DILLON CONSULTING

City of Hamilton

Rymal Road

(Upper James Street to Dartnall Road) Municipal Class Environmental Assessment Phases 1 to 4

Environmental Study Report

February 2025

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Appendices (provided as a separate document)

Acronyms, Abbreviations, Definitions

AA	Archaeological Assessment
AADT	Average Annual Daily Traffic
AM	Morning
APEC	Area of Potential Environmental Concern
APU	Assessment of Past Uses
BHA	Butternut Health Assessment
BRT	Bus Rapid Transit
CC	Coefficient of Conservatism
COPC	Contaminants of Potential Concern
CRZ	Critical Root Zone
DBH	Diameter at Breast Height
Dillon	Dillon Consulting Limited
EA	Environmental Assessment
e.g.	exempli gratia (for example)
EMME	Equilibre Multimodal/Multimodal Equilibrium
EMP	Environmental Monitoring Plan
ERIS	Environmental Risk Information Services
ESR	Environmental Study Report
FAC	Fisher Archaeological Consulting
GGH	Greater Golden Horseshoe
GRID	Growth Related Integrated Development Strategy

Ha	Hectares
HCA	Hamilton Conservation Authority
HCCC	Haudenosaunee Confederacy of Chiefs Council
HOV	High Occupancy Vehicle
HSR	Hamilton Street Railway
HUOPA	Urban Hamilton Official Plan Amendment
HWFN	Huron-Wendat First Nation at Wendake
i.e.	id est (that is)
IGF	Information Gathering Form
km	Kilometre(s)
km/h	Kilometres per hour
LID	Low Impact Development
LOS	Level of Service
LRT	Light Rail Transit
m	Metre(s)
m^2	Square metre(s)
mm	Millimetre
MECP	Ministry of the Environment, Conservation and Parks
MCEA	Municipal Class Environmental Assessment
MCFN	Mississaugas of the Credit First Nation
MNO	Métis Nation of Ontario
MNR	Ministry of Natural Resources
MUP	Multi-Use Pathway

NEP	Niagara Escarpment Plan
NHIC	Natural Heritage Information Centre
O. Reg.	Ontario Regulation
OPA	Official Plan Amendment
OPRAR	Ontario Public Register of Archaeological Reports
OTM	Ontario Traffic Manual
PCA	Potentially Contaminating Activity
PIC	Public Information Centre
PM	Afternoon
PPS	Provincial Policy Statement
RHPZ	Root Harm Prevention Zone
RIRO	Right-in Right-out
ROW	Right-of-Way
RTP	Regional Transportation Plan
SAP	Sampling Analysis Plan
SAR	Species at Risk
SARA	Species at Risk Act
SCC	Species of Conservation Concern
SCR	Soil Characterization Report
SNGR	Six Nations of the Grand River Elected Council
SWH	Significant Wildlife Habitat
TAC	Technical Advisory Committee
TAC GDG	Transportation Association of Canada Geometric Design Guidelines

TDM	Transportation Demand Management
TMP	Transportation Master Plan
TSM	Transportation System Management
TWLTL	Two-Way Left Turn Lane
UHOP	Urban Hamilton Official Plan
VPZ	Vegetation Protection Zone

Executive Summary

The City of Hamilton retained Dillon Consulting Limited to complete a Municipal Class Environmental Assessment (MCEA) study for improvements to Rymal Road from Upper James Street to Dartnall Road. This study aims to address current transportation issues and create a well-connected multi-modal transportation corridor. The focus of the study is on improving safety, efficiency, and multi-modal connectivity in the corridor.

As part of this study, five alternative solutions were developed and evaluated:

1. Do nothing;
2. Implement transportation demand management (TDM) and transportation system management (TSM) strategies;
3. Create additional travel lanes and implement TDM and TSM strategies;
4. Create high-occupancy vehicle lanes and implement TDM and TSM strategies; and,
5. Improve other roads.

Each alternative was assessed based on criteria including its impact on the social and natural environment, transportation infrastructure and travel, and cost considerations. The preferred solution is to create additional travel lanes (largely within the existing road right-of-way) and implement TDM and TSM strategies. Key advantages of this solution include:

- Addresses the vehicular travel delay that was identified based on traffic forecasting;
- Provides spaces for all modes of transportation including cyclists and pedestrians;
- Improves transit travel times and amenities;
- Complements the existing Rymal Road designs west of Upper James Street and east of Dartnall Road; and,
- Expected to result in limited adverse impacts on social and natural environment, which can be addressed through mitigation.

An online Public Information Centre (PIC) was held in March 2022 to provide an overview of the project and gather feedback on the evaluation completed to identify the preferred solution. Mixed responses to road widening were received, with some participants expressing that it would lead to more traffic and others supportive of expansion to relieve current traffic congestion. Other comments included concerns

about existing speeding, support for active transportation and transit improvements, streetscaping suggestions, and concerns about tree removals and other environmental impacts. Comments related to the design and impacts helped to inform the development and evaluation of alternative design concepts.

Alternative design concepts for the preferred solution were developed through a screening of potential design options, considering constraints in the project area. Three alternative design concepts were carried forward for evaluation, all with the same roadway alignment and lane configuration:

1. Dual MUPs (on both sides of the road);
2. North Side MUP (and sidewalk on south side of the road); and,
3. Dual Cycle Tracks (on both sides of the road, in addition to sidewalks).

Through a comparative evaluation, Alternative 2 was selected as the preferred design concept, primarily due to its smaller footprint when compared to the other alternatives that were considered. The key advantages can be summarized as follows:

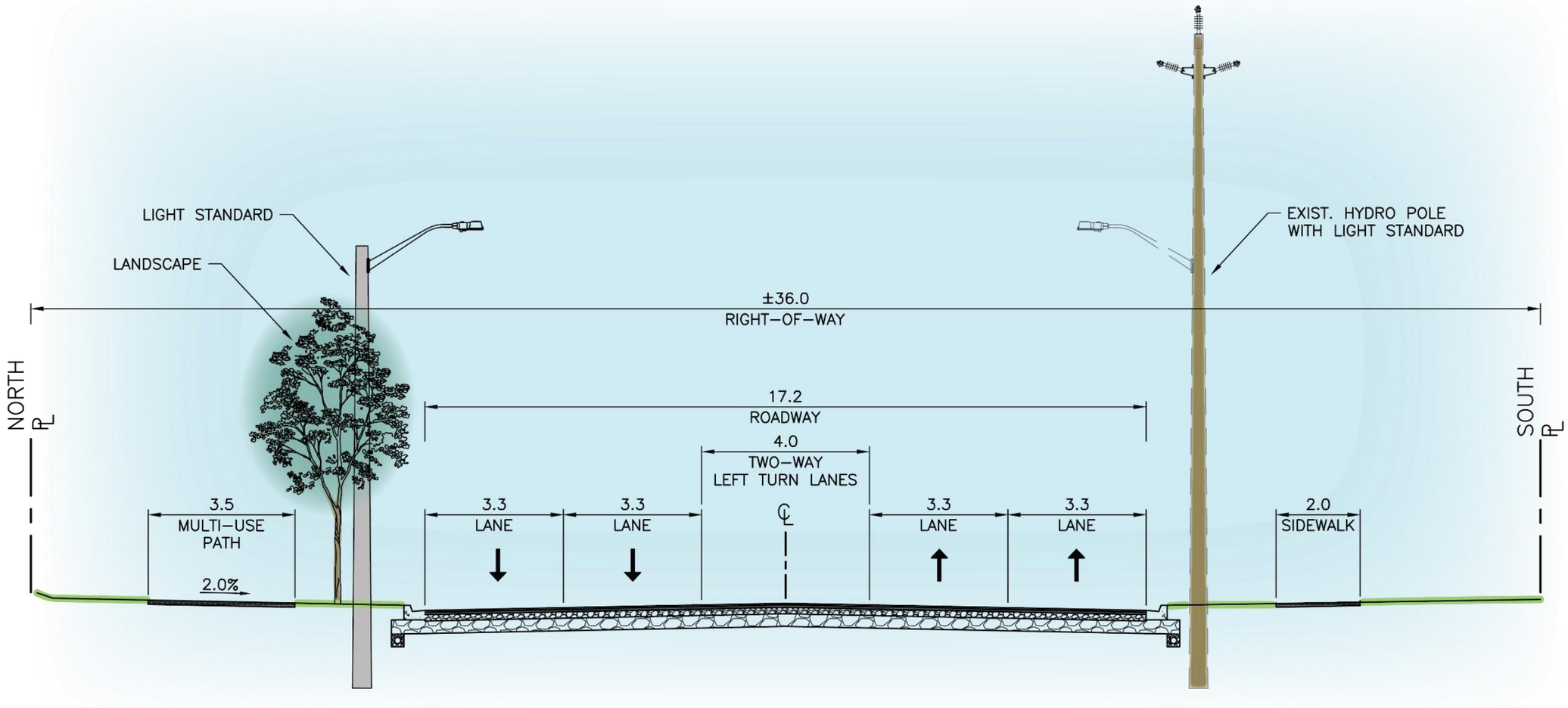
- Least impact to existing mature vegetation (street trees) along the corridor;
- Greatest remaining surface area to accommodate green stormwater management features (such as bioswales), new street trees, and other streetscaping;
- Lowest estimated capital cost, including the least impact to existing utilities; and,
- Lowest estimated long-term operations and maintenance cost.

A second online PIC was held in September 2023 to present the preferred design concept and gather feedback. Comments were received regarding specific design details, which resulted in minor refinements to the design as outlined in this report.

The recommended conceptual design for Rymal Road from Upper James Street to Dartnall Road includes the following key features, as shown in **Figure ES-1**:

- Two 3.3 metre (m) vehicular lanes in each direction;
- A 4 m centre left turn lane;
- A 3.5 m MUP on the north side; and,
- A 2 m sidewalk on the south side.

Figure ES-1: Typical Mid-block Cross-Section Illustration



TYPICAL CROSS-SECTION
RYMAL ROAD

The conceptual design includes space for landscaping, utility poles, and light standards on both sides of the roadway, with a width of approximately 2.5 m that varies throughout the corridor. There is also additional space within the right-of-way to accommodate low-impact development features. Details of these and other design features will be developed and refined during the future detailed design phase.

In general, significant impacts are not anticipated based on the conceptual design. A total of approximately 630 square metres (m^2) of private land is anticipated to be required from 4 private properties at the Upper James Street intersection. Minor grading impacts are expected at a number of locations along the corridor but will not require land acquisition.

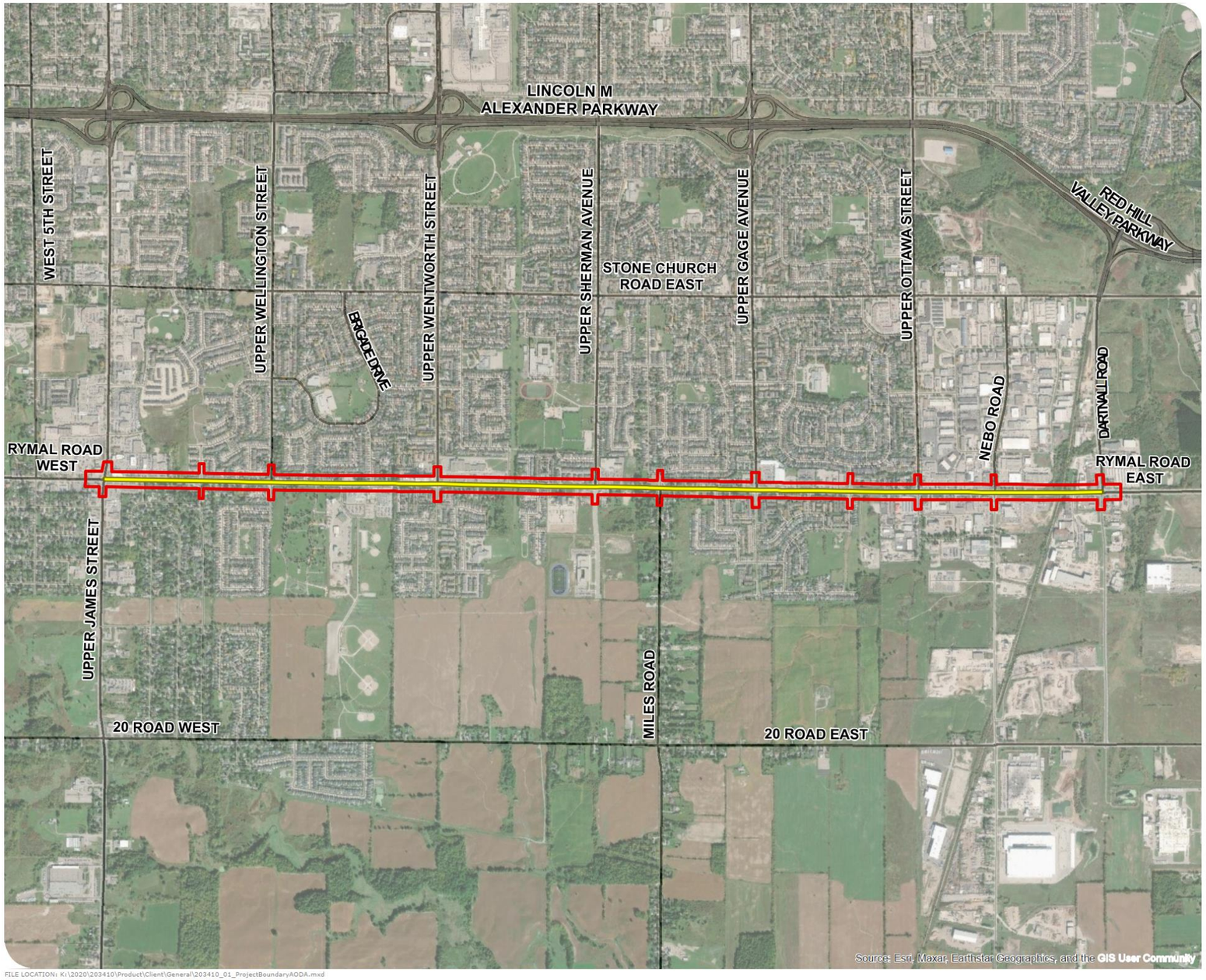
Based on the preliminary natural heritage impact assessment, the majority of the potential impacts to natural heritage features can be mitigated using standard mitigation measures for construction as outlined in this report. Further study is required during detailed design to assess impacts to a Butternut tree on private property adjacent to the Study Area and woodlands at various locations along the corridor. It is recommended (where site access permits) that a Butternut Health Assessment be completed to confirm the retainable status of the Butternut. Any encroachment into the woodlands may require submission of an Information Gathering Form to the Ministry of the Environment, Conservation and Parks as encroachment may impact potential Species at Risk (SAR) bat habitat.

The total estimated costs based on the conceptual design are approximately $93 million. A phased implementation approach is recommended, with construction to be split into four segments. Phasing should be planned to minimize overall disruption to the vehicle and pedestrian network.

1.0 Introduction

The City of Hamilton (City) retained Dillon Consulting Limited (Dillon) to complete a Municipal Class Environmental Assessment (MCEA) study for Rymal Road from Upper James Street to Dartnall Road. The project limits extend approximately 5 kilometres (km) from west to east along Rymal Road, as shown in **Figure 1**.

Figure 1: Project Location and Study Area



RYMAL ROAD, HAMILTON, ON

ENVIRONMENTAL STUDY REPORT

STUDY AREA

FIGURE 1

- Study Area
- Project Limits
- Highway
- Major Road
- Minor Road

SCALE 1:19,000

0 250 500 1,000 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, City of Hamilton Open Data, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 20-3410
STATUS: FINAL
DATE: 2024-11-07

FILE LOCATION: K:\2020\203410\Product\Client\General\203410_01_ProjectBoundaryAODA.mxd

1.1 Purpose of the Study

Rymal Road is a critical link in the transportation network, connecting residents within and across the southern limits of Hamilton's urban area. The purpose of this study is to determine the preferred solution and conceptual design for a safer, more efficient, and well-connected multi-modal transportation corridor.

1.1.1 Study Rationale

The following key problems were identified in the Study Area, as described further in **Section 3.0**:

- Limited mode choice;
- Insufficient transit service and amenities;
- Congestion/travel reliability issues;
- Poor pavement condition; and,
- Not consistent with adjoining roadway cross-sections.

This study aims to address existing transportation issues in the Study Area and support the City's transportation and land use policy objectives for the area. Key opportunities include providing multi-modal amenities to support travel reliability and integrating with the street design to the east and west of the project limits as well as planned active transit improvements in the area. Integrating the surrounding cycling routes and trails, and the addition of pedestrian crossings, would also address key concerns for the corridor.

1.2 Environmental Study Report

This Environmental Study Report (ESR) documents the study process, potential project impacts, mitigation measures, and commitments for future work. In accordance with the requirements of the MCEA, this ESR is being made available for a 30-day public, agency, and Indigenous community review period.

The preparation and filing of this ESR completes the planning and conceptual design stage of the project. Following completion of this study, the project will proceed to detailed design and construction.

2.0 Study Approach

This study was completed in accordance with the planning and design process for Schedule C projects under the MCEA (2024). Further details on the study process are provided in the following sections.

2.1 Class Environmental Assessment Process

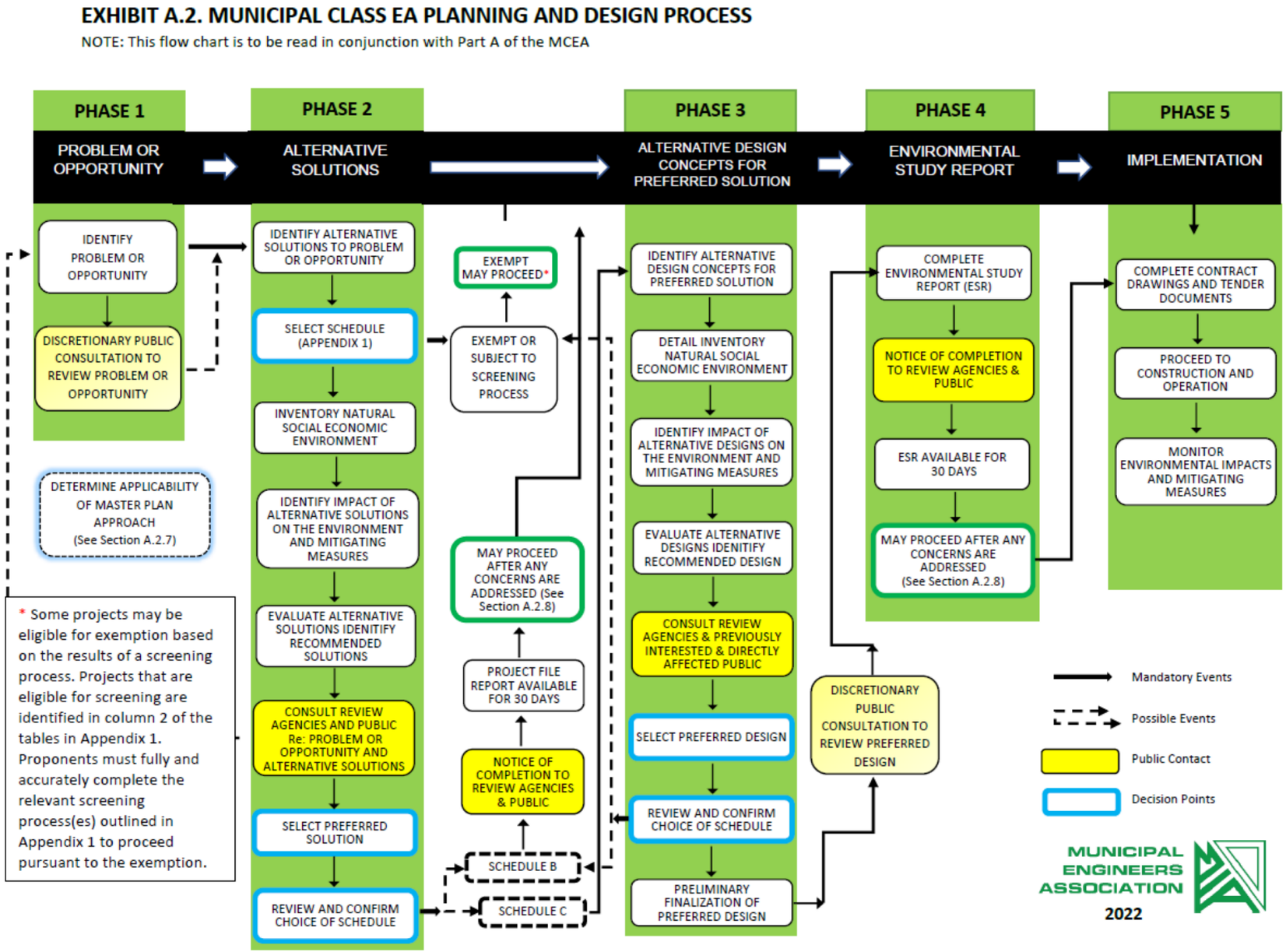
Municipal infrastructure projects must meet the requirements of the Ontario *Environmental Assessment Act* (EA Act). The MCEA (2024), applies to a group or "class" of municipal infrastructure projects which occur frequently and have relatively minor and predictable impacts. These projects are approved under the EA Act if they are planned, designed, and constructed according to the requirements of the MCEA.

Under the MCEA, projects are classified based on the type of work proposed and, for some projects, the anticipated construction costs. The classification of the project determines the planning and design process that is required under the MCEA, as described in **Section 2.1.1**.

The full planning and design process under the MCEA is illustrated **Figure 2**, and includes the following 5 phases:

- Phase 1 – Identify the problem/opportunity to be addressed;
- Phase 2 – Evaluate alternative solutions to address the problem/opportunity;
- Phase 3 – Develop and evaluate alternative design concepts for the preferred solution;
- Phase 4 – Document the study in an ESR; and,
- Phase 5 – Implement the project (detailed design, construction, and environmental monitoring).

Figure 2: MCEA Planning and Design Process (Source: MCEA, 2024)



2.1.1 Project Classes

Three classes of projects are identified in the MCEA:

- **Exempt** projects generally have the lowest complexity and potential for environmental impacts. These projects do not need to follow the MCEA process as they are exempt from the requirements of the EA Act.
  - Some projects with a higher level of complexity and potential for environmental impacts are eligible for exemption, subject to screening. Two screening processes are described in Appendix 1 of the MCEA, one or both of which may apply to a given project.
- **Schedule B** projects generally have a greater potential for environmental impacts, and are required to proceed through the first two phases of the MCEA planning and design process prior to implementation. Accordingly, proponents must inventory existing conditions, identify, and evaluate alternative solutions to the problem/opportunity, and select a preferred solution. They must also consult with relevant agencies, affected members of the public, and Indigenous communities during the study. Following completion of Phase 2 of the MCEA process and publishing of the project file for public review, the project may proceed to detailed design and construction (Phase 5) as long as there are no outstanding concerns.
- **Schedule C** projects require more detailed study, public consultation, and documentation, as they generally have greater potential for impacts. Projects categorized as Schedule C must proceed through all 5 phases of the MCEA planning and design process. This includes evaluation of design concepts for the preferred solution as well as an additional opportunity for public review in Phase 3, and publication of an ESR for public review (Phase 4).

2.1.2 Scope of Environmental Assessment

As noted in **Section 2.0**, this study is following the planning and design process for Schedule C projects. Schedule C is the applicable class for projects that widen a road to increase its vehicular capacity and have an anticipated cost greater than or equal to $3 million (MCEA, 2024, Appendix 1, item 33).

As required for Schedule C projects, this study proceeded through Phases 1 through 4 of the planning and design process depicted in **Figure 2**. In general, the following activities were completed as part of the study:

- The public, stakeholders, Indigenous communities, and agencies were consulted with at key milestones throughout the study, as outlined in **Section 2.2** and **Section 2.3**;
- Existing environmental conditions were reviewed, and a problem and opportunity statement was developed to guide the study (**Section 3.0**);
- Feasible alternative solutions were evaluated to select a preferred solution to address the identified problems and opportunities (**Section 4.0**);
- Alternative design concepts for the preferred solution were developed and evaluated to select the preferred design concept (**Section 5.0**);
- The recommended conceptual design was refined (**Section 6.0**);
- Anticipated environmental impacts were assessed and mitigation measures were developed (**Section 7.0**);
- An implementation plan was developed to guide the future detailed design phase (**Section 8.0**); and,
- This ESR was prepared to document the study.

2.1.3 Section 16 Order (Aboriginal and Treaty Rights)

A request can be made to the Ministry of Environment, Conservation and Parks (MECP) for a Section 16 Order under the EA Act. A Section 16 Order requires a project to complete a higher level of study (i.e., an individual/comprehensive EA), or imposes conditions (e.g., requiring further studies). A Section 16 Order can only be sought on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and Treaty Rights. Requests on other grounds will not be considered.

Further information on Section 16 Order requests is provided in the Notice of Completion, a copy of which is included following the cover page of this report.

2.2 Public & Agency Engagement

The engagement process for this study was aligned with the phases of the planning and design process for Schedule C projects. The aim was to engage in a meaningful and interesting way throughout the study. The following engagement activities were completed as part of the study:

- A Notice of Study Commencement and Public Information Centre (PIC) 1 was issued in March 2022 to introduce the study and advertise the upcoming online PIC;
- Online PIC 1 was held on March 29, 2022, to provide an overview of the study, the problems and opportunities identified, and the evaluation undertaken to identify the preferred solution. Further details on this PIC are provided in **Section 4.3**.
- Online PIC 2 was held on September 19, 2023, to provide an update and gather feedback on the evaluation and identification of the preferred design concept. Further details on this PIC are provided in **Section 5.5**.
- The Notice of Completion is planned to be issued in March 2025 to advertise the opportunity for public, agency, and Indigenous community review of this ESR.

Notices issued as part of the EA were sent to the contact list and posted on the project webpage as outlined in the respective sections.

In addition to public and stakeholder engagement, a Technical Advisory Committee (TAC) was formed for this project, including City staff from various departments. The TAC was consulted throughout the design process, specifically regarding alternative design concepts, evaluation methods, and recommendations. Further information on the TAC consultation is provided throughout **Section 5.0**.

Copies of engagement materials, comments, and responses are included in **Appendix A**. The Notice of Completion for this study is included following the cover page of this report.

2.2.1 Contact List

The contact list for this study includes a total of 1,384 contacts, categorized as follows:

- Local representatives;
- City staff;
- Hamilton Conservation Authority;

- Provincial Ministries;
- Indigenous and Northern Affairs Canada;
- Indigenous communities (listed in **Section 2.3**);
- Local interest groups;
- Utility companies;
- School boards;
- Transportation service providers and authorities; and,
- Local property owners abutting Rymal Road within the project limits.

2.2.2 Project Webpage

A project page was set up for this study on the City's public consultation website, Engage Hamilton, at the link below. The webpage was updated at key milestones during the study.

https://engage.hamilton.ca/rymalea

2.3 Consultation with Indigenous Communities

Representatives from the following Indigenous communities were included in the contact list to receive notices issued throughout the study:

- Haudenosaunee Confederacy of Chiefs Council (HCCC);
- Huron-Wendat First Nation at Wendake (HWFN);
- Métis Nation of Ontario (MNO);
- Mississaugas of the Credit First Nation (MCFN); and,
- Six Nations of the Grand River Elected Council (SNGR).

It is noted that the MECP only listed MCFN and SNGR as required contacts. However, City practices have also established consistent connections with HWFN and MNO.

The City communicated with representatives of each of the Nations listed above and reviewed the project as part of larger coordination meetings with the Nations. Reports were sent for review in cases where interest was expressed by the communities, as outlined below. No correspondence or meeting requests were received from MNO.

The draft Stage 1 Archaeological Assessment (AA) Report (discussed in **Section 3.4.1**) was sent to HCCC, HWFN, MCFN, and SNGR for review in February 2021. No comments

or concerns were received regarding the report, but all four communities requested continued contact regarding future archaeological assessments and the opportunity to provide monitors if fieldwork is planned.

The draft Natural Heritage Existing Conditions Report was sent to HCCC, MCFN, and SNGR for review in March 2021. SNGR questioned why the report was focused on Species at Risk (SAR) and asked whether studies had been conducted to assess impacts on other species and develop mitigation measures. The City responded by clarifying the scope of the Natural Heritage Existing Conditions Report and providing additional information on planned future studies and reports, including this ESR. No further questions or comments were received regarding the report.

Records of communications with Indigenous communities throughout the study are provided in **Appendix A**.

3.0 Existing Conditions

3.1 Study Area and General Conditions

Rymal Road is a major arterial roadway located near the southern boundary of Hamilton's urban area. The project limits extend approximately 5 km along Rymal Road, from Upper James Street in the west to Dartnall Road in the east (**Figure 1**).

Within the project limits, Rymal Road has a three to five lane cross-section, discontinuous sidewalk network, and no cycling facilities. To the west and east of the project limits, Rymal Road has a five lane cross-section. The transition from 5 to 3 lanes east of Upper James Street is pictured in **Figure 3**.

Figure 3: Rymal Road Narrows to 3 Lanes East of Upper James Street

The Study Area that was generally used for the MCEA study is shown in **Figure 1**, and includes:

- Lands within the Rymal Road public right-of-way (ROW) from 100 metres (m) west of Upper James Street to 100 m east of Dartnall Road; and,
- At signalized intersections, the Study Area includes an additional 50 m to the north and south of Rymal Road within the public ROW of the intersecting roads.

Some technical studies completed as part of this MCEA study employed a different study area from what is described above. In such cases, the discipline-specific study area is outlined in the respective section below.

3.2 Background and Related Studies

Two MCEA studies were previously completed for the portions of Rymal Road to the west and east of the project limits. Both studies recommended widening Rymal Road to a total of five lanes, including a centre two-way left turn lane (TWLTL). Key details from the respective ESRs are presented in this section.

3.2.1 Garner Road/Rymal Road and Garth Street

West of Upper James Street, the ESR for Garner Road/Rymal Road and Garth Street (SNC-Lavalin, 2014) recommended the following roadway layout:

- Two 3.75 m through lanes in each direction;
- A 5 m TWLTL;
- A 1.5 m on-street bike lane in each direction; and,
- A 2 m sidewalk in each direction.

In response to concerns from Council, the City committed to investigate road layout modifications to improve safety for cyclists. During the detailed design phase, the City decided to construct a multi-use pathway (MUP) on the north side of Rymal Road instead of on-street bike lanes.

As of November 2024, construction of this project was substantially complete. It was noted MUPs had been constructed on a portion of Garth Street and approximately 400 to 500 m of Rymal Road on either side of Garth Street, from Spadera Drive to Hazelton Avenue.

3.2.2 Improvements to Rymal Road (Dartnall Road to New Trinity Church Corridor)

East of Dartnall Road, the ESR for Improvements to Rymal Road (Dartnall Road to New Trinity Church Corridor) (AECOM, 2011) recommended the following roadway layout:

- Two 3.5 m through lanes in each direction;
- A 5 m TWLTL; and,
- A 1.5 m sidewalk in each direction.

Construction of this project is complete.

3.3 Natural Heritage

This section summarizes the natural heritage conditions surrounding Rymal Road within the project limits. More detailed information is available in the Natural Heritage Report (Dillon, November 2024; **Appendix B**).

A study area of 120 m extending from the Rymal Road centreline was used for the purposes of natural environment review and assessment. The tree inventory study was limited to City-owned trees in the Rymal Road ROW to a maximum of 20 m from the road centreline and private trees with driplines that extend into the ROW.

3.3.1 Background Review

Secondary source information was used to identify known environmental constraint areas, significant natural heritage features such as watercourses, woodlands, and wetlands, and potential wildlife occurrences in relation to the study area. Information sources reviewed to provide an understanding of the study area in the context of the surrounding area included:

- Provincial Policy Statement (2020);
- Growth Plan for the Greater Golden Horseshoe (2020);
- Greenbelt Plan (2017);
- *Endangered Species Act* (2007);
- *Species at Risk Act* (2002);
- Ministry of Natural Resources (MNR) mapping and guides;
- Hamilton Conservation Authority mapping and reports;
- City of Hamilton policies, by-laws, and reports; and,
- Wildlife atlases.

3.3.1.1 Species of Conservation Concern & Significant Wildlife Habitat

Potential for Species of Conservation Concern (SCC) and candidate Significant Wildlife Habitat (SWH) in the Study Area was identified as part of the background review. SWH includes:

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

SCC are defined in the Significant Wildlife Habitat Technical Guide (MNR, 2000) as:

- Species listed as Threatened or Endangered under the federal *Species at Risk Act* (SARA), but not under the provincial *Endangered Species Act*;
- Species that are provincially rare/tracked (i.e., have a Sub-national (provincial) Rank of S1 – Critically Imperilled, S2 – Imperilled, or S3 – Vulnerable); and/or,
- Species that are listed as Special Concern under the *Endangered Species Act*.

A search of the MNR Natural Heritage Information Centre (NHIC) database and other available wildlife atlases was conducted to identify possible occurrences of SCC within or adjacent to the Study Area. Species habitat requirements were compared with the existing habitat within the Study Area to determine the potential for species occurrence(s). The Natural Heritage Report includes a list of SCC with occurrence records in the area and the rationale used to determine the potential for these species and/or their habitat to occur in the Study Area. SCC identified as having the potential to occur within the Study Area are listed in **Table 1**.

Table 1: Species of Conservation Concern with Potential to Occur within the Study Area

Notes:

- S-Rank: S2= Very Rare, S3= Rare, S4= Apparently Secure and S5= Secure, B= Breeding, N= Non-breeding, ?= Some uncertainty with the classification due to insufficient information.
- NAI: R = Rare; C = Common.
- Sources: OBA = Ontario Butterfly Atlas; eBird = https://ebird.org/explore; OBBA = Ontario Breeding Bird Atlas

Class	Scientific Name	Common Name	SARA[1]	ESA[2]	S-Rank[3]	NAI[4]	Source
Birds	*Contopus virens*	Eastern Wood-pewee	SC	SC	S4B	C	eBird
	Hirundo rustica	Barn Swallow	THR	SC	S4B	C	OBBA
Insects	*Danaus plexippus*	Monarch	SC	SC	S2N, S4B	C	OBA

Through reviewing the potential habitat and SCC, the following candidate SWHs were identified for the Study Area:

- Seasonal Concentration Areas of Animals: Bat Maternity Colonies; and
- Habitat for Species of Conservation Concern: Special Concern and Rare Wildlife Species (Eastern Wood-pewee, Barn Swallow, and Monarch).

An evaluation of SWH using the MNR SWH Criteria Schedules for Ecoregion 7E (2015) is included in the Natural Heritage Report.

[1] Federal Species at Risk Act, 2002.
[2] Provincial Endangered Species Act, 2007.
[3] Provincial Conservation Ranking
[4] Hamilton Natural Areas Inventory Project 3rd Edition – Species Checklist Document (2014)

3.3.1.2 Species at Risk

SAR are defined as those listed as Endangered or Threatened under the *Endangered Species Act*. There are no federal lands located within the Study Area; therefore, the federal SARA applies only to SAR migratory birds and SAR aquatic species for this project, none of which were identified in this review.

A search of the NHIC database and other available wildlife atlases was conducted to identify possible occurrences of SAR and/or provincially rare species in proximity to the Study Area. The Natural Heritage Report includes a list of SAR with occurrence records in proximity to the Study Area and the rationale used to determine the potential for these species and/or their habitat to occur in the Study Area. SAR identified as having the potential to occur within the Study Area are listed in **Table 2**.

Table 2: Species at Risk with Potential to Occur within the Study Area

Notes:

- S-Rank: S2= Very Rare, S3= Rare, S4= Apparently Secure and S5= Secure, B= Breeding, N= Non-breeding, ?= Some uncertainty with the classification due to insufficient information.
- NAI: R = Rare, U = Uncommon, C = Common.
- Source: CBC = Christmas Bird Count; OBBA = Ontario Breeding Bird Atlas; MNR Reg. Habitat = MNR Regulated Habitat (Ontario Regulation 242/08); MWH = Ontario Mammals Atlas; NHIC = Natural Heritage Information Centre; City = Correspondence with the City of Hamilton.
- N/A = Not Applicable

Class	Scientific Name	Common Name	SARA[5]	ESA[6]	S-Rank[7]	NAI[8]	Source
Birds	*Dolichonyx oryzivorus*	Bobolink	THR	THR	S4B	U	OBBA
	Sturnella magna	Eastern Meadowlark	THR	THR	S4B	U	OBBA, CBC
Mammals	*Myotis leibii*	Eastern Small-footed Myotis	N/A	END	S2S3	N/A	MWH
	Myotis lucifugus	Little Brown Myotis	END	END	S4	N/A	MWH
	Myotis septentrionalis	Northern Myotis	END	END	S3	N/A	MWH
	Pipstrellus subflavus	Tri-colored Bat	END	END	S3?	N/A	MWH
Plants	*Juglans cinerea*	Butternut	END	END	S3?	N/A	City

[5] Federal Species at Risk Act, 2002.
[6] Provincial Endangered Species Act, 2007.
[7] Provincial Conservation Ranking
[8] Hamilton Natural Areas Inventory Project 3rd Edition – Species Checklist Document (2014)

3.3.2 Field Studies

The results of the background review were used to confirm the scope of the field study program, which was undertaken throughout 2021. The following field studies were completed:

- Botanical surveys;
- A tree inventory including a search for bat habitat (snag/cavity trees);
- Aquatic assessment and sampling;
- Breeding bird surveys;
- Amphibian breeding surveys;
- Incidental wildlife observations; and,
- Significant wildlife habitat assessment.

3.3.2.1 Tree Inventory

The study area can be described as a disturbed landscape, largely consisting of urban areas and species commonly found in such areas. The tree inventory documented 698 trees within the Study Area. The majority of these trees are designated by the MNR NHIC as having a sub-national ranking (SRank) of very common (S5), common (S4), or non-native (SNA) in southern Ontario.

3.3.2.2 Aquatic Assessment

The study area includes five watercourses that are conveyed through culverts/catch basins/storm sewers under Rymal Road. All five watercourses were dry or mostly dry with some standing water during the field visit, and do not constitute direct fish habitat. However, during times of flow, the watercourses may constitute indirect fish habitat for downstream reaches within the watershed. No wetlands were identified within the Study Area.

3.3.2.3 Significant Natural Features

The following significant natural features were identified within the Study Area:

- One Butternut tree, which is a SAR listed as Endangered under the provincial *Endangered Species Act* and the federal SARA, was identified. The Butternut is

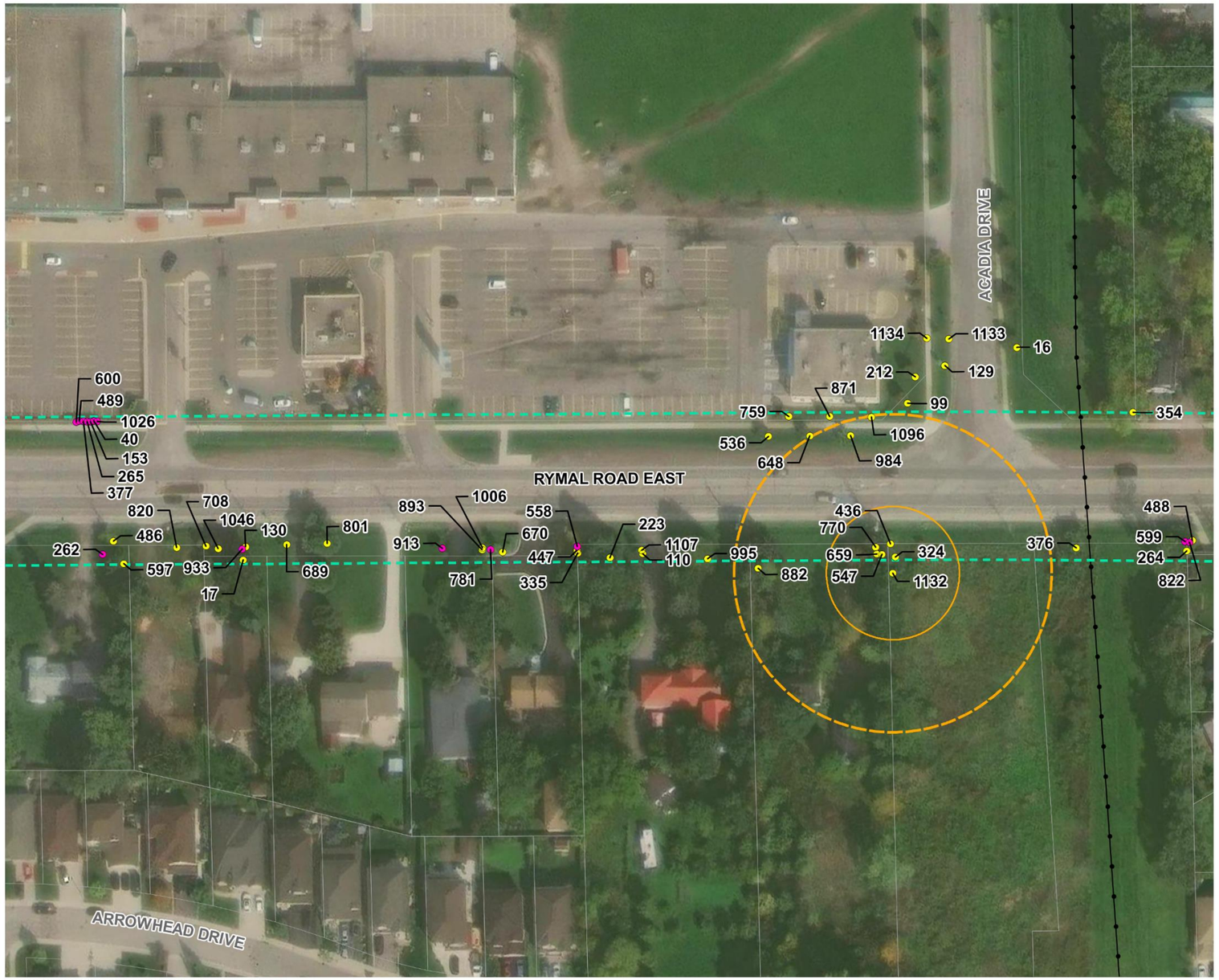
labelled as tree number 1132 on **Figure 4**, and the following applicable setbacks are illustrated:

  - The Critical Root Zone (CRZ) is the area extending in a 25 m radius around the tree, which covers areas suitable for seed dispersal and establishment surrounding the tree. As per *Ontario Regulation (O. Reg.) 830/21*, permanent structures should not be constructed or installed within the 25 m CRZ; and
  - The Root Harm Prevention Zone (RHPZ) prohibits temporary work within proximity to Butternut trees that are to be retained. The size of the RHPZ depends on the diameter at breast height (DBH) of the tree. The Butternut tree in the Study Area had a DBH of 30 cm, therefore, the RHPZ for the tree is 18 m.

- While specific bat surveys were not conducted, potential SAR bat habitat exists within the Study Area in the woodlands, and within the urban structures (i.e., attics, roofs) along Rymal Road;
- The wooded areas in the Study Area are conservatively identified as Significant Wildlife Habitat for Bat Maternity Colonies as detailed snag density surveys were not conducted; and,
- A total of 26 bird species were observed during breeding bird surveys, including 2 locally rare species: Northern Harrier (*Circus cyaneus*) and Trumpeter Swan (*Cygnus buccinator*). No SAR birds were observed during breeding bird surveys, and no suitable SAR bird habitat was identified in the Study Area.

The natural features listed above are discussed further in **Section 7.1** as they relate to the recommended design.

Figure 4: Butternut Tree and Applicable Setbacks



RYMAL ROAD
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

TREE INVENTORY
FIGURE 2H

- Tree
- Shrub
- Tree Inventory Study Area (20m)
- Utility Line
- Property Parcel
- Butternut Setback (18 m)
- Butternut Setback (25 m)

SCALE 1:1,000
0 5 10 20 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, City of Hamilton Offical Plan Schedule, Hamilton Region Conservation Authority

MAP CREATED BY: LMM/DU
MAP CHECKED BY: CCJB
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 20-3410
STATUS: DRAFT
DATE: 2024-09-10

3.4 Cultural Heritage Resources

3.4.1 Archaeological Resources

A Stage 1 archaeological assessment (AA) was completed by Fisher Archaeological Consulting (FAC) on October 31, 2021 as part of this study. The Stage 1 AA Report (**Appendix C**) was entered into the Ontario Public Register of Archaeological Reports (OPRAR) on March 25, 2023.

A Stage 1 AA consists of background research and a property inspection. The purposes of a Stage 1 AA are:

- To determine the potential for the presence of undocumented cultural heritage resources; and,
- To determine whether known cultural heritage resources are extant (still existing) within the study area.

Based on background research, the Study Area has high archaeological potential for Indigenous archaeological resources and Euro-Canadian archaeological resources (FAC, October 31, 2021). The property inspection confirmed that most of the Study Area has been impacted by modern development, construction, and disturbance that have removed the archaeological potential from these areas. Two areas retain high potential:

- The first area is on the south side of Rymal Road west of Upper Sherman Avenue, near a small Indigenous archaeological site (**Figure 4**); and,
- The second area is adjacent to the 19th century St. George's Cemetery, which is on the north side of Rymal Road east of the Trans Canada Trail (**Figure 5**).

Recommended next steps for these 2 areas are outlined in **Section 7.5** as they relate to the recommended design.

Figure 5: Areas of Archaeological Potential West of Upper Sherman Avenue (FAC, 2021)

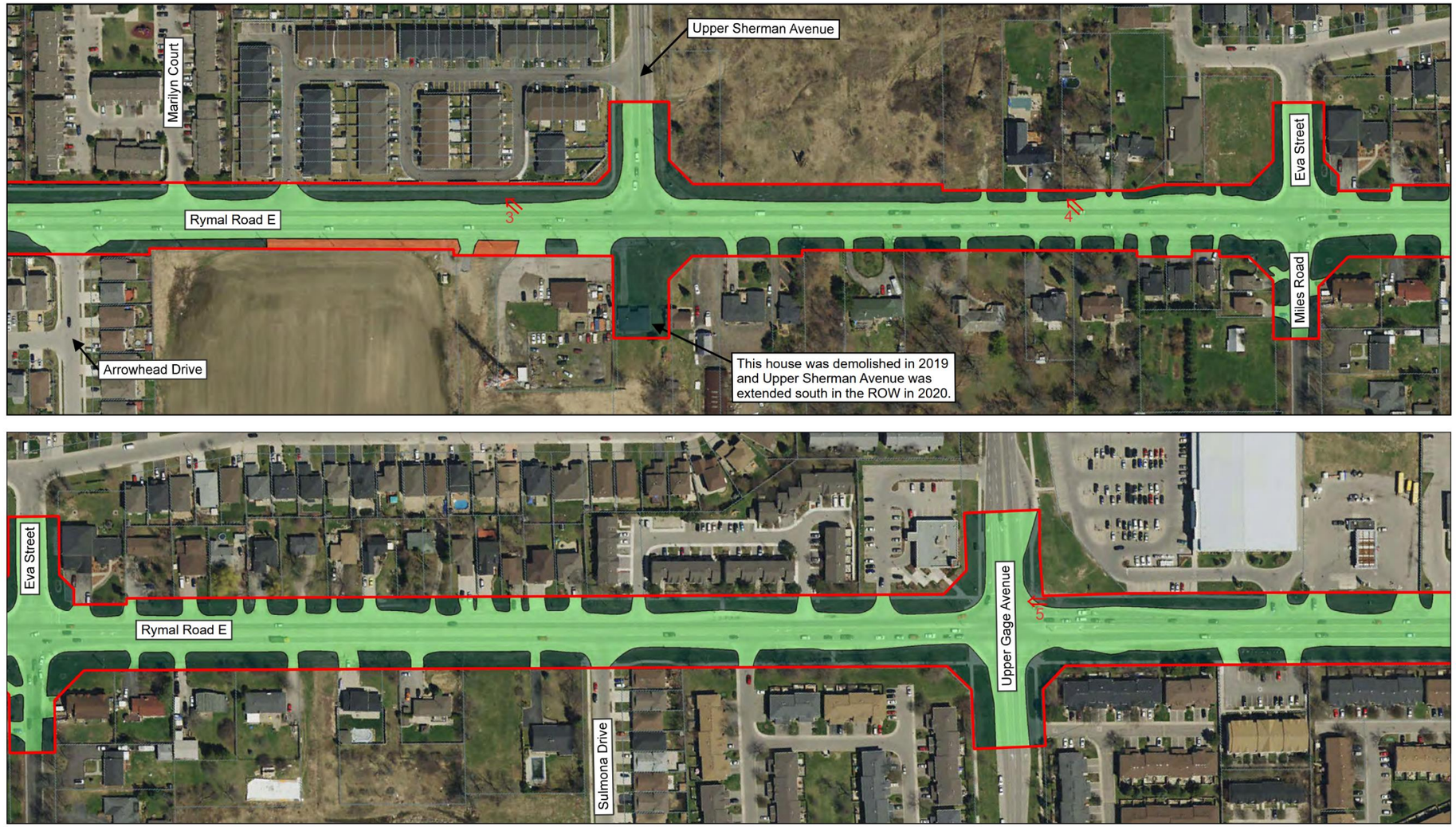
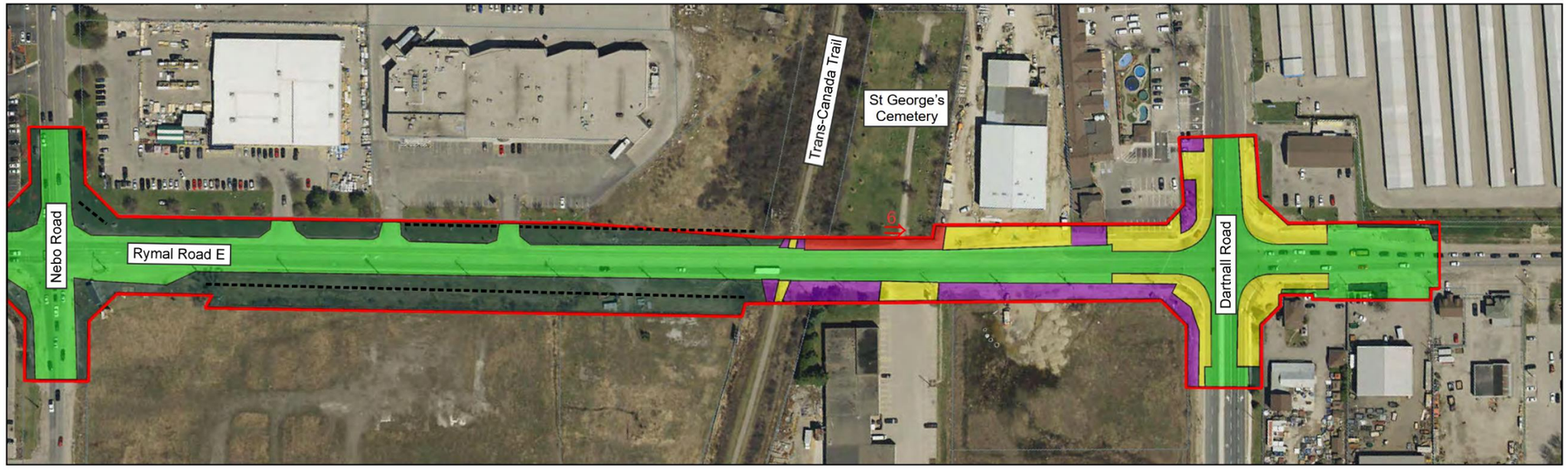


Figure 6: Areas of Archaeological Potential Adjacent to St. George's Cemetery (FAC, 2021)



3.4.2 Built Heritage Resources and Cultural Heritage Landscapes

The potential for built heritage resources and cultural heritage landscapes within the project area was reviewed based on the City's internal procedures. The City also completed the relevant portions of the Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes checklist (**Appendix D**).

The City has identified 3 properties adjacent to the Study Area that have cultural heritage significance:

- 164 Rymal Road East: This property is included on the City's inventory of properties with cultural heritage value or interest;
- 311 Rymal Road East: This property is listed on the City's Municipal Heritage Register; and,
- 2 Dartnall Road: There is a historic grain elevator onsite which is designated under Part 4 of the *Ontario Heritage Act*.

Anticipated impacts and recommended mitigation measures as they relate to the above-noted properties are discussed in **Section 7.2.2**.

3.5 Socio-Economic and Land Use

The description of baseline socio-economic conditions was completed for the Study Area in September 2023 and included a desktop review of plans, policies, data collected through the City of Hamilton, and satellite/Google Street View imagery. The Study Area described in **Section 3.1** was used for this study, with the exception of existing land use designations and community services, for which buffer areas of 350 m and 500 m from the ROW were added, respectively.

This section provides baseline information on the following topics as they relate to the Study Area:

- Provincial policies;
- Existing and designated land use;
- Development applications;
- Population and demographics;
- Economic activities, employment, and labour force;
- Parks and open spaces; and,
- Community facilities.

3.5.1 Provincial Policies

The City of Hamilton is located within the Greater Golden Horseshoe (GGH) area of the Province of Ontario. The provincial importance of this region is highlighted by several provincial planning documents that guide land use planning in the GGH. This section discusses the Provincial Policy Statement, 2024 (PPS) and associated Provincial Plans as they relate to the Rymal Road MCEA study.

The PPS provides overall policy direction on matters of provincial interest related to land use and development in Ontario. Section 3.2 of the PPS, Transportation Systems, includes the following policies which are relevant to the consideration of alternatives for this study:

- Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and support the use of zero- and low-emission vehicles.
- Efficient use should be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.
- As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be planned for, maintained and, where possible, improved, including connections which cross jurisdictional boundaries.

Section 3.3 of the PPS, Transportation, and Infrastructure Corridors, includes the following policies which highlight the importance of planning for and protecting roadway corridors:

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

possible, minimize and mitigate negative impacts on and adverse effects from the corridor and transportation facilities.

The Provincial Plans summarized below are pertinent to Hamilton, providing additional land use planning policies to address issues; taking precedence over the policies of the PPS:

- The *Places to Grow Act*, 2005 enables the development of regional growth plans that guide government investments and land use planning policies. The Study Area falls within the Greater Golden Horseshoe Growth Plan Area. A Place to Grow for the Greater Golden Horseshoe (2020) is the province's initiative to plan for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life.
- The Niagara Escarpment Plan (NEP) seeks to protect the geologic feature of the Niagara Escarpment and lands in its vicinity. The NEP identifies land use designations that focus on the continuous landform of the Niagara Escarpment and provide a series of connected and protected areas. The NEP does not have designated areas within the Study Area, but there is an "Escarpment Protection Area" (Chippewa Trail Conservation Area) approximately 250 m north and east of the intersection of Rymal Road East and Dartnall Road as.
- The Ontario Greenbelt Plan was introduced in 2005 to help guide development within the region. The Greenbelt Plan does not have regulatory areas within the Study Area, but Chippewa Trail Conservation Area is in proximity to the east, with an important trail link that is within the Study Area.

3.5.2 Municipal Planning Context

The City of Hamilton is a single-tier municipality and has two Official Plans, the Urban Hamilton Official Plan (UHOP; 2013) and Rural Hamilton Official Plan (2012). The Study Area is located at the southern extent of the urban area and falls under the policies of the UHOP.[9]

[9] In January 2023, it was noted that both the Urban Hamilton Official Plan and Rural Hamilton Official Plan were updated to reflect the Amendments contained in OPA 167 (Urban) and OPA 34 (Rural), as well as the Ministry of Municipal Affairs and Housing's modifications to the respective Official Plan Amendments, including expansion of the urban boundary, and changes to intensification and density targets (City of Hamilton, 2023; retrieved from: https://www.hamilton.ca/build-invest-grow/planning-development/official-plan/official-plan-review).

This section discusses relevant policies from the UHOP as well as the City's Transportation Master Plan (TMP; 2018), Cycling Master Plan (2018) and Recreational Trails Master Plan (2016). Relevant mapping from these documents is included in **Appendix E**.

3.5.2.1 Urban Hamilton Official Plan (2013)

Rymal Road within the Study Area is designated as a "Secondary Corridor" in the UHOP (2013). The intent is for Secondary Corridors to link nodes and employment areas or Primary Corridors, to be intensified with multi-storey, mixed use building in small clusters (UHOP Policies 2.4.5 and 2.4.12). As noted in Policy 2.4.8, Secondary Corridors "may be served by a higher order transit service."

Rymal Road is classified as a Major Arterial Roadway in the UHOP (2013). This class of roadway is designed to carry relatively high volumes of intra-municipal and inter-regional traffic and have controlled/restricted accesses.

Chapter C.4.0, Integrated Transportation Network, notes the objective and function of the City's road network is to, "safely and efficiently move people and goods seamlessly and effectively, and serve as an economic enabler." Balancing the competing demands of cars, transit, parking, active transportation (cycling, pedestrian, and any other non-motorized modes), and goods movement is recognized as vital to create a more sustainable transportation network.

3.5.2.2 Transportation Master Plan: City in Motion

The City's TMP (2018 Update) sets out policies for a balanced transportation system that provides for all modes of transportation in Hamilton. Areas of focus relevant to this study include:

- Complete-Livable-Better Streets: A ROW design approach that balances the needs of all users regardless of age, ability, or mode of transportation in an equitable manner;
- Connecting and improving access between different areas of the City; and,
- Road safety and the concept of "Vision Zero," a proactive approach with the goal of zero fatalities or serious injuries on roadways in Hamilton.

Within the Study Area, Rymal Road between Upper James Street and Upper Sherman Avenue is noted as having a planned multi-use trail (TMP Map 1B, **Appendix E**). Multi-

use trails are also planned on Upper James Street south of Rymal Road and within the hydro corridor on the east side of Acadia Drive. On-street bike lanes are planned on Upper Ottawa Street and Nebo Road south of Rymal Road. Existing bike lanes are identified on Upper Wellington Street and Upper Sherman Avenue, and an existing multi-use trail is located at the Chippewa Trail.

The TMP includes policies for a planned five-route rapid transit network, BLAST (TMP Map 2, **Appendix E**). Rymal Road is part of the S-Line of this network, which is planned to extend along Garner Road and Rymal Road before turning northward at Upper Centennial Parkway and continuing to Confederation GO Station. Further details on considerations to support the future S-Line are provided in **Section 3.11.3.2**.

The entire Garner Road/Rymal Road corridor forms part of the City of Hamilton's truck route network, as shown in the Truck Route Network Map in **Appendix E** (City of Hamilton and IBI Group, 2022). Garner Road/Rymal Road is the only continuous east-west truck route south of the Lincoln M. Alexander Parkway.

3.5.3 Existing and Designated Land Uses

In general, the Study Area features a mix of land uses including commercial, residential, institutional, and industrial uses. A large commercial area surrounds Upper James Street at the west end of the Study Area. The central portion of the Study Area is primarily residential, with some commercial properties as well as institutional lands. The east end of the Study Area from Upper Ottawa Street to Dartnall Road is a mix of commercial, industrial, and offices.

The following key features were identified along the corridor:

- Two large commercial properties and numerous small commercial and industrial businesses along Rymal Road;
- Five key institutional uses which may be particularly sensitive to access disruptions: a police station, a long-term care facility, a cemetery, a funeral home, and a child daycare facility;
- Chippewa Trail, a multi-use trail on the former Hamilton and Lake Erie Railroad Line, which provides an important connection for pedestrians and cyclists; and,
- St. George's Anglican Cemetery, a National Historic Site (1307 Rymal Road East), which is likely to require special consideration to avoid or mitigate impacts.

Existing land use and Official Plan land use designations within the Study Area (as of May 2022) are described below from west to east. Mapping of Official Plan land use designations is included in Figures 1 to 4 in **Appendix E**.

3.5.3.1 Christie Street/West 5th Street to Upper James Street

On the north side of Rymal Road, from Christie Street/West 5th Street to Upper James Street, land uses immediately adjacent to the roadway are primarily commercial (retail, restaurants, used car dealership). Land uses along the south side of Rymal Road are also primarily commercial (chiropractic clinic, dentist, car dealership, nail salon, concrete contractor, car wash, gas station, restaurant). The majority of restaurants in this section of the corridor are fast food establishments, some with drive throughs, and outdoor seating is unavailable.

3.5.3.2 Upper James Street to Upper Wellington Street

On the north side of Rymal Road, from Upper James Street to Upper Wellington Street, land uses immediately adjacent to the roadway are primarily commercial (retail, restaurants, car dealerships). A segment of vacant land is also located on the north side of Rymal Road. Land uses immediately to the south of Rymal Road includes primarily residential, as well as commercial (restaurants, retail, salon and spa) and institutional. It is noted that satellite imagery shows institutional designated land use as residential housing. The majority of restaurants in this section of the corridor are fast food establishments, some with drive through, and outdoor seating is unavailable.

3.5.3.3 Upper Wellington Street to Upper Wentworth Street

On the north side of Rymal Road, from Upper Wellington Street to Upper Wentworth Street, land uses immediately adjacent to the roadway are primarily residential. Land identified as institutional is located at the Upper Wentworth Street intersection and includes the Village of Wentworth Heights retirement home. Land uses immediately to the south side of Rymal Road includes open space (Mount Hamilton Cemetery), vacant land, transportation, and utility (B.A. Court Public Works Operations Yard), and park (Turner Park). Also located in the land designated as park, are the Les Chater Family YMCA, the Hamilton Public Library, a skate park, and the Hamilton Police Service.

3.5.3.4 Upper Wentworth Street to Upper Sherman Avenue

On the north side of Rymal Road, from Upper Wentworth Street to Upper Sherman Avenue, land uses immediately adjacent to the roadway includes commercial (grocery store, retail, restaurants, bank), transportation and utility (transmission tower structure), and residential. Land uses immediately adjacent to the south side of Rymal Road includes primarily residential and vacant lands. The majority of restaurants in this section of the corridor are fast food establishments, some with drive through, and outdoor seating is unavailable.

A transmission tower structure is located at Acadian Drive and Rymal Road East and is approximately 20 m from the roadway. The power transmission line continues across Rymal Road from the north to the south side. An auto repair shop is located on the south side of Rymal Road at the Upper Sherman Avenue intersection.

3.5.3.5 Upper Sherman Avenue to Upper Gage Avenue

On the north side of Rymal Road, from Upper Sherman Avenue to Upper Gage Avenue, land uses immediately adjacent to the roadway includes commercial (grocery store, restaurants), residential, institutional (home health care service), and office (bank). Land uses immediately adjacent to the south side of Rymal Road are primarily residential. Commercial land (real estate broker) and vacant land are also adjacent to the roadway on the south side. The majority of restaurants in this section of the corridor are fast food establishments and outdoor seating is unavailable.

3.5.3.6 Upper Gage Avenue to Upper Ottawa Street

On the north side of Rymal Road, from Upper Gage Avenue to Upper Ottawa Street, land uses immediately adjacent to the roadway includes commercial (grocery store, retail, gas station, Bay Gardens Funeral Home, restaurants), office (real estate agency), and residential. Land uses immediately adjacent to the south side of Rymal Road includes residential, commercial (retail, auto services, moving and storage facility), vacant land, and transportation and utility (TransCanada compression station). Lands approaching Upper Ottawa Street on to the south of Rymal Road are also designated as Employment Land. The majority of restaurants in this section of the corridor are fast food establishments and outdoor seating is unavailable; however, drive through is available.

3.5.3.7 Upper Ottawa Street to Dartnall Road

On the north side of Rymal Road, from Upper Ottawa Street to Dartnall Road, land uses immediately adjacent to the roadway includes commercial (restaurants, retail, real estate agency, flooring supplier, metal fabricator, car detailing service, driving school, hardware store, grocery store, pool supply store), industrial (industrial equipment supplier, electrical supply store, used furniture supply store, car stereo store, laundromat, concrete contractor), open space and vacant land. Land uses immediately adjacent to the south side of Rymal Road includes office (builders association), industrial (car dealers, tire shops, auto repair shop, pool and supply store, cabinet/woodworking, steel fabricator), commercial (restaurants, retail), vacant land and open space.

The open space crosses Rymal Road from north to south and is the entrance to the Greenbelt Route (Rymal Road Rail Trail). St. George's Cemetery is also located in the open space area on the north side.

The majority of restaurants in this section of the corridor are fast food establishments, some with drive through, and outdoor seating is unavailable. One restaurant (1275 Rymal Road East) has outdoor seating available and is setback from the road by approximately 45 m.

3.5.3.8 Dartnall Road to Glover Road

On the north side of Rymal Road, from Dartnall Road to Glover Road, land uses immediately adjacent to the roadway includes commercial (retail), industrial (storage facility), residential, and open space (pedestrian access to trail). Land uses immediately adjacent to the south side of Rymal Road includes industrial (hot tub store, manufacturing, auto parts store), office (roofing contractor, monument maker), commercial (retail), park (Hannon South Open Space) and vacant land. Part of the lands on the north and south sides of Rymal Road are designated as Employment Land. It is noted that the Study Area extends up to 100 m east of Dartnall Road and does not include all lands up to Glover Road.

3.5.4 Development Applications

Development activity in the Study Area was reviewed in October 2020 through the City's interactive mapping database to understand the potential impacts to future travel demand and the potential to change travel patterns.[10] Table 1 in **Appendix E** provides an inventory of these development applications identified within and adjacent to the Study Area. Google Maps/Street View was used to identify vacant lands that may be available for development.

Overall, development proposed in the Study Area includes large commercial developments, institutional uses (church and schools), and 342 residential units consisting of single, townhouse, mixed-use, and apartment. In addition, a land division application (HM/B-15:111) is in process for future residential subdivision of unknown number of units. Future development will eventually require construction of extensions to existing trunk sewers and extension/upsizing of watermains that will potentially impact Rymal Road directly with construction of infrastructure and connections, and indirectly with traffic rerouting and interruptions causing traffic onto and/or away from Rymal Road.

It is anticipated that the proposed developments would increase daily traffic counts along the corridor. These developments have been considered in the traffic forecasting for this study.

The commercial developments proposed along Rymal Road include:

- Gas station, car wash, convenience store, restaurant (1324 Rymal Road East);
- Large plaza with: drive-thru restaurant, stand-alone restaurant, retail units, office units, medical clinic, and a building supply store (385 Nebo Road at Rymal Road East);
- Small mixed-use plaza (738 Rymal Road East); and,
- Small mixed-use plaza (140 Rymal Road East).

[10] City of Hamilton. 2022a. Interactive Mapping - Find Development Applications. Accessed: October 2020. Retrieved from: https://www.hamilton.ca/build-invest-grow/planning-development/planning-applications/where-development-happening-hamilton

The residential developments on Rymal Road include:

- 14-unit condominium townhomes (820 Rymal Road East);
- 4 single detached dwellings (off Miles Rd);
- 8 single detached dwellings/10 townhomes/69 stacked townhomes/203 apartments (544-550 Rymal Road East);
- 21-unit 3-storey apartment building (333 Rymal Road East);
- 10-unit above a commercial plaza (140 Rymal Road East); and,
- 2-unit (estimated) apartments above commercial units (738 Rymal Road East).

The institutional developments proposed on Rymal Road include:

- Nora Frances Henderson Secondary School with 291 parking spaces (640 Rymal Road East);
- Broughton Avenue School - a 3-storey, 12,239 square metres (m^2), combined French Public and Separate School Boards Secondary school (16 Broughton Avenue with access from Rymal Road onto Grayrocks Ave.); and,
- A 3,094 m^2 church facility with accompanying rectory of 375.6 m^2 (620 Rymal Road East).

There are three other vacant land parcels identified at 809, 705, and 100 Rymal Road East that did not have applications for development identified through the City's interactive mapping. However, it is noted these lands may potentially be developed within the 2021 to 2051 planning timeframe, which would add to the traffic count on Rymal Road East.

Two Official Plan Amendments are currently in-process outside of the Study Area that may potentially impact the future, long-term volume, and traffic flow on Rymal Road. Urban Hamilton OPA (UHOPA)-20-020/011 proposes 2,450 residential units, and UHOPA-20-022 is for a future residential subdivision of an unknown number of units. Both consist of an urban boundary adjustment as part of the approval process, and may occur within the 2021 to 2051 planning horizon.

The City's draft Land Needs Assessment identifies how much of the forecasted growth can be accommodated within the existing urban area boundary and concludes that an

urban expansion area ranging in size from 1,340 ha to 1,640 ha will be required to accommodate residential growth to the year 2051.[11]

3.5.5 Population and Demographics

As of the 2021 census, the City of Hamilton had a population of 569,353 with an average age of 41.5 years. The approximate population within 1 km of the Rymal Road corridor was 25,000 in 2021 (Census Mapper, 2021).

Hamilton (Census subdivision) experienced the following population increases from 2011 to 2021, according to Statistics Canada (2017, 2023):

- An increase of approximately 3.3 percent between 2011 (519,949) and 2016 (536,917); and,
- An increase of approximately 6 percent from 2016 to the 2021 population of 569,353.

The Rymal Road corridor extends through City of Hamilton wards 6, 7, and 8, which are ordered from east to west. Population changes in each of these wards since 2016 are summarized in **Table 3.**

Table 3: 2021 Population Changes by Ward (since 2016)[12]

Ward	Population (2016)	Population (2021)	Population Absolute Change	Population Change (Percent)
6	38,650	38,965	315	0.8
7	47,460	48,565	1,105	2.3
8	34,485	36,120	1,635	4.7

[11] City of Hamilton. 2020a. GRIDS 2 and Municipal Comprehensive Review - Land Needs Assessment and Technical Background Reports (PED17010).

[12] Source: City of Hamilton (2022b). 2021 Census Change in Population, Units and Persons per Unit by Ward and Community (City Wide). Retrieved from: https://www.hamilton.ca/sites/default/files/2022-07/communication-update-ped-2022-census-change-population.pdf

3.5.6 Economic Activities, Employment, and Labour Force

The City of Hamilton (Census subdivision) had a total labour force population aged 15 years and over of 290,990 individuals in 2021 (Statistics Canada, 2023). The City had a labour participation rate of 61.9 percent, which is 1.3 percent lower than the rate in 2016. The City's unemployment rate was 12.3 percent in 2021, which is higher than 2016 by approximately 5.3 percent.

Hamilton's economy includes the following major business sectors:

- Advanced manufacturing;
- Agribusiness and food processing;
- Creative industries;
- Finances, insurance, and real estate;
- Goods movement;
- Information communication technology and digital media;
- Life sciences; and,
- Tourism industry.

The City of Hamilton's 2019 Employment Survey indicated that the Health Care and Social Assistance sector continued to be the largest industry with an estimated 18.8 percent (42,000 jobs). The other largest sectors included Educational Services (11.1 percent), Retail Trade (12.3 percent), and Manufacturing (12.9 percent) (City of Hamilton, 2020b).

3.5.6.1 Advanced Manufacturing

Hamilton's Advanced Manufacturing sector contributes to 4 percent of Ontario's total economy ($12 billion annually) and has seen continuous growth since 2012. Hamilton's key Advanced Manufacturing sectors (Invest in Hamilton, 2022a) include:

- Primary metal manufacturing;
- Steel services and processing;
- Clean technology – power generation and water;
- Metal fabrication;
- Aerospace;
- Automotive;
- Nuclear; and,
- Oil and gas.

Within the Rymal Road corridor, there are lands designated as industrial, with the majority towards the eastern extent of the corridor. This includes a steel fabricator, auto parts supplier, building materials supplier, and tool and plumbing stores.

3.5.6.2 Agribusiness and Food Processing

Hamilton's Agribusiness and Food Processing sector contributes $1 billion to Hamilton's economy annually and has experienced 35 percent growth in food manufacturing employment over the last 10 years. Hamilton's Agribusiness and Food Processing sector is home to world-class companies and has several sectors with global competitiveness, including meat products, bakery, grain, and oilseed, confectionary and sugar, and beverages (i.e., cider and craft beer) (Invest in Hamilton, 2022b).

There are no agricultural lands or agribusinesses/food processing located in the Rymal Road corridor.

3.5.6.3 Goods Movement

Due to Hamilton's strategic location and infrastructure, Hamilton supports a variety of transportation, including eCommerce, passenger, heavy/project cargo, or commodities. Hamilton is a major trade hub for sea, air, rail, and surface cargo and has two ports of entry. Several world-class companies are located in Hamilton, including Canadian Pacific Railway and the Hamilton International Airport (Invest in Hamilton, 2022c).

The Hamilton International Airport, Highway 403, and Lincoln M. Alexander Parkway are located near the Rymal Road corridor. It is noted that Rymal Road is a designated truck route.

3.5.6.4 Life Sciences

The Life Sciences sector is one of the largest employers in Hamilton and has one of the strongest hospital networks in Canada. Hamilton is home to several world-class companies, including Fusion, Triumvira, and Affinity Biologicals (Invest in Hamilton, 2022d).

The majority of Life Sciences companies, hospitals, and medical centres are located outside of the Rymal Road corridor; however, there is one medical centre located north of Rymal Road on Upper Ottawa Street.

3.5.6.5 Tourism and Recreation

Tourism is one of Hamilton's largest industry sectors and attracts six million visitors annually (Invest in Hamilton, 2022e). Tourism activities include local markets, restaurants, natural areas, museums, golf courses, arts and culture, and festivals. There are no major tourism features in the Rymal Road corridor.

3.5.7 Parks and Open Spaces

Approximately 13 parks and open spaces are located within the study area, as shown in Figures 5 to 8 in **Appendix E**; City of Hamilton, 2023).

A cemetery (Mount Hamilton Cemetery) is located at the intersection of Upper Wellington Street and Rymal Road and is accessible via Rymal Road. Two waterfalls are also located near Rymal Road east of Dartnall Road.

3.5.8 Community Facilities

Due to the length of the corridor and its status as a major arterial, the type and scale of community facilities that are within the Study Area varies widely. Community facilities include local community centres, places of worship, schools, libraries, emergency services, and cemeteries. The following community facilities are located on Rymal Road within the project limits:

- Community Centre: Les Chater Family YMCA (356 Rymal Road East);
- Places of Worship: St. Catherine of Siena Roman Catholic Church (1694 Upper James Street), Eternal Spring United Church (708 Rymal Road East), and Life Christian Church (1205 Rymal Road East);
- Schools: None located on Rymal Road; however, a number of schools are located within the Study Area;
- Library: Hamilton Public Library – Turner Park Branch (352 Rymal Road East);
- Emergency Services: Hamilton Police Service (400 Rymal Road East); and,
- Cemeteries: Mount Hamilton Cemetery (260 Rymal Road East) and St. George's Anglican Cemetery (1307 Rymal Road East).

Community facilities throughout the Study Area are identified in Figures 5 to 8 in **Appendix E**.

3.6 Source Water Protection

As part of this MCEA, the Source Protection Information Atlas online mapping was reviewed to identify whether the Study Area is within a vulnerable area for source water protection. The Source Water Protection page on the City's website[13] indicates that vulnerable areas in Hamilton where source protection policies apply are wellhead protection areas and intake protection zones. The Source Protection Information Atlas indicates that Study Area is not located within a wellhead protection area or intake protection zone, as shown on the mapping in **Appendix F**.

3.7 Assessment of Past Uses

An Assessment of Past Uses (APU) was completed as part of this MCEA study to comply with Ontario Regulation 406/19 – On-Site and Excess Soil Management. The Project Area considered for the APU consists of the Study Area for this MCEA as described in **Section 3.1**. The study area for the APU is a 100m buffer around the Project Area.

The objectives of the APU are to:

- Develop a preliminary determination of the likelihood that one or more contaminants have affected soil or rock in a location where soil or crushed rock is to be excavated within the Project Area;
- Identify areas of potential environmental concern (APECs) within the Project Area and determine if locations where soil or crushed rock is to be excavated could have been affected by a potentially contaminating activity (PCA); and,
- Identify the contaminants of potential concern (COPCs) to determine the focus of the Sampling and Analysis Plan (SAP), if APECs are identified.

[13] Source: City of Hamilton (2024). Source Water Protection Webpage. Retrieved from: https://www.hamilton.ca/home-neighbourhood/water-wastewater-stormwater/water-treatment-distribution/source-water-protection#risk-management-protection-plan-policies

The following records were reviewed as part of the APU:

- Environmental source information (including Environmental Risk Information Services [ERIS] Ltd. Environmental Databases);
- Technical Standards and Safety Authority records;
- Aerial photographs (ERIS);
- Physical environment data and mapping;
- MECP well records;
- Municipal drinking water supply and groundwater protection areas; and,
- MECP Water Well Record Database.

Since 1934 the land has been utilized as a roadway and 10 PCAs have been identified within the Study Area. Three APECs were identified in the Project Area as a result of the PCAs:

- The first APEC encompasses the entire Project Area as unknown fill materials were imported as well as de-icing activities;
- The second APEC covers the western, central, and eastern portions of the Project Area due to reported spills; and,
- The third APEC covers the eastern portions of the Project Area beyond the site with off-site PCAs caused by extensive industrial and commercial property use.

Additional details and mapping of the PCAs and APECs are provided in **Appendix G**. The need for further investigations during detailed design to address excavation of soils during construction is discussed in **Section 7.3** as it relates to the recommended design.

3.8 Stormwater Management

As part of this study, a desktop review was completed to document existing drainage conditions and identify opportunities and constraints within the Study Area. This section summarizes key findings; further details are provided in the Existing Conditions Drainage Assessment (**Appendix H**).

The Study Area is located within the Redhill Creek watershed. Runoff from the Study Area discharges to two separate tributaries that convey the runoff to Redhill Creek: Upper Ottawa Creek and Hannon Creek.

Most of the storm sewers that were evaluated have sufficient capacity to accommodate the existing conditions calculated peak discharges. However, approximately 18 pipes have estimated capacities less than the peak flow rate to convey.

A number of roadside ditches convey runoff within the Rymal Road ROW. There are three culvert crossings within the Study Area. Two of the culverts are 800 to 900 millimetre (mm) corrugated steel pipes, located between Eva Street and Upper Gage Avenue. The third is a 1,500 mm by 2,700 mm concrete culvert that conveys runoff from the lands located south of Rymal Road and bounded by Nebo Road to the west and the Chippewa Trail to the east.

The Rymal Road ROW is poorly suited for infiltration measures due to the presence of silty and/or clayey soils, and potential karst conditions. Karst conditions can act as a natural subsurface conveyance system that can convey groundwater unpredictably and have the potential to result in sinkholes, which can be difficult to predict or prevent. Consequently, LID opportunities should focus on filtration measures below the asphalt surfaces of the roadway and associated active transportation facilities.

3.9 Well and Septic

A Well and Septic Survey (Dillon, November 2020) was conducted to identify if any of the properties within the project study area are likely to rely on well and septic for servicing. In general, properties within the Study Area are unlikely to be serviced by well supply or private septic services, excluding the properties that are undergoing a development process. The exception is 20 Rymal Road East, which was identified to likely have a holding tank for the property.

Well records that indicated domestic use were likely associated with decommissioned wells where the records have not been updated. Wells in use currently are for observation and monitoring on properties that are not yet developed or are open fields. The assessment concluded that it is not necessary to proceed with further assessments of the properties within the scope of this study.

3.10 Municipal Infrastructure and Utilities

A utility composite for Rymal Road within the project limits was completed in support of this study (Dillon, February 2021). The findings can be summarized as follows:

- Alectra Utilities owns some of the utility poles in the Study Area. Alectra does not currently have planned changes within this area in the next 10 years.
- Enbridge has no plans to replace any gas mains in the Study Area at this time. A new main installation or upsizing may be required to support development; however, this is still unknown at this time.
- Rogers has no future works planned within the Study Area, but would like to be consulted if conflicts with existing infrastructure are identified;
- Bell owns the majority of poles located along the south side of the Study Area; and,
- Cogeco, Hydro One, and HCE Telecom have confirmed that they have no existing infrastructure within the Study Area.

As this information was provided in 2021, it will need to be updated prior to the detailed design phase to incorporate changes as a result of development in the area.

3.11 Transportation

Rymal Road is a major arterial road and the southernmost east-west arterial road within Hamilton's urban area, approximately 2 km south of the Lincoln M. Alexander Parkway. Combined with Garner Road to the west and Hamilton Road 20 (formerly Highway 20) to the east, it forms a continuous major arterial road corridor between Wilson Street (former Highway 2) in Ancaster and the Region of Niagara boundary at Westbrook Road. Rymal Road has a posted speed limit of 60 km per hour (km/h) within the project limits.

Until recently, Rymal Road has had a continuous two- to three-lane cross-section for the majority of its length, save for short five-lane sections near Upper James Street and near Upper Centennial Parkway. Sidewalks were present in some sections in the Study Area but were not continuous. In the past five years, parts of Rymal Road to the west and east of the Study Area have been widened to a five-lane cross-section as outlined in **Section 3.2**.

Some sections Rymal Road within the Study Area have been widened in conjunction with sidewalk construction, with paved shoulders hatched out with pavement markings.

However, Rymal Road within the Study Area continues to operate with one lane per direction plus a two-way center left turn lane and auxiliary right turn lanes at some intersections.

3.11.1 Active Transportation Network

Prior to 2016, the sidewalks along Rymal Road were discontinuous and had numerous gaps of significant length. Many of these gaps were filled by new sidewalks constructed in 2016 and 2017, and sidewalks now exist along both sides of Rymal Road between Upper James Street and Nebo Road, except as follows:

- A 100 m gap on the north side, west of Atessa Drive;
- A 300 m gap between Upper Sherman Avenue and Miles Road (both sides); and,
- A 125 m gap on the south side, east of Upper Ottawa Street.

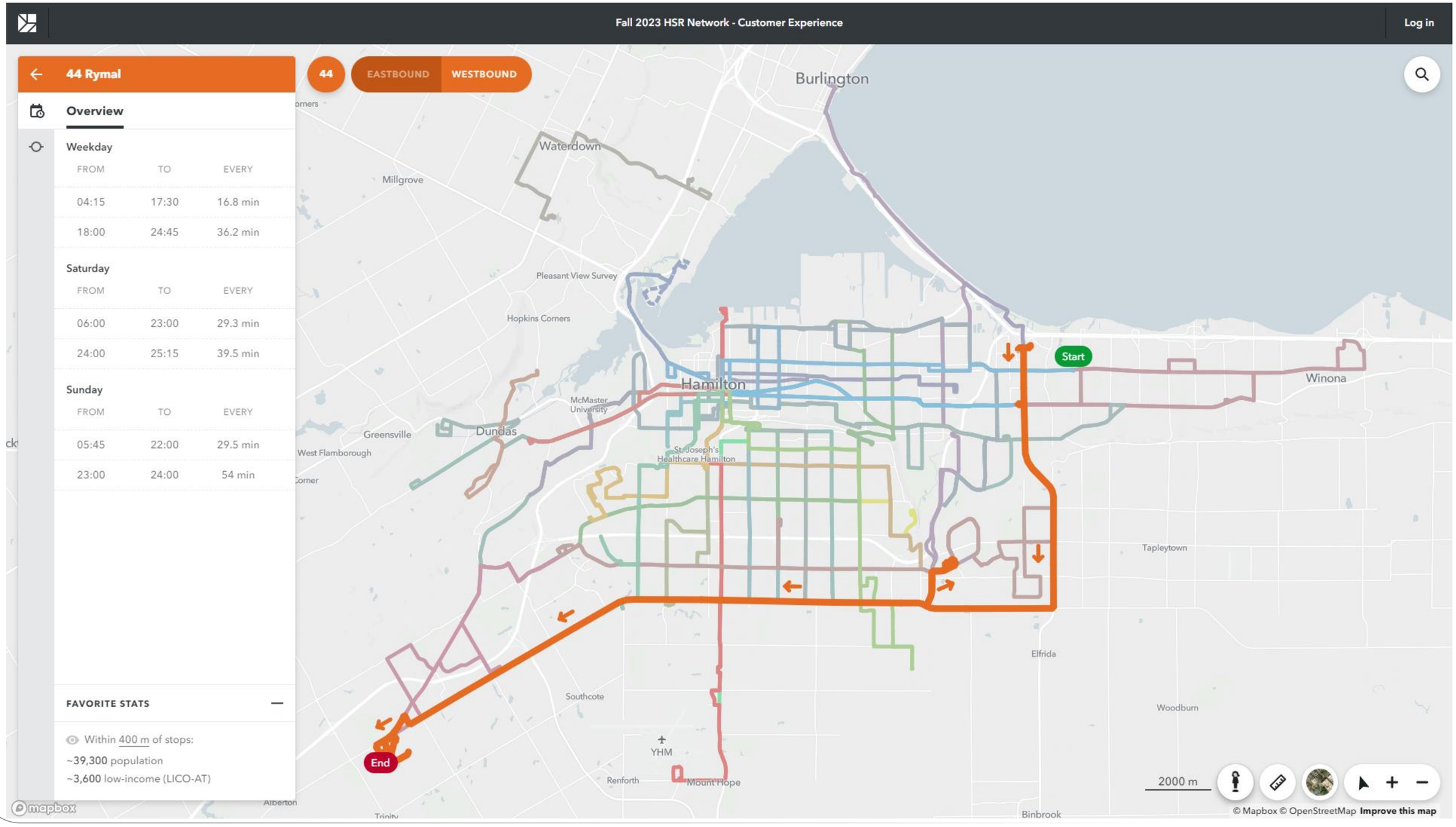
Pedestrian activity is generally low at most intersections. The intersections with the most pedestrian activity are at Upper James Street, Upper Wentworth Street, and Upper Gage Avenue. At these intersections, an average of approximately one pedestrian was recorded as crossing in each direction per traffic light cycle. These correspond to intersections with adjacent commercial nodes (including supermarkets) as well as Hamilton Street Railway (HSR) transfer points.

There are no dedicated cycling facilities along Rymal Road within the Study Area. West of the Study Area, there is a MUP within the north boulevard for approximately 400 to 500 m on both sides of Garth Street (Spadera Drive to Hazelton Avenue). Otherwise, there are no dedicated cycling facilities on Rymal Road. Cycling activity is currently minimal (an average of 2 cyclists per hour or fewer).

3.11.2 Transit Service

The HSR operates transit service along Rymal Road and cross streets within the Study Area. The HSR network is shown in **Figure 7**, with Route 44 (Rymal) highlighted.

Figure 7: Transit Network Map (Hamilton Street Railway, 2023)



Route 44 (Rymal) operates along the full extent of Rymal Road throughout the Study Area. To the west, it continues along Rymal Road and Garner Road westerly to the Ancaster Business Park at Wilson Street. To the east, it extends along Rymal Road to Upper Centennial Parkway, where it turns north and continues to Confederation GO Station south of the Queen Elizabeth Way. Route 44 operates every 15 minutes during the weekday peak periods and every 30 minutes at most other times.

Rymal Road forms the southern boundary of Hamilton's transit service area. With the exception of routes traveling on Upper James Street, all north-south routes extend as far south as Rymal Road before looping to return north. Routes 23 and 24, and Routes 25 and 26, are interlined to operate in two-way loops (e.g., Route 24 travels south along Upper Sherman Avenue to Rymal Road, then turns to the east toward Upper Gage Avenue where it returns north as Route 23, and vice versa).

3.11.3 Transportation Forecasting and Analysis

3.11.3.1 Existing Transportation Demand

In general, existing signalized intersections within the Study Area currently operate at good levels of service (Level of Service [LOS] A to B) during the AM and PM peak periods, with two exceptions:

- The intersections at Upper James Street and at Miles Road/Eva Street are operating at LOS C to D; and,
- The intersections at Upper Ottawa Street and at Nebo Road are operating at LOS C.

The only existing capacity constraint along the corridor is at the intersection with Miles Road/Eva Street.

The unsignalized intersections that were included in the assessment are all operating at reasonable levels of service (LOS C to D for left turn or shared lanes).

A set of representative baseline traffic volumes was determined from traffic data provided by the City. Additional information about the base traffic volume conditions can be found in the Multi-Modal Transportation Report in **Appendix I**.

Based on the available traffic counts and information, trucks comprise the following percentage of traffic on Rymal Road:

- During the AM peak hour:
  - Approximately 7 percent of all traffic between Upper James Street and Upper Sherman Avenue; and,
  - Approximately 10 percent of all traffic between Upper Sherman Avenue and Dartnall Road.
- During the PM peak hour:
  - Approximately 2 percent of all traffic between Upper James Street and Upper Ottawa Street; and,
  - Approximately 5 percent of all traffic between Upper Ottawa Street and Nebo Road.
- During daytime hours on a typical weekday:
  - Approximately 4 to 6 percent of all traffic between Upper James Street and Nebo Road; and,
  - Approximately 7 to 8 percent of all traffic between Nebo Road and Dartnall Road.

Since Rymal Road will be part of the S-Line for future rapid transit as described in **Section 3.5.2.2**, transit demand and volumes were also analyzed.

During the AM peak hour, bus loading increases as buses travel westbound and eastbound through the study area. The maximum point ridership is approximately 80 passengers/hour westbound (departing Upper Wellington Street) and approximately 70 passengers/hour eastbound (approaching Dartnall Road). At a 15-minute headway, this would correspond to an average loading of up to 20 riders per bus.

During the PM peak hour, bus loading decreases as buses travel westbound and eastbound through the Study Area. The maximum point ridership is approximately 90 passengers/hour eastbound (departing Upper James Street) and approximately 60 passengers/hour westbound (between Dartnall Road and Upper Ottawa Street). At a 15-minute headway, this would correspond to an average loading of up to 22 riders per bus.

3.11.3.2 S-Line Corridor Transit Assessment

As part of this study, the need and justification for dedicated transit facilities within the project limits was assessed. This assessment is documented in the S-Line Corridor Transit Assessment (Dillon, 2023; **Appendix J**).

The transit measures options that were considered include:

- No additional transit measures required;
- Priority bus corridor, including:
  - Transit signal priority and/or physical intersection measures (such as queue jump lanes); and/or,
  - Managed lane for transit and high occupancy vehicles;
- Exclusive transit lane, either:
  - Not separated from general traffic; or,
  - Physically separated from traffic.

Based on estimated future ridership and transit vehicle frequency, it was identified that isolated transit priority measures should be considered for all segments of the S-Line corridor by the 2051 planning horizon. No transit priority measures were recommended within the Study Area in the nearer term 2031 and 2041 planning horizons.

3.11.3.3 Forecasted Transportation Demand

Future traffic volumes and expected infrastructure were determined based on City policies including Rapid Ready (2013) and (Re)envision the HSR (2018), as well as the S-Line Corridor Transit Assessment (Dillon, 2023). Future traffic volumes were estimated by considering two potential components of traffic growth:

- Traffic generated by site specific developments within the Study Area; and,
- Additional general background traffic growth as a result of changes in conditions or growth elsewhere in the region.

The general background growth rate was then calibrated against traffic forecasts for the Rymal Road corridor generated in the City's regional transportation model, which uses the Equilibre Multimodal/Multimodal Equilibrium (EMME) modeling platform. The City's EMME model projects traffic volumes at a 2031 horizon. However, for the purposes of this study, a 20-year (2041) horizon has been considered.

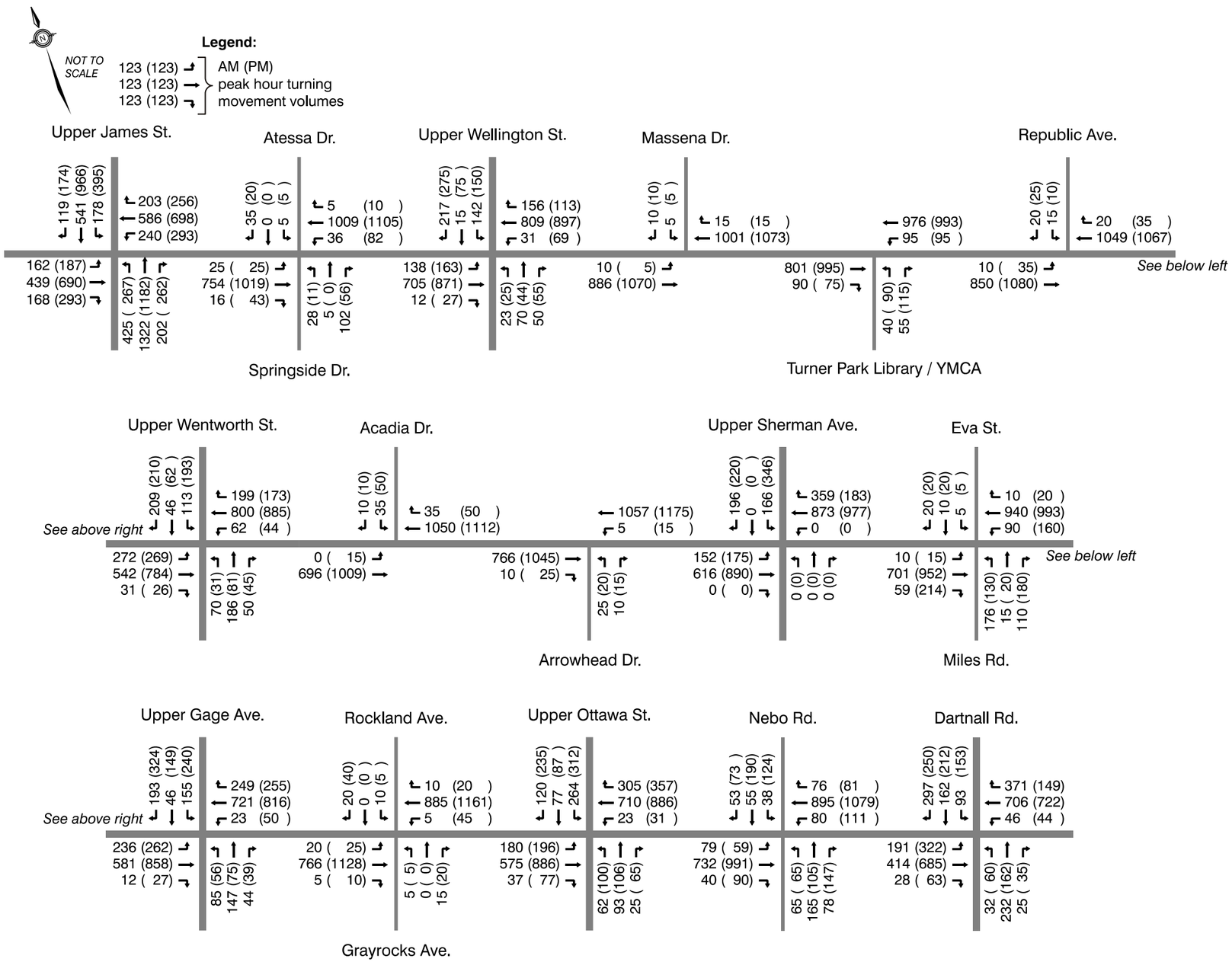
City staff provided a list of active development applications that could directly affect traffic volumes within the Study Area. In total, the active applications would result in the following development yield along the corridor:

- 587 residential units;
- A 33,300 square foot place of worship;
- 185,000 square feet of retail and commercial space; and,
- 2 service stations and 2 other auto service facilities.

Based on available traffic studies and estimated trip generation forecasts, a total of 863 trips and 1,617 additional two-way trips are expected in the AM and PM periods respectively. These trips were added to the general background growth and assigned logically to the road network.

Figure 8 presents the estimated 2041 traffic volumes applied in the traffic analyses. These volumes account for the development traffic and the traffic growth rates (extrapolated an additional 10 years to 2041).

Figure 8: Estimated 2041 Traffic Volumes



3.11.4 Transportation Safety

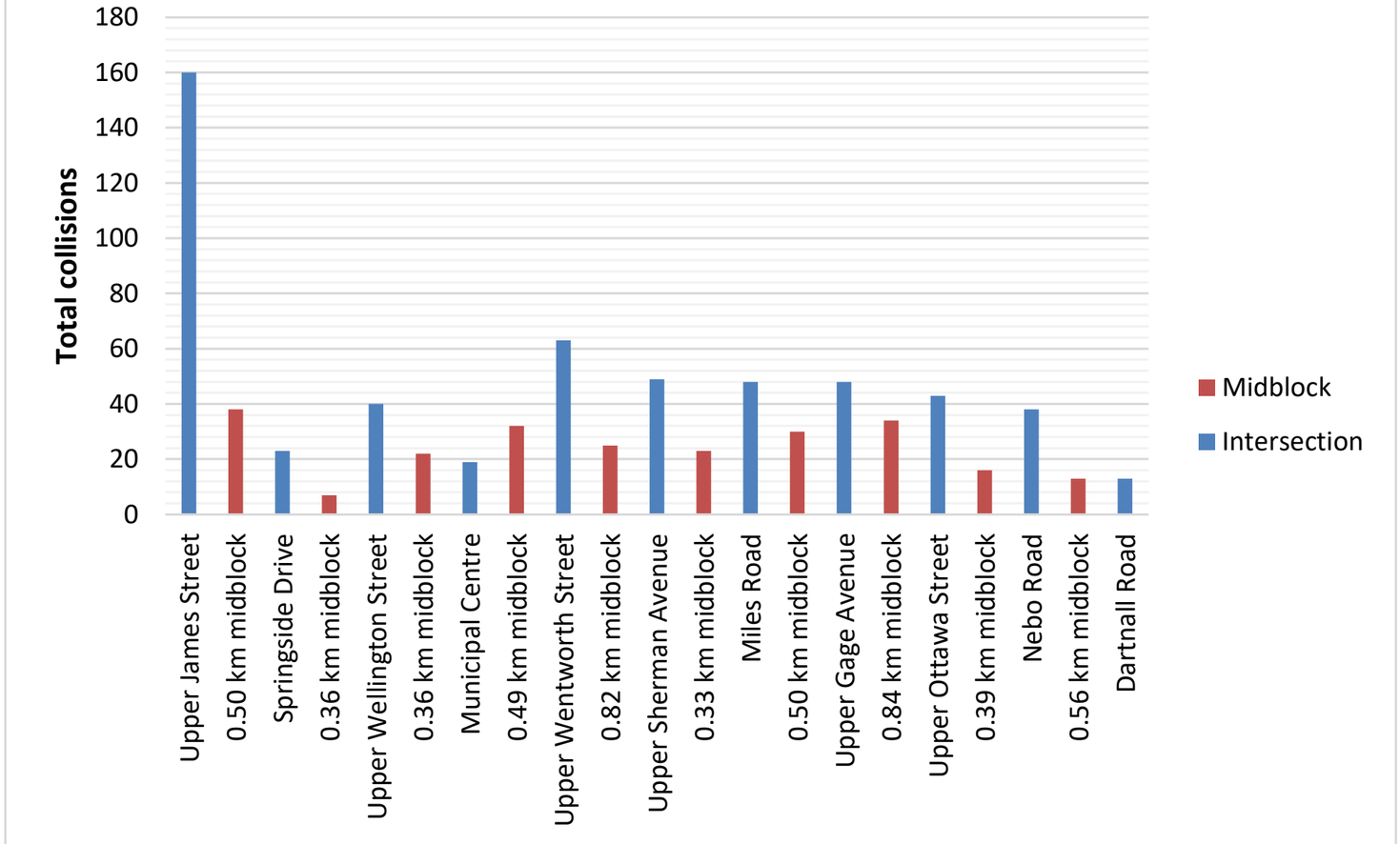
To better understand areas of concern and to redesign areas to improve safety, the City of Hamilton provided 5 years (2015 through 2019) of collision records for the Rymal Road corridor between Upper James Street and Dartnall Road. The records encompass a total of 784 individual collisions. These collision records were reviewed to determine whether patterns could be identified.

By a wide margin, the location experiencing the greatest number of collisions was the intersection with Upper James Street (160 collisions over 5 years). By comparison, the next highest location was the intersection with Upper Wentworth Street (63 collisions over the same 5-year period). **Figure 9** presents the total number of collisions reported by location.

These collisions were broken down further based on mode of transportation. Eleven reported collisions involved pedestrians and 10 involved cyclists, with the remaining 763 being automobile only collisions. None of the reported collisions resulted in a fatality.

The collisions were further analyzed by environmental factor such as lighting, road conditions, weather, and type of collision. This analysis can be found in the Multi-Modal Transportation Report in **Appendix K**.

Figure 9: Geographic Distribution of Collisions



3.12 Problem and Opportunity Statement

Considering the existing conditions documented above, the following problem and opportunity statement was developed to guide the study:

- Rymal Road is a major arterial roadway with a three to five lane cross-section, discontinuous sidewalk network, and no cycling facilities within the Study Area. There are limited transportation options within the Study Area, and transit service frequencies and amenities do not reflect the City's policy objectives for the corridor. Additionally, Rymal Road within the Study Area lacks consistency with adjoining roadway cross-sections, creating a bottleneck where the roadway narrows from five lanes to three.
- The key objectives of the Rymal Road MCEA include providing a safe, efficient, and well-connected multi-modal transportation corridor. The intent is to balance the needs of pedestrians, cyclists, transit users, goods movement, and drivers in a way that is economical and minimizes impact to the natural, social, cultural, and built environments.

4.0 Alternative Planning Solutions

Phase 2 of the MCEA process involves the development of alternative solutions to address the problems and opportunities identified in Phase 1. Alternative solutions are different ways of solving the problem or addressing an opportunity.

4.1 Description of Alternative Solutions

Considering the problems and opportunities identified in **Section 3.12**, the alternative solutions described below were assessed.

4.1.1 Alternative 1: Do Nothing with Exception of Other Committed Non-Capital Projects

This alternative would involve no improvements other than future regular maintenance and committed non-capital projects.

4.1.2 Alternative 2: Implement Transportation Demand Management (TDM) and Transportation System Management (TSM) Strategies

This alternative would include:

- Improvements to transit and active transportation facilities (e.g., cycling lanes and sidewalks); and,
- Localized roadway improvement and optimization (e.g., transit queue jump lanes, intersection improvements, signal optimization, turn restrictions, etc.).

4.1.3 Alternative 3: Create Additional Travel Lanes

In addition to improvements associated with Alternative 2 (including TDM/TSM measures), this alternative would increase vehicular capacity by providing up to a total of five lanes to accommodate future projected travel demand. It is assumed one new travel lane would be added in each direction. The additional travel lanes would benefit private vehicles, goods movement, and bus travel times through the corridor. The corridor would maintain the existing centre two-way-left-turn lane.

4.1.4 Alternative 4: Create High Occupancy Vehicle (HOV) Lanes

In addition to improvements associated with Alternative 2 (including TDM/TSM measures), this alternative would provide high-occupancy vehicle (HOV) lanes in the corridor to accommodate future projected travel demand. It is assumed to include one additional lane in each direction for HOV vehicles to create a cross-section with up to five lanes.

The additional travel lanes would improve overall travel times through the corridor and would provide the greatest benefit for transit and carpoolers. The existing centre two-way-left-turn lane would also be maintained.

4.1.5 Alternative 5: Complete Committed Non-Capital Improvements on Rymal Road and Improve Other Roads

Instead of improving Rymal Road, this alternative would improve other parallel roads in the vicinity of Rymal Road. This would potentially require the widening of those adjacent corridors (i.e., Stone Church Road).

4.2 Evaluation of Alternative Solutions

The alternative solutions were evaluated based on criteria that represent the broad definition of the environment as set out in the EA Act, including the natural, social, cultural, built, and economic environments. The evaluation criteria are structured around 5 main groupings, as presented in **Table 4**.

A comparative evaluation was completed to identify the preferred planning solution. Each alternative was evaluated against each other, with alternatives being labeled “most preferred” to “least preferred” for each evaluation criteria. The evaluation is presented in **Table 5**, and the results are discussed in **Section 4.2.1**.

It is typical that not one alternative solution is preferred for all evaluation criteria. Rather, the alternative that provides the best results overall and results in the fewest trade-offs is selected as the preferred alternative. The evaluation that was completed did not assume one criterion was more important than another, but instead focused on the magnitude of the differences between alternatives for particular criteria. The preferred design was also determined by identifying which alternative best aligned with the project objectives overall.

Table 4: Alternative Solutions Evaluation Criteria

Category	Criteria
Transportation	Ability to address identified roadway vehicle capacity deficiencies
	Ability to address concerns related to access to adjacent properties
	Ability to address identified operational deficiencies
	Ability to facilitate and accommodate growth in public transit usage
	Ability to facilitate and accommodate safe and convenient active transportation modes
	Ability to facilitate and support safety for all users (Ex: Providing safe crossing locations for pedestrians and encompassing Vision Zero principles)
	Potential to improve goods movement traffic flow through corridor
Natural Environment	Potential for removal and disturbance effects to street trees and other natural heritage features
	Ability to have a positive impact on climate change through reduced personal vehicle use
Engineering	Potential for significant roadway design challenges
	Consistency and compatibility of the design concept with connecting roadway sections
	Potential to avoid significant impacts to existing utility infrastructure
	Provides opportunities to address existing drainage issues and consider implementation of Low Impact Development (LID) measures within the Rymal Road ROW
Socio-Economic Environment	Potential for loss of residential/business property
	Potential for disruption effects to residences/businesses post construction
	Potential for disruption effects to residences/businesses during construction
	Potential for improved street corridor character (i.e. complete streets considerations)
	Potential for loss of park land/open space
	Potential for impact on cultural heritage resources
	Ability to support and compliment planned future development and growth in the area, which may include transit-oriented development
Cost	Relative capital cost estimate
	On-going maintenance and operational costs

Table 5: Evaluation of Alternative Solutions

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
Transportation	Ability to address identified roadway vehicle capacity deficiencies.	**Least Preferred** Does not address the roadway capacity deficiencies.	**Less Preferred** While TDM and TSM on their own would be expected to help address some of the roadway capacity deficiencies, they would not be able to completely address the problem.	**Most Preferred** The addition of one travel lane per direction (for a continuous five lane cross-section) would provide the greatest amount of new capacity for private vehicles and would address the identified roadway capacity deficiencies.	**Moderately Preferred** The addition of one travel lane per direction for HOVs and/or buses only would help to address capacity deficiencies but not to the same extent that Alternative 3 would.	**Moderately Preferred** Extending Upper Sherman Avenue south to at least Twenty Road would partially mitigate congestion on Rymal Road between Upper Sherman Avenue and Miles Road (this segment of Rymal Road is currently used to facilitate north-south travel). While improving other parallel roadways would increase east-west vehicular capacity at a network level (though no parallel route has the same level of east-west connectivity as Rymal Road), this would not fully address the capacity problems within the Rymal Road corridor – particularly for vehicles with origins or destinations on Rymal Road. Stone Church is not a feasible road for improvements, except with significant land acquisitions and the removal of the tree canopy. Additional lanes would likely result in the removal of cycling lanes.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Ability to address identified concerns related to access to adjacent properties.	**Least Preferred** Future congestion (lack of capacity) in the existing travel lanes will make finding a safe gap in traffic to exit driveways increasingly difficult.	**Less Preferred** Future congestion (lack of capacity) in the existing travel lanes will make finding a safe gap in traffic to exit driveways increasingly difficult. However, TDM/TSM measures are anticipated to somewhat reduce overall congestion levels in the corridor.	**Most Preferred** Reduced congestion through a combination of TSM/TDM measures and roadway widening will increase the number of opportunities to find safe gaps to exit adjacent driveways. The presence of an additional travel lane in each direction will allow through moving vehicles to travel in the inside lanes and avoid conflicts with vehicles turning right to enter driveways. However, left turns across two lanes of traffic are more complex than turns across one lane.	**Less Preferred** Reduced congestion through a combination of TSM/TDM measures and roadway widening will increase the number of opportunities to find safe gaps to exit adjacent driveways**.** However, entering and exiting these driveways will require merging into and out of the curbside HOV lanes from/to the more congested general use lane. The anticipated speed differential between lanes as well as the need for merge will negatively impact access and egress operations.	**Less Preferred** Future congestion (lack of capacity) in the existing travel lanes will make finding a safe gap in traffic to exit driveways increasingly difficult. However, congestion along this segment of Rymal Road may decrease if other parallel roads are improved and traffic is diverted.
	Ability to address identified operational deficiencies.	**Least Preferred** Does not address the identified operations deficiencies in the Rymal Road corridor.	**Moderately Preferred** Implementation of TDM/TSM strategies and localized intersection improvements will partially address operational issues along the corridor.	**Most Preferred** It is anticipated the combination of TDM/TSM strategies, localized intersection improvements and providing a minimum of two additional travel lanes (one in each direction) will address operations deficiencies and result in less delay to vehicles entering and exiting properties with direct access to Rymal Road.	**Moderately Preferred** Implementation of TDM/TSM strategies and localized intersection improvements will partially address operational issues along the corridor. The presence of multiple accesses along the HOV lanes will negatively impact the reduced travel times typically provided by these lanes (i.e. result in greater travel times).	**Least Preferred** Does not address the identified access and operations deficiencies in the Rymal Road corridor.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Ability to facilitate and accommodate growth in public transit usage.	**Least Preferred** Without transit oriented infrastructure improvements along the corridor, there will be limited ability to grow ridership levels.	**Less Preferred** While TDM/TSM measures, operational changes at intersections, and provision of safe, continuous pedestrian and cycling facilities are all considered transit-supportive improvements, this alternative will only address some of the anticipated delays to transit service caused by congestion.	**Moderately Preferred** Capacity, operational, and supportive active transportation improvements along the corridor will contribute to the ability to grow ridership levels. An additional lane will result in improved overall transit travel times in the corridor.	**Most Preferred** The introduction of HOV lanes is expected to provide the fastest transit travel times relative to alternatives that do not provide reserved HOV lanes. Reduced travel times will make transit a more desirable mode relative to personal vehicle use, and will contribute to the ability to grow ridership levels. HOV lanes could be used as bus rapid transit (BRT) lanes in the future.	**Less Preferred** Without capacity, operational, and supportive active transportation improvements along the corridor, the ability to grow ridership levels by providing efficient transit service will be greatly diminished. Ridership levels will need to increase before service improvements are warranted.
	Ability to facilitate and accommodate safe and convenient active transportation modes.	**Less Preferred** Due to the current lack of continuous sidewalks and complete lack of cycling facilities in the corridor, this alternative will not facilitate and accommodate active transportation in the corridor.	**Most Preferred** Completing previously planned projects and implementing TDM/TSM strategies would include measures to better promote and facilitate active modes through provision of safe, continuous cycling and pedestrian facilities.	**Most Preferred** Alternative 3 provides all of the TDM/TSM and active mode improvements associated with Alternative 2. Designs will need to consider enhanced intersection treatments and addition of Pedestrian Crossovers at popular mid-block crossing locations.	**Most Preferred** Alternative 4 provides all of the TDM/TSM and active mode improvements associated with Alternative 2. Designs will need to consider enhanced intersection treatments and addition of Pedestrian Crossovers at popular mid-block crossing locations.	**Less Preferred** Improving other corridors would not lead to an increase in active transportation in the Rymal corridor due to the current lack of continuous sidewalks and complete lack of cycling facilities. Stone Church is not a feasible road for improvements, except with significant land acquisitions and the removal of the tree canopy. Additional lanes would likely result in the removal of cycling lanes.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Ability to facilitate and support the health and safety for all users (Ex: Providing safe crossing locations for pedestrians and encompassing Vision Zero principles).	**Less Preferred** Due to the current lack of continuous sidewalks and complete lack of cycling facilities in the corridor, this alternative will not facilitate and support health and safety for all users.	**Most Preferred** Completing previously planned projects and implementing TDM/TSM strategies would include measures to better facilitate and support health and safety for all users.	**Moderately Preferred** Alternative 3 provides all of the improvements associated with Alternative 2. Road widening will, however, increase crossing distances for vulnerable road users. This will increase their collision exposure. Designs will need to consider enhanced intersection treatments.	**Moderately Preferred** Alternative 4 provides all of the improvements associated with Alternative 2. Road widening will, however, increase crossing distances for vulnerable road users. This will increase their collision exposure. Designs will need to consider enhanced intersection treatments.	**Less Preferred** Improving other corridors would not lead to an improvement in facilitating and supporting health and safety for all users within the Rymal Road corridor.
	Potential to improve goods movement traffic flow through corridor.	**Less Preferred** No potential improvements to goods movement traffic flow through corridor.	**Moderately Preferred** Completing previously planned projects and implementing TDM/TSM strategies would have potential to partially improve some goods movement traffic flow operations.	**Most Preferred** Alternative 3 provides all of the improvements associated with Alternative 2. Additional travel lanes will provide improved traffic flow for all traffic, including goods movement.	**Most Preferred** Alternative 3 provides all of the improvements associated with Alternative 2. Overall, the introduction of HOV lanes is expected to provide improved traffic flow for all traffic, including goods movement.	**Less Preferred** Improving other corridors has the potential to improve goods movement on Rymal Road (which is identified as a truck route) if vehicular traffic in the corridor is reduced as a result.
Natural Environment	Potential for removal and disturbance effects to street trees and other natural heritage features.	**Most Preferred** No impact to street trees or natural heritage areas.	**Moderately Preferred** Some trees may be removed as a result TSM and TDM strategies. The primary natural heritage area within the corridor exists adjacent to the Radial Trail, west of Dartnall Road. Widening to accommodate a sidewalk and cycling facilities in the westbound direction	**Less Preferred** Some trees may be removed as a result of TSM and TDM strategies. The primary natural heritage area within the corridor exists adjacent to the Radial Trail, west of Dartnall Road. Widening to accommodate an additional lane, sidewalk, and cycling facilities in the westbound direction may	**Less Preferred** Some trees may be removed as a result of TSM and TDM strategies, and road widening. The primary natural heritage area within the corridor exists adjacent to the Radial Trail, west of Dartnall Road. Widening to accommodate an additional lane, sidewalk, and cycling facilities in the westbound direction may	**Less Preferred** Some trees may be removed as a result of road widening. Depending on which alternative routes are improved, there may be impacts to natural heritage features. If improvements are made to Stone Church Road instead of Rymal Road, impacts are anticipated to be

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
			may have edge impacts on these features.	have edge impacts on these features.	have edge impacts on these features.	similar to Alternatives 3 and 4. Stone Church is not a feasible road for improvements, except with significant land acquisitions and the removal of the tree canopy.
	Ability to have a positive impact on climate change through reduced personal vehicle use.	**Least Preferred** Does not assist in achieving climate change goals set by the City of Hamilton. By not providing an alternative mode choice for even short trips, this option encourages driving.	**Moderately Preferred** TDM and TSM strategies include provision of active transportation facilities and localized changes to improve transit operations. These facilities will allow for improved modal choice which will have a positive impact on climate change. Additionally, active transportation options will be increasingly desirable for short trips and during peak traffic periods as congestion in the corridor increases.	**Less Preferred** TDM and TSM strategies include provision of active transportation facilities and localized changes to improve transit operations. These facilities will allow for improved modal choice which will have a positive impact on climate change. However, provision of additional general use lanes will facilitate and encourage growth in the use of personal vehicles.	**Most Preferred** All changes being proposed under this alternative support a shift in travel behaviour away from personal vehicle use. TDM and TSM strategies include provision of active transportation facilities and localized changes to improve transit operations. Implementation of HOV lanes will provide for faster transit service and encourage carpooling – reducing the total number of vehicles per person in the corridor. These changes will have a positive impact on climate change.	**Less Preferred** Does not assist in achieving climate change goals set by the City of Hamilton considering travel along the Rymal Road corridor. By not providing an alternative mode choice for even short trips, this option encourages driving.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
Engineering	Potential for significant roadway design challenges.	**Most Preferred** No design challenges.	**Most Preferred** Minor design challenges. Intersection improvements are not expected to have significant design challenges.	**Most Preferred** The majority of the corridor has already been constructed with a five lane cross-section (though portions are painted out). No significant design challenges are anticipated.	**Most Preferred** The majority of the corridor has already been constructed with a five lane cross-section (though portions are painted out). No significant design challenges are anticipated.	**Less Preferred** Widening of Stone Church Road and/or Twenty Road East would be required to address east-west vehicular demand if Rymal Road is not widened. These corridors are significantly more constrained by adjacent residential properties than Rymal Road. Designing this solution would be significantly more complex. Stone Church is not a feasible road for improvements, except with significant land acquisitions.
	Consistency and compatibility of the design concept with connecting roadway sections.	**Less Preferred** Current Rymal Road cross-section is not consistent with improvements already made east and west of the study limits.	**Less Preferred** Current Rymal Road cross-section is not consistent with improvements already made east and west of the study limits. Implementation of cycling facilities would be consistent with the recommendation of the Transportation Master Plan and the Cycling Master Plan; however, these facilities do not currently exist to the east or west of the study limits.	**Most Preferred** The road cross-section would be consistent with recently reconstructed segments east and west of the study limits. Implementation of cycling facilities would be consistent with the recommendation of the Transportation Master Plan and the Cycling Master Plan; however, these facilities do not currently exist to the east or west of the study limits. Widening of the ROW is not anticipated to accommodate this alternative.	**Moderately Preferred** The road cross-section would be consistent with recently reconstructed segments east and west of the study limits; however, the HOV lanes would operate differently. Implementation of cycling facilities would be consistent with the recommendation of the Transportation Master Plan and the Cycling Master Plan; however, these facilities do not currently exist to the east or west of the study limits.	**Less Preferred** Improving other corridors does not change the current cross-section of Rymal Road. Current Rymal Road cross-section is not consistent with improvements already made east and west of the study limits.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Potential to avoid significant impacts to existing utility infrastructure.	**Most Preferred** No impacts to existing utility infrastructure.	**Moderately Preferred** Impacts to existing utility infrastructure will be mitigated to the extent feasible, with potential impacts only anticipated at intersections.	**Less Preferred** Widening along the majority of the Rymal Road corridor will require relocation of overhead and surface level utilities. Relocations have already occurred along select segments.	**Less Preferred** Widening along the majority of the Rymal Road corridor will require relocation of overhead and surface level utilities. Relocations have already occurred along select segments.	**Least Preferred** Widening of either Stone Church Road or Twenty Road East to accommodate additional vehicular volumes will require substantial relocation of overhead and surface utilities which are located in close proximity to the existing edges of pavement.
	Provides opportunities to address existing drainage issues and consider implementation of Low Impact Development (LID) measures within the Rymal Road ROW.	**Least Preferred** Current capital plans do not include drainage improvements along Rymal Road.	**Less Preferred** Improvements at intersections to address operational issues may provide opportunities to improve drainage patterns as part of the same project.	**Moderately Preferred** Reconstruction and urbanization of the corridor will provide opportunities to correct issues with profile and crossfall, implement improved storm sewer systems, and manage runoff more effectively. However, this solution will result in increased impervious areas to be drained and stormwater to be managed.	**Moderately Preferred** Reconstruction and urbanization of the corridor will provide opportunities to correct issues with profile and crossfall, implement improved storm sewer systems, and manage runoff more effectively. However, this solution will result in increased impervious areas to be drained and stormwater to be managed.	**Least Preferred** Improvements to other corridors will not address current drainage issues along Rymal Road.
Socio-Economic Environment	Potential for loss of residential/ business property.	**Most Preferred** No potential for property loss.	**Most Preferred** No potential for significant property impacts.	**Moderately Preferred** It is anticipated that most of the road widening can be accommodated within the existing ROW. Minimal property impacts are anticipated.	**Moderately Preferred** It is anticipated that most of the road widening can be accommodated within the existing ROW. Minimal property impacts are anticipated.	**Less Preferred** Significant potential for property impacts along other corridors depending on extent of improvements. Significant land acquisitions would be required to improve Stone Church.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Potential for disruption effects to residences/ businesses post construction.	**Most Preferred** No potential for disruption to residents.	**Moderately Preferred** There is potential for additional disruption to residences or businesses due to sidewalks, bike lanes, and queue jump lanes.	**Less Preferred** Roadway capacity improvements could attract additional vehicles to the corridor resulting in additional vehicle related disruption effects (I.e. noise).	**Less Preferred** Roadway capacity improvements could attract additional vehicles to the corridor resulting in additional vehicle related disruption effects (I.e. noise). New traffic volumes are expected to be less than Alternative 3.	**Least Preferred** Roadway capacity improvements could attract additional vehicles to the other corridors, resulting in additional vehicle related disruption effects (I.e. noise) in those locations.
	Potential for disruption effects to residences/ businesses during construction.	**Most Preferred** No potential for disruption to residents as a result of construction activities.	**Moderately Preferred** There is potential for additional disruption during construction.	**Less Preferred** New lane related construction activities will temporarily impact residential and business access. Traffic management plans will be developed ahead of construction to mitigate and minimize impacts.	**Less Preferred** New lane related construction activities will temporarily impact residential and business access. Traffic management plans will be developed ahead of construction to mitigate and minimize impacts.	**Least Preferred** New lane related construction activities will temporarily impact residential and business access. Traffic management plans will be developed ahead of construction to mitigate and minimize impacts. As widening of alternative corridors would require property taking and significant modification to driveways, this alternative would have the greatest impact.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Potential for improved street corridor character (i.e. complete streets considerations).	**Less Preferred** No improvements to character of the Rymal Road corridor.	**Most Preferred** Public realm improvements completed in concert with active transportation facility works would improve the character of the Rymal Road corridor.	**Moderately Preferred** Public realm improvements completed in concert with active transportation facility and road reconstruction works would improve the character of the Rymal Road corridor. The addition of road lanes results in less space being available to implement streetscape elements.	**Moderately Preferred** Public realm improvements completed in concert with active transportation facility and road reconstruction works would improve the character of the Rymal Road corridor. The addition of road lanes results in less space being available to implement streetscape elements.	**Less Preferred** No improvements to character of the Rymal Road corridor.
	Potential for loss of park land/open space.	**Most Preferred** No loss of park land.	**Most Preferred** No loss of park land.	**Most Preferred** While Turner Park is located adjacent to the study corridor, it is not expected that the ROW would need to be widened to accommodate proposed improvements; the roadway is not anticipated to impact park facilities.	**Most Preferred** While Turner Park is located adjacent to the study corridor, it is not expected that the ROW would need to be widened to accommodate proposed improvements; the roadway is not anticipated to impact park facilities.	**Moderately Preferred** Potential for minor impacts to parks along Twenty Road if that road were widened instead of Rymal Road.
	Potential for impact on cultural heritage resources.	**Most Preferred** No impact on cultural heritage resources.	**Most Preferred** No impact on cultural heritage resources.	**Moderately Preferred** Potential for impact to St. George's Cemetery, though risk is considered low. Stage 3 AA recommended for works adjacent to St. George's cemetery.	**Moderately Preferred** Potential for impact to St. George's Cemetery, though risk is considered low. Stage 3 AA recommended for works adjacent to St. George's cemetery.	**Moderately Preferred** Potential for impact on archaeological features. Potential has not been assessed.

Category	Criterion	Alternative 1: Do Nothing and Other Committed Non-Capital	Alternative 2: Implement TDM and TSM strategies	Alternative 3: Create New Travel Lanes	Alternative 4: Create HOV Lanes	Alternative 5: Improve Other Roads
	Ability to support and compliment planned future development and growth in the area, which may include transit-oriented development.	**Less Preferred** Does not provide additional roadway capacity and/or improve other modes of travel to support planned development in the project area. Does not support transit-oriented development.	**Moderately Preferred** Provides some improvements to the transportation system but would not fully support planned developments in the project area. Potential to support transit-oriented development.	**Most Preferred** Additional roadway capacity in combination with TDM/TSM strategies would provide a high level of support to planned new developments in the project area. Potential to support transit-oriented development.	**Most Preferred** Additional HOV Lanes in combination with TDM/TSM strategies would provide a high level of support to planned new developments in the project area. Potential to support transit-oriented development.	**Most Preferred** Additional road capacity in other corridors in combination with TDM/TSM strategies would provide a high level of support to planned new developments in the project area. Does not support transit-oriented development.
Cost	Relative capital cost estimate	**Most Preferred** No capital cost.	**Most Preferred** Low to moderate capital cost associated with localized intersection, pedestrian and cycling improvements.	**Moderately Preferred** Moderate to high capital cost associated additional lanes, intersection, pedestrian and cycling improvements.	**Moderately Preferred** Moderate to high capital cost associated with localized road widening, intersection, pedestrian and cycling improvements.	**Less Preferred** High capital cost associated with road widening and anticipated property acquisition.
	Ongoing maintenance and operational costs	**Less Preferred** Continuous costs to maintain existing infrastructure.	**Most Preferred** Low maintenance costs associated with localized intersection, pedestrian and cycling improvements.	**Most Preferred** Low maintenance costs associated with additional lanes, intersection, pedestrian and cycling improvements.	**Most Preferred** Low maintenance costs associated with localized road widening, intersection, pedestrian and cycling improvements.	**Moderately Preferred** Moderate maintenance costs with road widening and anticipated property acquisition.

4.2.1 Evaluation Results

Considering the evaluation summarized in **Table 5**, Alternative 3: Create New Travel Lanes (along with TDM/TSM measures) is the recommended solution. The evaluation and rationale for the recommended solution are discussed below, drawing on the criteria rankings presented in **Table 5**.

4.2.1.1 Alternative 1: Do Nothing with Exception of Committed Non-Capital Projects

While Alternative 1 would not result in social or natural environment impacts and would have low cost, it does not address the identified capacity problem and would not promote the use of other modes of travel. It does not resolve the problem/opportunity statement. As such this alternative is not recommended for further consideration.

4.2.1.2 Alternative 2: Implement Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies

It is expected that Alternative 2 would result in minimal social or natural environment impacts and would have relatively low cost. However, TDM and TSM strategies would only partially address the problem/opportunity.

The addition of facilities to support active transportation (e.g., bike lanes and sidewalks) and measures to improve bus travel through the corridor (e.g., queue jump lanes) would be beneficial to promote other modes of travel. However, this alternative would not substantially address corridor capacity deficiencies, which would impact traffic and transit travel times as well as the viability of future development in the area. For these reasons, it is recommended that these measures be included as part of the preferred alternative, but not be carried forward on their own.

4.2.1.3 Alternative 3: Create New Travel Lanes

Alternative 3 is expected to address the identified capacity problem as well as access and operational issues for vehicular traffic. This alternative would also support other modes of transportation through improved active transportation facilities and the promotion of TDM and TSM strategies. Additionally, this alternative is consistent with existing roadway infrastructure at both ends of the corridor.

The additional general use lanes would provide less benefit to transit travel time and ridership levels as compared to Alternative 4, which designates HOV lanes. The addition of general use lanes may encourage an increased number of vehicles to use the corridor; however, those additional volumes are not anticipated to have a significant impact on travel times.

Further, as it is not expected that the ROW would need to be widened to accommodate this alternative, impacts to the social and natural environment are anticipated to be minimal and can likely be largely mitigated through sensitive roadway design. This alternative is also expected to improve the character of the roadway.

This alternative would have a higher cost than Alternatives 1 and 2. However, considering that this alternative addresses the problems and opportunities identified, leading to overall transportation benefits, and is not expected to have significant adverse impacts, it is recommended to be carried forward.

4.2.1.4 Alternative 4: Create HOV Lanes

From an infrastructure perspective, Alternative 4 is similar to Alternative 3 in that it would add two lanes to the corridor (one in each direction). These new lanes would not be open to all traffic, but would be dedicated for transit or HOV use only. The impacts and costs of this alternative would be similar to Alternative 3.

Adding HOV lanes has the highest potential to improve transit travel time and, as a result, increase transit ridership. By encouraging carpooling to take advantage of the less congested HOV lanes, along with active transportation improvements, this alternative also has the potential to move the greatest number of people through the corridor – even if the total number of vehicles remains the same. This alternative has the greatest potential climate change benefit.

However, there are fundamental issues with Alternative 4. Rymal Road has a significant number of direct private residential and commercial accesses within the project limits. As a result, a significant number of vehicles would be required to weave into, out of, and across the HOV lanes, impacting the potential safety, speed, and capacity improvements typically associated with HOV lanes. Enforcement is also expected to be challenging.

Additionally, implementing isolated HOV lanes from Upper James Street to Dartnall Road will not provide the overall travel time improvements that could be realized if the

entirety of Rymal Road operated in a similar way. Transitions between general use and HOV lanes at either end of the corridor are also likely to introduce localized operational issues.

In addition, as noted in **Section 3.11.3.2**, transit priority measures are not required during the 20-year planning horizon of this study.

For these reasons, Alternative 4 is not recommended for further consideration as part of this MCEA study. HOV lanes could be considered for implementation in the future should transit ridership, adjacent land use patterns, and operational issues provide warrant.

4.2.1.5 Alternative 5: Improve Other Roads

Improvements to other corridors are expected to resolve the capacity deficiencies at a network level, but would not resolve the operational, access, or modal choice issues within the Rymal Road corridor. Furthermore, for trips with origins and destinations in the corridor, this alternative would not likely result in improved travel times.

Impacts to the social and natural environment would be corridor dependent. These impacts could be greater than those associated with Alternatives 3 or 4 since Rymal Road has a wide ROW and consequently widening the road is expected to have little to no impacts outside the ROW. As such, improving other roads instead of Rymal Road is not recommended for further consideration.

4.2.1.6 Conclusion

As noted above, Alternative 3: Create New Travel Lanes, is the recommended solution along with TDM/TSM measures. Alternative 3 was presented for public input at PIC 1 and ultimately carried forward into Phase 3 of the MCEA process, as described in the following sections.

4.3 Engagement

The goal of engagement in Phase 2 was to help finalize the evaluation and confirm the preferred solution.

4.3.1 Notice of Study Commencement & Public Information Centre 1

A Notice of Study Commencement and PIC 1 was published and circulated to the contact list in March 2022 to introduce the study and advertise the upcoming PIC. The Notice was published in the Hamilton Spectator on March 17 and 24, 2022. Around the same time, the project webpage was launched on the City of Hamilton's Engage Hamilton website (https://engage.hamilton.ca/rymalea) to provide project information, updates, and contact information.

A virtual PIC was held on March 29, 2022 from 6:00 PM to 8:00 PM. The project team provided an overview of the project, including the evaluation completed to identify the preferred solution. The presentation was followed by a question and answer session where the project team was available to answer questions. The event was held using the Webex Event platform where individuals were able to participate online or by phone. A total of 16 members of the public attended the virtual meeting.

An online survey and mapping tool was available for 2 weeks (March 29, 2022 to April 12, 2022) on the Engage Hamilton webpage to gather public feedback on the evaluation of alternative solutions. The survey received 3 responses, which are included in the summary provided in the sections below.

4.3.2 Comments Received

Four emails were received by the project team, which included comments and questions related to:

- Public health impacts from living in proximity to roads;
- Support for BRT;
- Road design details including number of lanes, bike lanes and sidewalks, and location of bus stops; and,
- Questions regarding potential property impacts.

The following sections summarize key themes that emerged through the engagement process and feedback in relation to the alternative solutions evaluation.

4.3.2.1 Feedback Regarding Road Widening

There were mixed responses to road widening, with some participants expressing that it would lead to more traffic and others supportive of expansion to relieve current traffic congestion.

4.3.2.2 Road Safety

Several participants expressed concerns related to the current road design and safety concerns such as speeding and the need for improvements to the sidewalks to provide a safe, walking-friendly environment. There was also a suggestion to add mid-block crosswalks along the corridor as part of the redesign to provide an improved pedestrian experience. Road safety for cars, cyclists, and pedestrians was considered in the development and evaluation of alternative design concepts, as discussed in **Section 5.0**.

4.3.2.3 Cycling Facilities

Concerns were expressed about safety for cyclists on Rymal Road, with some participants expressing a desire to introduce a dedicated space for cyclists as part of the redesign. There was a sentiment that if the City is adding cycling facilities, they should be fully protected. However, there were also comments opposed to adding on street bike lanes due to traffic impacts. One participant suggested that the sidewalk could be expanded to convert it to a MUP. Protected cycling facilities were incorporated into the alternative design concepts as outlined in **Section 5.0**.

4.3.2.4 Transit Improvements

Many participants expressed support for improvements to transit on Rymal Road as part of the road redesign to encourage transit use. There was a sentiment that HOV lanes during peak periods could make transit more attractive, along with transit priority measures such as queue jump lanes. Rapid transit options such as BRT/light rail transit (LRT) were also raised as potential options for the road. As noted in **Section 3.11.3**, traffic forecasting completed as part of this study indicates there is not sufficient demand for dedicated transit facilities within the 2041 planning horizon.

4.3.2.5 Streetscaping

It was suggested that this redesign is an opportunity to improve the look and feel of the road through additional streetscaping. Specifically, the addition of landscaped pedestrian islands was suggested. Streetscaping improvements were incorporated into the alternative design concepts presented in **Section 5.0**.

4.3.2.6 Environmental Impacts

Some participants raised ideas and concerns related to environmental impacts of the redesign. There were suggestions to plan how the project can reduce air pollution through the road design, and how biodiversity could be fostered. There were also concerns regarding impacts to trees along the corridor.

Other comments and questions were received regarding property impacts, the project schedule, noise pollution, and lessons learned from the section of Rymal Road that has been completed. Responses to these comments and questions were provided by the project team as required.

5.0 Alternative Design Concepts

During Phase 3 of the MCEA process, alternative design concepts for the preferred solution are developed and evaluated.

This section provides an overview of the alternative design concepts, consultation with the TAC during the design process, and the evaluation process used to identify the preferred alternative. Details on the recommended design are provided in **Section 6.0**.

5.1 Design Objectives

Rymal Road plays a critical role in several multi-modal networks within the City of Hamilton, as is common of roads with a major arterial classification. It is identified as a Transitioning Avenue with the City's Complete Streets Design Guide. Transitioning Avenues are specifically intended to support transit priority, active transportation, goods movement (shipping), and vehicular movement[14]. Rymal Road is also intended to provide medium to high people-moving capacity by accommodating a combination of private and commercial motorized vehicles and transit[14].

Rymal Road is identified as part of the S-Line of Hamilton's BLAST rapid transit network, with Metrolinx's Regional Transportation Plan[15] identifying it as a "transit priority corridor." Transit priority corridors encourage more people to take transit by increasing reliability and reducing bus travel times compared to other vehicles. Transit priority measures may include advanced/dedicated signals at intersections and dedicated lanes along the length of the corridor or just at intersections (known as queue jump lanes).

The number, type, and location of transit priority features are determined based on a combination of their potential to measurably reduce transit travel times and the number of current and potential transit users who could benefit from this improvement. Design of transit priority corridors should include high quality pedestrian and cycling facilities to help riders get to and from their destinations. This helps to maximize the total number of potential transit riders.

[14] City of Hamilton, Transportation Master Plan Review and Update Background Report: Complete Livable Better Streets (2018), Appendix A.
[15] Metrolinx, 2041 Regional Transportation Plan For the Greater Toronto and Hamilton Area (2018), p.157.

This MCEA study provides the opportunity to design Rymal Road between Upper James Street and Dartnall Road to meet the multi-modal objectives set out for the corridor.

Rymal Road currently has limited multi-modal elements between Upper James Street and Dartnall Road, as discussed in **Section 3.10**. There are currently no cycling facilities and there are sections on either side of the roadway that do not include sidewalks. Transit vehicles currently operate in mixed traffic in single east and westbound lanes that are frequently congested. Alternative designs should address these deficiencies and include connections for cyclists to navigate between Rymal Road and the north-south cycling connections described in **Section 3.11**.

The cross-section width of Rymal Road also varies throughout the corridor and does not match the design west of Upper James Street nor east of Dartnall Road. A consistent corridor design can help with traffic and transit delays, as well as maintaining a consistent design vision throughout the corridor.

The development of alternative design concepts considered design elements to address the following objectives:

- Reduce vehicular travel delay currently experienced on Rymal Road;
- Provide dedicated space for all modes of transportation including cyclists and pedestrians;
- Improve transit travel times and amenities to support ridership growth along the S-Line corridor;
- Enhance the visual appeal of Rymal Road through additional boulevard streetscaping and landscaped medians;
- Design a consistent roadway that matches existing cross-section elements to the west and east of the project limits; and,
- Minimize impacts on the social and natural environments.

5.1.1 Design Criteria

Roadway design criteria were developed to determine the required widths for facilities such as travel lanes, cycle facilities, and pedestrian facilities when designing the alternatives. The following documents and guidelines were referenced in addition to consultation with TAC members:

- Transportation Association of Canada Geometric Design Guidelines (TAC GDG);
- City of Hamilton: Complete Streets Design Guidelines (2022);
- Ontario Traffic Manual (OTM) Book 18 (2021);
- City of Hamilton: Engineering Guidelines for Servicing Land Under Development Applications (2012); and
- City of Hamilton: Lot Grading Policy, Criteria and Standards for Single and Semi Detached Dwelling Units.

The design criteria identified in **Table 6** were approved by City staff for use when designing Rymal Road.

Table 6: Proposed Roadway Design Criteria

Roadway Design Criteria	Existing	Proposed
Number of Through Lanes in Each Direction	1	2
Through Lane Width	3.3 m to 3.5 m	3.2 m to 3.5 m
Centered Left-Turn Lane Width	4.0 m	4.0 m
Landscaped Median Width	N/A	4.0 m
Planting and Furnishing Zone Width	N/A	2.6 m (ideal)
Rapid Transit Lane Width	N/A	3.5 m
Cycle Track + Buffer Zone Width	N/A	2.0 m
Edge Zone Width	N/A	1.0 m
Cycling Lane Width	N/A	1.8 m (minimum)
Sidewalk Width	1.5 m	1.5 m (minimum)
MUP Width	N/A	3.5 m

5.2 Alternative Design Pre-Screening

To identify feasible options for further development and evaluation, pre-screening of alternatives was completed before developing a long list of alternative designs. This pre-screening removed alternative designs that would result in significant limitations or were not aligned with modern guidelines. Pre-screening was completed for active transportation facilities, roadway alignment, and transit priority features, as discussed in the following sections. Details related to the pre-screening of alternatives can be found in **Appendix K**.

5.2.1 Active Transportation Facilities

An initial pre-screening of active transportation facilities was completed, as shown in **Table 7**. The pre-screening was based on the guidance provided in Ontario Traffic Manual (OTM) Book 18 and the recommendations provided in the City's Complete-Livable-Better Streets Guideline. Based on the corridor purpose, average annual daily traffic (AADT) counts, and vehicular operating speeds, only physically separated cycling facilities were considered as viable options. These options include protected bike lanes, cycle tracks, and MUPs.

Table 7: OTM Book 18 Cycle Facility Screening

Consideration	Description of Existing Condition	Shared Lane	Paved Shoulder	Cycling Lane	Protected Bike Lane	Cycle Track	MUP
Facility type recommended through previous study	MUP recommended for western segment in TMP. Protected Bike Lane in Complete-Better Livable Street Guide.	N/A	N/A	N/A	Yes	N/A	Yes
Traffic Volume (vehicles)	14,400 current AADT, anticipated to grow with time.	No	No	No	Potential	Yes	Yes
Operating Speed	70 km/h	No	No	No	Potential	Yes	Yes
Function of Street or Road or Highway	Mobility roads such as major collectors and arterials	No	N/A	Yes	Yes	Yes	Yes
Vehicle Mix	Bus stops located along route	No	N/A	Yes	Yes	Yes	Yes
Pedestrian Activity	Low Pedestrian Volumes (anticipated to be high in the future)	Yes	N/A	Yes	Yes	Yes	Potential
On-Street Parking (for urban situations)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Frequency of Intersections (for urban situations)	Signalized intersections with high-volume turning conflicts	N/A	N/A	Yes	Yes	Yes	No
Feasible Options	N/A	No	No	No	Potential	Yes	Potential

Guidance provided in OTM Book 18 further recommends that use of protected bike lanes only be considered where motor vehicle operating speeds are less than 60 km/h and AADT volumes are less than 10,000 vehicles per day. Current AADT within the study corridor is estimated at 14,400 vehicles per day, with a measured 85th percentile operating speed (Nebo Road to Dartnall Road) approaching 70 km/h. This information, combined with the significant number and frequency of driveways that will require breaks in the physical protection, result in a recommendation to screen out the protected bike lane option.

The two remaining physically separated cycling alternatives are MUPs and cycle tracks (paired with sidewalks). Discussions with the TAC members also included consideration for a combination of MUP on the north side and sidewalk only on the south side of Rymal Road, for consistency with the segment of Rymal Road to the west of the project limits. This option also reduces utility and property impacts by limiting the cross-section width.

5.2.2 Horizontal Alignment

Several horizontal alignment alternatives were initially considered. This included options that held the existing north edge of pavement and widened to the south, held the existing south edge of pavement and widened to the north, or that widened the roadway evenly from the existing centreline. A hybrid option that shifted the centreline only when required to mitigate impacts to property, mature trees, and major utility infrastructure was also considered.

Alternatives that contemplated only widening north or south ultimately resulted in designs that had very limited or non-existent boulevard space. In some segments, the space would be so constrained between the curb and property line that recommended active transportation facility widths would need to be compromised to provide streetlighting.

Alternatives that contemplated holding the existing north edge of pavement and widening towards the south also resulted in significant impacts to a major hydro pole line that follows the south edge of pavement. The ability to relocate the pole line is impacted not only by the significant capital cost of doing so, but also by property limits and the presence of a watermain, trunk storm sewer, and sanitary sewer that limit the locations to which the pole line could be moved.

Alternatives that considered holding the existing south edge of pavement and widening towards the north resulted in significant impacts to private property, shortening of some private driveways to the point of being unusable, loss of mature trees, and additional impact to overhead utilities.

Widening the road evenly from the existing centreline ultimately resulted in less overall impacts than only widening north or south. This is a result of the fact that widening could generally be accommodated within the existing gravel or paved shoulders. There are a few locations along the corridor where undesirable impacts can be avoided through a slight shift to the north or south. One of these areas includes the segment of Rymal Road east of Upper Ottawa Street.

Consequently, only alternatives that maintain the existing centreline and include minor localized realignments to avoid impacts to major constraints (hybrid alternative) were recommended for further consideration.

5.2.3 Transit Priority Features

Rymal Road, from its western limit to Centennial Parkway, makes up a portion of the S-Line component of the City's overall BLAST Rapid Transit network. Based on recommendations made in the Metrolinx Regional Transportation Plan (RTP, 2018), and confirmed through a dedicated S-Line Transit Ridership Study (Dillon, 2021), the S-Line portion of Rymal Road will ultimately function as a "Transit Priority Corridor." Transit Priority Corridors often include features such as HOV lanes and queue jump lanes to allow transit vehicles to operate at a faster speed than they would in lanes shared with mixed traffic.

As noted in **Section 3.11.3**, transit ridership levels are not anticipated to warrant dedicated transit priority features during the current study's 2041 planning horizon. However, the current study considered where they may be warranted beyond 2041 to limit the need for future road realignments and/or property acquisition, as discussed below.

The City of Hamilton has expressed a desire to implement transit priority measures at each of the Route 44 (Rymal) Express Stops. These stops will ultimately serve as BRT stops when growth in transit ridership is within reach of warranting that type of transit service. As the S-Line runs east-west through each express stop along the corridor,

transit priority measures will be focussed on mitigating transit travel delays in the through-bound travel direction.

Through-bound transit priority is primarily provided through implementation of features known as “queue jump lanes.” Queue jump lanes are short segments of dedicated lane that allow buses to jump ahead of a queue of traffic at signalized intersections. They have the potential to significantly reduce transit delays, particularly as congestion along a corridor increases.

Queue jumps can be designed to accommodate stops that are located on either the nearside of the intersection or the farside (preferred). When transit stops are located nearside within a queue jump, right turn movements are generally not permitted from the curb lane.

When transit stops are located on the farside of the intersection and right turn volumes do not warrant a dedicated lane, a shared right turn/transit priority lane can be used to move buses to the front of the queue. A dedicated transit/right turn signal phase can then allow buses to move ahead to serve their stop, move out ahead of traffic after serving their stop, or bypass the stop and get ahead of other through-moving vehicles.

There are two design options for implementing through-bound queue jump lanes at signalized intersections:

1. **Lane Addition**: A new outside lane is added on approach to the intersection, with a short segment of receiving lane on the farside of the intersection if that is where the stop is located. The lane should be added sufficiently far from the intersection to allow transit vehicles to move into the lane before encountering queuing associated with the intersection. If right turn volumes do not warrant their own lane and the stop is not located nearside, then the nearside portion of this new lane can be shared with right-turning vehicles.
2. **Lane Conversion**: An existing outside lane can be transitioned to function as transit-only or “right turn only with buses exempted” on the nearside of an intersection and transit-only for a short segment on the farside of the intersection.

The opportunities and challenges associated with each of these options are summarized in **Table 8**. Queue jump lanes implemented through lane conversion were considered undesirable as the block lengths between intersections are relatively short, resulting in safety concerns with traffic merging in and out of these lanes.

Table 8: Opportunities and Challenges Associated with Queue Jump Design Options

Queue Jump Design Option	Opportunities	Challenges
Lane Addition	• Improve overall transit travel times, particularly within congested corridors; and, • Improve general traffic operations along the corridor by removing transit and right turning vehicles[16] from through lanes at signalized intersections.	• Additional construction and maintenance costs associated with the new lane and signal infrastructure/utility relocations; • Increased crossing distances for vulnerable road users; and, • Requires adequate property be available for construction.
Lane Conversion	• Improve overall transit travel times, particularly within congested corridors; • Minimal cost to implement; and, • No increase in crossing distances for vulnerable road users.	• Reduces the effective cross-section of the roadway by one lane on approach to the intersection, resulting in an overall worsening of traffic operations for non-transit vehicles; • Not recommended where reducing the through bound capacity would result in a level of service of D or worse for the affected intersection approach; • Results in increased weaving on approach to intersections; and, • Has the potential to increase speeding in the corridor as vehicles try to move ahead of vehicle convoys between intersections.

[16] If bus stop is implemented on the farside of the intersection.

The S-Line Future Transit Needs Memo (**Appendix J**) notes that isolated transit priority measures should be considered for all segments of the S-Line corridor by 2051. However, in the interim, no transit priority measures are recommended at any segment based on the population and traffic growth estimates.

The results from the multi-modal traffic modelling report (**Appendix I**) indicate queue jump lanes would only provide a benefit at Rymal Road and Upper Ottawa Street where queues are long enough to be jumped by a queue jump lane.

The evaluation of the queue jump facility locations are explored further in **Appendix K**, which describes limitations of each location. Key limitations include minimal anticipated transit travel time improvement within the near-term planning horizon and the desire to minimize crossing distances at intersections.

Ultimately, all transit queue jump lanes were ruled out as the benefits to transit travel times did not outweigh the costs including property acquisition and road widening. Queue jump lanes can be implemented at individual intersections in the future as the need arises. It is anticipated these localized improvements would be exempt from the MCEA process.

The recommended design includes bus bays at Upper James Street and no additional transit priority features throughout the corridor, as described in **Section 6.1.3**.

5.3 Short List of Alternatives

The shortlist of design alternatives were all designed with a 5 vehicular lane cross-section and TDM/TSM measures, consistent with the preferred solution. As outlined in **Section 5.2**, all alternatives used the “hybrid” centreline alignment and the MUP was divided into two alternatives (north side only and both sides). As a result, the following cross-section alternatives were carried forward for further design and consultation:

- **Alternative 1**: Dual MUPs (on both sides);
- **Alternative 2**: North Side MUP (and sidewalk on south side); and,
- **Alternative 3**: Dual Cycle Tracks (on both sides, in addition to sidewalks).

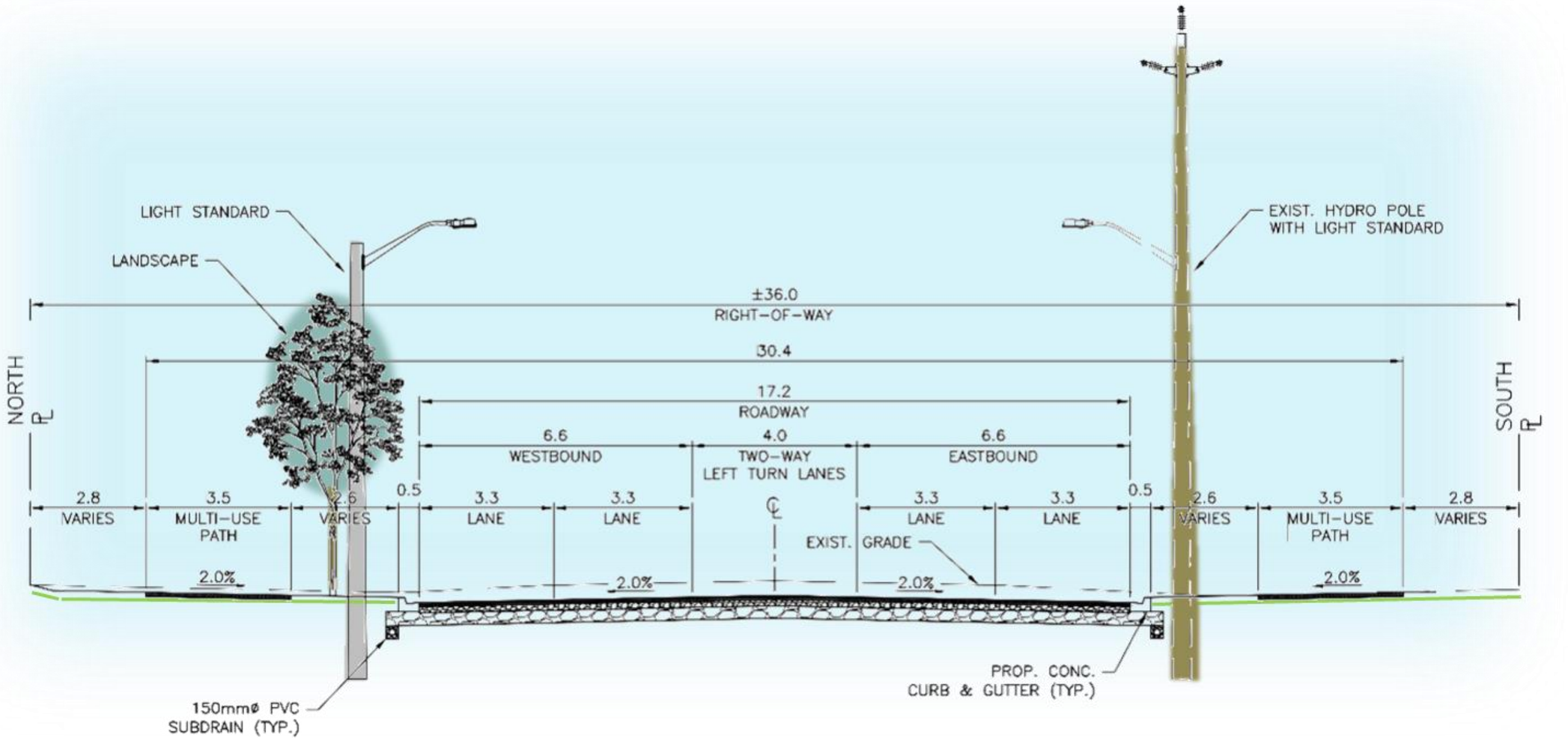
The following subsections describe the three design alternatives considered for Rymal Road. All three design alternatives have the same ROW width of 36 metres and use 3.3 m through lanes as recommended by the City’s Complete Streets Design Guidelines.

5.3.1 Design Alternative 1: Dual Multi-Use Pathways

Alternative 1 introduces a MUP on both the north and south side of the roadway. Where possible, the MUPs follow the same alignment as the existing sidewalks. These MUPs would allow for pedestrian and cycling activity on both sides of the roadway and provide easy connectivity to the north-south intersecting cycling routes along Rymal Road. The MUPs also provide strong first and last mile transportation connections to all future express transit stops.

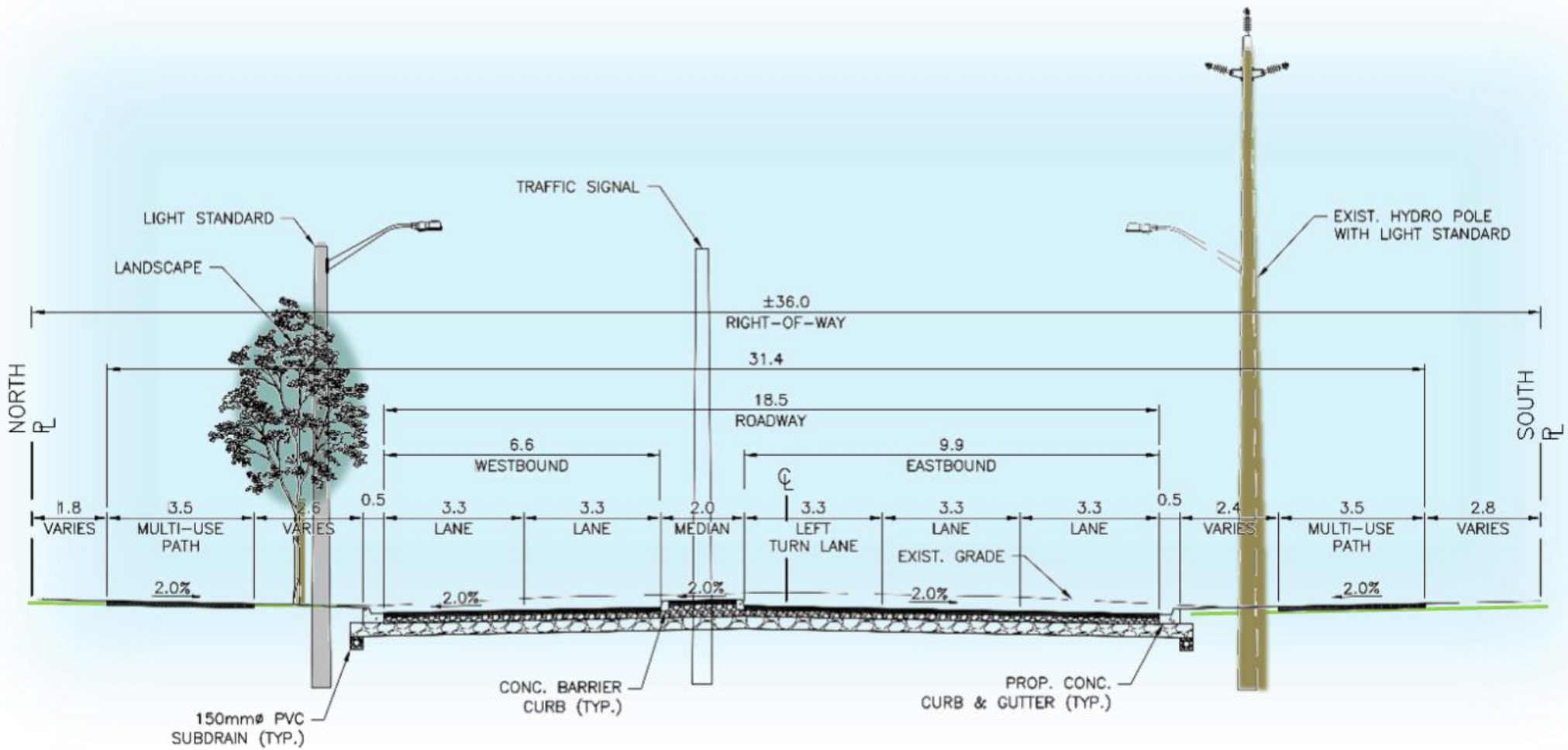
Typical cross-sections for Alternative 1 are provided in **Figure 10** and **Figure 11**.

Figure 10: Alternative 1 Typical Mid-block Cross-Section Illustration



TYPICAL CROSS-SECTION

Figure 11: Alternative 1 Typical Intersection Cross-Section Illustration



TYPICAL INTERSECTION CROSS-SECTION

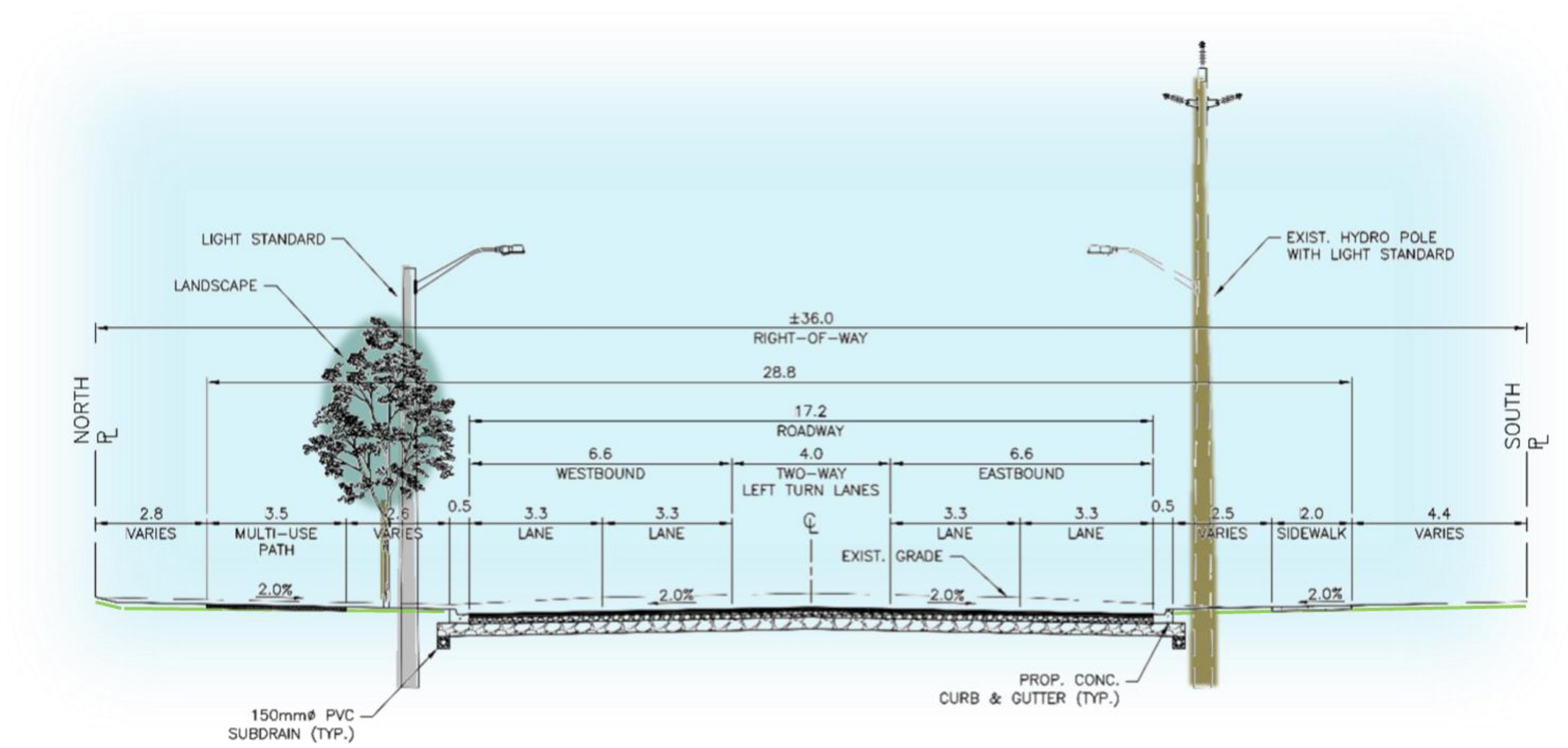
5.3.2 Design Alternative 2: North Side Multi-Use Pathway

Alternative 2 would introduce a MUP on the north side and slightly widen and realign the existing sidewalk on the south side. This would maintain the benefits outlined for Alternative 1 on the north side while minimizing impacts to existing utilities and greenspace on the south side of the roadway.

In this alternative, cyclists would be able to travel along the north side, but there would be no cycling facility on the south side. Cyclists would instead be required to cross at signals and walk their bikes to destinations on the south side of the roadway.

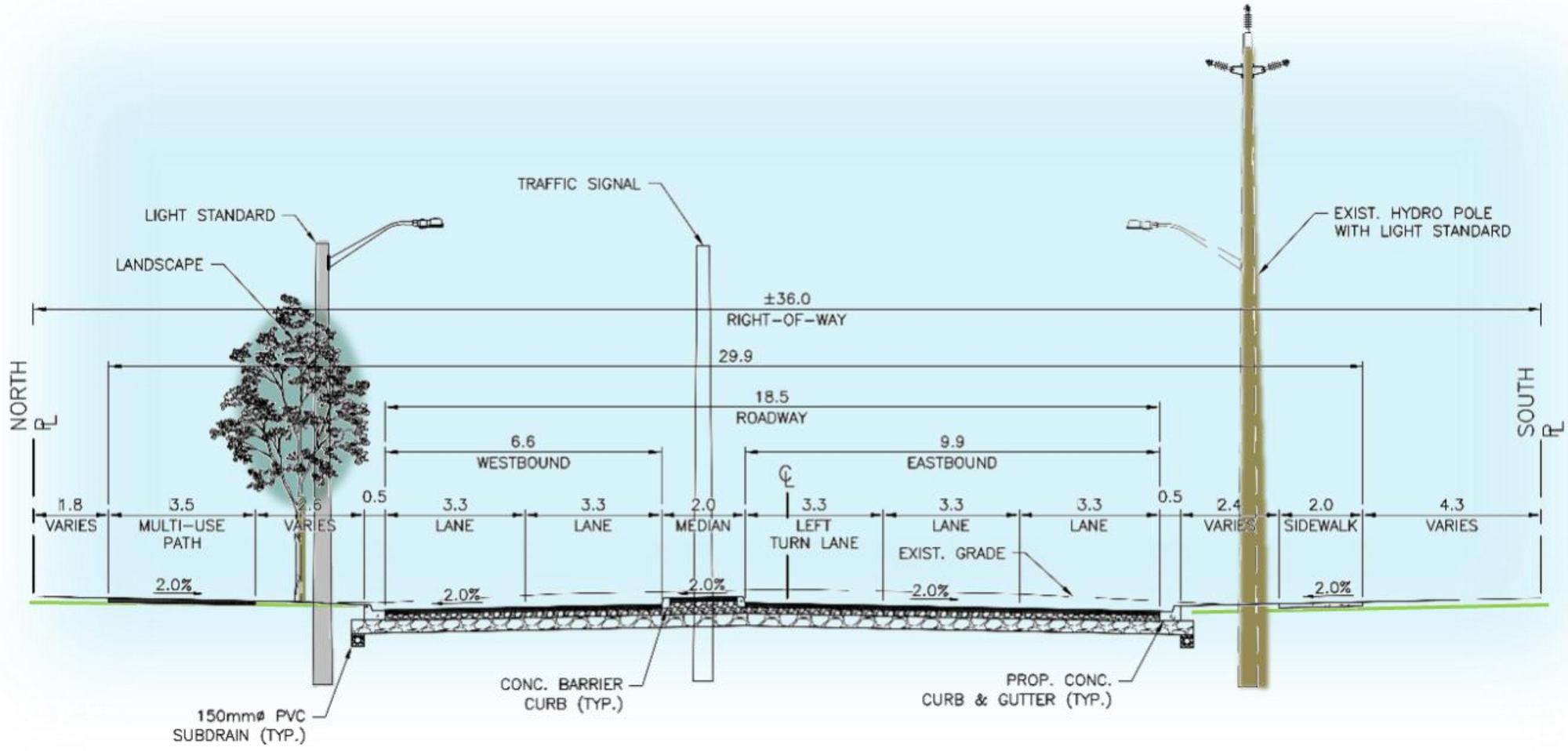
Typical cross-sections for Alternative 2 are provided in **Figure 12** and **Figure 13**.

Figure 12: Alternative 2 Typical Mid-block Cross-Section Illustration



TYPICAL CROSS-SECTION

Figure 13: Alternative 2 Typical Intersection Cross-Section Illustration



TYPICAL INTERSECTION CROSS-SECTION

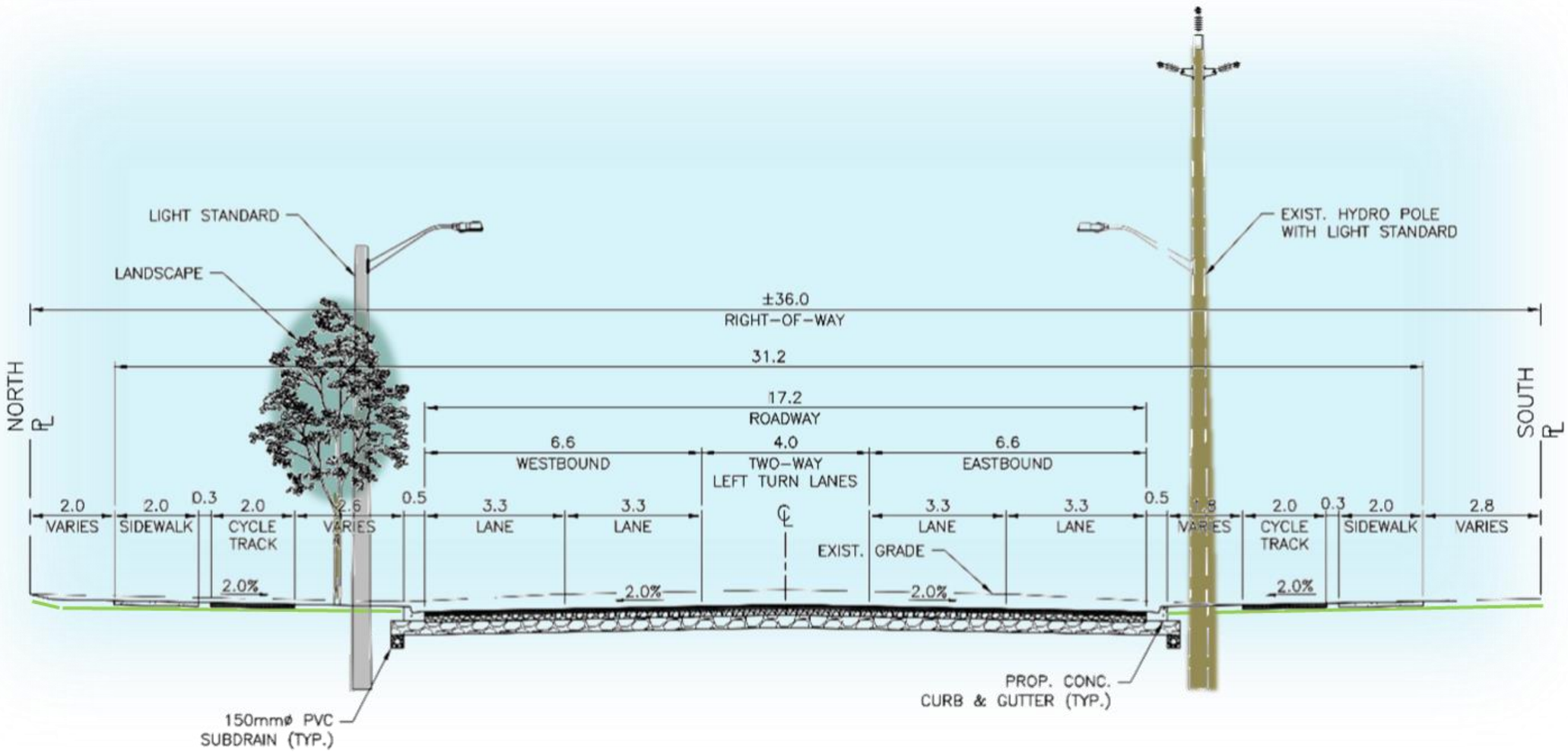
5.3.3 Design Alternative 3: Dual Cycle Tracks

Alternative 3 provides dedicated cycling and pedestrian facilities on both sides of the roadway in the form of cycle tracks next to sidewalks. In this alternative, cyclists would ride in their own dedicated space with a buffer separating them from pedestrians. Each cycle track would be a one-way lane requiring cyclists to travel in the same direction as vehicular traffic on either side of the roadway.

This alternative minimizes the potential conflicts between transportation modes, but requires more space in the boulevard compared to the other two alternatives. This alternative is likely to result in additional impacts to both natural heritage features and utilities on the south side of the roadway.

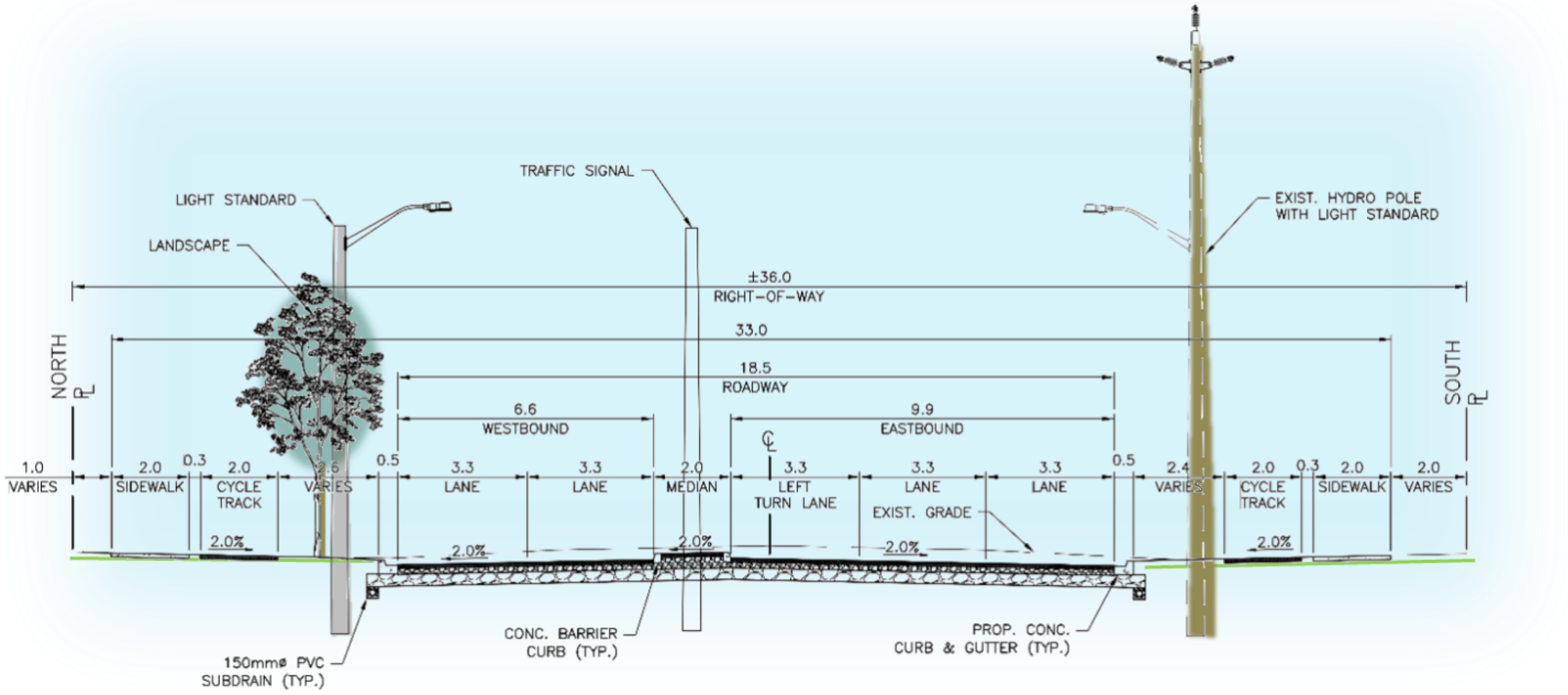
Typical cross-sections for Alternative 3 are provided in **Figure 14** and **Figure 15**.

Figure 14: Alternative 3 Typical Mid-block Cross-Section Illustration



TYPICAL CROSS-SECTION

Figure 15: Alternative 3 Typical Intersection Cross-Section Illustration



TYPICAL INTERSECTION CROSS-SECTION

5.4 Evaluation of Alternative Design Concepts

The alternative design concepts were evaluated based on criteria that were developed by the project team to address the objectives outlined in **Section 5.1**, considering input received through Public Information Centre 1. The criteria were vetted by the TAC in conjunction with a review of the draft design alternatives.

The evaluation criteria were grouped into the following five categories:

- Engineered environment;
- Natural environment;
- Cultural environment;
- Socio-economic environment; and,
- Cost.

For each criterion, one or more measures were developed to specify the data to be collected or the effects to be assessed. A comparative evaluation was completed to identify the preferred design for Rymal Road across each of the measures developed.

The evaluation followed the same general approach as the evaluation completed in Phase 2 of the MCEA process, as outlined in **Section 4.2**. Each alternative was evaluated against each other with alternatives being labeled “most preferred” to “least preferred” for each evaluation criteria. The evaluation did not assume one criteria was more important than another, but instead focused on the magnitude of the differences between alternatives for particular criteria. The preferred design was also determined by identifying which alternative best aligned with the design objectives overall.

The evaluation criterion and metrics used in the evaluation of the alternatives are presented in **Table 9**.

Table 9: Evaluation Criteria

Category	Criterion	Metric
Engineered Environment	Impact on Future Transportation Network	Potential to improve future traffic operations within the greater transportation network.
	Conflict Points Between Modes	Conflict points between transportation modes (vehicle-cyclist, cyclist-cyclist, cyclist-pedestrian).
	Winter Maintenance	Surface area requiring snow clearing and availability of boulevard for snow storage.
	Cycling Access to Destinations	Ease of access for cyclists travelling to destinations along the corridor.
	Transportation Network Construction Impacts	Anticipated duration of construction activities.
		Anticipated traffic disruptions during construction.
	Transit Rider Experience	Available space to accommodate experience-enhancing stop amenities.
	Construction Complexity	Relocation of utilities.
		Construction staging.
	Drainage	Anticipated change in impervious surface area.
		Available space to accommodate low-impact development (LID) measures.
Natural Environment	Tree Removals	Number of large trees (diameter at breast height greater than 30 centimetres) requiring removal.
	Terrestrial Species and Habitat	Anticipated impacts to woodlands, wetlands, candidate Significant Wildlife Habitat, and potential SAR and/or SAR habitat.
	Aquatic Species and Habitat	Potential impacts to features containing fish and fish habitat, including SAR.
	Hamilton Conservation Authority Approvals	Need for approvals from Hamilton Conservation Authority.

Category	Criterion	Metric
Socio-Economic Environment	Planning Policy	Alignment with Provincial Policy Objectives.
		Alignment with Regional Planning Objectives.
		Alignment with Municipal Planning Objectives.
	Existing Communities	Improvement to access to existing communities adjacent to the study area.
	Existing Residential Areas	Alternative requires minimal residential property and minimal impact to residential access.
	Recreational Facilities	Alternative requires minimal property from recreational facilities and minimal impact to facility access.
	Noise and Vibration	Identification of significant changes in anticipated noise and vibration impacts between alternatives.
	Air Quality	Identification of significant changes in anticipated air quality impacts between alternatives.
	Aesthetics / Streetscaping	Opportunities for aesthetic enhancements (plantings, decorative pavement materials, streetlights).
Cultural Heritage	Built Heritage Resources and Cultural Heritage Landscapes	Potential for impacts to known or potential built heritage resources and cultural heritage landscapes.
	Archaeological Resources	Potential for impacts to archaeological sites and areas of archaeological potential.
Cost	Estimated Capital Costs	Capital infrastructure costs.
		Utility relocation costs.
		Property acquisition costs (assumed value of $650 per square metre).
	Estimated operations and maintenance costs	Operations and maintenance costs.

The evaluation of alternative design concepts for each of the categories listed above is summarized in **Table 10, Table 11, Table 12, Table 13**, and **Table 14**. The evaluation results are discussed in **Section 5.4.1**.

Table 10: Evaluation of Alternative Design Concepts – Engineered Environment

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
Impact on Future Transportation Network	Potential to improve future traffic operations within the greater transportation network.	**Equally Preferred** All alternatives widen this section of Rymal Road to five lanes, which is expected to mitigate existing traffic issues and allow for more efficient movement of transit, goods movement, and personal vehicles within the corridor.	**Equally Preferred** All alternatives widen this section of Rymal Road to five lanes, which is expected to mitigate existing traffic issues and allow for more efficient movement of transit, goods movement, and personal vehicles within the corridor.	**Equally Preferred** All alternatives widen this section of Rymal Road to five lanes, which is expected to mitigate existing traffic issues and allow for more efficient movement of transit, goods movement, and personal vehicles within the corridor.
Conflict Points Between Modes	Conflict points between transportation modes (vehicle-cyclist, cyclist-cyclist, cyclist-pedestrian).	**Moderately Preferred** Cyclists are separated from vehicular traffic but share space with pedestrians throughout the corridor, creating a higher risk of cyclist-pedestrian conflicts when compared to Alternative 3. Two-way cyclist travel on the MUP increases the risk of bike-vehicle conflict at driveways and intersections as fast-moving cyclists approaching vehicles head-on are not as visible as those that the driver will pass on approach to the conflict zone. Two-way cyclist travel also increases the risk of cyclist-cyclist conflicts throughout the corridor.	**Least Preferred** Similar to Alternative 1 overall, with cyclist separated from vehicular traffic but sharing space with pedestrians on the north MUP. While the number of cyclist-pedestrian and cyclist-vehicle conflict points is halved because the MUP is only on the north side of the road, the lack of cycling facilities on the south side would double the volume of cyclists on the north side. Additionally, there is the risk of cyclists using the south sidewalk or the roadway to access mid-block destinations.	**Most Preferred** Cyclists, pedestrians, and vehicles have their own dedicated spaces throughout the corridor. Pedestrians will need to cross the cycle track to access transit stops; however, tactile surface indicators, pavement markings and signs can be used to alert cyclists and pedestrians of the conflict zone. One-way cyclist travel on the cycle track reduces risk of conflict with vehicles and other cyclists compared to two-way travel on a MUP.
Winter Maintenance	Surface area requiring snow clearing and availability of boulevard for snow storage.	**Moderately preferred** Alternative has a larger surface area requiring winter maintenance than Alternative 2 (approximately 14.4 hectares [ha]) as sidewalks will be replaced with MUPs on both sides of the roadway. Length of roadway lane kilometres that require winter maintenance is the same for all three alternatives. Minimum 1 m boulevard maintained along the majority of the corridor to facilitate snow storage, with exception of the south side from Upper Sherman Avenue to Eva Street.	**Most preferred** Alternative has the smallest surface area requiring winter maintenance out of the three alternatives (approximately 13.7 ha) as it includes replacement of sidewalk with MUP on only one side of the roadway. Length of roadway lane kilometres that require winter maintenance is the same for all three alternatives. Minimum 1 m boulevard maintained along entire corridor to facilitate snow storage.	**Least preferred** Alternative has the largest area requiring winter maintenance out of the three alternatives (approximately 14.9 ha) as it includes widening of sidewalks and addition of cycle tracks on both sides of the roadway. Length of roadway lane kilometres that require winter maintenance is the same for all three alternatives. Minimum 1 m boulevard maintained along the majority of the corridor to facilitate snow storage, with exception of the south side from Upper Sherman Avenue to Eva Street and the south side from Rockland Avenue to Upper Ottawa Street.

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
Cycling Access to Destinations	Ease of access for cyclists travelling to destinations along the corridor.	**Most preferred**  Two-way cycling facilities provided on both sides of the roadway, minimizing the need for cyclists to cross the road and backtrack.	**Least preferred**  Two-way cycling facility provided on one side of the roadway only, creating a need for cyclists to cross the road and walk to destinations on the south side of the road that are not immediately adjacent to signalized intersections.	**Moderately preferred**  Dedicated one-way cycling facilities provided on both sides of the roadway. One-way cycle tracks may create a need for cyclists to cross the road and backtrack to mid-block destinations on the opposite side of the road; however, cyclist conflicts with both pedestrians and vehicles are reduced with this facility type.
Transportation Network Construction Impacts	Anticipated duration of construction activities.	**Equally Preferred** Time required to complete utility relocations and roadway construction are anticipated to be substantially the same between alternatives. Minor differences in the time it would take to construct the different types of active transportation facilities is negligible in comparison to the overall construction timeline.	**Equally Preferred** Time required to complete utility relocations and roadway construction are anticipated to be substantially the same between alternatives. Minor differences in the time it would take to construct the different types of active transportation facilities is negligible in comparison to the overall construction timeline.	**Equally Preferred** Time required to complete utility relocations and roadway construction are anticipated to be substantially the same between alternatives. Minor differences in the time it would take to construct the different types of active transportation facilities is negligible in comparison to the overall construction timeline.
	Anticipated traffic disruptions during construction.	**Equally Preferred** It is anticipated that roadway reconstruction would be staged similarly between all alternatives and therefore does not provide a distinction between alternatives. Anticipate shortened periods of traffic impact at entrances will be required for construction of MUPs relative to constructing separate sidewalks and cycle tracks.	**Equally Preferred** It is anticipated that roadway reconstruction would be staged similarly between all alternatives and therefore does not provide a distinction between alternatives. Anticipate shortened periods of traffic impact at entrances will be required for construction of single active transportation facilities on the north and south sides relative to constructing separate sidewalks and cycle tracks.	**Equally Preferred** It is anticipated that roadway reconstruction would be staged similarly between all alternatives and therefore does not provide a distinction between alternatives. Anticipate slightly longer periods of traffic impact at entrances to construct separate sidewalks and cycle tracks relative to constructing single facility types on both sides of the roadway.

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
Transit Rider Experience	Available space to accommodate experience-enhancing stop amenities.	**Most Preferred**  Adequate space is identified in the proposed design to provide appropriate transit amenities at existing and future stops - including larger shelters and pads at future S-Line Transit stops. MUPs provide strong first and last mile active transportation connections to all transit stops.	**Moderately Preferred**  Adequate space is identified in the proposed design to provide appropriate transit amenities at existing and future stops - including larger shelters and pads at future S-Line Transit stops. MUPs provide strong first and last mile active transportation connections to all transit stops on the north side. With exception of stops at Sumona Drive and Derby Street, all other eastbound transit stops are located in close proximity to signalized intersections and can be readily accessed by cyclists.	**Most Preferred**  Adequate space is identified in the proposed design to provide appropriate transit amenities at existing and future stops - including larger shelters and pads at future S-Line Transit stops. Sidewalks and cycle tracks provide strong first and last mile active transportation connections to all transit stops along the corridor.
Construction Complexity	Relocation of utilities.	**Moderately Preferred**  Both sides of the road have a MUP with a total width requirement of approximately 7.0 metres (m). Any above-ground utilities within the footprint of the MUP will require relocation. Anticipated utility relocations are based on a 0.5 m offset from the project edge and have been identified as follows: 1) Utility Poles (0.3 m buffer): 310 2) Telecom Box and Pedestals (0.3 m buffer): 44 3) Concrete Utility Poles (0.3 m buffer): 73 4) Hydro Access Vaults and Manholes: 22 5) Hydro Transformer Box: 8 6) Hydro Duct: 5.79 kilometres (km) 7) Fibre Cable: 3.72 km 8) Gas Main: 6.00 km	**Most Preferred**  The north side of the road has a MUP, and the south side has a sidewalk with total width requirements of approximately 5.5 m. Any above-ground utilities within the footprint of the MUP and sidewalk will require relocation. Anticipated utility relocations are based on a 0.5 m offset from the project edge and have been identified as follows: 1) Utility Poles (0.3 m buffer): 227 2) Telecom Box and Pedestals (0.3 m buffer): 35 3) Concrete Utility Poles (0.3 m buffer): 71 4) Hydro Access Vaults and Manholes: 15 5) Hydro Transformer Box: 6 6) Hydro Duct: 5.01 km 7) Fibre Cable: 3.13 km 8) Gas Main: 5.67 km	**Least Preferred**  Both sides of the road have a sidewalk and cycle track with total width requirements of approximately 8.0 m. Any above-ground utilities within the footprint of the sidewalk and cycle track will require relocation. Anticipated utility relocations are based on a 0.5 m offset from the project edge and have been identified as follows: 1) Utility Poles (0.3 m buffer): 377 2) Telecom Box and Pedestals (0.3 m buffer): 63 3) Concrete Utility Poles (0.3 m buffer): 76 4) Hydro Access Vaults and Manholes: 24 5) Hydro Transformer Box: 12 6) Hydro Duct: 5.98 km 7) Fibre Cable: 4.10 km 8) Gas Main: 6.45 km

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
	Construction staging.	**Equally Preferred** Set up and construction staging will be required to maintain continuous traffic flow during construction. Road width is consistent throughout. No significant difference with other alternatives based on preferred cross-section. Construction of utilities has little impact with the overall staging of the project.	**Equally Preferred** Set up and construction staging will be required to maintain continuous traffic flow during construction. Road width is consistent throughout. No significant difference with other alternatives based on preferred cross-section. Construction of utilities has little impact with the overall staging of the project.	**Equally Preferred** Set up and construction staging will be required to maintain continuous traffic flow during construction. Road width is consistent throughout. No significant difference with other alternatives based on preferred cross-section. Construction of utilities has little impact with the overall staging of the project.
Drainage	Anticipated change in impervious surface area.	**Moderately Preferred** Impervious surface area is anticipated to increase by approximately 35 percent (or 4 ha) as a result of road widening and active transportation and transit amenity improvements.	**Most Preferred** Impervious surface area is anticipated to increase by approximately 29 percent (or 3.3 ha) as a result of road widening and active transportation and transit amenity improvements.	**Least Preferred** Impervious surface area is anticipated to increase by approximately 39 percent (or 4.5 ha) as a result of road widening and active transportation and transit amenity improvements.
	Available space to accommodate low-impact development (LID) measures.	**Most Preferred** Proposed grassed boulevards have a total boulevard length of approximately 1,900 m that is wide enough for LID features (i.e., greater than 4 m wide). This space is moderately interrupted by driveways.	**Most Preferred** Proposed grassed boulevards have a total boulevard length of approximately 2,300 m that is wide enough for LID features (i.e., greater than 4 m wide). This space is moderately interrupted by driveways.	**Least Preferred** Proposed grassed boulevards have a total boulevard length of approximately 800 m that is wide enough for LID features (i.e., greater than 4 m wide). This space has limited driveway interruptions.

Table 11: Evaluation of Alternative Design Concepts – Natural Environment

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUPs	Alternative 3 Dual Cycle Tracks
Tree Removals	Number of large trees (diameter at breast height greater than 30 centimetres) requiring removal.	**Moderately Preferred** Removal of 26 large trees would be required.	**Most Preferred** Removal of 10 large trees would be required.	**Least Preferred** Removal of 34 large trees would be required.
Terrestrial Species and Habitat	Anticipated impacts to woodlands, wetlands, candidate Significant Wildlife Habitat, and potential Species at Risk (SAR) and/or SAR habitat.	**Equally Preferred** Limited natural heritage features are present along the corridor. Minor edge impacts to vegetation surrounding Chippewa Trail are anticipated (approximately 550 m^2 of total area adjacent to the trail will be impacted). Tree/shrub removals have the potential to impact SAR bats and/or nesting birds. There is potential to impact one SAR Butternut tree on private property south of Rymal Road. Further study is required to assess the health of the Butternut.	**Equally Preferred** Limited natural heritage features are present along the corridor. Minor edge impacts to vegetation surrounding Chippewa Trail are anticipated (approximately 500 m^2 of total area adjacent to the trail will be impacted). Tree/shrub removals have the potential to impact SAR bats and/or nesting birds. There is potential to impact one SAR Butternut tree on private property south of Rymal Road. Further study is required to assess the health of the Butternut.	**Equally Preferred** Limited natural heritage features are present along the corridor. Minor edge impacts to vegetation surrounding Chippewa Trail are anticipated (approximately 600 m^2 of total area adjacent to the trail will be impacted). Tree/shrub removals have the potential to impact SAR bats and/or nesting birds. There is potential to impact one SAR Butternut tree on private property south of Rymal Road. Further study is required to assess the health of the Butternut.
Aquatic Species and Habitat	Potential impacts to features containing fish and fish habitat, including SAR.	**Equally Preferred** No watercourse or water body features observed along the length of the corridor.	**Equally Preferred** No watercourse or water body features observed along the length of the corridor.	**Equally Preferred** No watercourse or water body features observed along the length of the corridor.
Hamilton Conservation Authority Approvals	Need for approvals from Hamilton Conservation Authority.	**Equally Preferred** Approvals are anticipated to be required from Hamilton Conservation Authority for work within its regulated area.	**Equally Preferred** Approvals are anticipated to be required from Hamilton Conservation Authority for work within its regulated area.	**Equally Preferred** Approvals are anticipated to be required from Hamilton Conservation Authority for work within its regulated area.

Table 12: Evaluation of Alternative Design Concepts – Socio-Economic Environment

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUPs	Alternative 3 Dual Cycle Tracks
Planning Policy	Alignment with Provincial Policy Objectives.	**Equally Preferred** Alternative is consistent with the Ontario Municipal Class Environmental Assessment process and Provincial Policy Statement.	**Equally Preferred** Alternative is consistent with the Ontario Municipal Class Environmental Assessment process and Provincial Policy Statement.	**Equally Preferred** Alternative is consistent with the Ontario Municipal Class Environmental Assessment process and Provincial Policy Statement.
	Alignment with Regional Planning Objectives.	**Equally Preferred** Alternative is consistent with the Metrolinx Regional Transportation Plan (RTP, 2018), as the affected portion of Rymal Road will ultimately function as a 'Transit Priority Corridor'. Transit Priority Corridors include features such as high occupancy vehicle (HOV) lanes and queue jump lanes, with the objective of allowing transit vehicles to operate at a faster speed than vehicles in mixed traffic. Alternative is consistent with the Growth Plan: A Place to Grow for the Greater Golden Horseshoe that aims for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life.	**Equally Preferred** Alternative is consistent with the Metrolinx Regional Transportation Plan (RTP, 2018), as the affected portion of Rymal Road will ultimately function as a 'Transit Priority Corridor'. Transit Priority Corridors include features such as high occupancy vehicle (HOV) lanes and queue jump lanes, with the objective of allowing transit vehicles to operate at a faster speed than vehicles in mixed traffic. Alternative is consistent with the Growth Plan: A Place to Grow for the Greater Golden Horseshoe that aims for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life.	**Equally Preferred** Alternative is consistent with the Metrolinx Regional Transportation Plan (RTP, 2018), as the affected portion of Rymal Road will ultimately function as a 'Transit Priority Corridor'. Transit Priority Corridors include features such as high occupancy vehicle (HOV) lanes and queue jump lanes, with the objective of allowing transit vehicles to operate at a faster speed than vehicles in mixed traffic. Alternative is consistent with the Growth Plan: A Place to Grow for the Greater Golden Horseshoe that aims for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life.

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUPs	Alternative 3 Dual Cycle Tracks
	Alignment with Municipal Planning Objectives.	**Moderately Preferred**  Compared to Alternative 3, this alternative is less closely aligned with Official Plan policies aimed at maximizing safe and convenient passages for cyclists and a high standard of connectivity through continuous improvement and expansion of the cycling network. Alternative is consistent with Transportation Master Plan designation that provides for MUPs along Rymal Road from Upper James Street to Upper Sherman Avenue.	**Least Preferred** Alternative is least aligned with Official Plan policies aimed at maximizing safe and convenient passages for cyclists and a high standard of connectivity through continuous improvement and expansion of the cycling network. Alternative is consistent with Transportation Master Plan designation that provides for MUPs along Rymal Road from Upper James Street to Upper Sherman Avenue.	**Most Preferred**  Alternative is most closely aligned with Official Plan policies aimed at maximizing safe and convenient passages for cyclists and a high standard of connectivity through continuous improvement and expansion of the cycling network. Alternative differs from Transportation Master Plan designation that provides for MUPs along Rymal Road from Upper James Street to Upper Sherman Avenue; however, cycle tracks are generally consistent with the intent to create safe cycling facilities as cycle tracks will be separate from vehicular traffic.
Existing Communities	Improvement to access to existing communities adjacent to the study area.	**Equally Preferred** Improved active transportation facilities, reduced traffic delays with resultant improvements in transit travel times will provide enhanced access to communities along the corridor. No difference between alternatives.	**Equally Preferred** Improved active transportation facilities, reduced traffic delays with resultant improvements in transit travel times will provide enhanced access to communities along the corridor. No difference between alternatives.	**Equally Preferred** Improved active transportation facilities, reduced traffic delays with resultant improvements in transit travel times will provide enhanced access to communities along the corridor. No difference between alternatives.
Existing Residential Areas	Alternative requires minimal residential property and minimal impact to residential access.	**Moderately Preferred**  More residential property impacts associated with this alternative than Alternative 2. All minor property takings. No significant difference in long term residential access impacts between alternatives.	**Most Preferred**  Least residential property impacts associated with this alternative. All minor property takings. No significant difference in long term residential access impacts between alternatives.	**Least Preferred**  Greatest residential property impacts associated with this alternative. All minor property takings. No significant difference in long term residential access impacts between alternatives.

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUPs	Alternative 3 Dual Cycle Tracks
Recreational Facilities	Alternative requires minimal property from recreational facilities and minimal impact to facility access.	**Most Preferred**  Recreational facilities within the study area are limited to the Les Chater Family YMCA and the Chippewa Trail. No impacts to the YMCA property are anticipated. Minor encroachment is anticipated at the Chippewa Trail (approximately 550 m^2); however, access to the trail is improved through implementation of a pedestrian crossover.	**Most Preferred**  Recreational facilities within the study area are limited to the Les Chater Family YMCA and the Chippewa Trail. No impacts to the YMCA property are anticipated. Minor encroachment is anticipated at the Chippewa Trail (approximately 500 m^2); however, access to the trail through is improved implementation of a pedestrian crossover.	**Moderately Preferred**  Recreational facilities within the study area are limited to the Les Chater Family YMCA and the Chippewa Trail. Minor changes to the Turner Skatepark entrance will be needed along the YMCA property. Minor encroachment is anticipated at the Chippewa Trail (approximately 600 m^2); however, access to the trail is improved through implementation of a pedestrian crossover.
Noise and Vibration	Identification of significant changes in anticipated noise and vibration impacts between alternatives.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in noise and vibration impacts between alternatives. Technical assessment of noise did not identify the need for new or additional mitigation.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in noise and vibration impacts between alternatives. Technical assessment of noise did not identify the need for new or additional mitigation.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in noise and vibration impacts between alternatives. Technical assessment of noise did not identify the need for new or additional mitigation.
Air Quality	Identification of significant changes in anticipated air quality impacts between alternatives.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in air quality impacts between alternatives.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in air quality impacts between alternatives.	**Equally Preferred** All design alternatives include the same roadway widening limits and intersection configurations. No significant difference in air quality impacts between alternatives.
Aesthetics / Streetscaping	Opportunities for aesthetic enhancements (plantings, decorative pavement materials, streetlights).	**Moderately Preferred**  Anticipated boulevard widths exceed 1.5 m for 52 percent of the corridor, providing adequate space to plant new trees if soil cells are used. Boulevard widths exceed 2.5 m for 35 percent of the corridor, providing adequate space to support mature trees without the need for soil cells.	**Most Preferred**  Anticipated boulevard widths exceed 1.5 m for 52 percent of the corridor, providing adequate space to plant new trees if soil cells are used. Boulevard widths exceed 2.5 m for 40 percent of the corridor, providing adequate space to support mature trees without the need for soil cells.	**Moderately Preferred**  Anticipated boulevard widths exceed 1.5 m for 52 percent of the corridor, providing adequate space to plant new trees if soil cells are used. Boulevard widths exceed 2.5 m for 35 percent of the corridor, providing adequate space to support mature trees without the need for soil cells.

Table 13: Evaluation of Alternative Design Concepts – Cultural Heritage

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
Built Heritage Resources and Cultural Heritage Landscapes	Potential for impacts to known or potential built heritage resources and cultural heritage landscapes.	**Most Preferred**  Avoids impacts to Mount (Mt) Hamilton Cemetery and Saint (St) George's Cemetery. Cultural Heritage Evaluation Report is required prior to construction due to adjacent cemeteries.	**Most Preferred**  Avoids impacts to Mt Hamilton Cemetery and St George's Cemetery. Cultural Heritage Evaluation Report is required prior to construction due to adjacent cemeteries.	**Least Preferred** Avoids impacts to Mt Hamilton Cemetery. Minor encroachment into St George's Historic Cemetery. Cultural Heritage Evaluation Report is required prior to construction due to adjacent cemeteries.
Archaeological Resources	Potential for impacts to archaeological sites and areas of archaeological potential.	**Moderately Preferred**  With exception of St George's Cemetery, no archaeological potential has been identified within the study area. Impacts to approximately 300 m^2 of land beyond the existing edge of pavement adjacent to St George's Cemetery are anticipated; this area would require a Stage 3 AA.	**Moderately Preferred**  With exception of St George's Cemetery, no archaeological potential has been identified within the study area. Impacts to approximately 300 m^2 of land beyond the existing edge of pavement adjacent to St George's Cemetery are anticipated; this area would require a Stage 3 AA.	**Least Preferred** With exception of St George's Cemetery, no archaeological potential has been identified within the study area. Impacts to approximately 350 m^2 of land beyond the existing edge of pavement adjacent to St George's Cemetery are anticipated; this area would require a Stage 3 AA. The proposed infrastructure encroaches onto the southeast corner of the cemetery property.

Table 14: Evaluation of Alternative Design Concepts – Cost

Criterion	Metric	Alternative 1 Dual MUPs	Alternative 2 North Side MUP	Alternative 3 Dual Cycle Tracks
Estimated Capital Costs	Capital infrastructure costs.	**Most Preferred** Estimated capital construction cost of $82.4 million, including engineering design, internal City costs, and 40 percent contingency.	**Most Preferred** Estimated capital construction cost of $82.0 million, including engineering design, internal City costs, and 40 percent contingency.	**Moderately Preferred** Estimated capital construction cost of $83.4 million, including engineering design, internal City costs, and 40 percent contingency.
	Utility relocation costs.	**Moderately Preferred** Alternative has the least impact on existing surficial and subsurface infrastructure. Cost estimated at $9.9 million.	**Most Preferred** Alternative has the least impact on existing surficial and subsurface infrastructure. Cost estimated at $8.2 million.	**Least Preferred** Alternative has the least impact on existing surficial and subsurface infrastructure. Cost estimated at $11.3 million.
	Property acquisition costs (assumed value of $650/m^2).	**Moderately Preferred** Based on the initial conceptual design, approximately 3,000 m^2 of property was expected to be required, not including easements. Estimated value of $1.96 million.	**Most Preferred** Based on the initial conceptual design, approximately 2,200 m^2 of property was expected to be required, not including easements. Estimated value of $1.43 million.	**Least Preferred** Based on the initial conceptual design, approximately 3,700 m^2 of property was expected to be required, not including easements. Estimated value of $2.48 million.
Estimated Operations and Maintenance Costs	Operations and maintenance costs.	**Most Preferred** Operation and maintenance will be required for 25.6 lane km of roadway (5 lanes x 5.2 km, less narrowing between Nebo and Dartnall), and 10.4 km of MUPs. Estimated annual operations and maintenance cost of $815,000.	**Most Preferred** Operation and maintenance will be required for 25.6 lane km of roadway (5 lanes x 5.2 km, less narrowing between Nebo and Dartnall), and 5.2 km each of MUPs and sidewalk. Estimated annual operations and maintenance cost of $815,000.	**Moderately Preferred** Operation and maintenance will be required for 25.6 lane km of roadway (5 lanes x 5.2 km, less narrowing between Nebo and Dartnall), 10.4 km of sidewalks and 10.4 km of cycle track. Estimated annual operations and maintenance cost of $852,000.

5.4.1 Evaluation Results

Based on the evaluation presented in **Section 5.4**, Alternative 2 (North Side MUP) was selected as the preferred design concept. This alternative scored highest in the evaluation and is most closely aligned with the design objectives. The design provides dedicated cycling facilities on the north side of Rymal Road and limits impacts to both utilities and the natural environment on the south side.

The advantages of Alternative 2 over the other alternatives are primarily related to its smaller footprint when compared to the other alternatives that were considered. The key advantages can be summarized as follows:

- Least impact to existing mature vegetation along the corridor;
- Greatest remaining surface area to accommodate green stormwater management features (such as bioswales), new street trees, and other streetscaping;
- Lowest estimated capital cost, including the least impact to existing utilities; and,
- Lowest estimated long-term operations and maintenance costs.

Alternative 1 (Dual MUPs) was preferred over Alternative 3 (Dual Cycle Tracks) in terms of criteria related to transit rider experience, property acquisition requirements, and infrastructure and maintenance costs. This alternative scored higher than Alternative 3 largely because MUPs require less space than cycle tracks. However, this alternative would involve additional impervious surface and greater natural heritage impacts than Alternative 2 which does not convert the south sidewalk into a MUP.

Alternative 2 (North Side MUP) was preferred in terms of criteria related to costs and property acquisition as it involves the narrowest cross-section. This alternative was preferred in terms of infrastructure and maintenance costs as well as stormwater management due to the smaller footprint. In addition, this alternative had the least impact to natural features including drainage features and trees.

Alternative 3 (Dual Cycle Track) was most preferred in terms of criteria related to conflicts between transportation modes, transit rider experience, and providing dedicated cycling facilities throughout Rymal Road. However, this alternative was least preferred in terms of impacts to natural heritage features, infrastructure and maintenance costs, and property acquisition requirements. It is expected impact the

greatest number of trees and the require the most additional impervious surface to provided dedicated spaces for both sidewalks and cycle tracks.

One potential issue with the preferred design concept (Alternative 2) is the lack of cycling connectivity along the south side of the roadway. The North Side MUP was least preferred in terms of conflicts between transportation modes and providing dedicated cycling facilities throughout Rymal Road as it only provides them on the north side. Due to the relatively low existing cyclist volumes in the area, the benefits listed above are considered to outweigh this potential issue. It is recommended that the need for cycling improvements on the south side of Rymal Road be monitored as the area develops.

5.5 Engagement

The alternative design concepts and the evaluation were presented to the TAC members and to the public at PIC 2 to gather feedback. The following sections summarize the engagement completed and feedback received. Further details on feedback received through PIC 2 can be found in **Appendix A**.

5.5.1 Technical Advisory Committee Comments

The TAC meeting to discuss the alternative design concepts and evaluation was held on August 14, 2023.

The TAC members agreed with the preferred design as it would be consistent with the MUP implemented along Rymal Road west of Upper James Street.

The TAC members raised questions regarding the connection of the cycling facilities on Rymal Road with existing or proposed facilities on intersecting roadways. These connections will be determined during detailed design following completion of the intersecting cycling facilities.

5.5.2 Public Information Centre 2

The second virtual PIC was held on September 19, 2023 from 6:00 PM to 8:00 PM. The project team provided an overview of the project followed by a question and answer session where the project team was available to answer questions. The event was held using the Webex Event platform where individuals were able to participate online or by phone. A total of 9 members of the public attended the virtual meeting.

Two emails were received by the project team following PIC 2. Both comments raised concerns about the use of a right turn channel at the Upper James Street intersection and suggested that pedestrian safety would be negatively impacted by these channels. One of the comments also suggested that the proposed curb return radii were too large, which would negatively impact cyclists and pedestrians. Raised crossings were suggested as a potential way to improve pedestrian safety along the right turn channels.

Responses were provided by the project team, and opportunities for design refinements to address the comments were reviewed. Ultimately, the right turn channels were removed from the conceptual design. Further details regarding the recommended design and refinements completed following PIC 2 are presented in **Section 6.0**.

6.0 Description of Recommended Design

Based on the evaluation described in **Section 5.4**, Alternative 2 (North Side MUP) was selected as the preferred design concept for Rymal Road. Additional refinements to the design were completed after PIC 2 and discussions with the TAC members.

The conceptual design drawings are included in **Appendix L**. It is noted the design will be further refined during the future detailed design phase.

6.1 Key Design Elements

The key design elements of the recommended design are summarized in **Table 15** as they relate to the design objectives. Details of these design elements are explored in further detail in the following sections.

Table 15: Key Design Elements of the Recommended Design

Design Objective	Key Design Element
Reduced vehicular travel delay	An additional travel lane will be added in each direction to increase the capacity of the roadway. Improvements to transit and active transportation infrastructure will help to shift travel patterns and reduce the number of private vehicle trips.
Dedicated space for all modes of transportation	A MUP will be constructed on the north side for both cyclists and pedestrians and a sidewalk will be constructed for pedestrians on the south side. The MUP will connect to existing and planned cycling infrastructure west, north, and east of the project limits.
Improved transit travel times	Additional travel lanes are expected to reduce overall travel delays on the corridor. Queue jump lanes could be provided in the future, as warranted.
Enhanced streetscaping and landscaped medians	Landscaped medians are provided where there is sufficient space to do so. Alternative 2 has the most available boulevard space for both new and existing mature street trees.

Design Objective	Key Design Element
Consistent roadway	The proposed cross-section matches the 5-lane cross-sections west of Upper James Street and east of Dartnall Road.
Minimal impacts on social and natural environment	The minor widening of south sidewalk avoids major impacts to the natural features on the south side. The hybrid alignment minimizes property impacts, including impacts to both Mt. Hamilton Cemetery and St. George Cemetery.

6.1.1 Roadway

One of the key design objectives was to design the road to be consistent with Rymal Road east of Dartnall Road and West of Upper James Street. The recommended design has a five-lane cross-section which is consistent with the roadway at the east and west limits and was done to improve traffic conditions through Rymal Road by preventing slowdowns caused by merging traffic and capacity limits. The multi-modal transportation analysis presented in **Appendix I** also noted that the five-lane cross-section is required to prevent capacity constraints throughout Rymal Road as traffic increases in the area.

Rymal Road is intended to be a multi-modal arterial with priorities given to rapid transit. The wider cross-section allows for more reliable transit operation and the opportunity to implement transit priority lanes or additional infrastructure in the future.

6.1.1.1 Geometric Design

The roadway has been designed to match the existing road centreline where possible, with slight deviations at key areas to mitigate impacts caused by the widening of the road. Keeping the centreline as close to the existing location as possible minimizes the need to modify the roadway crossfall and disrupt traffic during construction. Deviations were made in the following key locations:

- Near Nebo Road, where the road is shifted north; and
- Near Upper Ottawa Street, where the road is shifted south.

These centreline shifts were made to mitigate impacts to existing trees, utilities, and property.

6.1.1.2 Traffic Control

Additional traffic control measures have been proposed throughout the corridor as part of the recommended design. This includes new medians and extending existing medians.

The five-lane cross-section is expected to address the anticipated capacity requirements through the majority of the study area and provide flexibility for future growth. Right turn lanes at all corners of Upper James Street and westbound at Upper Ottawa Street are recommended to satisfy potential capacity constraints.

The opportunity to reduce the cycle length of signals along Rymal Road from 120 seconds was also reviewed to reduce delays and queues for vehicular traffic and improve pedestrian waiting times. Details related to the traffic modelling results of the five-lane cross-section and the reduced cycle times are provided in **Appendix I**.

New and extended medians will result in some existing driveways being converted to a right-in right-out (RIRO) configuration. This will reduce the number of left turns across the roadway and improve safety for pedestrians and cyclists crossing driveways. In addition, new greened medians are being proposed in areas where there is sufficient space. These greened medians will add vibrancy to the roadway and help to reduce operating speeds by creating the appearance that the roadway is narrower.

6.1.1.3 Lighting Strategy

A detailed lighting strategy that considers all modes should be developed during the detailed design phase of the project. Enhanced lighting should also be provided at existing and proposed transit stops to improve passenger safety.

6.1.2 Active Transportation Facilities

The preferred design includes a MUP on the north side and a sidewalk on the south side for active transportation users. The MUP is designed to be 3.5 m wide while the new south sidewalk will be 2.0 m wide (where feasible). The MUP on the north side is intended to be shared by cyclists and pedestrians and will have appropriate signage and pavement markings to inform users that the space is shared.

Cyclists and pedestrians will be directed across major driveways and intersections using ‘crossrides’ which are pavement markings that indicate where pedestrians and cyclists

should be crossing the road. Drivers will also be made aware of pedestrian and cycling crossings through pavement markings and signage. Additional details and locations regarding signage and pavement markings should be explored during the detailed design phase.

6.1.3 Transit

The S-Line Corridor Initial Assessment of Future Transit needs memo (**Appendix J**) notes that the long-term ridership forecasts along Rymal Road are below levels where continuous exclusive transit facilities (i.e., dedicated bus lanes) are warranted. The City will continue to monitor transit delays along the corridor and may consider implementation of queue jump lanes at key intersections in the future.

Passenger amenities at all express stops (future S-Line BRT stops) should be considered as part of the detailed design. Providing appropriate bus stop amenities will encourage people to use the transit system by making their wait as comfortable as possible. These amenities should include shelters, bicycle storage, digital displays, and wide platforms, where appropriate and feasible, to enhance passenger comfort and promote the use of the rapid transit corridors.

6.2 Stormwater Management Systems

The preferred alternative will result in a fully urbanized cross-section with curb and gutter, with the roadway being made wider through most of the project area. The change in impervious area caused by the proposed road widening is relatively small as the new asphalt footprint is primarily located within the existing gravel shoulder. The proposed MUP located along the north side of the roadway will result in an increase in impervious area as it is wider than the existing sidewalk. The proposed south sidewalk will result in an increase in impervious area in areas where no sidewalk is present under existing conditions.

The overall contributing area from within the proposed ROW is small relative to the external areas, which result in little change to the sewer assessment compared to existing conditions. Therefore, no appreciable impact to the existing storm sewer system is anticipated as a result of the Rymal Road improvements. Further details related to the changes caused by the preferred design are provided in **Appendix H**.

Two existing culverts located approximately between Eva Street and Upper Gage Avenue, which currently convey flow from the existing roadside ditches will no longer be necessary. The third culvert ties directly into the maintenance hole at the Hannon Creek Tributary outlet and is located approximately at station 4+910 and is recommended to be reassessed during detailed design.

The potential for low impact development (LID) implementation was assessed for the recommended design. From the available background information, the Rymal Road ROW is poorly suited for infiltration measures, but likely feasible for filtration based measures. Grassed areas, and tree planting areas in the preferred alternatives may be suitable locations for LID features. Ideal locations are where road runoff can be directed to LID features as surface drainage, which is favourable where the sidewalk and multi-use path are separated from the road by a grasses boulevard. Where the sidewalk and multi use-trail are adjacent to the roadway, directing surface runoff from the road to LID features may not be feasible; however, some features can accommodate inlet pipe connections such as tree root support systems.

It is recommended that groundwater monitoring and in-situ percolation testing be completed at proposed LID locations. In areas with poorly draining in-situ soils, filtration-based measures may be appropriate with a small amount of the treated water infiltrated.

Based on a coarse preliminary analysis, several sections of the existing storm sewer have been identified as operating under surcharged conditions. In support of future design stages, a further drainage and hydrology study will be required to confirm drainage areas, existing conditions/peak flow rates and define water quality and quantity control requirements, all as part of an implementation strategy for the stormwater management approach recommended in this report.

6.3 Landscaping Plan

The recommended design is expected to result in the removal of 10 large trees (>30cm DBH) and approximately 50 smaller diameter trees. Trees are planned to be replaced at a minimum ratio of two replacements for every one tree removed. Additional planting of trees should be considered in the proposed greened medians and along the boulevard on either side of the roadway.

A Landscaping and Planting Plan should be developed during detailed design, including consideration for invasive species removal and control where necessary.

7.0 Environmental Impacts and Mitigation

This section outlines anticipated impacts based on the recommended design and recommends mitigation measures for the project. The recommended design and associated mitigation measures will be refined during the future detailed design stage.

7.1 Natural Heritage

A preliminary assessment of natural heritage impacts of the project is documented in the Natural Heritage Report (**Appendix B**). Based on the assessment, it is expected the majority of the potential impacts to natural heritage features can be mitigated using standard mitigation measures for construction as outlined in the following sections. These standard mitigation measures aim to minimize the disturbance to wildlife, natural heritage features, and the natural heritage system.

For residual impacts that cannot be fully mitigated, landscaping and planting is recommended to offset tree and vegetation removals. As noted in **Section 6.3**, trees are planned to be replaced at a minimum ratio of 2 replacements for every 1 tree removed.

Continued consultation with the Hamilton Conservation Authority (HCA) and MECP is recommended during detailed design inform the natural heritage mitigation, restoration, and monitoring measures.

7.1.1 Species at Risk

Any encroachment into the Butternut RHPZ shown on **Figure 4** will require compensation following the requirements listed under *O. Reg. 830/21*. It is recommended (where site access permits) that a Butternut Health Assessment (BHA) be completed to confirm the retainable status of the Butternut.

Any encroachment into the woodlands adjacent to the corridor may require submission of an Information Gathering Form (IGF) to the MECP as encroachment may impact potential SAR bat habitat.

7.1.2 General Wildlife

Strategies to mitigate impacts to general wildlife prior to and during construction should include (but are not limited to):

- Clearing ground vegetation, shrubs, or trees outside the breeding bird season (**April 1 to August 31**);
    - Should any clearing be required during the breeding bird season (**April 1 to August 31**), nest searches should be conducted by a qualified person 48 hours prior to clearing activities. If active nests are found, work within approximately 10 m (depending on the associated bird species) of the nest should cease until the young of year have fledged or until the nest is determined to be inactive. If no nests are present, clearing may occur. This is in accordance with the federal *Migratory Birds Convention Act*.
- Clearing trees outside the active bat season (**May 1 to September 30**);
- Where feasible, maximize the distance from construction activities to the woodland/wetland edges to avoid disturbing wildlife as per the vegetation protection zones (VPZs) described in Chapter C, Section 2.5.10 of the UHOP; namely:
    - A 15 m VPZ applies to the woodlands throughout the Study Area (at this point, the woodlands are assumed to be significant as assessment to determine their significance was not completed as part of this study); and,
    - A 15 m VPZ applies to the unevaluated wetland at the eastern limit of the Study Area (it is noted this wetland is approximately 220 metres from the anticipated area of impact);
- Limit the use of lighting during construction, where feasible;
- Install appropriate fencing to delineate work areas and direct wildlife away from the construction area toward more suitable habitat in areas adjacent to woodlands/ wetlands/watercourses, as applicable;
- Visual monitoring for wildlife species and avoidance where encountered, if feasible;
- If wildlife is found within the construction area, they should be allowed to leave the area on their own accord or relocated to an area outside of the construction zone into an area of appropriate habitat;
- Construction crews working on site should be educated on local wildlife and take appropriate measures for avoiding wildlife; and,
- Should an animal be injured or found injured during construction, they should be transported to (or contact made with) an appropriate wildlife rehabilitation center.

7.1.3 Erosion and Sediment Control

An Erosion and Sediment Control Plan should be developed during detailed design. The plan may include, but is not limited to, the following measures:

- Geotextile silt fences, rock check dams, ditch checks, and mud mats;
- Temporary sediment ponds;
- Designated topsoil stockpile areas;
- Cut-off swales and ditches to divert surface flows to the appropriate sediment control area; and,
- Provisions for revegetating the area promptly following completion of construction.

7.1.4 Environmental Monitoring Plan

An Environmental Monitoring Plan (EMP) should be developed during detailed design and implemented through the duration of construction. The purpose of the EMP is to ensure that the erosion and sediment control measures operate effectively and to monitor the potential impact, if any, upon the natural environment.

The duration of construction is defined as the period from the beginning of earthworks until the site is stabilized. Site stabilization is the point in time when the roads have been paved, lawns have been sodded, and restoration plantings have been completed.

Monitoring should be required after every 10 mm or greater rainfall event and bi-weekly at minimum throughout active construction periods. Protected vegetation areas will require periodic monitoring to check that they are not being impacted by construction activities. Should impacts be observed, necessary steps should be taken to confirm that the impacted vegetation is either restored or replaced.

7.2 Cultural Heritage Resources

7.2.1 Archaeological Resources

As noted in **Section 3.4**, a Stage 1 AA was completed by FAC as part of this study (**Appendix C**) and entered into the OPRAR on March 25, 2023. The Stage 1 AA Report identifies 2 areas of archaeological potential.

- The first area is on the south side of Rymal Road west of Upper Sherman Avenue, near a small Indigenous archaeological site (**Figure 4**). Prior to any ground disturbing

activities in this area, Stage 2: Assessment by means of shovel testing at 5 m intervals is required as described in the Stage 1 AA Report.

- The second area is adjacent to the 19th century St. George's Cemetery, which is on the north side of Rymal Road east of the Trans Canada Trail (**Figure 6**). Prior to any ground disturbing activities in this area, Stage 3: Testing by means of mechanical excavation is required as described in the Stage 1 AA Report.

Ministry of Citizenship and Multiculturalism acceptance of all required archaeological reports into the OPRAR is required prior to any ground disturbing activities.

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

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

7.2.2 Built Heritage Resources and Cultural Heritage Landscapes

As noted in **Section 3.4.2**, the City's Cultural Heritage staff have identified 3 properties adjacent to the Study Area that have cultural heritage significance. The City has assessed the potential for impacts, and the need for mitigation measures, as follows based on the recommended design:

- 164 Rymal Road East: The proposed design plan calls for lowering of the road (approximately 0.3 to 0.4 m) and to transition this grade change, a new/extended

retaining wall is also proposed at the limit of the right of way. This will limit disturbance to a nominal distance adjacent to the wall. As the proposed wall will prevent the need to intrude further into the property, Cultural Heritage staff are satisfied the heritage components will not be impacted.

- 311 Rymal Road East: There is no new property acquisition and while the design plan indicates some grading and tree removal at this location, Cultural Heritage staff have confirmed the designated feature is a heritage building. No impacts to the heritage building are anticipated based on the conceptual design.
- 2 Dartnall Road: Cultural Heritage staff advise that this parcel is part of the Chippewa Trail and the designated feature on the property is the historic grain elevator. The current design plans show some property impacts; however, not in the vicinity of the designated feature, which is located to the north.

Based on this assessment, the City has advised that a Cultural Heritage Evaluation Report is not required for this project.

7.3 Noise Impacts

A Traffic Noise Impact Assessment Report (Dillon, 2023; **Appendix M**) was completed to assess the traffic noise impacts associated with widening Rymal Road. The study included modelling to predict the change in noise levels that would result from traffic on Rymal Road post-construction (operation phase). A qualitative assessment of noise impact during the construction phase of project was also completed.

For the operation phase, the results indicate that noise levels are not sufficient to require noise mitigation.

Noise generated during construction of the Rymal Road improvements, although temporary, is expected to impact both humans and wildlife. Nuisance noise during construction is associated with typical construction activities including, but not limited to, operation of equipment and machinery, internal combustion engines, construction-related vehicular traffic onsite and along nearby road networks and back-up beepers on mobile equipment. The setback distances from the closest receptors to the construction site (i.e., along Rymal Road) range from approximately 15 m to greater than 120 m. For these receptors, nuisance construction noise impact is expected to be moderate to high.

Construction activities will likely extend beyond the allowable construction hours set by the municipal noise control by-laws, including City of Hamilton 11-285 (i.e., 7 AM to 7 PM). While City does not need to apply for municipal noise control by-law exemptions, City will consider best practices that will strive to work within the spirit of the municipal noise bylaw once more construction details are known.

7.4 Excess Soils

Based on the conceptual design, it is estimated 76,000 cubic metres of earth materials will be excavated for the project. This value is expected to change as the design is refined during detailed design.

As outlined in **Section 3.6**, the APU identified 3 APECs within the Project Area. Further investigations into the COPC identified in the APU should be completed prior to the planned construction works, including preparation of a SAP and Soil Characterization Report.

7.5 Waste Management

During construction, waste materials will be generated from construction crews. All waste generated during construction must be disposed of in accordance with MECP requirements. Waste management procedures should be developed during the detailed design phase and included in the construction contract.

7.6 Climate Change

Hamilton City Council declared a Climate Change Emergency on March 27, 2019 and approved Hamilton's Climate Action Strategy in August 2022. This strategy document includes advancements to both climate mitigation and climate adaptation. The City has committed to achieve net zero greenhouse gas emissions by 2050.

It is expected that the implementation of both a dedicated space for cyclists and improvements to transit infrastructure as part of the recommended design will lead to an increase in use of sustainable modes of transportation. With the full implementation of the "BLAST" transit network, it is anticipated that users will be encouraged to substitute more private vehicle trips with public transportation thereby reducing the amount of greenhouse gas emissions caused by automobiles.

As noted in **Section 6.3**, this project is anticipated to involve the removal of 10 large trees (>30cm DBH) and approximately 50 smaller diameter trees. Trees are planned to be replaced at a minimum ratio of two replacements for every one tree removed. Green space including trees and greened medians are planned for Rymal Road to provide additional carbon storage and water retention for stormwater runoff and thereby help mitigate the impacts of climate change.

During detailed design, sustainable measures to further reduce and mitigate the negative effects of climate change should be reviewed and incorporated where feasible.

7.7 Utility Relocations

Impacts to utilities are expected as a result of expansion of the roadway and the introduction of a MUP on the north side and wider sidewalks on the south side. The total utility relocation costs for the recommended design are estimated to be $8.2 million. This involves relocating both underground and above-ground infrastructure due to the excavation and paving required. The anticipated utility relocations are based on a 0.5 m offset from the project edge. The anticipated lengths/counts of utility relocations are listed in **Table 16**.

Table 16: Anticipated Utility Relocations

Utility Infrastructure	Length/Count
Utility poles	227
Telecom box and pedestals	35
Concrete utility poles	71
Hydro access vaults and manholes	15
Hydro transformer box	6
Hydro duct	5 km
Fibre cable	3.1 km
Gas main	5.7 km

The anticipated costs and number of items impacted will be refined during the detailed design stage as the required space for expansion and existing utility locations are confirmed.

7.8 Cost Estimate

The overall capital cost estimate for the expansion of Rymal Road is comprised of the costs of materials, design, construction, and the utility relocation costs. Estimated construction costs are based on conceptual designs only and may vary through the refinement of detailed design. The estimated costs consider civil engineering design and construction as well as City staff time associated with management of those components.

The total estimated costs associated with the recommended design are approximately $94.3 million. Cost estimates are subject to refinement during detailed design. Costs associated with permits, approvals, and additional technical studies required to support detailed design, and receipt of approvals from other affected agencies, are assumed to be included within the 10 percent engineering fee. Operations and maintenance costs are not included within the provided estimates. The full breakdown of the estimated costs is included in **Appendix N** and a summary of the estimated costs is provided in **Table 17**.

Table 17: Estimated Capital Costs

Item	Estimated Cost
Roadworks and earthworks	$31.5 million
Storm sewers and appurtenances	$7.2 million
Utility Relocations	$9.8 million
Streetlights and traffic signals	$6.3 million
Engineering and technical studies (7.5% of Capital Cost)	$4.1 million
Internal City fees (7.5% of Capital Cost)	$4.1 million
Property (5% of Capital Cost)	$2.7 million
Sub-total	**$65.7 million**
Contingency (40% of Capital Cost)	$22.0 million
Total preliminary cost estimate	**$87.7 million**

8.0 Implementation Plan

This section describes the recommended approach for phasing, funding, land acquisition requirements, utility relocations, additional studies, and monitoring that will be required as part of the project. It is recommended that construction occur in conjunction with other capital projects along/near Rymal Road to minimize reconstruction costs and demolition works. It may be possible to further divide the construction by roadway elements, sidewalk or behind the curb elements, and underground improvements.

8.1 Phasing

Combining construction of the Rymal Road expansion with previously planned capital projects may be the most cost-effective strategy for implementation. Collaborating with other large capital projects may reduce duplicated effort in terms of road construction. The following capital projects are currently planned in the vicinity of Rymal Road; approximate construction schedules are noted where available:

- West 5th Street improvements between Rymal Road and Stone Church Road (construction 2028/2029);
- Nebo Road improvements between Rymal Road and Twenty Road East; and,

Phasing should also be conducted to minimize overall disruption to the vehicle and pedestrian network. Accesses to shopping plazas, community centers, and the Hamilton Police Service facility on Rymal Road should be maintained where feasible.

8.1.1 Phasing Schedule

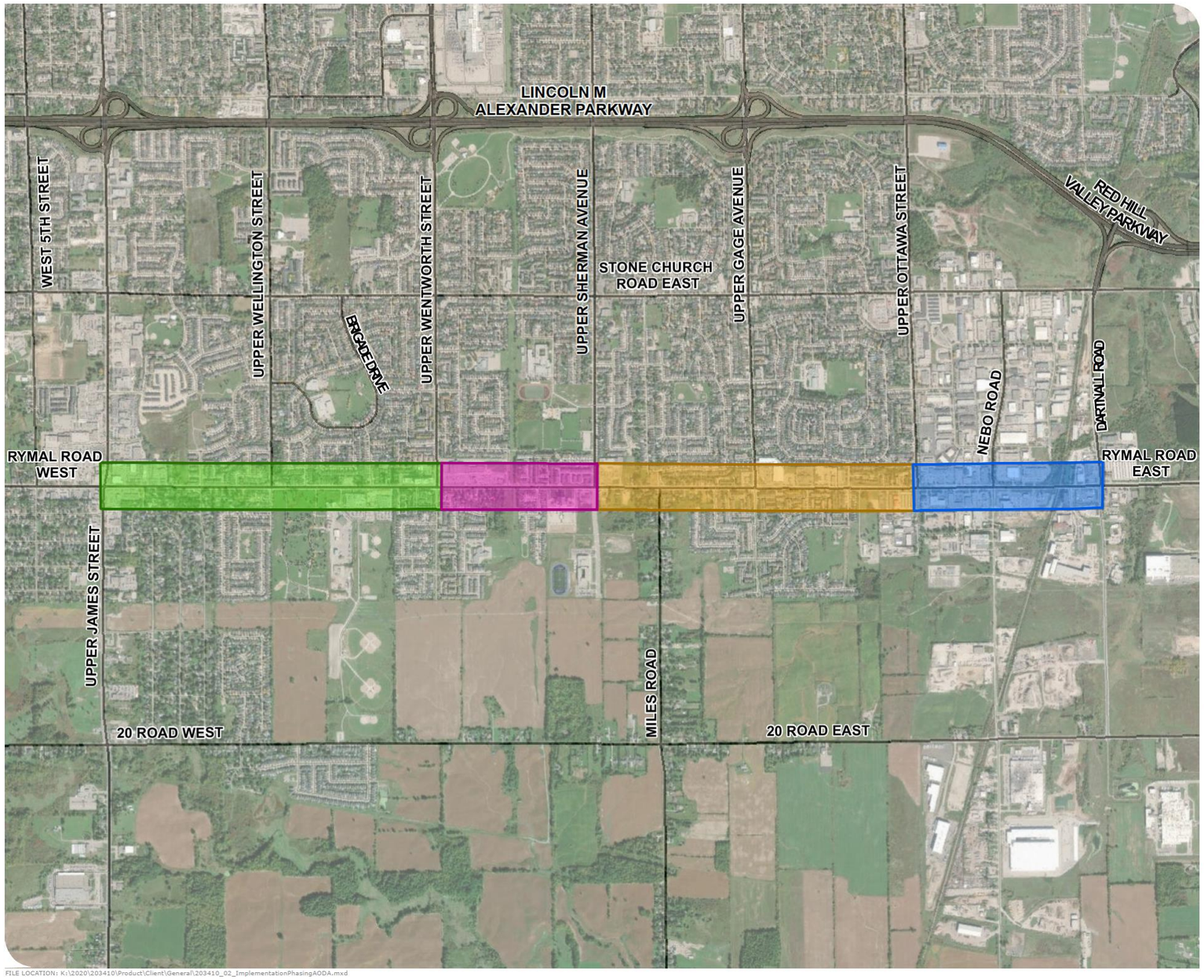
As Rymal Road is a major arterial, construction should occur in blocks between major intersections to divide contracts and stages of work evenly. Construction along Rymal Road is expected to result in traffic diverting to either Stone Church Road East or Twenty Road East. Dividing construction into blocks would mitigate the amount of traffic being diverted and provide access to properties along Rymal Road. Intersection improvements should be completed at the beginning and ends of each block of construction.

The following phasing schedule is recommended to minimize disruptions along Rymal Road, as shown in **Figure 16**:

- Dartnall Road to Upper Ottawa Street (approximately 1 km);
- Upper Ottawa Street to Sherman Avenue (approximately 1.6 km);
- Sherman Avenue to Upper Wentworth Street (approximately 800 m); and,
- Upper Wentworth Street to Upper James Street (approximately 1.8 km).

The Dartnall Road to Upper Gage Avenue section of construction is expected to be the most challenging due to existing property constraints and being closest to the low point of the storm sewer.

Figure 16: Recommended Implementation Phasing



RYMAL ROAD, HAMILTON, ON

ENVIRONMENTAL STUDY REPORT

IMPLEMENTATION PHASING

FIGURE 16

Implementation Phasing

- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Highway
- Major Road
- Minor Road

SCALE 1:19,000

0 250 500 1,000 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, City of Hamilton Open Data, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: GJH
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 20-3410
STATUS: FINAL
DATE: 2025-01-14

FILE LOCATION: K:\2020\203410\Product\Client\General\203410_02_ImplementationPhasingAODA.mxd

8.2 Funding Strategy

Details as to construction phasing and associated funding will be brought forward to City Council for approval as part of the City's normal capital forecast updates and annual budget process. No additional higher-tier funding has been allocated as of the writing of this report.

8.3 Land Acquisition

As this area of Rymal Road has a wide ROW, substantial property acquisition impacts are not anticipated. Based on the conceptual design, it is anticipated a total of approximately 630 m^2 of land would need to be acquired from 4 properties, all at the intersection of Rymal Road and Upper James Street. The extent of property impacts may change during the detailed design phase and land acquisition requirements will be confirmed at that stage.

Additional property impacts through grading requirements are expected throughout the corridor but will not require land acquisition. These grading impacts will be required to properly grade the land behind the installation of the sidewalk and MUP. Significant impacts to private property are not expected as a result of grading requirements. Grading will be refined during the detailed design phase.

8.4 Commitments for Future Work

8.4.1 Future Consultation

The following future consultation activities are recommended as this project advances through detailed design:

- Outreach to HCCC, HWFN, MCFN, and SNGR regarding future archaeological assessments and the opportunity to provide monitors for fieldwork;
- Continued consultation with HCA and MECP during detailed design to inform the natural heritage mitigation, restoration, and monitoring measures;
- Submission of an IGF to MECP may be required for encroachment into woodlands, which have been identified as potential SAR bat habitat; and,
- Continued consultation with utility companies and City departments regarding utilities and servicing along the corridor.

8.4.2 Recommended Additional Studies

The following additional studies are recommended to be completed during the detailed design phase prior to construction:

- Natural environment studies should be updated if field data exceeds five years in age, or if there are changes to requirements under the *Endangered Species Act* to address potential impacts to SAR;
- Where site access permits, a BHA should be completed to confirm the retainable status of the Butternut identified in **Figure 4**;
- A Stage 2 AA is required prior to any ground disturbing activities in the areas of archaeological potential on the south side of Rymal Road west of Upper Sherman Avenue (**Figure 5**);
- A Stage 3 AA is required prior to any ground disturbing activities in the areas of archaeological potential on the north side of Rymal Road east of the Trans Canada Trail (**Figure 6**);
- Further investigations into the COPC identified in the APU should be completed prior to the planned construction works, including preparation of a SAP and Soil Characterization Report; and,
- Updated traffic modelling should be undertaken to consider developments that have been completed from the time of writing this report. Additional review of truck turning paths should be completed during detailed design to identify the minimum corner radii.

8.4.3 Anticipated Permits, Approvals, and Exemptions

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

- Potential *Endangered Species Act* permitting for encroachment into woodlands, to be confirmed through consultation with MECP; and,
- The need for an Environmental Activity and Sector Registry or Permit to Take Water for groundwater dewatering should be confirmed during detailed design.

8.5 Monitoring

To monitor the implementation and effectiveness of the environmental mitigation measures and provisions recommended in this report, a contract administrator should be retained by the City to:

- Prepare a monitoring plan prior to project construction to communicate mitigation and monitoring activities that aim to prevent negative impacts;
- Inspect and monitor construction environmental work;
- Monitor conformance with permits, approvals, and associated contract requirements; and,
- Evaluate whether changes proposed by the contractor meet the intent of the mitigation measures and reflect prevailing conditions onsite.

The monitoring plan should outline the responsibilities of monitoring activities, including timing and frequency of monitoring activities and compliance reporting.

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