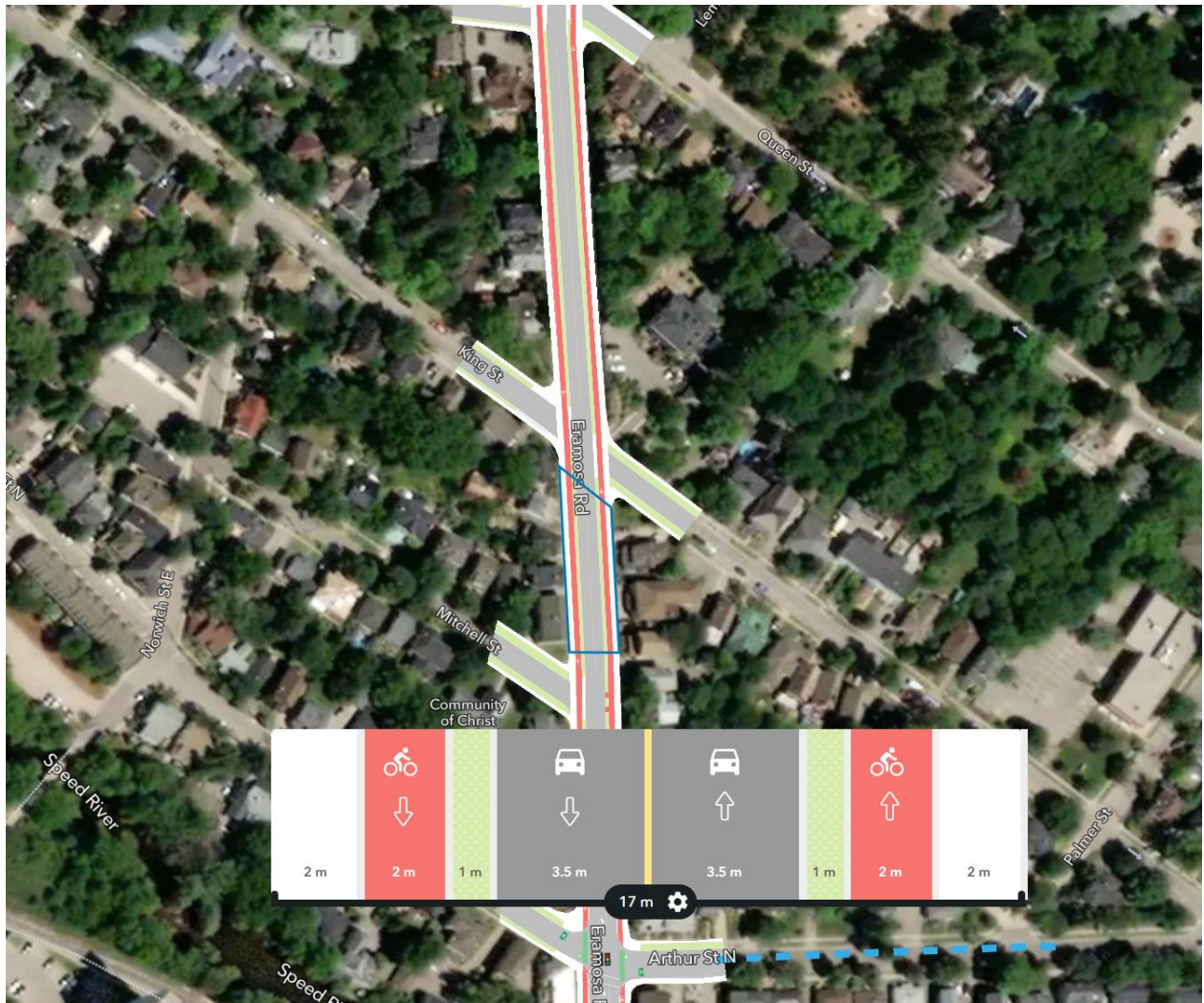
Option 3: Cycle Tracks

Cycle tracks accommodate cyclists only and are located above road grade – often within the boulevard. This provides both horizontal and vertical separation between vehicular and cyclist traffic.

As illustrated in **Figure 5** and **Appendix L**, design Option 3 for Eramosa Road generally includes the following elements, which will require relocation of the existing curbs on both sides of the roadway:

- 1.65 to 2.0 m wide cycle tracks on both sides of the roadway. Narrower facilities were implemented at intersections that required turn lanes.
- Minimum 1.0 m wide physical separation between cyclists and vehicles provided by curb and gutter and a narrow maintenance strip;
- 2.0 to 2.2 m wide sidewalks; and
- 3.5 m wide vehicular through lanes with 3.3 m wide turn lanes.

Figure 5: Design Option 3 Example between Arthur Street and King Street



Implementation of Option 3 would preclude provision of centre left turn/two-way left turn lanes throughout certain segments of the corridor. These include the highly constrained segment between Arthur Street and Stuart Street and the segment north of Meyer Drive to Orchard Crescent. Fire and Emergency Services have raised concerns regarding emergency access through the narrow (6.6 m) two lane sections associated with Option 3.

4.3 Evaluation of Design Options

The design options described in **Section 4.2** were evaluated to compare their alignment with AAA design principles and impacts on the engineered, natural, socio-economic, and cultural environments, as well as anticipated costs.

A summary of the comparative evaluation of design options is provided in **Table 3**. Letter grades were used to identify an alternative's alignment with the ideal condition. A letter grade of 'A' indicates that the option is most closely aligned with the ideal condition, whereas a letter grade of 'F' indicates unacceptable negative impacts. The detailed evaluation tables are included in **Appendix M**.

Options 1 (protected bike lanes) and 3 (cycle tracks) scored the highest in the comparative evaluation, primarily because they are most closely aligned with AAA design requirements and the TMP. Key constraints within the corridor are discussed in **Section 4.4**, and the resulting preferred design options are presented in **Section 5.0**.

Table 3: Evaluation Summary

Category	Option 1: Protected Cycling Lanes	Option 2.1: Multi-Use Pathway, One Side	Option 2.2: Multi-Use Pathways, Both Sides	Option 3: Cycle Tracks
AAA Design Requirements (Pre-Screening)	<p>Grade: B</p> <ul style="list-style-type: none"> Option meets the majority of requirements of AAA cycling facility design. Facility does not have a recommended minimum 1.0m buffer between vehicular and cyclist lanes at all locations. There are 9 locations where proposed cycling lanes will cross transit passenger loading zones with 0.5m buffer between curb and cycle lane. 	<p>Grade: F</p> <ul style="list-style-type: none"> Option includes MUP facilities that are 0.4m narrower than recommended in current design guidelines. Absence of cycling facility on east side of Eramosa Road creates cyclist safety and access issues. Curb ramps will be present at multiple intersections and driveway accesses. Contra-flow conflicts at intersections with 50 percent more conflict points compared to Options 1 and 3. 	<p>Grade: D</p> <ul style="list-style-type: none"> Option includes MUP facilities that are 0.4m narrower than recommended in current design guidelines. Cross-rides are provided at intersections but are not as well marked as with alternatives that include separate cycling and pedestrian facilities. In most instances, cyclists will cross intersections in a shared pedestrian crossing. Highest risk of pedestrian/bike collisions. 	<p>Grade: A</p> <ul style="list-style-type: none"> Option meets the majority of requirements of AAA cycling facility design. Design includes both cycle and pedestrian facilities that meet current width guidelines. Cycling access provided on both sides of the corridor and is horizontally and vertically separated from vehicular traffic. There are two locations where proposed cycling lanes will cross transit passenger loading zones.

Category	Option 1: Protected Cycling Lanes	Option 2.1: Multi-Use Pathway, One Side	Option 2.2: Multi-Use Pathways, Both Sides	Option 3: Cycle Tracks
Engineering (Safety, Operations, and Infrastructure)	Grade: D <ul style="list-style-type: none"> • Through lane capacity reduced from two lanes to one in each direction, with inadequate space to accommodate auxiliary and/or two-way-left turn lane through most of the corridor. Fire and emergency services have indicated this space is required for passing stopped vehicles. • Requires coordination of clearing operations to prevent snow from the roadway blocking the cycle lane. • No space within the existing right-of-way to provide rest areas for pedestrians within steep sections. 	Grade: A <ul style="list-style-type: none"> • Through lane capacity reduced from two lanes to one in each direction, with adequate space to accommodate auxiliary and/or two-way-left turn lane throughout the corridor. • Adequate boulevard width to accommodate snow storage. • Slight increase in net cyclist and pedestrian capacity relative to existing condition. 	Grade: B <ul style="list-style-type: none"> • Through lane capacity reduced from two lanes to one in each direction, with adequate space to accommodate auxiliary and/or two-way-left turn lane in most of the corridor. • Inadequate space within the boulevard to accommodate snow storage. Specialized winter maintenance processes will be required. • Temporary closure of existing sidewalks will be required during construction. • Combined facilities on both sides would result in moderate increase in net cyclist and pedestrian capacity relative to the existing condition. 	Grade: D <ul style="list-style-type: none"> • Through lane capacity reduced from two lanes to one in each direction, with inadequate space to accommodate auxiliary and/or two-way-left turn lane through most of the corridor. Fire and emergency services have indicated this space is required for passing stopped vehicles. • Option doubles the total length of active transportation facilities to be maintained. • Temporary closure of existing sidewalks will be required during construction. • Transit users need to cross cycle tracks when boarding/alighting.

Category	Option 1: Protected Cycling Lanes	Option 2.1: Multi-Use Pathway, One Side	Option 2.2: Multi-Use Pathways, Both Sides	Option 3: Cycle Tracks
Natural Environment	<p>Grade: A</p> <ul style="list-style-type: none"> No anticipated impacts to vegetation or landscaping. Minimal opportunity for landscape enhancements due to limited right-of-way. No anticipated opportunity to incorporate surface Low Impact Development features due to existing right-of-way constraints. 	<p>Grade: B</p> <ul style="list-style-type: none"> Minimal anticipated impacts to vegetation or landscaping. Minimal opportunity for landscape enhancements due to limited right-of-way. No anticipated opportunity to incorporate surface Low Impact Development features due to right-of-way constraints. 	<p>Grade: C</p> <ul style="list-style-type: none"> Greater anticipated impacts to vegetation and landscaping from Stevenson Street to Victoria Road than Option 2.1. Minimal opportunity for landscape enhancements due to limited right-of-way. No anticipated opportunity to incorporate surface Low Impact Development features due to right-of-way constraints. 	<p>Grade: C</p> <ul style="list-style-type: none"> Greater anticipated impacts to vegetation and landscaping from Stevenson Street to Victoria Road than Option 2.1 (similar to Option 2.2). Minimal opportunity for landscape enhancements due to limited right-of-way. No anticipated opportunity to incorporate surface Low Impact Development features due to right-of-way constraints.
Socio-Economic Environment	<p>Grade: B</p> <ul style="list-style-type: none"> Option aligns with TMP and Official Plan policies aimed at providing multi-modal transportation corridors and improving health of citizens through provision of safe spaces to enjoy physical activity. No anticipated property impacts. Limited opportunities to add any streetscaping features. 	<p>Grade: B</p> <ul style="list-style-type: none"> Option aligns with TMP and Official Plan policies aimed at providing multi-modal transportation corridors and improving health of citizens through provision of safe spaces to enjoy physical activity. No anticipated property impacts. Limited opportunities to add any streetscaping features. 	<p>Grade: D</p> <ul style="list-style-type: none"> Option aligns with TMP and Official Plan policies aimed at providing multi-modal transportation corridors and improving health of citizens through provision of safe spaces to enjoy physical activity. Minor property impacts anticipated. Lack of space for additional streetscaping options resulting from implementing wide pathways on either side of the roadway, reducing the visual interest of the streetscape. Potential edge impacts to Skov Park. 	<p>Grade: C</p> <ul style="list-style-type: none"> Option aligns with TMP and Official Plan policies aimed at providing multi-modal transportation corridors and improving health of citizens through provision of safe spaces to enjoy physical activity. Minor property impacts anticipated. Lack of space for additional streetscaping options resulting from implementing wide sidewalks and cycle tracks on either side of the roadway would reduce the visual interest of the streetscape.

Category	Option 1: Protected Cycling Lanes	Option 2.1: Multi-Use Pathway, One Side	Option 2.2: Multi-Use Pathways, Both Sides	Option 3: Cycle Tracks
Cultural Environment	<p>Grade: A</p> <ul style="list-style-type: none"> Potential impact to Guelph Cenotaph landscaping/walkway. No other impacts to cultural heritage properties or resources anticipated. 	<p>Grade: A</p> <ul style="list-style-type: none"> Potential impact to Guelph Cenotaph landscaping/walkway. No other impacts to cultural heritage properties or resources anticipated. 	<p>Grade: C</p> <ul style="list-style-type: none"> Potential impact to Guelph Cenotaph landscaping/walkway. Edge impacts to 3 other properties with cultural heritage value or potential (no impacts to buildings anticipated). 	<p>Grade: B</p> <ul style="list-style-type: none"> Potential impact to Guelph Cenotaph landscaping/walkway. Edge impacts to 2 other properties with cultural heritage value or potential (no impacts to buildings anticipated) provided EMS does not require a centre turn lane.
Anticipated Cost¹	<p>Grade: B</p> <ul style="list-style-type: none"> Estimated capital cost of \$6.2 million. Annual winter maintenance for active transportation doubles. Low physical barriers between vehicular and cycling infrastructure have the potential to damage plows. 	<p>Grade: A</p> <ul style="list-style-type: none"> Estimated capital cost of \$7.2 million. Annual winter maintenance for active transportation increases by 50 percent as sidewalk plows will need to make two passes on one side to clear multi-use path. Replacement of the multi-use path required on a 20-year cycle rather than 40-year cycle of concrete sidewalks. 	<p>Grade: C</p> <ul style="list-style-type: none"> Estimated capital cost of \$13.6 million. Annual winter maintenance budget for active transportation doubled. Replacement of the multi-use path required on a 20-year cycle rather than 40-year cycle of concrete sidewalks. 	<p>Grade: D</p> <ul style="list-style-type: none"> Estimated capital cost of \$15.1 million. Annual winter maintenance budget for active transportation doubled. Replacement of the multi-use path required on a 20-year cycle rather than 40-year cycle of concrete sidewalks.

¹ Capital infrastructure cost estimates in this table are high-level functional cost estimates. A more detailed cost estimate was completed for the preferred design option (Section 5.1.2).

Category	Option 1: Protected Cycling Lanes	Option 2.1: Multi-Use Pathway, One Side	Option 2.2: Multi-Use Pathways, Both Sides	Option 3: Cycle Tracks
Conclusion	<p>Grade: A</p> <p>This option meets the majority of AAA design requirements, aligns with the TMP, and has the least anticipated impacts on the natural, social, and cultural environments compared to other options.</p> <p>Feasibility of implementing this cross-section north of Arthur Street is dependent on reaching a solution that is acceptable to EMS and fits within the available ROW.</p>	<p>Grade: B</p> <p>Due to anticipated conflicts on shared pedestrian and cyclist operating spaces, particularly on steep sections, as well as not providing cycling access to the east side of the roadway, this option is not considered a desirable solution.</p> <p>This solution does, however, allow for implementation of cycle facilities on Eramosa Road while maintaining three vehicular lanes. This situation is preferred by EMS.</p>	<p>Grade: C</p> <p>Due to anticipated conflicts on shared pedestrian and cyclist operating spaces, particularly on steep sections, as well as a significant increase in cyclist/vehicle conflict points at intersections, this option is not considered a desirable solution.</p> <p>This solution does, however, allow for implementation of cycle facilities on Eramosa Road while maintaining three vehicular lanes along the majority of the corridor. This situation is preferred by EMS.</p>	<p>Grade: A</p> <p>This option is most closely aligned with AAA design requirements, aligns with the TMP, and has limited anticipated impacts on the natural, social, and cultural environments.</p> <p>Feasibility of implementing this cross-section north of Arthur Street is dependent on reaching a solution that is acceptable to EMS and fits within the available ROW.</p>

4.4 Key Constraints

A preferred design option for cycling facilities on Eramosa Road from Arthur Street to Victoria Road has not been identified at this time. While Option 1 (Protected Bike Lanes) and Option 3 (Cycle Track) score highest in the evaluation, the ideal design for these facilities would reduce Eramosa Road to two lanes in several sections. Emergency Services has indicated a minimum three lane cross-section on Eramosa Road is required to facilitate timely access to the Guelph General Hospital.

There are significant constraints associated with accommodating sidewalks, a three-lane cross-section, and either cycle tracks or protected bike lanes on Eramosa Road. The right-of-way in the area is narrow, particularly between Arthur Street and Stevenson Road, where a number of heritage properties are directly adjacent to the existing sidewalks (**Figure 6**). There are also significant overhead utilities that require space within the right-of-way. Burying these utilities is expected to be too costly to include in this project.

Figure 6: Photo of Eramosa Road at Mitchell Street, Looking North



Along Eramosa Road from Arthur Street to Delhi Street, geometric constraints, retaining walls, and the presence of heritage properties abutting the roadway preclude a three-lane cross section. The section from Delhi Street to Meyer Drive generally has larger building setbacks, but includes a retaining wall north of Delhi Street and a number of heritage properties. From Meyer Drive to Victoria Road, there is generally more space in the ROW and few heritage properties, but the additional space has been allocated to streetscaping, and a large retaining wall is found north of Callander Drive that restricts available space.

The only option that contemplated maintaining a three lane cross-section throughout the corridor is Option 2.1 (Multi-Use Pathway, One Side). However, Option 2.1 does not provide equal cycling access to both sides of the roadway, creating issues for connectivity as well as safety. Additionally, multi-use pathways result in pedestrians using a shared facility, which is not ideal on Eramosa Road as cyclists can reach high speeds on the steep downhill segments along the corridor.

It is recommended the City continue exploring the technical feasibility of AAA cycling facilities along Eramosa Road north of Arthur Street; however, at present they have been identified as infeasible.

5.0 Preferred Design Options

Due to variations in the feasibility of implementing AAA cycling facilities along its entire length, the Eramosa Road study corridor has been divided into two segments, described below.

5.1 Woolwich Street to Arthur Street

This study has determined that AAA cycle facilities can be implemented between Woolwich Street and Arthur Street. Option 1 (Protected Bike Lanes) has been selected as the preferred design option for this segment of Eramosa Road and is recommended to proceed to detailed design.

Eramosa Road from Woolwich Street to Arthur Street is a critical section for active transportation users. Eramosa Road intersects with two existing east-west bike routes (Arthur Street and the TCT). The City's 2012 Cycling Master Plan proposes a third route intersecting with Eramosa Road, running from Woolwich Street to the west and on to Wyndham Street North (**Appendix D**). This proposed route would serve as a major connection to downtown Guelph. As such, the intersection of Eramosa Road and Woolwich Street is an important gateway into the downtown for cyclists coming from neighbourhoods to the north and northwest.

In general, the proposed improvements consist of reconfiguring the existing roadway. Minor expansions of the roadway footprint are anticipated between Woolwich Street and the TCT; however, these expansions are limited to existing disturbed areas. No private property acquisition is expected to be required to accommodate the proposed improvements. The design will be refined as this project progresses through future design stages.

5.1.1 Major Features of the Conceptual Design

The conceptual design drawings for Eramosa Road from Woolwich Street to Arthur Street are included in **Appendix N**. The following key features are included in the recommended design:

Protected Intersection: A protected intersection is proposed at Woolwich Street to provide physically separated spaces for cyclists, pedestrians, and vehicles. The intent is

to improve safety and comfort for all users by minimizing potential conflicts points. Cyclists will complete left turns through a two-stage process that involves travelling counter-clockwise outside the vehicular lanes and parallel to pedestrians. “Right on red” turn restrictions can be considered during the detailed design stage to further reduce conflicts.

Design treatments at both intersections in this segment are to be reviewed during detailed design. Special attention is required at the Woolwich Street protected intersection, which should include the following details:

- Sufficient cyclist queueing space (minimum 1.8 m) should be provided so cyclists do not block the cycling facility while waiting to cross the street;
- Cross-rides should be set back by a sufficient distance (ideally one car length) to improve driver visibility of cyclists and reduce turn conflicts; and
- Medians should extend beyond the crosswalk and cross-ride to provide pedestrians and cyclists with a protected refuge in case they cannot cross the entire width of the street in one light cycle.

The intersection approaches would be served by unidirectional protected bike lanes along the west approach on Woolwich Street and on Wyndham Street. The design of pedestrian and cyclist facilities on Wyndham Street will be confirmed separately by the City through the Wyndham Street Class EA. The east approach from Woolwich Street is not identified as a cycling route in the Cycling Master Plan; however, a short section of raised unidirectional cycle tracks is included in the conceptual design (**Appendix N**). This improvement is recommended to create a fully protected intersection and improve safety for cyclists coming from all approaches.

The crossing of the TCT over Eramosa Road presents a challenging design issue. The TCT is a key component of Guelph’s active transportation network. Ideally, curb cuts and a signalized crossing would allow TCT users to continue on a direct path and safely cross Eramosa Road mid-block. Several constraining factors prevent this treatment:

- The proximity of the trail crossing to the Guelph Junction Railway tracks;
- The proximity to the Eramosa Road/Woolwich Street intersection; and
- The grade change from Woolwich Street to the crossing.

For the reasons listed above, it is recommended that trail users be directed to the protected intersection at Woolwich Street to cross safely.

Bi-directional Cycling Facilities: Bi-directional cycling facilities are proposed on both sides of Eramosa Road between the Woolwich Street intersection and the TCT. These bi-directional facilities will allow TCT users to safely navigate to the protected intersection to cross Eramosa Road and return to the trail. On the west side, a multi-use pathway is proposed due to space constraints. The multi-use pathway transitions to a protected bike lane at the Woolwich Street intersection to separate cyclists and pedestrians, due to high pedestrian and cyclist volumes at this location. On the east side, a bi-directional cycle track and sidewalk are proposed to separate users. This treatment ties in with the cycle track from the Woolwich Street approach east of Eramosa Road and connects users to the TCT on the east side of Eramosa Road.

Unidirectional Protected Bike Lanes: North of the TCT, unidirectional protected bike lanes provide cyclists with separation from vehicle lanes and connect users to Arthur Street North and the remainder of the Eramosa Road corridor.

Pedestrian Crossing Relocation: The relocation of the existing signalized pedestrian crossing at Mitchell Street to Arthur Street is proposed to improve active transportation connectivity at this location. Arthur Street is currently a signed bike route along a low-volume local street that connects to the TCT by way of the Norwich Street Bridge and the Heffernan Street Bridge. There is currently no signalization at Arthur Street, which can lead to difficulties for active transportation users wanting to cross Eramosa Road. The new signalized intersection at Arthur Street will replace the existing signalized pedestrian crossing at Mitchell Street to avoid unnecessary detours for active transportation users at this junction between two cycling routes.

Raised Cycling Facilities: Raised cycling facilities are proposed at the transit stops south of Arthur Street. Protected bike lanes will be ramped up to curb height where they cross in front of a transit stop. This will provide a level, accessible connection across the cycle lane for transit riders. Pavement markings, signage, and tactile strips will be used to communicate pedestrian priority and to communicate to individuals with visual impairment that they are moving outside the limits of the sidewalk or transit platform.

5.1.2 Estimated Capital Cost

Based on the conceptual design, the estimated capital cost to construct the proposed improvements from Woolwich Street to Arthur Street is \$2.3 million. This cost estimate includes high-level estimates to upgrade the existing signalized intersection at Woolwich Street to a protected intersection, and to relocate the existing signalized pedestrian crossing at Mitchell Street to Arthur Street. The Class C cost estimate for the recommended design is included in **Appendix O**. Additional notes are included within the cost estimate for reference.

5.1.3 Additional Design Considerations

The following sections outline additional considerations that should be incorporated into the detailed design for the corridor.

5.1.3.1 Stormwater Management

Opportunities may exist to include Low Impact Development (LID) measures within grassed boulevards when the corridor is reconstructed. Preliminary identification of opportunities for LID measures is included in **Appendix E**. Opportunities to incorporate LID measures within the study corridor should be explored through the ongoing Stormwater Management Master Plan update.

As the project is located in a source water protection area, infiltration based LIDs may not be desirable. Filtration LID measures may be more suitable, which pass surface runoff through a filter medium. The treated stormwater is then collected by a perforated underdrain that outlets to a storm sewer, or natural outlet. Any filtration alternative would require impermeable lining to prevent infiltration, or a gate/valve that could prevent runoff from entering the feature during winter months. Enhanced grassed swales, bioretention cells, permeable hardscapes, tree root support systems, subsurface sand filters, and rain gardens are examples of LID filtration features that can treat surface runoff through filtration.

5.1.3.2 Cycling Supportive Design Features

The following cycling-supportive design features should be incorporated into the detailed design for Eramosa Road, if and where appropriate:

- Bike racks;
- On-street tool kits;
- Pedestrian level lighting;
- Bike signals;
- Street trees; and
- Pavement markings and signs.

5.1.4 Impacts and Mitigation

The anticipated impacts and recommended mitigation measures for the project, based on the conceptual design, are summarized in **Table 4**. Overall, minimal environmental impacts are anticipated. Mitigation measures outlined in **Table 4** are to be refined during the future detailed design phase and incorporated into the construction contract.

Table 4: Anticipated Impacts and Recommended Mitigation Measures

Category	Environmental Feature	Impacts and Mitigation
Natural Environment	Speed River	<p>No vegetation removal or work on the banks of the Speed River are anticipated based on the conceptual design. Should the extent of construction change during detailed design, additional recommended mitigation measures for the Speed River are outlined in Table 6 of the EIS (Appendix H; Dillon, December 2022).</p> <p>Develop and implement an Erosion and Sediment Control Plan that would prevent sedimentation into the Speed River. The Erosion and Sediment Control Plan should include the use of silt fencing, silt socks, straw bales, and other suitable erosion prevention measures.</p> <p>The operation of construction equipment and road painting have the potential for leaks and spills into the Speed River and impacts to water quality and associated impacts to fish, turtles, their habitat, and to Significant Wildlife Habitat for Waterfowl Overwintering Areas. Develop and implement a Spill and Leak Prevention and Response Plan.</p>

Category	Environmental Feature	Impacts and Mitigation
	Wildlife	The establishment of buffers from the natural heritage features is expected to minimize potential impacts to wildlife, including potential SAR habitat within the study area. Strategies to mitigate impacts to general wildlife prior to and during construction are provided within the EIS included in Appendix H .
	General	An Environmental Monitoring Plan should be developed and carried out through the duration of construction activities on-site to review that the erosion and sediment control measures operate effectively and to monitor the impact, if any, on the natural environment.
Water Resources	Drainage and stormwater management	<p>Minimal to no increase in impervious surface area is anticipated as the proposed improvements consist of reconfiguring the existing roadway. Minor expansions of the roadway footprint are anticipated between Woolwich Street and the TCT; however, these expansions are limited to existing disturbed areas.</p> <p>Opportunities to incorporate LID measures within the study corridor should be explored through the ongoing Stormwater Management Master Plan update. Preliminary identification of opportunities for LID measures is included in Appendix E.</p>

Category	Environmental Feature	Impacts and Mitigation
	Source water	Potential for impacts to source water due to construction activities within sensitive areas throughout the study corridor. A groundwater study should be completed during detailed design to determine potential impacts, mitigation measures, and permitting requirements (if any).
Socio-Economic Environment	Construction-related disruptions	Implementation of the cycling facilities will cause localized disruptions during construction, including lane closures on Eramosa Road and at intersections, as well as noise, vibration, and dust. Traffic control measures are required to follow Ontario Traffic Manual – Book 7. Noise control measures including timing restrictions and standard mitigation measures should be developed during detailed design and incorporated into the construction contract in accordance with the local noise by-law. If public complaints are received during construction, they should be addressed as required.

Category	Environmental Feature	Impacts and Mitigation
Cultural Environment	Built heritage resources and cultural heritage landscapes	<p>No direct impacts to known or potential cultural heritage resources are anticipated.</p> <p>Potential for vibration impacts and accidental impacts is low; however, the location of all identified built heritage resources and cultural heritage landscapes is outlined in Appendix K should be considered in decisions regarding construction laydown. Locations of heritage properties should be clearly marked on all project mapping and workers should be made aware of heritage properties in the vicinity of their workspace.</p> <p>As design and construction of the cycling facilities progresses, design should continue to avoid encroachment onto the heritage properties identified in Appendix K. Should it be determined that there is no other technically feasible location for infrastructure, encroachment should be minimized.</p> <p>Significant changes to design in the vicinity of the heritage properties listed in Appendix K should be reviewed for potential impacts to the cultural heritage value or interest or heritage attributes of identified cultural heritage resources.</p>

Category	Environmental Feature	Impacts and Mitigation
	Archaeological resources	Potential for impact to archaeological resources within portions of the study area that retain archaeological potential. Within these areas, Stage 2 test pit surveys at 5 m intervals are required in accordance with Section 2.1.2 of the Standards and Guidelines for Consultant Archaeologists (Ministry of Heritage, Sport, Tourism and Culture Industries, 2011). Should deeply buried archaeological materials be encountered during construction, all work must cease and a professionally licenced archaeologist shall be consulted to assess the cultural heritage value and significance of any such archaeological deposits.
Engineering	Utilities	Coordination with affected utilities is required during detailed design when impacts are known.

5.1.5 Implementation Plan

The Implementation Phasing Memo (**Appendix P**; Dillon, March 2023) presents this project as part of a larger program of construction including cycling improvements on Gordon Street and College Avenue. The cycling improvements on Eramosa Road from Woolwich Street to Arthur Street are identified as following after the works on College Avenue and Gordon Street. However, as noted in the memo, this project is not dependent on completion of the cycling improvements on Gordon Street or College Avenue.

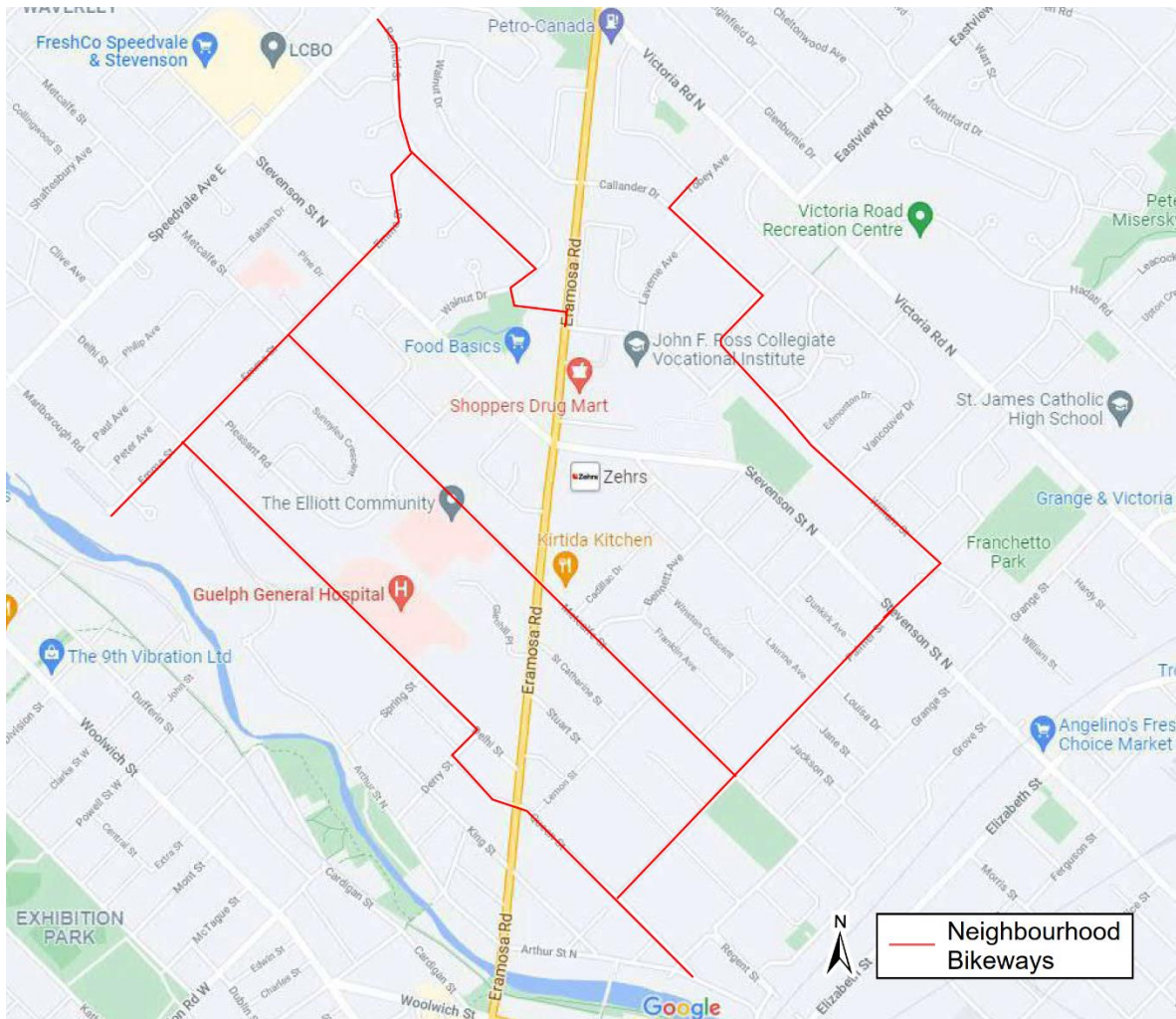
5.2 Arthur Street to Victoria Road

Due to outstanding issues related to traffic operations and physical constraints, the feasibility of implementing AAA cycle facilities on Eramosa Road north of Arthur Street could not be confirmed through this study. While cycle tracks have been identified as the preferred design option for this segment, significant additional work must be completed before feasibility can be confirmed. As a result, no cycling improvements are recommended on Eramosa Road from Arthur Street to Victoria Road at this time.

In lieu of cycling improvements to Eramosa Road north of Arthur Street, creation of new local neighbourhood bikeways on the surrounding streets is recommended. A conceptual layout of potential new neighbourhood bikeways to improve cycling connectivity to key destinations along Eramosa Road is outlined in **Figure 7**. This layout is preliminary and is provided for reference purposes only.

The layout of neighbourhood bikeways in this area should be considered in the future Cycling Master Plan update. These bikeways should include pavement markings and signage to alert drivers to the presence of a shared facility and to assist with wayfinding to key destinations along Eramosa Road in the absence of protected cycling infrastructure on Eramosa Road.

Figure 7: Conceptual Layout of Potential New Neighbourhood Bikeways (imagery source: Google Maps)



In the long-term future, the ideal condition would be to expand AAA cycling infrastructure along Eramosa Road north of Arthur Street to Victoria Road. At this time, the preferred design options for this segment are either Option 1 (Protected Bike Lanes) or Option 3 (Cycle Tracks). **Section 6.2** discusses additional work that is recommended to further investigate the constraints and develop a feasible design for cycling improvements on this segment of the Eramosa Road study corridor.

6.0 Recommended Future Work

Due to variations in the feasibility of implementing AAA cycling facilities along Eramosa Road study corridor, the recommendations for future work have been divided into two segments, described below.

6.1 Woolwich Street to Arthur Street

6.1.1 Additional Recommended Studies

The following additional studies are recommended prior to implementing protected bike lanes on Eramosa Road from Woolwich Street to Arthur Street:

- Complete a detailed topographical survey of the corridor within 5 m of the right-of-way (ROW) mid-block and within 10 m of the ROW at the Woolwich Street protected intersection at a minimum;
- Review public comments regarding the conceptual design and adjust the design where appropriate to address concerns;
- Conduct a Tree Inventory and develop a Tree Protection Plan for lands within the proposed municipal ROW, including documentation of trees with a diameter at breast height of 10 centimeters or greater;
- Explore opportunities to incorporate LID measures within the study corridor through the ongoing Stormwater Management Master Plan update;
- Conduct a geotechnical and groundwater study ahead of detailed design to determine potential impacts, mitigation measures, and permitting requirements (if any) to minimize source water impacts as well as to inform design of LID measures;
- Conduct a condition survey of the existing Eramosa Road bridge;
- Stage 2 archaeological assessment is required within portions of the study area that retain archaeological potential, including consultation with First Nations;
- A lighting study should be completed to assess and confirm that existing streetlight light levels are sufficient to meet cyclist and pedestrian needs;
- Updated utility information should be compiled and reviewed as a component of detailed design. A minimum Subsurface Utility Engineering investigation with accuracy Level B is recommended.

- Detailed design of AAA cycling infrastructure should include consideration for multiple design vehicle types, including recumbent bicycles; and
- An additional traffic impact study should be completed ahead of the detailed design of the Woolwich Street and Arthur Street intersections, to confirm vehicular lane requirements and assess the need and feasibility of implementing right on red turn restrictions.

6.1.2 Consultation

The following future consultation activities are recommended to be completed as the project proceeds through detailed design:

- If property impacts are identified during detailed design, consult with impacted property owners regarding required property acquisition;
- Engage the Indigenous communities contacted as part of this study prior to conducting further archaeological work to determine their level of interest and involvement; and
- Consult with affected utility companies during detailed design when utility impacts are known.

6.1.3 Anticipated Permits and Approvals

It is anticipated that the following approvals will need to be obtained prior to construction start:

- A letter from the Ministry of Citizenship and Multiculturalism indicating that the required archaeological assessment report(s) have been entered into the Ontario Public Register of Archaeological Reports is required prior to any ground disturbance;
- The requirement for a permit from the Grand River Conservation Authority should be confirmed during detailed design; and
- The requirement for an Environmental Compliance Approval from the Ministry of the Environment, Conservation and Parks should be confirmed during detailed design.

6.1.4 Construction Monitoring

Construction monitoring requirements should be developed during the detailed design stage once project specific details are determined and in accordance with any permits, approvals, licenses, or authorizations obtained prior to construction. If, during detailed

design or construction, changes are required to identified mitigation measures, they should be implemented through provisions in the construction contract as administered by the contract administrator.

6.2 Arthur Street to Victoria Road

For the segment of the Eramosa Road study corridor north of Arthur Street, the following additional technical work is recommended to determine the feasibility of implementing AAA cycle facilities:

- Complete a detailed topographical survey for the entire corridor, including delineation of the footprints of heritage buildings that directly abut the ROW;
- Complete a condition survey of existing concrete retaining walls along the corridor;
- Consult with Emergency Services regarding opportunities to meet operational requirements with a two-lane cross-section that either includes wider lanes and/or a painted or mountable median that could be used to pass between stopped cars during an emergency;
- If construction of the proposed cycling improvements on Eramosa Road from Woolwich Street to Arthur Street is completed prior to determining the feasibility of the segment north of Arthur Street, post-implementation traffic surveys should be undertaken to determine the project's effect on traffic levels in the corridor;
- Updated utility information should be compiled and reviewed to inform the next stage of design. A minimum Subsurface Utility Engineering investigation with accuracy Level B is recommended.
- If a potentially feasible design concept can be determined, the requirements for future work should be assessed; and
- Include the identification of new neighbourhood bike routes in the Cycling Master Plan update.