MEMORANDUM

To: Shun Cheung (Town of Caledon)

From: Matthew Loni (MP Traffic), Mehemed Delibasic (MP Traffic)

Date: June 1, 2022

Re: NRFP #2021-118: Glasgow Road Environmental Assessment and Detailed Design
Transportation Background Review Memo

1.0 INTRODUCTION

In response to continued population growth and increased wear and tear on existing infrastructure through increased traffic, development, new infrastructure, and increased expectations as to the type and quality of services the Town provides, the Town of Caledon has identified the need for improvements to Glasgow Road, from Chickadee Lane to Deer Valley Drive. Subsequently, the Town has initiated a Municipal Class Environmental Assessment (Class EA) to review and identify required road improvements along the corridor.

As part of the EA process, MP has reviewed available traffic data, including development generated traffic, as well as the existing and planned active transportation (AT) facilities on Glasgow Road, in Bolton, Ontario.

The study area includes Glasgow Road, from Chickadee Lane to Deer Valley Drive, and is illustrated in Figure 1.0.1.

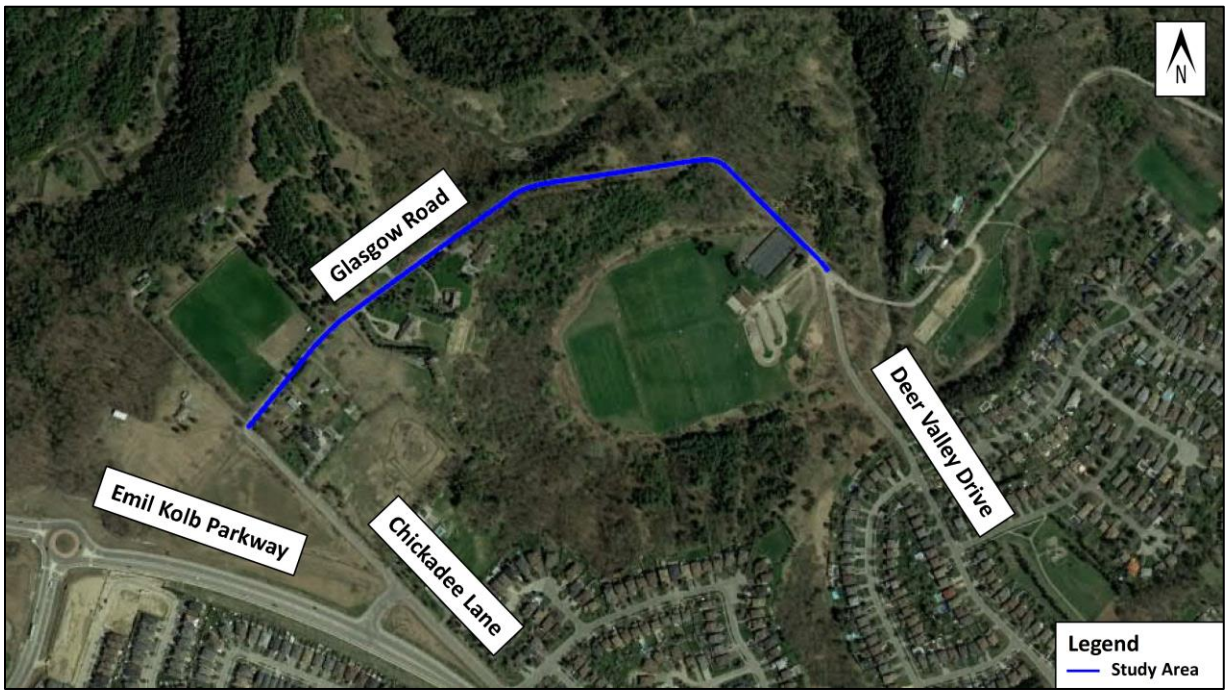


Figure 1.0.1: Study Area (Courtesy of Google Earth)

The following plans/reports were reviewed as part of this Memo:

- Brampton Transit service maps;
- The Town of Caledon *Transportation Master Plan, October 2017*, with associated figures provided in **Attachment A**;
- The Region of Peel *Sustainable Transportation Strategy, February 2018*;
- The Bolton *Transportation Master Plan, August 2015*, with the executive summary provided in **Attachment B**;
- The Ministry of Transportation (MTO) *Province-Wide Cycling Network*;
- The Humber River Trail Map;
- The *Chickadee Grove Community Traffic Impact Study* and supporting documents, completed by GHD and dated August 25, 2021, provided in **Attachment C**, and
- The *Glasgow Road Safety Review – Final Report*, completed by R.J. Burnside & Associates Ltd. and dated April 12, 2022, provided in **Attachment D**.

2.0 STUDY AREA ROAD NETWORK

The study area, illustrated in Figure 1.0.1, above, runs along Glasgow Road, from Chickadee Lane to Deer Valley Drive.

Roadways within the study area are classified below:

- **Glasgow Road** is a local roadway with a posted speed limit of 40 km/h;
- **Chickadee Lane** is a local roadway with a posted speed limit of 40 km/h, and
- **Deer Valley Drive** is a local roadway with a posted speed limit of 40 km/h.

The following intersections are located within the study area:

- **Glasgow Road and Chickadee Lane** is an existing two-leg intersection with stop-control on Glasgow Road, westbound, while Chickadee Lane, northbound, operates in free-flow.
- **Glasgow Road and Deer Valley Drive** is an existing three-leg intersection with stop-control on Deer Valley Drive, northbound, while Glasgow Road, eastbound and westbound, operates in free-flow.
- **Glasgow Road/Street 'C' and Chickadee Lane** is a future three-leg intersection that will replace the existing Glasgow Road and Chickadee Lane intersection upon connection of Street 'C'. While the exact intersection control is not known it is expected that Street 'C' will operate under stop-control conditions, while Glasgow Road and Chickadee Lane will continue operation under the existing conditions of stop-controlled and free-flow, respectively.
- **Glasgow Road and Street 'A'** is a future three-leg intersection. While the exact intersection control is not known it is expected that Street 'A', northbound, will operate under stop-control conditions while Glasgow Road, eastbound and westbound, will operate under free-flow conditions.

3.0 TRAFFIC OPERATIONS REVIEW

Traffic data was obtained from the *Chickadee Grove Community Traffic Impact Study,* and the *Glasgow Road Safety Review – Final Report,* and reviewed.

From data within the *Glasgow Road Safety Review – Final Report*, 24-hour automated traffic recorder (ATR) counts were provided for Glasgow Road, 300 m east of Deer Valley Drive, and 200 m north of Hickson Street. Due to the proximity to our study area the count 300 m east of Deer Valley Drive was reviewed. From the ATR count, the highest 24-hour volume on Glasgow Road was recorded on May 3rd, 2017, and was found to be 388 vehicles, with 221 vehicles travelling in the eastbound direction and 167 vehicles travelling in the westbound direction.

From data within the *Chickadee Grove Community Traffic Impact Study*, an 8-hour turning movement count (TMC), recorded on October 31st, 2017, was provided for the intersection of Chickadee Lane and the access to Emil Kolb Parkway. From the TMC, the peak hour volume using the north leg of Chickadee Lane, towards Glasgow Road, was 18 vehicles, while the 8-hour count recorded a total of 76 vehicles. Based on the typical assumptions that the peak hour volume of a roadway is approximately 10% the daily traffic, and that the total volume for an 8-hour count is approximately 50% the daily traffic, daily traffic on the north leg of Chickadee Lane is estimated to be 180 vehicles per day during 2017.

Growth of background traffic volumes on Glasgow Road are expected to be minimal as most trips are expected to begin/end within the residential area, as is supported by assumptions in the *Chickadee Grove Community Traffic Impact Study* which did not apply a background growth rate to volumes on Chickadee Lane and De Rose Avenue. However, due to the location of the Humber Trail and Edelweiss Park, east of the study area, it is expected that the roadway will experience some growth. As a result, a 2.0% growth rate was applied to the background traffic volume to determine the expected future traffic volumes.

Applying the background growth rate to the 2017 traffic volumes for Glasgow Road produces an expected daily traffic volume of 200 vehicles during the 2022 existing year, 220 vehicles during the 2027 5-year horizon, and 240 vehicles during the 2032 10-year horizon.

Site generated traffic from the proposed development is expected to peak at 86 vehicle trips during the peak hour, however all trips were distributed to the Chickadee Lane and Emil Kolb Parkway intersection, avoiding Glasgow Road east of the subdivision. While most trips would be expected to access the development via Emil Kolb Parkway, some trips would still be expected to use Glasgow Road, to access either Deer Valley Road or Hickman Street. Assuming a maximum of one third of vehicles use Glasgow Road would result in an increase of 29 vehicles per hour. With the inclusion of the development generated traffic, Glasgow Road, between the east portion of the subdivision and Deer Valley Road, is expected to experience a daily traffic volume of 490 vehicles during 2022, 510 vehicles during 2027, and 530 vehicles during 2032. While volumes on Glasgow Road, between Street ‘A’ and Chickadee Lane are harder to estimate, no more than two thirds of trips from the development would be expected to use this portion of Glasgow Road resulting in an average daily traffic volume of up to 770 vehicles during 2022, 790 vehicles during 2027, and 810 vehicles during 2032.

A small number of residential driveways are located between the TMC data collection point and the eastern limits of study area while access to a parking lot for Dick's Dam Park as well as the intersection of Glasgow Road and Deer Valley Drive are located between the ATR data collection point and the western limits of study area. As a result, data from the *Chickadee Grove Community Traffic Impact Study* was found to be more relevant and has been selected for use.

4.0 TRANSPORTATION FACILITIES REVIEW

The following sections outline the existing and proposed transit and AT facilities identified within the documents reviewed. Existing and proposed facilities are illustrated in Figure 4.0.1, below.

4.1 Transit

Existing

No existing transit facilities were identified within the study area.

Review of the Brampton Transit weekday service map, and Go Transit GO Train and Bus Route Map, indicates that there are no regularly scheduled bus routes within 500 m of the study area.

Proposed

No future transit facilities within 500 m of the study area were identified in the documents reviewed.

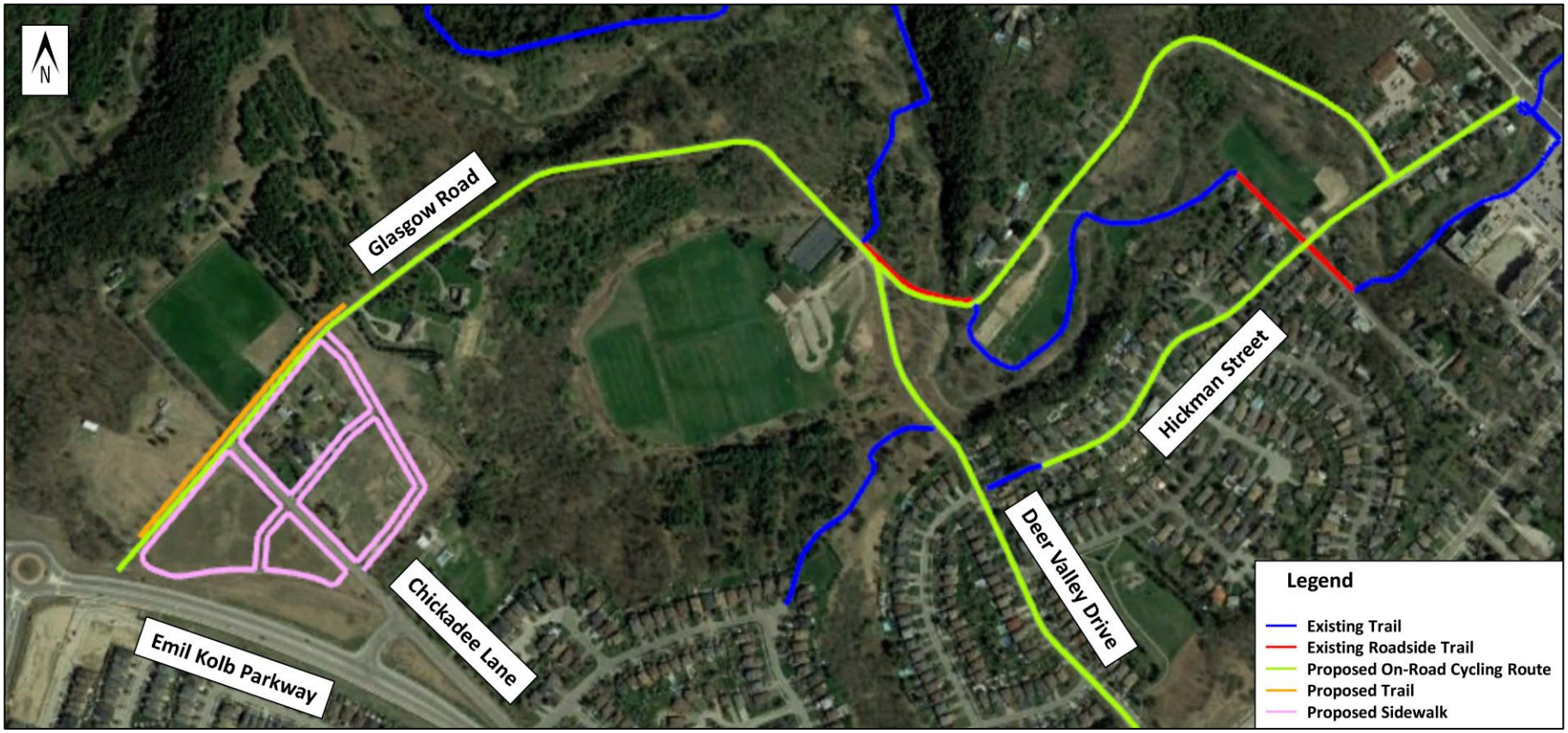


Figure 4.0.1: Existing and Proposed Transportation Facilities (Courtesy of Google Earth)

4.2 Cycling

Existing

Within the Town of Caledon *Transportation Master Plan*, a small portion of Glasgow Road, at the east end of the study area in the vicinity of Deer Valley Drive, was identified as having a roadside trail consistent with the portion of the Humber Trail that runs along Glasgow Road as it crosses from the south side of the roadway to the north within the vicinity of Deer Valley Drive.

No other existing cycling facilities were identified within the study area.

Proposed

Within the Town of Caledon *Transportation Master Plan*, a future shared on-road cycling route was identified on Glasgow Road, from Chickadee Lane in the west, to Deer Valley Drive in the east. The future shared on-road cycling route continues onto Deer Valley Drive, across King Street to Station Road, ending at Ellwood Drive.

Within the Bolton *Transportation Master Plan, 2015*, a future shared on-road cycling route is was identified on Glasgow Road, however is show to end at Hickman Street, with an additional on-road cycling route along Hickman Street, from Highway 50 to the cul-de-sac.

4.3 Walking

Existing

Within the Town of Caledon *Transportation Master Plan*, a small portion of Glasgow Road, at the east end of the study area in the vicinity of Deer Valley Drive, was identified as having a roadside trail consistent with the portion of the Humber Trail that runs along Glasgow Road as it crosses from the south side of the roadway to the north within the vicinity of Deer Valley Drive. In addition, the Humber Trail was also identified and has been marked as a recreational trail north and south of Glasgow Road.

Proposed

No future pedestrian facilities were identified within the study within the municipal or regional plans. However, plans for the Chickadee Grove Community include an internal sidewalk network. A 1.5 m concrete sidewalk is proposed on the south side of Glasgow Road, from the eastern limits of the study area to the intersection of Glasgow Road and the new Street ‘A’, approximately 155 m east of the Glasgow Road and Chickadee Lane intersection. Internal sidewalks on Chickadee Lane and Street ‘A” will provide connection to the sidewalk on Glasgow Road. In addition to the sidewalk, a trail is proposed on the north side of Glasgow Road, from the eastern limits of the study area to the eastern limits of the development, at the existing 2114 Glasgow Road driveway.

5.0 SUMMARY

This memo was prepared to review and summarize the traffic data as well as existing and proposed transportation facilities within the study area which includes Glasgow Road, from Chickadee Lane to Deer Valley Drive.

Based on the available background traffic data, as well as the expected additional vehicle trips from the proposed subdivision development, Glasgow Road is expected to experience the following daily traffic volumes:

- Glasgow Road, from Street 'A' to Deer Valley Drive;
    - 490 vehicles per day during 2022;
    - 510 vehicles per day during 2027, and
    - 530 vehicles per day during 2032.
- Glasgow Road, from Chickadee Lane to Street 'A';
    - 770 vehicles per day during 2022;
    - 790 vehicles per day during 2027, and
    - 810 vehicles per day during 2032.

Figure 4.0.1 illustrates the existing and planned transportation facilities within the study area.

Enclosed:

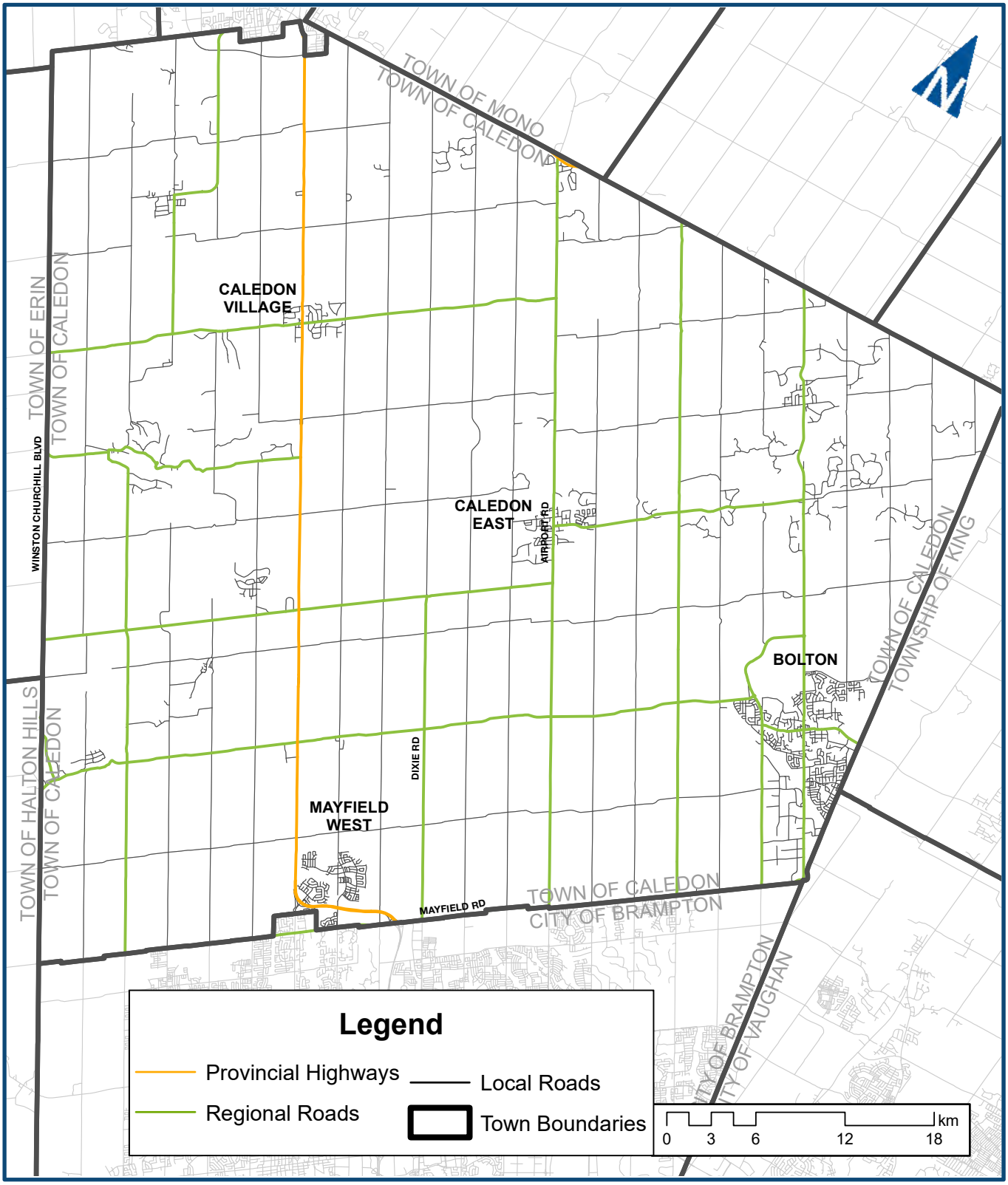
Attachment A – Town of Caledon Transportation Master Plan, October 2017 (19 Pages)

Attachment B – Bolton Transportation Master Plan, August 2015 (2 Pages)

Attachment C – Chickadee Grove Community Traffic Impact Study, GHD, August 25, 2021 (20 Pages)

Attachment D – Glasgow Road Safety Review – Final Report, R.J. Burnside & Associates Ltd., April 12, 2022 (16 Pages)

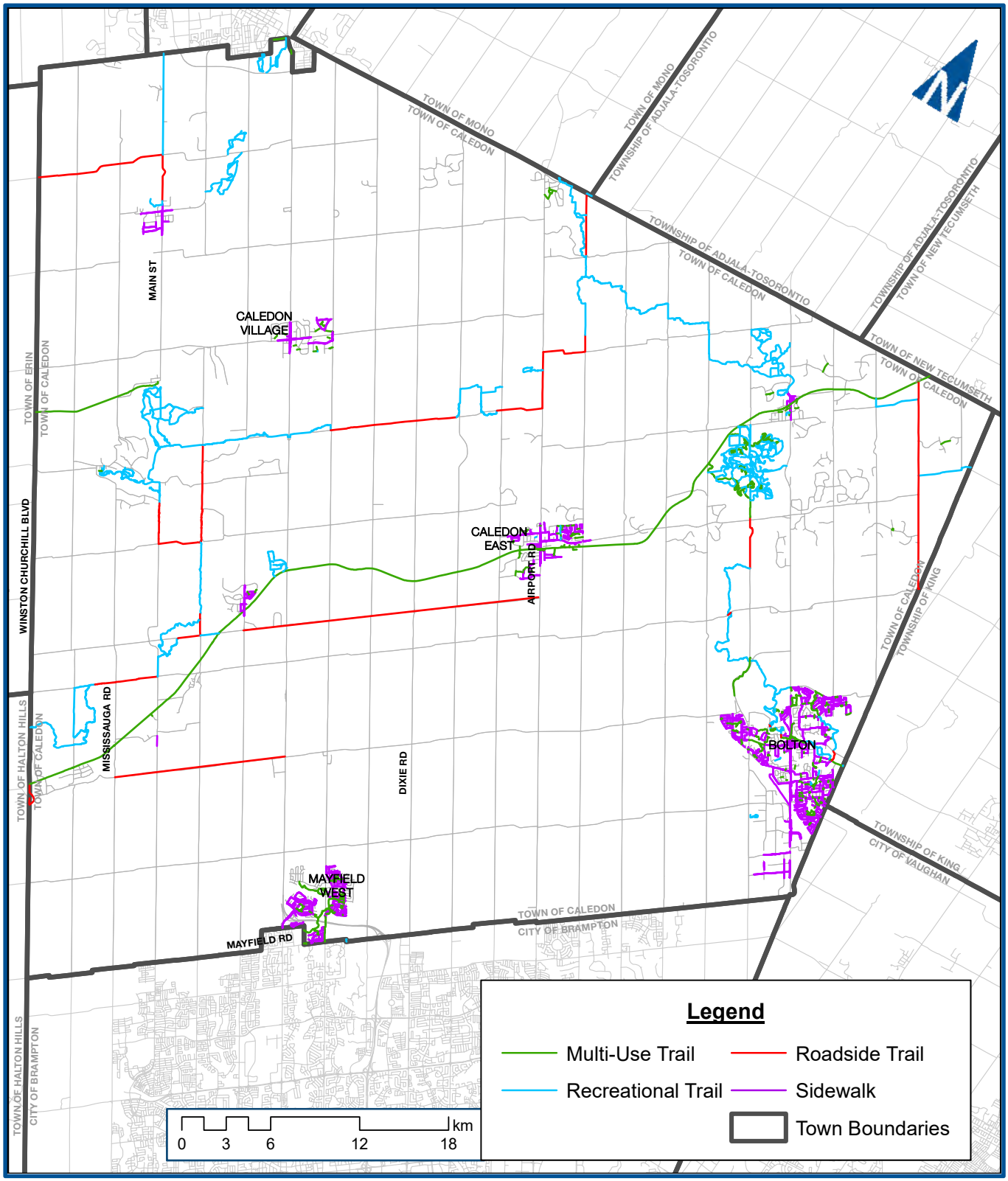
Attachment A – Town of Caledon Transportation Master Plan, October 2017 (19 Pages)



TOWN OF CALEDON

Transportation Master Plan Study Area

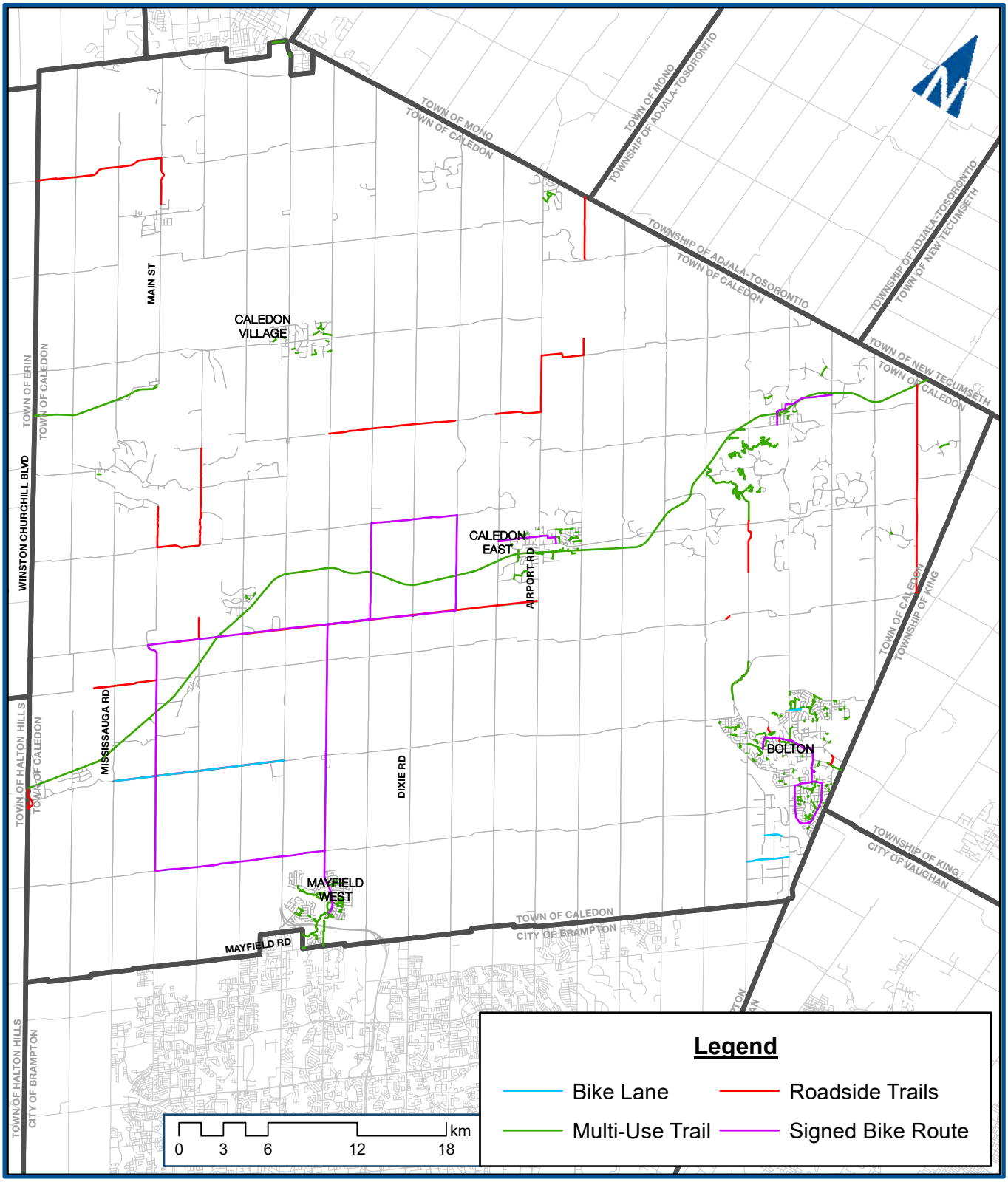
Figure 1.1



TOWN OF CALEDON

Existing Pedestrian Facilities

Figure 2.5



TOWN OF CALEDON

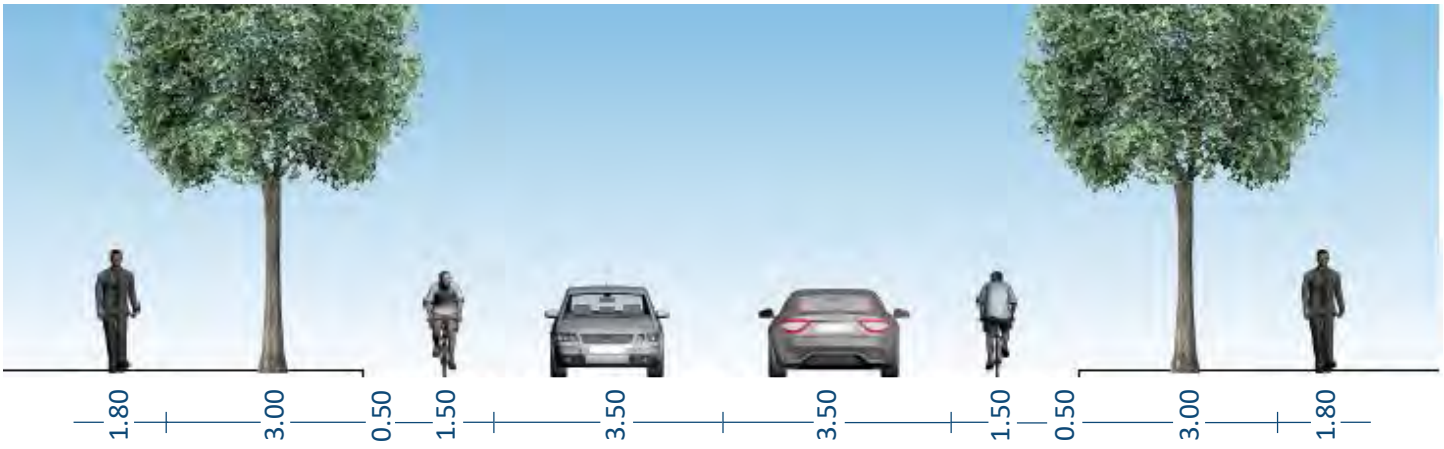
Existing Cycling Facilities

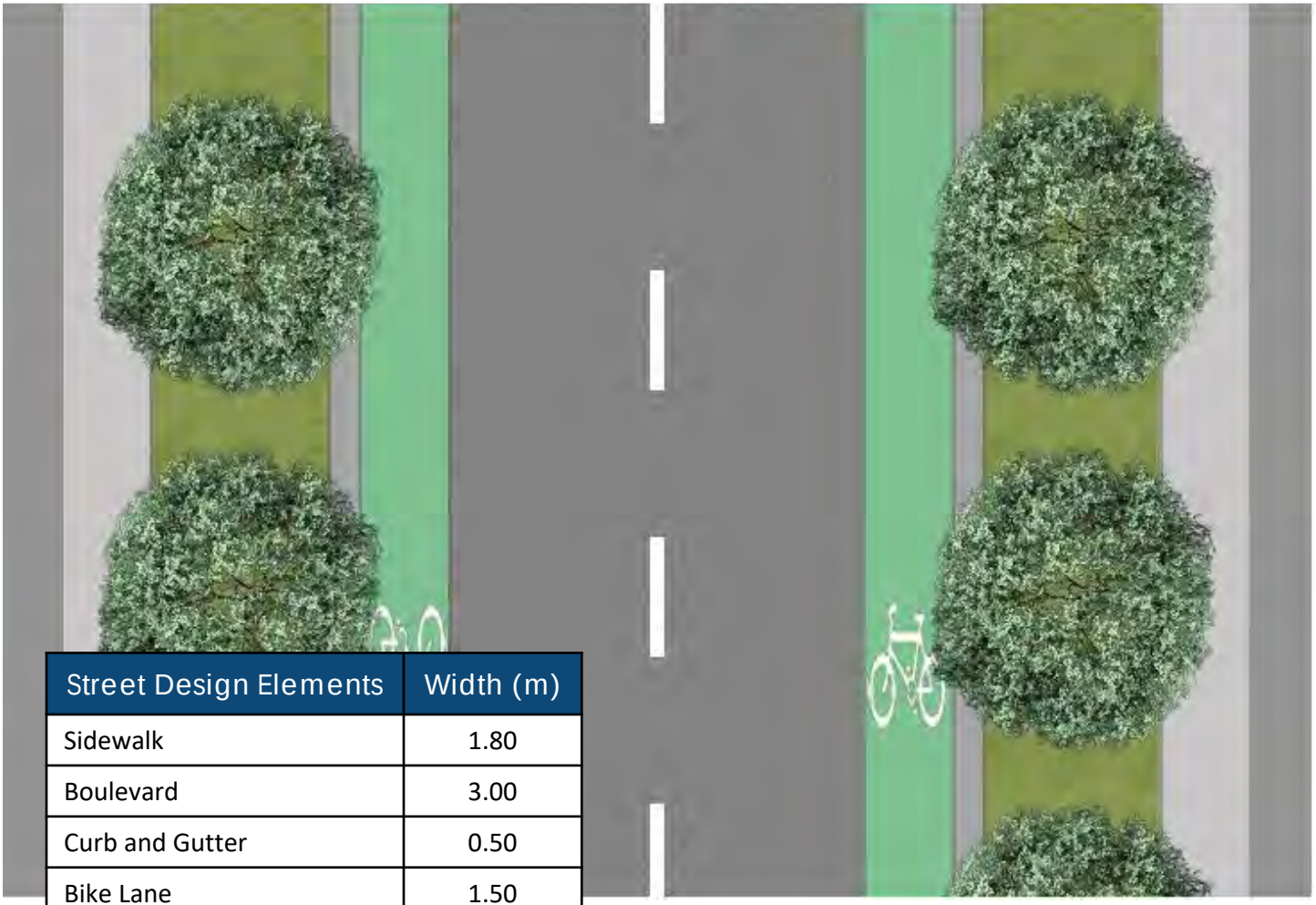
Figure 2.6

TABLE 4.4: ROAD CHARACTERIZATION MATRIX

Street Type	Land Use Designation	Through Lanes	Right of Way [m]	Desired Operating Speed [km/h]	Transit Role	Area for Pedestrians and Other Facilities[1]	Bicycle Facilities	Drainage Conditions	Freight Role
Commercial Collector	Commercial	2 to 4	26 m	40 to 60 km/h	Moderate to Major	Location Specific - Desired 1.5 m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	Behind the Curb where Design Speeds Exceed 50 km/h Otherwise On-Street	Curb and Gutter	Local Deliveries
Residential Collector	Low, Medium, High Density and Special Residential, Institutional	2 to 4	20 to 30 m	40 to 60 km/h	Moderate to Major	Desired 1.5 m Minimum Sidewalk + Furnishing/Planting Zone + Splash Strip + Utility Zone	1) For New Construction or Reconstruction accommodated in a 3 m Off-Street Multi-Use Trail 2) In Transitional Situations provide 1.5 m Striped On-Street Bicycle Lanes	Curb and Gutter	Local Deliveries
Local	Any Designation	2	17 to 20 m	30 to 40 km/h	Limited to Designated Stops	Desired 1.5 m Minimum Sidewalk	Sharing the Road	Curb and Gutter or Rural Swale Depending on Adjacent Uses	Local Deliveries

[1] In the case of new construction or reconstruction, where multiuse paths are proposed, the multiuse path will take the place of the sidewalk.



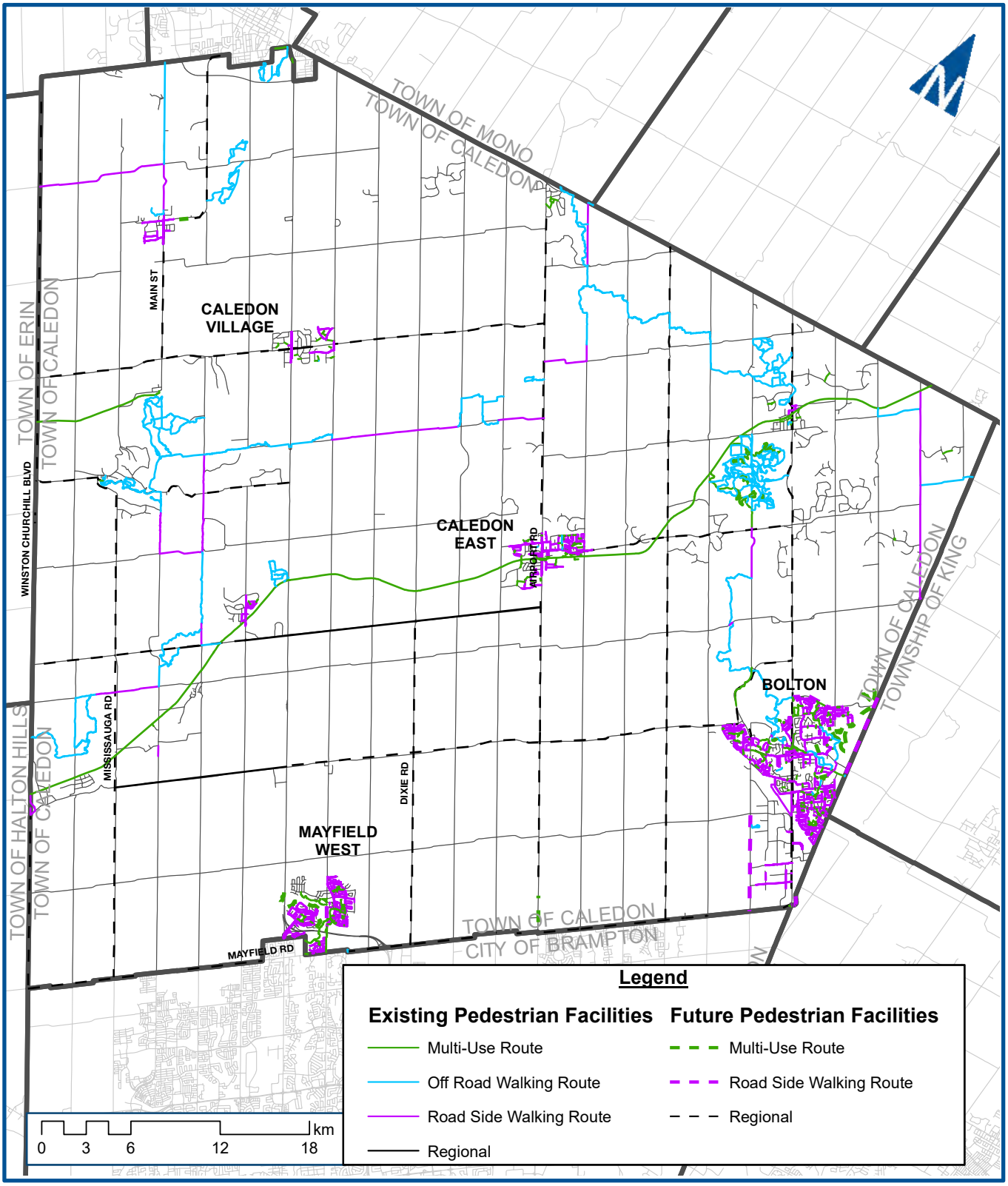


Street Design Elements	Width (m)
Sidewalk	1.80
Boulevard	3.00
Curb and Gutter	0.50
Bike Lane	1.50
General Purpose Lane	3.50

TOWN OF CALEDON

Local
Typical Cross-Section

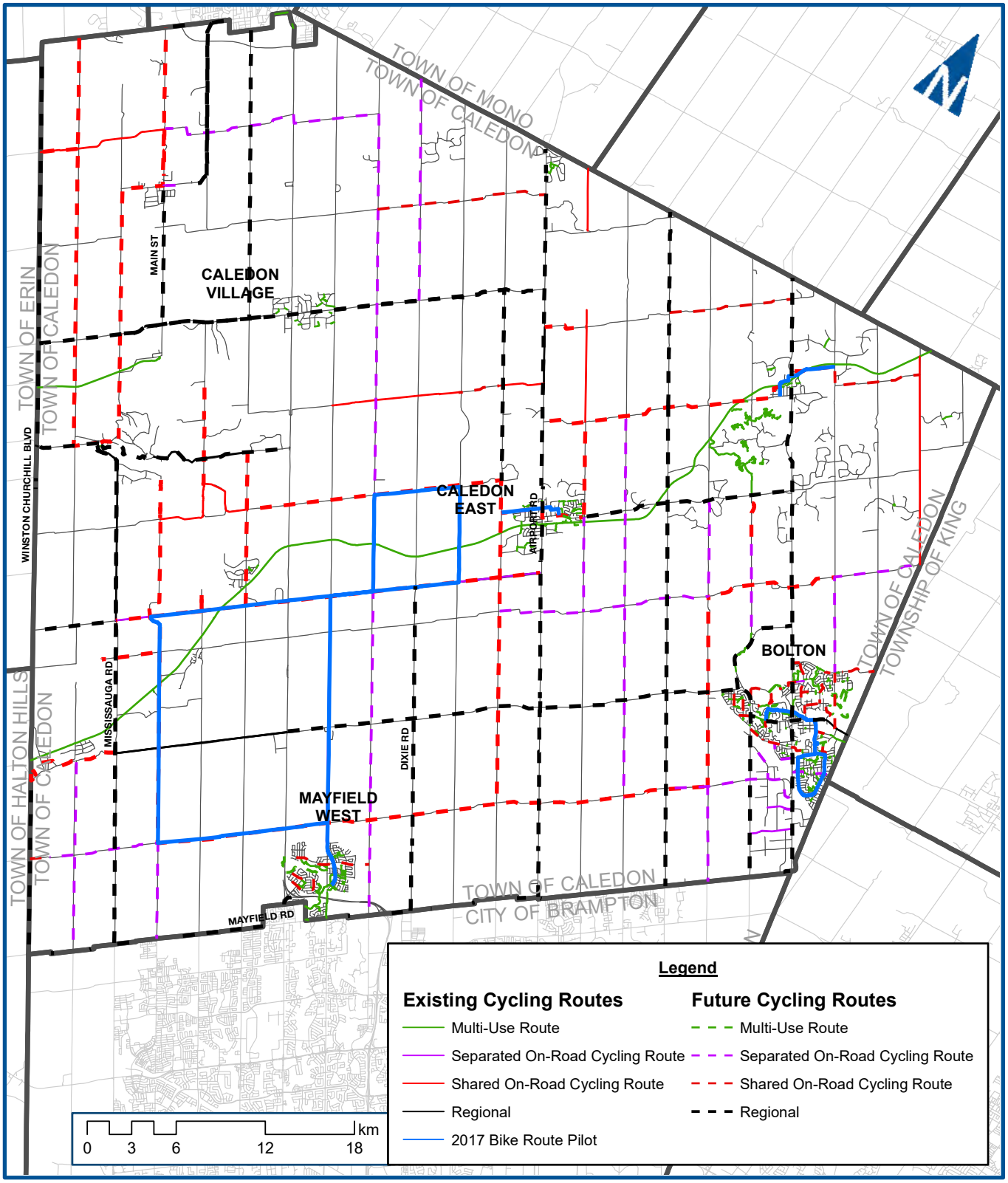
Figure 4.5



TOWN OF CALEDON

Recommended Pedestrian Network

Figure 4.6



TOWN OF CALEDON

Recommended Cycling Network

Figure 4.7

Caledon Transportation Master Plan

TABLE 4.5: PEDESTRIAN AND CYCLING ROUTE DESIGN GUIDELINES AND SPECIFICATIONS

Facility Type (Source)		Context		Width		Signs + Markings
		Urban	Rural	Desired	Minimum	
A. Multi-Use Route						
A1. Multi-Use Trail[b,c]				4.0m	3.0m	S1
A2. Separated Bicycle + Pedestrian Pathway[c]				4.0m (2.0m x 2)	3.0m (1.5m x 2)	S2
B. Roadside Walking Route						
B1. Sidewalk[a]				1.8m – 2.0m[1]	1.8m	--
B2. Sidewalk + Boulevard				Same as B1 + 2.5m boulevard	Same as B1 + 1.5m boulevard	--
B3. Roadside Trail[a,b]				3.0m Wider where high user volumes anticipated		S5
B4. Wide Shoulder[b]				1.8m	1.5m[2]	--
C. Off-Road Walking Route						
C1. Pedestrian Pathway[a]				3.0m	1.5m	--
C2. Recreational Trail[a]				3.0m	2.7m[3]	--
D. Separated On-Road Cycling Route						
D1. Conventional Bike Lane[a,b,c]				1.8m+	1.5m	S4, P1
D2. Buffered Bike Lane[c]				1.8m lane + 1.2m buffer	1.5m lane + 0.5m buffer	S4, S5, P1
D3. Cycletrack[c]	1-way			2.0m	1.5m	S4, S5, P1
	2-way			4.0m	3.0m	
D4. Paved Shoulder[b,c]	≤ 4,500 AADT			1.5m	1.2m	S3
	> 4,500 AADT			2.0m		
E. Shared On-Road Cycling Route						
E1. Shared Use[c]				4.5m	4.3m side-by-side < 4.3m single file[4]	S3, S6, S7, P2
E2. Bicycle Boulevard[c,d]				n/a		S3
E3. Signed Bike Route[b,c]	≤ 4,500 AADT			1.5m	1.2m	S3
	> 4,500 AADT			2.0 m		
E4. Urban Shoulder[c,d]				1.8m+	1.5m	S3

Notes:

[1] Current Town road standards specify only 1.5m sidewalk for most standard cross-sections
[2] Caledon Trails Master Plan currently specifies 1.2m minimum and 1.5m desirable shoulder width
[3] Current Town road standard no.222 specifies 0.5 – 1.0m
[4] Shared Use widths exceed minimum widths recommended in OTM Book 18 to provide for enhanced cyclist experience

Signs

S1. Shared Pathway Sign

OTM RB-71
300 x 450

S2. Pathway Organization Sign

OTM RB-72a
300 x 450

OTM RB-72b
300 x 450

S3. Bicycle Route Marker Sign

OTM M511
450 x 450

S4. Reserved Bicycle Lane Signs

TAC RB-90
600 x 750

TAC RB-91
600 x 750

TAC RB-92
600 x 750

S5. Turning Vehicles Yield to Bicycles Sign

TAC RB-37
600 x 750

S6. Share the Road Sign

OTM WC-19
600 x 600

OTM WC-19t
300 x 600

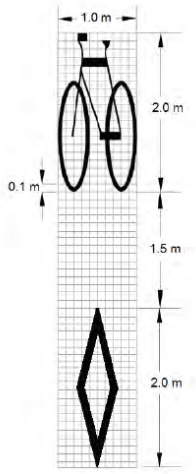
S7. Shared Use Lane Single File Sign

OTM WC-24
600 x 600

OTM WC-24t
300 x 600

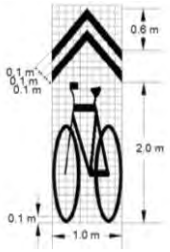
Pavement Markings

P1. Bicycle Lane Pavement Markings



TAC, Table 7-1

P2. "Sharrow" Pavement Marking



TAC, Section 7.4.3

Additional Design Considerations

Bicycle-Motorist Conflict Zones

Pavement markings may be applied to provide guidance to cyclists and motorists in conflict zones (e.g. offset intersections). The measures available for marking a bicycle facility through a conflict zone, in increasing order of visibility are:

- Bike stencils or chevrons at 1.5 m to 10 m spacing (with optional directional arrows to clarify cyclist trajectories);
- "Sharrows" at 1.5 m to 15 m spacing
- Dashed guide lines (with optional bike stencils or chevrons but not sharrows)
- Green surface treatment; or
- Dashed guide lines (with optional bike stencils or chevrons but not sharrows) and green surface treatment.

Refer to OTM Book 18, Section 5.4 for additional guidance on cyclist-motorist conflict treatments.

Additional signage alerting motorists to the presence of a pedestrian and/or cyclist crossing may be applied in conflict zones. The Pedestrian and Bicycle Crossing Ahead sign Wc-15 (OTM) should be placed on the roadway at the approach to an in-boulevard facility. The right or left version of the sign should be used as appropriate such that the pedestrian and bicycle symbols are oriented towards the centre of the road. The Crossing tab sign Wc-32t (OTM), must be attached below Wc-15 (OTM) to convey the meaning of the sign.

Wc-15 (OTM)
(600 mm x 600 mm)

Wc-32t (OTM)
(300 mm x 600 mm)

Trail Surface Treatment

Trail surface treatment will depend on the type of trail, user volume and surround context. Treatment options are as follows:

- Asphalt and/or concrete paving;
- Impressed and coloured paving;
- Granular surfacing;
- Wood mulch surfacing; or
- Natural earthen surfaces.

Refer to Caledon Trails Master Plan, Section 6.12 (pg. 57) for additional guidance on trail surfacing.

TABLE 5.3: POTENTIAL ACTIVE TRANSPORTATION NETWORK IMPROVEMENTS

No.	Road	From	To
Signed Cycling Routes – 2017 Pilot			
1	Kennedy Road	Etobicoke Creek Trail	Olde Base Line Road
2	St. Andrews Road	Olde Base Line Road	The Grange Side Road
3	The Grange Side Road	St. Andrews Road	Heart Lake Road
4	Heart Lake Road	The Grange Side Road	Olde Base Line Road
5	Creditview Road	Olde Base Line Road	Old School Road
6	Old School Road	Creditview Road	Kennedy Road
7	Walkers Road West	Mountainview Road	Marilyn Street
8	Marilyn Street	Walkers Road West	Miles Drive
9	Miles Drive	Marilyn Street	Marilyn Street
10	Marilyn Street	Miles Drive	Old Church Road
11	Brawton Drive	Patterson Side Road	Wallace Ave
12	Wallace Ave	Brawton Drive	Church street
13	Church Street	Wallace Ave	Highway 50
14	Pine Ave	Highway 50	Mount Hope Road
15	Deer Valley Drive	King Street West	Pathway
16	Pathway	Deer Valley Drive	Hickman Street
17	Hickman Street	Pathway	Highway 50
18	Humber Lea Road	Humber Valley Heritage Trail	King Street East
19	Old King Road	King Street East	Bond Street
20	Bond Street	Old King Road	Trail

BACKGROUND SUMMARY

ACTIVE TRANSPORTATION NETWORK

Caledon Transportation Master Plan
Town of Caledon, ON

Prepared for: **Town of Caledon**

Prepared by: **Boulevard Transportation, a division of Watt Consulting Group**

Our File: **1880**

Date: **February 06 2016**

GREAT!
transportation solutions for communities

APPENDIX A

PEDESTRIAN NETWORK MAP

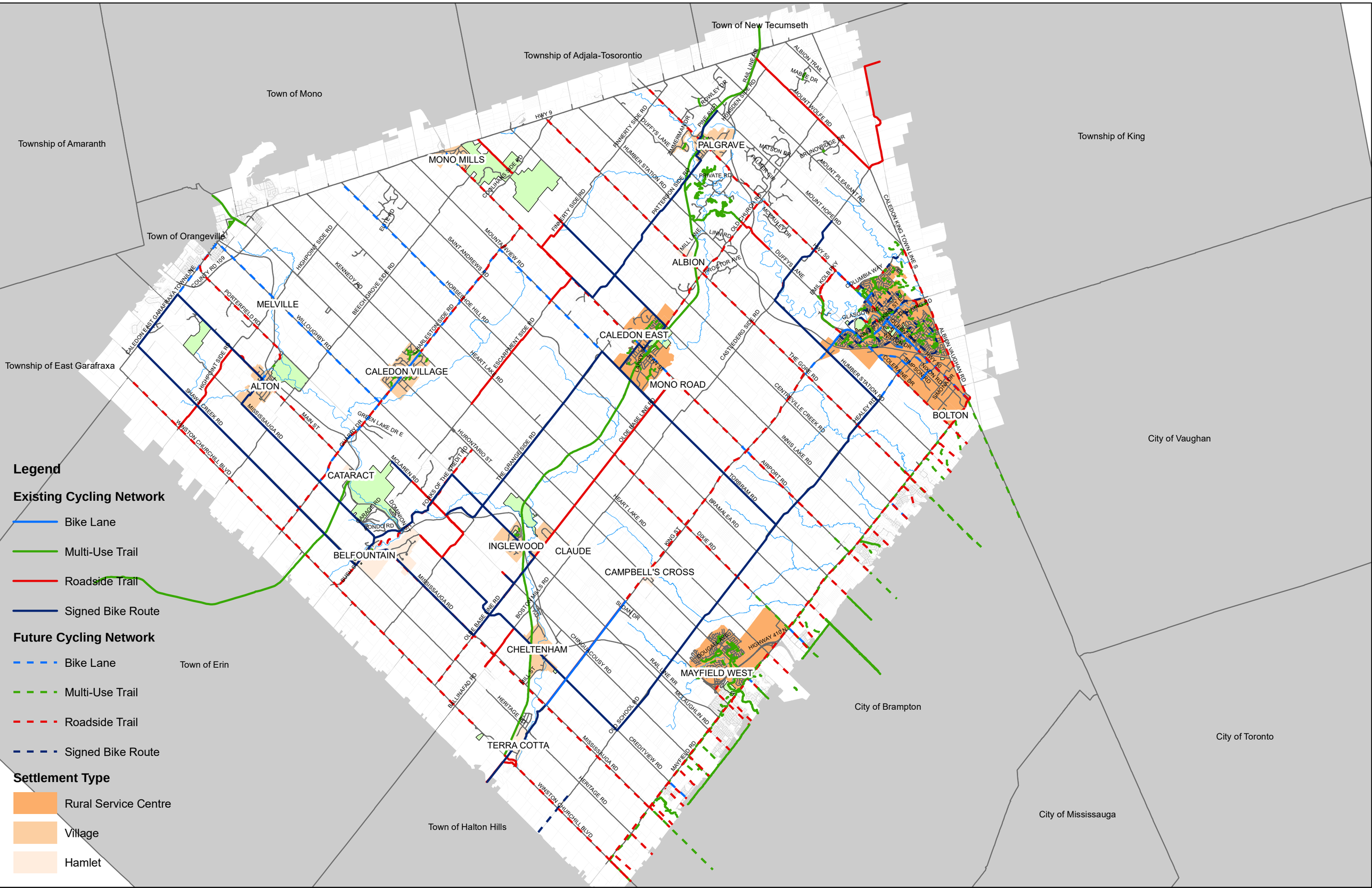
Boulevard
TRANSPORTATION
a division of Watt Consulting Group


Town of New Tecumseth
Township of Adjala-Tosorontio
Town of Mono
Township of Amaranth
Township of King
Town of Orangeville
Township of East Garafraxa
City of Vaughan
Town of Erin
City of Brampton
City of Toronto
City of Mississauga
Town of Halton Hills
MONO MILLS
PALGRAVE
MELVILLE
ALBION
CALEDON EAST
CALEDON VILLAGE
ALTON
MONO ROAD
BOLTON
CATARACT
BELFOUNTAIN
INGLEWOOD
CLAUDE
CAMPBELL'S CROSS
CHELTENHAM
MAYFIELD WEST
TERRA COTTA
Legend
Existing Pedestrian Network
Multi-Use Trail
Recreational Trail
Roadside Trail
Sidewalk
Future Pedestrian Network
Multi-Use Trail
Roadside Trail
Sidewalk
Settlement Type
Hamlet
Rural Service Centre
Village

APPENDIX B

CYCLING NETWORK MAP

Boulevard
TRANSPORTATION
a division of Watt Consulting Group


Town of New Tecumseth
Township of Adjala-Tosorontio
Town of Mono
Township of Amaranth
Township of King
Town of Orangeville
Township of East Garafraxa
City of Vaughan
Town of Erin
City of Brampton
City of Toronto
Town of Halton Hills
City of Mississauga
MONO MILLS
PALGRAVE
ALBION
MELVILLE
CALEDON EAST
CALEDON VILLAGE
ALTON
MONO ROAD
BOLTON
CATARACT
BELFOUNTAIN
INGLEWOOD
CLAUDE
CAMPBELL'S CROSS
CHELTENHAM
MAYFIELD WEST
TERRA COTTA
HWY 9
HWY 50
HIGHWAY 410 N
Legend
Existing Cycling Network
Bike Lane
Multi-Use Trail
Roadside Trail
Signed Bike Route
Future Cycling Network
Bike Lane
Multi-Use Trail
Roadside Trail
Signed Bike Route
Settlement Type
Rural Service Centre
Village
Hamlet

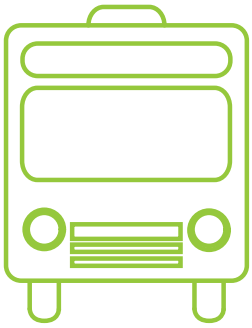
Appendix H – Cycling Route Summary

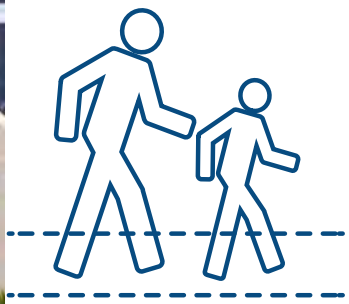
	Road	From	To	AADT/ Peak Hour Volume	Posted Speed	Truck %	Grade	Prime Users/ Purpose	Connectivity	Type of Recommended AT Facilities	Source	Other Location Description
1	Queens Gate Boulevard	Highway 50	Albion Vaughan Road	7088	50 km/h	Medium	Flat	Mixed	Major Routes	Separated On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
2	Healey Road	The Gore Road	Highway 50	6033	60 km/h 50 km/h W of Coleraine	High	Flat	Mixed	Major Routes Residential	Separated On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
3	Holland Drive	Coleraine Drive	Healey Road	3828	50 km/h	High	Flat	Mixed	Major Routes	Separated On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
4	Wilton Drive	Ellwood Drive West	Highway 50	3170	40 km/h	Medium	Flat	Mixed	Major Routes Residential	Separated On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
5	Lands Bridge Street Sant Farm Drive	Allan Drive	Allan Drive/Riverwood Terrace	2885	40 km/h	Low	Flat	Mixed	Schools Parks Major Routes Residential	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
6	Harvest Moon Drive	King Street	Emil Kolb Parkway	3655	40 km/h	Low	Flat	Mixed	Parks Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
7	Cedar Grove Road	Harvest Moon Drive	Harvest Moon Drive	1176	40 km/h	Low	Flat	Mixed	Parks Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
8	Derose Avenue	Chickadee Lane	Derose Avenue	Low	40 km/h	Low	Flat	Mixed	Parks Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
9	Glasgow Road Deer Valley Drive Station Road	Chickadee Lane	Ellwood Drive West	990	40 km/h	Low	Hilly	Mixed	Parks Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
10	Ellwood Drive West Ellwood Drive East Allan Drive	Coleraine Drive	Sant Farm Drive	2342	40 km/h	Low	Flat	Mixed	Schools Parks Major Routes Residential	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
11	Allan Drive	Highway 50	Ellwood Drive East	2459	40 km/h	Low	Flat	Mixed	Schools Transit Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton

	Road	From	To	AADT/ Peak Hour Volume	Posted Speed	Truck %	Grade	Prime Users/ Purpose	Connectivity	Type of Recommended AT Facilities	Source	Other Location Description
12	Hickman Street	Bruce Trail	Highway 50	1001	40 km/h	Low	Flat	Mixed	Parks Trails Residential Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
13	English Rose Lane Cross Country Boulevard Bolton Heights Road	Bruce Trail	Kingsview Drive	1846	40 km/h	Low	Flat	Mixed	Parks Trails Schools Major Routes	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
14	Taylorwood Avenue	Taylorwood Avenue	Taylorwood Avenue	555	40 km/h	Low	Flat	Recreational	Trails	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
15	Kingsview Drive Silver Valley Drive Evans Ridge	Columbia Way	King Street East	2345	40 km/h	Low	Flat	Mixed	Schools Parks Major Routes Residential	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
16	Kingsview Drive	Longwood Drive	Kingsview Drive/Silvermoon Drive	2469	40 km/h	Low	Flat	Mixed	Schools Trails	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
17	Humber Lea Road	Kingsview Drive	King Street East	5531	40 km/h	Low	Flat	Mixed	Schools Parks Major Routes Residential	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
18	Old Kings Road Bond Street	King Street East	Sunkist Valley Road	693	40 km/h	Low	Flat	Mixed	Major Routes Parks Trails	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
19	Strawberry Hill Court	Bruce Trail	Allan Drive	905	40 km/h	Low	Flat	Mixed	Major Routes Trails	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
20	Old Kings Road	Bond Street	Deer Hollow Court	765	40 km/h	Low	Flat	Recreational	Trails Parks	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
21	Columbia Way	Forest Gate Avenue	Caledon King Townline South	4017	60 km/h	Low	Flat	Mixed	Major Routes Trails	Shared On-Road Cycling Route	Bolton Transportation Master Plan	Bolton
22	Horeshoe Hill Road	Highway 9	Charleston Side Road	702	70 km/h	Low	Mixed	Mixed	Major Routes Bike Networks	Separated On-Road Cycling Route	Caledon Trails Plan	Bolton

	Road	From	To	AADT/ Peak Hour Volume	Posted Speed	Truck %	Grade	Prime Users/ Purpose	Connectivity	Type of Recommended AT Facilities	Source	Other Location Description
77	Centreville Creek Road	Patterson Side Road	Healey Road	576	60 km/h N of King 80 km/h	Low	Mixed	Mixed	Major Routes Trails	Separated On-Road Cycling Route	Mayor	Rural
78	Duffy's Lane	Between Old Church Road and Castlederg Side Road	Emil Kolb Parkway	437	60 km/h	Low	Mixed	Mixed	Connection to Bolton Major Routes Trails	Separated On-Road Cycling Route	Watt Consulting Group	Rural
79	N/A	Trail connecting to English Rose Lane	Glasgow Road	N/A	N/A	N/A	Mixed	Recreational	Connection from trail to Glasgow Road Filling gap	Multi-Use Route	Watt Consulting Group	Bolton
80	Chickadee Lane	Glasgow Road	Derose Avenue	Low	40 km/h	Low	Flat	Mixed	Filling gaps Mahor Routes	Shared On-Road Cycling Route	Watt Consulting Group	Bolton
81	Humber Station Road	Old Church Road	Castlederg Side Road	887	70 km/h	Low	Hilly	Mixed	Fill gaps Major Routes	Shared On-Road Cycling Route	Mayor	Rural

Attachment B – Bolton Transportation Master Plan, August 2015 (2 Pages)





EXECUTIVE SUMMARY FOR

THE BOLTON TRANSPORTATION MASTER PLAN STUDY

AUGUST 2015

MMM GROUP

D16-14-012

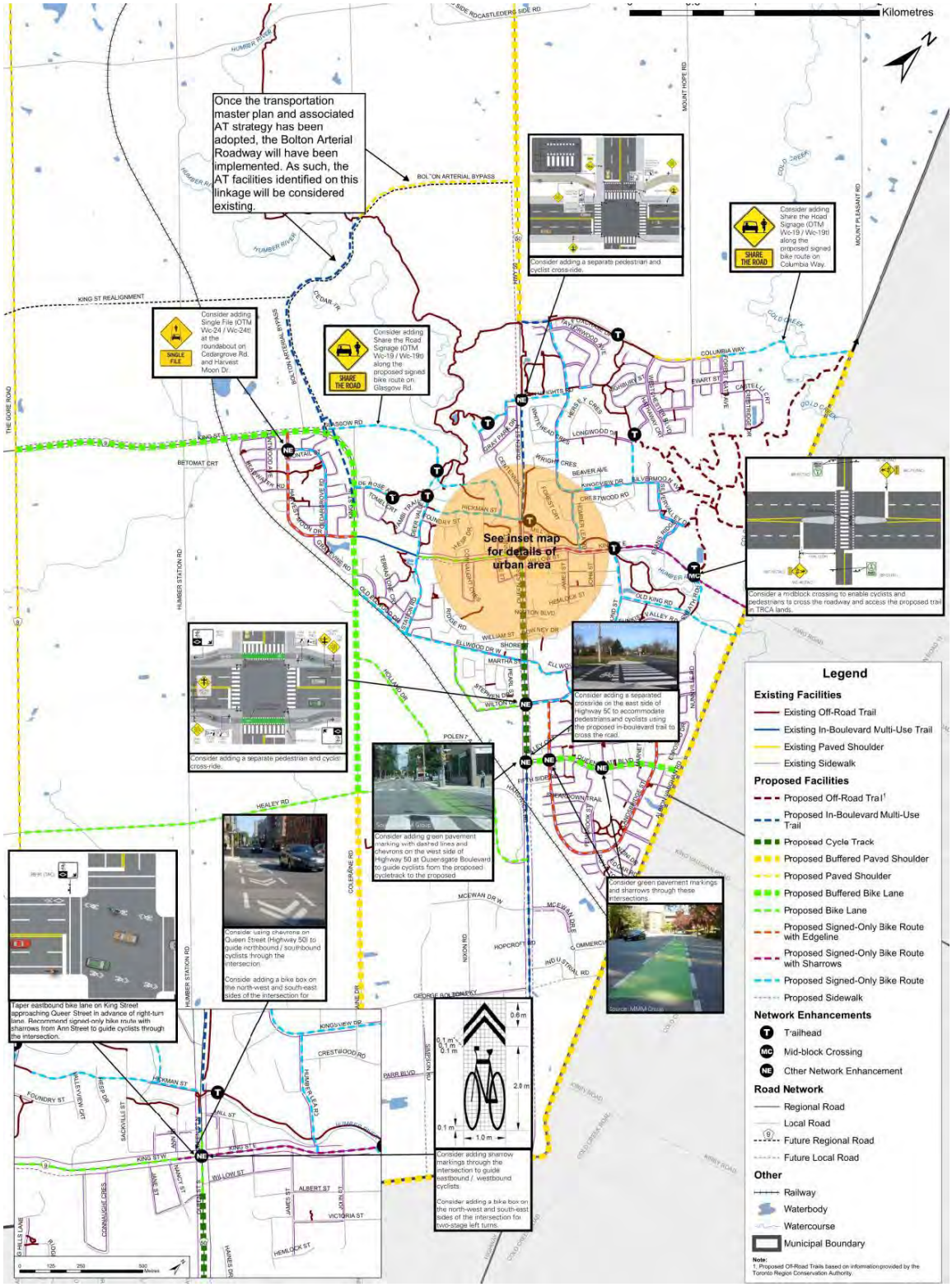


Figure 18: Proposed Active Transportation Facility Types & Network Enhancements

Attachment C – Chickadee Grove Community Traffic Impact Study, GHD, August 25, 2021

(20 Pages)

Traffic Impact Study

Chickadee Grove Community

Town of Caledon

GHD | 6705 Millcreek Drive Mississauga Ontario L5N 5M4 Canada

800 | Report No 3 | August 25, 2021

Executive Summary

GHD is please to provide this updated Traffic Impact Study for the proposed residential development located on the east and west side of Chickadee Lane in the community of Bolton, in the Town of Caledon. This update is in response to comments received from the Town on the first submission, a copy of these comments is included in Appendix A. Consistent with the original report, this update determines the site related traffic and the subsequent traffic-related impacts on the adjacent road network during the weekday a.m. and p.m. peak hours from the proposed development. These impacts are based on projected future background traffic and road network conditions derived for a 2031 planning horizon.

Proposed Site Characteristics

The proposed site plan prepared by Humphries Planning Group Inc., dated August 20, 2021 consists of 151 residential townhouse units and 1 single family detached residential unit.

New Site Traffic

The total subject development is estimated to generate a total of 77 two-way trips during the a.m. peak hour consisting of 17 inbound and 60 outbound trips and a total of 86 two-way trips during the p.m. peak hour consisting of 55 inbound and 31 outbound trips.

Future Intersection Operating Characteristics

Based on the results of the capacity analysis, the subject development is expected to have a negligible impact on intersection operations at Chickadee Lane and De Rose Avenue. Emil Kolb Parkway and De Rose Avenue will experience some issues with the westbound left-turn lane which can be mitigated with the signalization of the intersection.

A signal warrant was completed for the intersection of Emil Kolb Parkway and De Rose Avenue which determined that traffic signals are not warranted under the 2031 total traffic scenario. It is recommended that the Region continue to monitor this intersection and that traffic signals be installed by the Region when the warrants are satisfied.

We trust that this satisfies your requirements, but do not hesitate to contact the undersigned if you have any questions.

Sincerely,

GHD

William Maria, P.Eng.
Transportation Planning Lead

Table of Contents

Figure Index

Table Index

1. Introduction

1.1 Retainer and Objective

GHD was retained to prepare a Traffic Impact Study (TIS) for the proposed residential development located on the east and west side of Chickadee Lane in the community of Bolton, in the Town of Caledon, to determine the following:

- Establish baseline traffic conditions for the study area and update the existing traffic conditions to derive the future background operating conditions for the study intersections at a future 2031 planning horizon; and
- Determine the traffic volumes anticipated to be generated by the proposed development during the weekday a.m. and p.m. peak hours; to assess the impact of this traffic on the study intersections and if needed, to recommend improvements to accommodate the forecasted traffic volumes.

Figure 1 Site Location

1.2 Study Team

The GHD team involved in the preparation of the study are

- William Maria, P.Eng., Senior Project Manager
- Adam Mildenberger, B.A., C.E.T., Transportation Planner

2. Site Characteristics

2.1 Study Area

The study area includes the following intersections:

- Emil Kolb Parkway at De Rose Avenue; and
- Chickadee Lane at De Rose Avenue

2.2 Site Plan

The proposed site plan prepared by Humphries Planning Group Inc., dated August 20, 2021 consists of 151 residential townhouse units, and 1 single family detached residential unit.

The proposed site plan is shown in **Figure 2**.

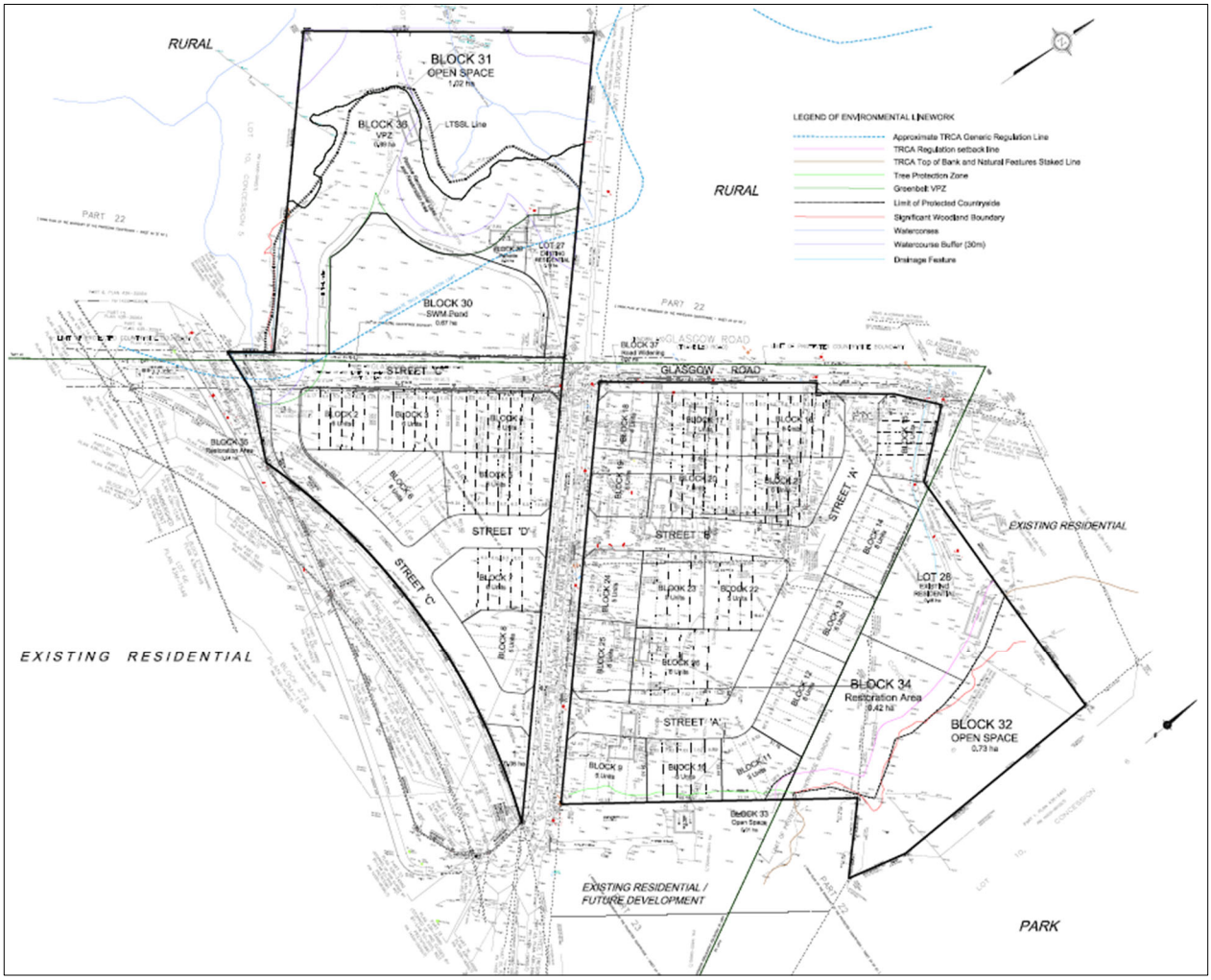


Figure 2 Site Plan

3. Existing Conditions

3.1 Existing Road Network

Emil Kolb Parkway is an arterial road with a posted speed limit of 60 km/h and a four-lane cross-section through the study area. The road is oriented north-south. It has a southbound auxiliary left-turn lane and a northbound auxiliary right-turn lane at the connecting road to Chickadee Lane.

Chickadee Lane is a minor two-lane collector road with a posted speed limit of 40 km/h. The road is oriented north-south and connects De Rose Avenue in the south to Glasgow Road to the north.

De Rose Avenue is a short section of road connecting Emil Kolb Parkway with Chickadee Lane. It is a four-lane road with auxiliary left and right turn at its intersection with Emil Kolb Parkway and Chickadee Lane.

3.2 Existing Traffic Data

GHD collected a.m. and p.m. peak hour turning movement counts at the study area intersections. These counts are included in **Appendix B**.

Figure 4 summarizes the adopted existing traffic volumes during the weekday a.m. and p.m. peak hours.

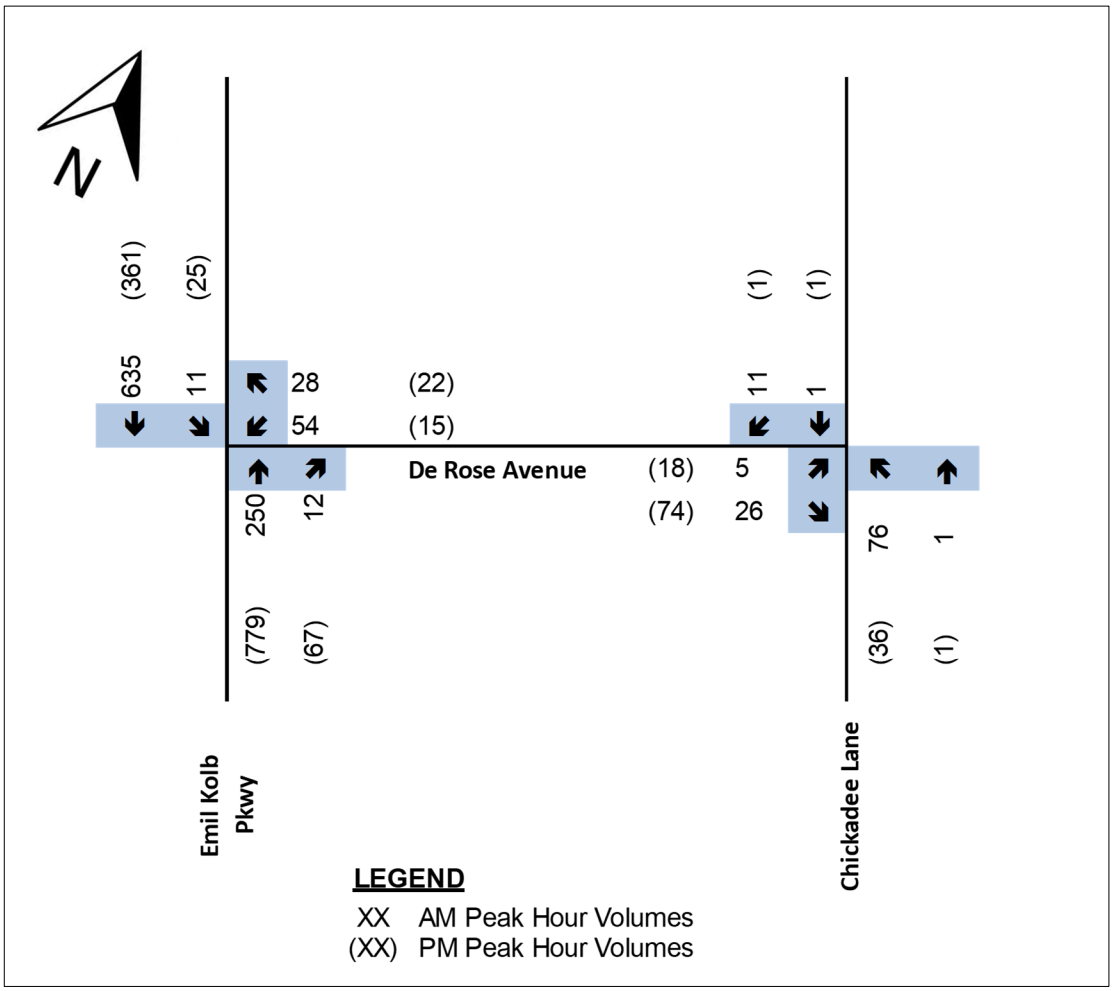


Figure 3 2017 Existing Traffic Volumes

4. Future Background Conditions

4.1 Background Growth

A planning horizon of 2031 was selected to be consistent with the Bolton Residential Expansion Study completed by Paradigm Transportation Solutions Ltd. which was used to establish future background traffic volumes for the unsignalized intersection of Emil Kolb Parkway and the De Rose Avenue. The p.m. northbound and southbound through movements of the 2031 future total volumes along Emil Kolb Parkway were used for the p.m. future background volumes. Since the

study did not include data for the a.m. peak hour, the future background volumes for the a.m. peak hour were derived by using the same percentage growth calculated for the p.m. between the 2017 and 2031 future background volumes in the Bolton Residential Expansion Study. The growth percentage of the p.m. southbound Emil Kolb Parkway through movement was 9%, and the northbound movement was 7%. These percentages were applied to opposite directions in the a.m. peak hour to reflect existing traffic patterns.

For the unsignalized intersection of Chickadee Lane and the De Rose Avenue, the 2031 future background volumes remained the same as the 2017 existing traffic volumes. The volumes at this intersection could only have an origin/destination within the surrounding residential area, and currently the surrounding areas are fully built-out with no plans for future development besides the subject site. As a result, no growth in future background traffic is expected.

4.2 Future Background Traffic

The 2031 future background traffic volumes are presented in **Figure 4**.

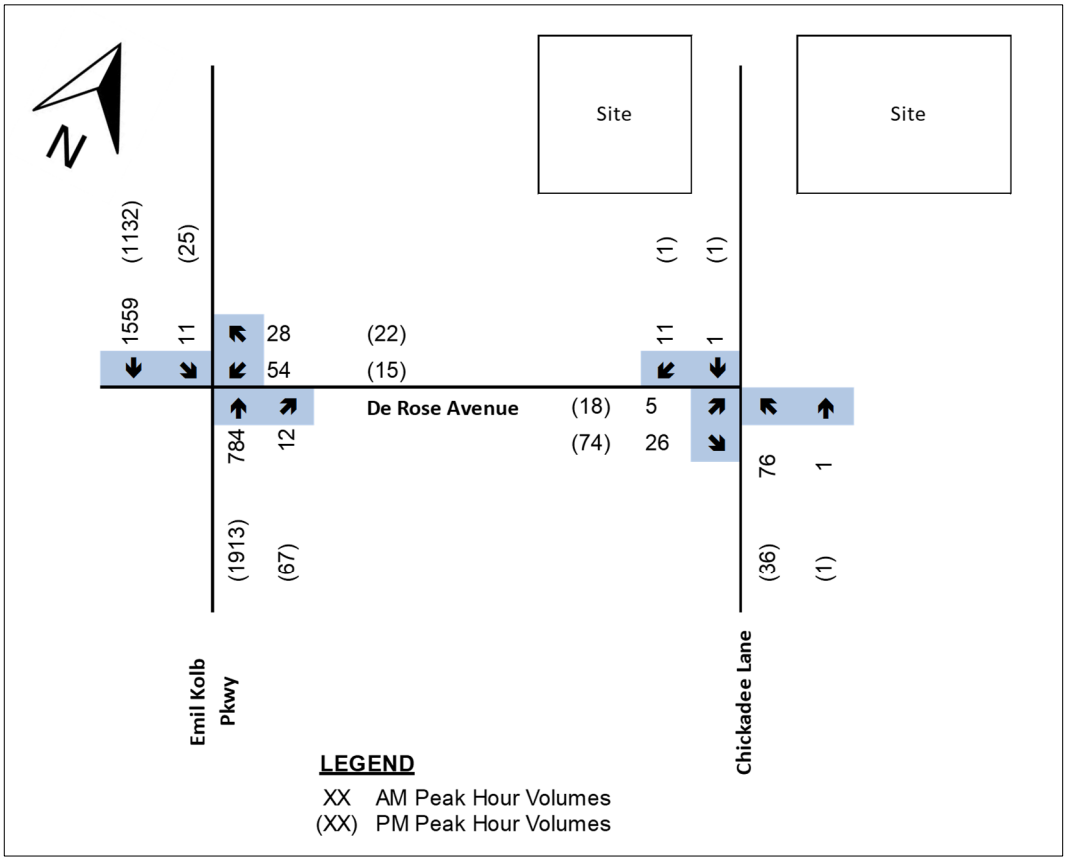


Figure 4 2031 Future Background Traffic Volumes

5. Site Generated Traffic

5.1 Site Trip Generation

Trip generation during the weekday peak hours for the proposed residential development was estimated using the Institute of Transportation Engineer's (ITE) 10th Edition Land Use Code (LUC) #230 for residential condominium/townhouses, as presented in **Table 1**. A comparison of the fitted curve equations and average rates resulted in greater trip generation for the fitted curve equation; therefore, the fitted curve equation was applied as a conservative measure.

Table 1 Site Trip Generation

Land Use Code	Units	Parameters	Peak Hour Trip Generation					
			Weekday AM			Weekday PM		
			In	Out	Total	In	Out	Total
Residential Townhouse (LUC 230)	151	Trip Rate	0.106	0.364	0.470	0.358	0.205	0.563
		Trip Ratio	23%	77%	-	63%	37%	-
		New Trips	16	55	71	54	31	85
Single Family Detached (LUC 210)	1	Trip Rate	1.000	5.000	6.000	1.00	1.00	2.00
		Trip Ratio	25%	75%	-	63%	37%	-
		New Trips	1	5	6	1	0	4
New Trips			16	60	77	55	31	86

The total subject development is estimated to generate a total of 77 two-way trips during the a.m. peak hour consisting of 17 inbound and 60 outbound trips and a total of 86 two-way trips during the p.m. peak hour consisting of 55 inbound and 31 outbound trips.

5.2 Site Trip Distribution and Assignment

Trips generated by the proposed development were distributed to the roadway system based on the existing traffic patterns and the available road network.

A review of existing traffic flows in the area (see Figure 4) confirmed that from the approximately 135 existing residential units along De Rose Avenue, Tomel Crescent and Bowes Crescent located south of the subject site, only one inbound and one outbound vehicle was observed during both the a.m. and p.m. peak hours heading north on Chickadee Lane and using Glasgow Road to exit the subdivision onto King Street West or Highway 50. It is therefore evident that Glasgow Road is currently not an attractive alternative for residents exiting the subdivision over using Emil Kolb Parkway and therefore no site traffic from the subject site was assigned to Glasgow Road.

The directional trip distributions for site traffic are summarized in Table 2.

Table 2 Site Trip Distribution

Trip Orientation	A.M. Peak		P.M. Peak	
	In	Out	In	Out
North on Emil Kolb Parkway	50%	30%	30%	60%
South on Emil Kolb Parkway	50%	70%	70%	40%
Total	100%	100%	100%	100%

The estimated site trips generated by the proposed development, as assigned to the nearby road network for the weekday a.m. and p.m. peak hours, is shown in **Figure 5**.

Figure 5 Site Generated Trips

6. Future Total Traffic

The future total traffic conditions for the peak study hours was derived by combining the projected future background traffic with the corresponding estimate of the total site generated traffic.

Figure 6 summarizes the future total traffic volumes at the 2031 planning horizon during the weekday a.m. and p.m. peak hours.

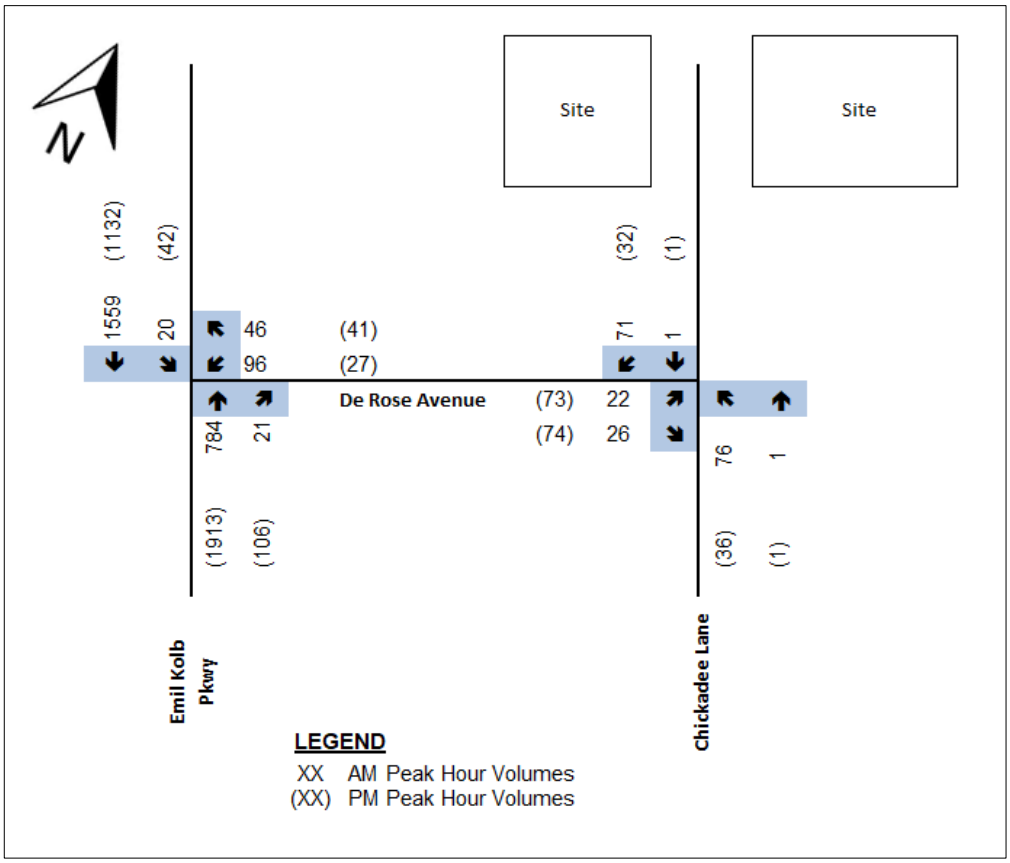


Figure 6 2031 Future Total Traffic Volumes

7. Intersection Capacity Analysis

The capacity analysis identifies how well the intersections and driveways are operating. The analysis contained within this report utilized the Highway Capacity Manual (HCM) 2000 procedure within the Synchro Version 10 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement. Queuing characteristics are reported as the predicted 95th percentile queue for each turning movement.

The following analysis includes identification of conditions at signalized intersections where:

- Volume/capacity (v/c) ratios for through movements or shared through/turning movements increased to 0.85 or above;
- V/c ratios for exclusive movements increased to 0.90 or above; or
- 95th percentile queues for an individual movement are projected to exceed available turning lane storage.

The analysis includes identification of conditions at unsignalized intersections where:

- Level of service if LOS "D" or greater; or
- 95th percentile queues for an individual movement are projected to exceed available turning lane storage.

The following tables summarize the HCM capacity results for the study intersections during the weekday a.m. and p.m. hours under existing 2017, future background 2031 and future total 2031 traffic conditions. The detailed calculation sheets are provided in **Appendix C**.

7.1 Emil Kolb Parkway at De Rose Avenue

Unsignalized and proposed signalized capacity analyses for this intersection during the weekday a.m. and p.m. peak hours are summarized in **Table 3**.

Table 3 Capacity Analyses for Emil Kolb Parkway at De Rose Avenue

Traffic Condition	Movement v/c (LOS) 95th Percentile Queue	
	AM Peak Hour	PM Peak Hour
Existing 2017	WBL: 0.13 (B) <1 veh WBR: 0.03 (A) <1 veh SBL: 0.38 (A) <1 veh	WBL: 0.08 (C) <1 veh WBR: 0.04 (B) <1 veh SBL: 0.03 (A) <1 veh
Future Background 2031	WBL: 0.59 (F) 20 m WBR: 0.05 (B) <1 veh SBL: 0.01 (A) <1 veh	WBL: **0.97** (F) 18 m WBR: 0.10 (C) <1 veh SBL: 0.10 (C) <1 veh
Future Total 2031	WBL: **1.1** (F) 210 WBR: 0.08 (B) 12 SBL: 0.02 (A) 10	WBL: **1.96** (F) 995 WBR: 0.18 (C) 23 SBL: 0.17 (C) 22
Future Total 2031 (Signalized)	**Overall: 0.55 (A) 10** WBL: 0.24 (C) 30 WBR: 0.03 (C) 28 NBT: 0.33 (A) 6 NBR: 0.01 (A) 5 SBL: 0.05 (A) 5 SBT: 0.66 (A) 10	**Overall: 0.64 (B) 12** WBL: 0.07 (C) 28 WBR: 0.08 (C) 28 NBT: 0.83 (B) 14 NBR: 0.07 (A) 5 SBL: 0.53 (C) 29 SBT: 0.49 (A) 8

Under the future background traffic conditions in 2031, this intersection is expected to have acceptable operational characteristics, with ample reserve capacity, acceptable levels of delay and no queueing issues during the weekday a.m. peak hour. During the p.m. peak hour, the westbound left-turn movement is expected to be over capacity. All other movements are expected to operate satisfactorily during the p.m. peak hour.

Under 2031 future total conditions with the added site traffic, the intersection continues to operate very similarly to the future background conditions, with any increase in v/c ratios, level of service, and queueing noticeable. The westbound left-turn lane is expected to continue to operate over capacity in both the a.m. and p.m. peak hours. However, these issues are expected to be mitigated with the signalization of the intersection.

There are no geometric improvements recommended at this intersection in response to the site traffic generated from the subject development.

7.2 Chickadee Lane at De Rose Avenue

Unsignalized capacity analyses for this intersection during the weekday a.m. and p.m. peak hours are summarized in **Table 4**.

Table 4 Capacity Analyses for Chickadee Lane at De Rose Avenue

Traffic Condition	Movement v/c (LOS) 95th Percentile Queue	
	AM Peak Hour	PM Peak Hour
Existing 2017	EBL: 0.00 (A) <1 veh NBLT: 0.10 (A) <1 veh SBTR: 0.01 (A) <1 veh	EBL: 0.01 (A) <1 veh NBLT: 0.05 (A) <1 veh SBTR: 0.00 (A) <1 veh
Future Background 2031	EBL: 0.00 (A) <1 veh NBLT: 0.10 (A) <1 veh SBTR: 0.01 (A) <1 veh	EBL: 0.01 (A) <1 veh NBLT: 0.05 (A) <1 veh SBTR: 0.00 (A) <1 veh
Future Total 2031	EBL: 0.02 (A) 7 NBTL: 0.13 (B) 10 SBTR: 0.08 (A) 9	EBL: 0.05 (A) 7 NBTL: 0.06 (B) 11 SBTR: 0.04 (A) 8

Under 2031 future background conditions there was no corridor growth at the unsignalized intersection, therefore there was no change to the operation of the intersection.

Under 2031 future total conditions with the added site traffic, the intersection continues to operate very similarly to the future background conditions, with any increase in v/c ratios, level of service, and queueing considered negligible. Any impacts from the proposed site traffic are not expected to be identifiable from the driver's perspective.

There are no geometric improvements recommended at this intersection in response to the site traffic generated from the subject development.

8. Signal Warrant Analysis

GHD completed a signal warrant analysis for the intersection of Emil Kolb Parkway and De Rose Way according to the Ontario Traffic Manual Book 12 (Justification 7 for Projected Volumes). The results of the signal warrant for the 2031 future total traffic planning horizon is attached in **Appendix D**.

According to the signal warrant calculations, neither Justification 1 – Minimum Vehicle Volume or Justification 2 – Delay to Cross Traffic meet the necessary compliance percentage to justify the installation of traffic signals at this intersection under future traffic conditions.

9. Functional Design Study

GHD has undertaken a functional design study to ensure the proposed road network meets the Town's design standards. As per the Town's *Development Standards, Policies and Guidelines* (2009), "*Roadway geometric design will be in accordance with the Town of Caledon Geometric Design Standards and Road Sections as outlined in Town Standard Drawings*."[1]

The Town's Geometric Design Standards are provided in Figure 7 below for reference throughout this section.

TABLE 3.3
TOWN OF CALEDON
GEOMETRIC ROAD DESIGN STANDARDS

	ADT	Posted Speed (km/h)	Hor. Curve Rad. (m)	Vert. Curve (Min. k)		Road Grade		Grade at Intersections		R.O.W Width (m)	Pav't Width (m)	Inter-section Angle	Cul-de-sac	
				Sag	Crest	Max. (%)	Min. (%)	Stop	Through				Radius Pav (m)	Max Grade
Local Residential	<1000	50	90	12	8	6.0%	0.75%	2.0%	3.0%	18	7.9	85->95	15	3.0%
Local Industrial	<1000	50	115	18	15	4.0%	0.75%	2.0%	3.0%	22.5	10.4	85->95	20	3.0%
Residential Collector	1000 to 3000	60	130	18	15	6.0%	0.75%	2.0%	3.0%	20	8.9	85->95	N/A	N/A
Industrial Collector	1000 to 3000	70	190	25	25	6.0%	0.75%	2.0%	3.0%	26	13.9	85->95	N/A	N/A
Arterial	> 6000	80	250	30	35	6.0%	0.75%	2.0%	3.0%	30	7.0-15.0	85->95	N/A	N/A

Figure 7: Town's Geometric Design Standards

9.1 Right-of-way (ROW) Width

The Town's right-of-way width for local residential roads (<1000 ADT) is 18 metres. The site's proposed roads (Streets A, B, C and D) are to have 18.0 metre ROWs, except for a portion of Street

[1] Development Standards, Policies and Guidelines, 2009, p.58

‘C’ which is proposed to have a 16 metre ROW due to property limitations associated with the adjacent curved Emil Kolb Parkway ROW.

This section of Street ‘C’ will provide direct access to only 8 residential townhouse units for a short portion of its east side, with its primary function being a secondary road connection between Street’s ‘A’, ‘D’ and ‘C’ on the west side of Chickadee Lane. The proposed subdivision layout results in a very nominal level of ADT (average daily traffic) expected to use Street ‘C’ with really only traffic generated from the aforementioned 8 units expected to use this section.

This Section of Street ‘C’ is to be referred to as a “Local Window Street’ as per the Town’s Road Section of the same name (Standard No. 201), which permits a 16.0 metre ROW. The cross-section elements proposed to be included (i.e. sidewalks, boulevard, travel lanes, etc.) are expected to be consistent with the Town’s cross-section drawing.

Chickadee Lane is currently a collector road with a ROW of approximately 20 metres, which is consistent with the Town’s standards.

9.2 Posted Speed

Although the Town’s standard for posted speed limit on local residential roads is 50 km/h, Chickadee Lane is currently posted at 40 km/h. Therefore it is recommended this posted speed limit be maintained and also be applied to the proposed local residential streets internal to the site.

9.3 Horizontal Curves

Noticeable horizontal curves are proposed on Street ‘C’ and Street ‘A’, however the curved portions of the roadway will be designed in accordance with Standard Drawing No. 214 for “Local Residential Road Elbow Design” which includes a centerline radius of approximately 14 metres.

9.4 Vertical Curves

The vertical grades of the proposed local residential roads are designed to not fall outsides of the Town’s standard range (0.75% to 6.0%).

9.5 Road Grades

The intersection approach grades of the proposed intersections are designed to not exceed the Town’s standards of 2.0% for stop-controlled approaches and 3.0% for free flow approaches.

9.6 Intersection Angles

The intersection angles of the proposed intersections are generally designed to not fall outside of the Town’s standard ranges (85 to 95 degrees). However, the centerline intersection angle of Street ‘B’ at Street ‘A’ is measured at 70 degrees. This is not considered a significant issue for the following reasons:

- The peak hour volumes turning at this intersection are expected to be negligible. Motorists residing on Street ‘A’ are expected to travel directly to either Chickadee Lane or Glasgow Road,

and not utilize Street ‘B’, and furthermore motorists residing on Street ‘B’ are expected to travel directly to Chickadee Lane.

- With an intersecting centerline angle of 70 degrees, this intersection is classified as a “right-angled” intersection as per the TAC Geometric Design Guide (70 to 110 degrees) and is considered an acceptable intersection type.
- If the Town is concerned with this proposed intersection alignment, the Town may recommended all-way stop control for this intersection. Such a control will mitigate any visibility and/or safety concerns potentially attributable to the oblique intersection configuration.

9.7 Cross-Sections

The proposed cross-section for the 16.0 metre ROW will be consistent with the Town’s Standard No. 201, which includes an 8.5 metre roadway, 7.9 metre pavement, one travel lane per direction, and sidewalk on one side of the roadway. The sidewalk will be constructed on the east side of Street ‘C’ fronting the proposed units, with no sidewalk on the west side required for pedestrian connectivity.

The proposed cross-section for the 18.0 metre ROW will be consistent with the Town’s Standard No. 202, which includes an 8.5 metre roadway, 7.9 metre pavement, one travel lane per direction, and sidewalks on both sides of the roadway.

The proposed cross-section for the 20.0 metre ROW on Chickadee Lane will be consistent with the Town’s Standard No. 203, which includes a 9.3 metre roadway, 8.7 metre pavement, one travel lane per direction, and sidewalks on both sides of the roadway.

The noted cross-sections are appended.

9.8 Traffic Calming

Traffic calming measures are not warranted for the following reasons:

- Based on the existing and proposed road network, significant traffic infiltration through the proposed subdivision is not expected;
- The proposed road network does not include any long lineal tangent road lengths that could potentially result in aggressive driving behavior;
- As per the Town’s standards, “Traffic calming designs should not be required on roads that carry local traffic only with less than 500 ADT”;
- As per the Town’s standards, “Traffic calming will not be supported on roadways that do not have more than 200 metres of uncontrolled length;” and
- The proposed combination of short tangent lengths and multiple horizontal curves together act as a suitable form of traffic calming.

9.9 Intersection Control

The following intersections are proposed:

- Street ‘C’ / Glasgow Road at Chickadee Lane;
- Street ‘D’ / Street ‘B’ at Chickadee Lane;
- Street ‘A’ at Street ‘B’;
- Street ‘C’ / Street ‘A’ at Chickadee Lane; and
- Street ‘A’ at Glasgow Road.

9.9.1 All-way Stop Control

As per the Ontario Ministry of Transportation’s (MTO) Ontario Traffic Manual (OTM) Book 5 Regulatory Signs, an all-way stop is warranted when:

- Total vehicle volume on all intersection approaches exceeds 350 for the highest hour recorded; and
- Volume split does not exceed 75/25 for three-way control or 65/35 for four-way control. Volume is defined at vehicles only.

As per the forecasted 2031 future total volumes on Chickadee Road presented in this report, the a.m. and p.m. peak hour volumes are expected to very low (76 vehicles southbound and 20 vehicles northbound during the a.m. peak hour; 29 vehicles southbound and 73 vehicles northbound during the p.m. peak hour) compared to the aforementioned 350 vehicle threshold as per OTM.

Of these peak hour volumes on Chickadee Lane, the majority of volumes are expected to be vehicles generated from the subject site, thus being inbound and outbound volumes from the proposed intersecting roads on Chickadee Lane, with the small remainder expected to be background volumes (through movements) on Chickadee Lane travelling through the site. This is evident in reviewing the trip figures presented in this report (i.e. Future Background Volumes, Site Trips, and Future Total Volumes).

It is therefore strongly expected that peak hour volumes at the site intersections on Chickadee Lane and on Glasgow Road will not exceed the required 350 vehicle threshold as required for an all-way stop to be warranted.

9.9.2 Traffic Signals

Furthermore, the volume thresholds are much higher for traffic signals as per OTM Book 12 Traffic Signals, and consequently traffic signals are not expected to be warranted at the site intersections on Chickadee Lane and on Glasgow Road.

9.9.3 Roundabouts

As per the Town’s standards, “intersections meeting warrants for signalization or all-way stop control MUST first be analyzed for the intersection of a roundabout prior to proceeding with intersection control.” As a result of all-way stops or signals not being warranted, roundabouts are not recommended.

10. Active Transportation

Sidewalks are proposed on both sides of all internal roads with the exception of Street C which contains a sidewalk on the east side only. The proposed sidewalks will provide residents with direct connections to the existing Multi-use Trail on Emil Kolb Parkway.

A potential Trail system is also proposed that travels along Glasgow Road, around the SWM Pond and down Chickadee Lane and De Rose Avenue to connect to the Multi-use Trail on Emil Kolb Parkway.

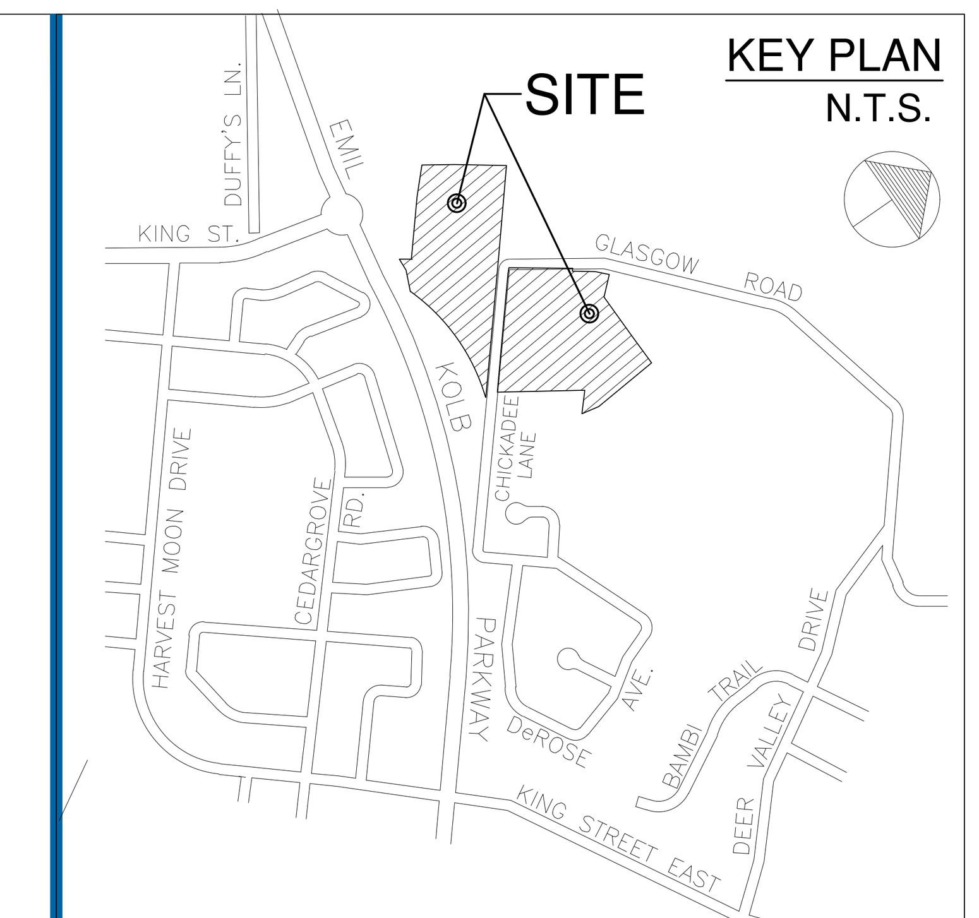
11. Conclusions and Recommendations

The proposed site plan prepared by Humphries Planning Group Inc., dated August 20, 2021 consists of 1451 residential townhouse units, and 1 single family detached residential unit.

The total subject development is estimated to generate a total of 77 two-way trips during the a.m. peak hour consisting of 17 inbound and 60 outbound trips and a total of 86 two-way trips during the p.m. peak hour consisting of 55 inbound and 31 outbound trips.

Based on the results of the capacity analysis, the subject development is expected to have a negligible impact on intersection operations at Chickadee Lane and De Rose Avenue. The intersection of Emil Kolb Parkway and De Rose Avenue will experience some issues with the westbound left-turn lane, but these issues can be mitigated with the signalization of the intersection once signal warrants are satisfied.

KEY PLAN
N.T.S.



LEGEND:

- LIMIT OF SUBDIVISION
- LONG TERM STABLE SLOPE LINE
- TRCA GENERIC REGULATION LINE
- TRCA TOP OF BANK & NATURAL FEATURES STAKED LINE
- WATERCOURSE BUFFER (30m)
- WATERCOURSE
- 73 ON-STREET PARKING SPACES

No.	Revision	Drawn	Job Manager	Project Director	Date
A	For Review	D.D.	W.M.	W.M.	10/14/21

Drawing Revisions
Note: * indicates signatures on original issue of drawing or last revision of drawing

GHD Inc.
Conditions of Use. This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.

TOWN OF CALEDON

GHD
6705 Millcreek Drive, Unit 1
Mississauga Ontario L5N 5M4
T 1 416 213 7121 F 1 416 890 8499
E ytomail@ghd.com W www.ghd.com

Client **Candevcon Limited**

Project **Zancor Homes (Bolton) Ltd**
Chickadee Lane

Title **On Street Parking Plan**

Scale	1:1000	DO NOT SCALE
Drawn	D.D.	
Designer	D.D.	
Drafting Check	W.M.	
Design Check	W.M.	
Approved (Project Director)	W.M.	
Date	Oct. 14, 2021	

This Drawing must not be used for Construction unless signed as Approved

Drawing No. **OS-101**
Original Size **Arch D**
Rev. **A**

Plot Date: 14 October 2021 - 2:38 PM Plotted by: Devindra Dharry Cad File No: C:\Users\ddharry\Documents\GHD\Cheekadee\2021-10-14\W17003-G1-DRIVEWAY.dwg

Attachment D – Glasgow Road Safety Review – Final Report, R.J. Burnside & Associates Ltd.,

April 12, 2022 (16 Pages)

R.J. Burnside & Associates Limited 6990 Creditview Road, Unit 2 Mississauga ON L5N 8R9 CANADA
telephone (905) 821-1800 **fax** (519) 941-8120 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Technical Memorandum

Road Safety Review – Final Report

Date:	April 12, 2022	**Project No.:**	300051505.0000
Project Name:	Glasgow Road Safety Review		
Client Name:	Town of Caledon		
Submitted To:	Arash Olia, Ph.D., P.Eng., Manager of Transportation Engineering		
Submitted By:	Nansen Feng, E.I.T. – Transportation Planner		
Reviewed By:	Gordon Hui, E.I.T. – Senior Transportation Planner and Ray Bacquie, P.Eng. – Senior Vice President		

1.0 Introduction

Road safety and operational needs commonly result from poor roadway geometry and/or traffic conditions that are not adequately supported by roadway conditions. These issues can be identified through analysis of collision data and through site observations by staff, the public and other stakeholders. Concerns have been raised by the public related to the operations of Glasgow Road between Hickman Street and Deer Valley Drive in the Town of Caledon (Town) that relate to the narrow road width, sight distance constraints and shared space between road users (vehicles, pedestrians and cyclist).

Glasgow Road between Hickman Street and Deer Valley Drive is a narrow local road, approximately 6.1 to 6.7 metres wide, sufficient for two-directional traffic, but below Town design standards. The road has no real defined shoulders and ditch drainage immediately adjacent to the road base in some locations. Traffic conflicts between directions are managed by a road centre line. Approximately 80 metres east of Deer Valley Drive, Glasgow Road has a one-lane bridge structure, crossing the Humber River, approximately 4 metres wide.

This safety review addresses opportunities to better manage the potential for traffic conflicts along Glasgow Road and particularly approaching and crossing the Humber River bridge. The Town of Caledon has requested this review to identify potential traffic control and traffic

management solutions that provide opportunities for improved safety. Geometric or road reconstruction improvements are beyond the scope of this study.

2.0 Safety Context and Scope of Work

2.1 Safety Context

In the road transportation environment, the probability of harm exists primarily from motor vehicle conflicts and collisions with other vehicles, cyclists and pedestrians. The three elements which comprise the transportation system are: the road user; the vehicle; and the road environment. Any or all of these elements can contribute to conflicts and collisions. Specifically, any of the following factors can influence the level of safety of roadway operations:

- Traffic exposure measured by volume and the degree interaction between road users,
- Impact of vehicle speeds on the ability of drivers to respond to conflicts and the severity of collisions,
- Human factors including road users' expectancy, perception and awareness,
- Design elements that affect road users' understanding of the rules of the road including which road user has the right of way at points of conflict, and
- Driver, cyclist and pedestrian behaviour.

2.2 Scope of Work

A road safety review or audit is a formal and independent safety performance review of an existing roadway. It addresses the safety of all road users. The main tasks of this study include:

- collect and analyze existing roadway conditions, including 5-year collision data, traffic data, geometrics, signage, sightlines, pavement markings and pavement conditions;
- identify safety issues, based on collision information, office investigation, field investigation and input by the Town of Caledon as the road authority; and
- identification of potential engineering countermeasures, evaluation and recommendation of appropriate traffic engineering countermeasures.

Road geometric solutions are beyond the scope of this assignment. Traffic engineering solutions may improve the awareness of road users to points of conflict and roadside hazards. It is recognized, however, that driver, cyclist and pedestrian behaviour cannot be fully influenced by traffic engineering treatments.

3.0 Data Analysis and Site Observations

A desk-top review of the site was conducted to assess road geometry and environment, traffic control and traffic volume data. A site visit was also conducted to observe road user operations on September 8, 2021. The following observations are identified below.

3.1 Traffic and Speed Data

Traffic count and speed data, collected in 2017 and 2021, was provided by the Town at two locations: 200m north of Hickman Street and 300m East of Deer Valley Drive. Based on the traffic data, the daily traffic volume on Glasgow Road is 397 vehicles for both directions on May 3, 2017 (pre-Covid 2019), with a northbound (westbound) volume of 173 and a southbound (eastbound) volume of 224 over 24-hour period. The original traffic data can be found in Attachment 1.

The average daily traffic volume is estimated to be 280-300 vehicles for both directions based on Town data. The 2021 speed data shows that the 85th percentile speed is 49 km/h for northbound (westbound) traffic and 52 km/h for southbound (eastbound) traffic.

3.2 Collision Data Analysis

There were three reported collisions on Glasgow Road between 2016 and 2021 based on the collision data provided by the Town. All three collisions were single-car accidents, and all three accidents were caused by running off road (one vehicle hit utility power pole). The original collision details report can be found in Attachment 2.

Consideration of investment in safety related improvements would usually be suggested for road segments with high collision rates per million vehicle kilometres (MVKM) per year. With the traffic volume data and the length of the corridor (0.81 kilometres), the collision rate is calculated to be (3 collisions ÷ 5 years ÷ 290 vehicles/day ÷ 365 days / 0.81 km) 7.0 collisions per million vehicle kilometers travelled per year. Very low volume roads, such as Glasgow Road, generally produce high crash rate. Despite the calculated collision rate, the nature of these collisions, geometric conditions and traffic characteristics have not resulted in collision trends that are unusually problematic. However, opportunities for safety improvements were considered based on the site observations as described in the following sections.

3.3 Site Observation

3.3.1 Pavement width and conditions

The site visit confirmed that the road has a minimum pavement width of 6.1 metres (20 ft) for the entire stretch between Hickman Street and Deer Valley Drive, while the typical width is about 6.5 metres – 6.7 metres (21 ft – 22 ft). The bridge over Humber River is 4.0-metre (13 ft) wide. The pavement condition includes minor lateral and alligator cracks in the western section of the study area and some longitudinal cracks in the eastern section of the corridor. The yellow centerline is clearly marked through the study area from Deer Valley Drive to Hickman Street, however, some of the pavement markings are faded as shown in the following **Figure 1**.

Figure 1: Clear Centreline and Faded "SLOW" Pavement Markings

The width of the pavement narrows as it approaches the bridge. On the east side of the bridge, the pavement narrows from 6.7 metres to 4.0 metres over approximately 10 metres of distance. On the west side of the bridge, the pavement narrows from 6.7 metres to 4.0 metres in 11 metres of distance. As shown in **Figure 2**. There is no yellow centre line for these sections on either approach of the bridge. In addition, the roadway parapet walls, and support structure are exposed without crash attenuation, as shown in **Figure 3**. While the assessment of appropriate end treatments for the bridge approach is beyond the scope of this study, further assessment may be undertaken in future studies.

Figure 2: Pavement Width and Pavement Marking at the Bridge

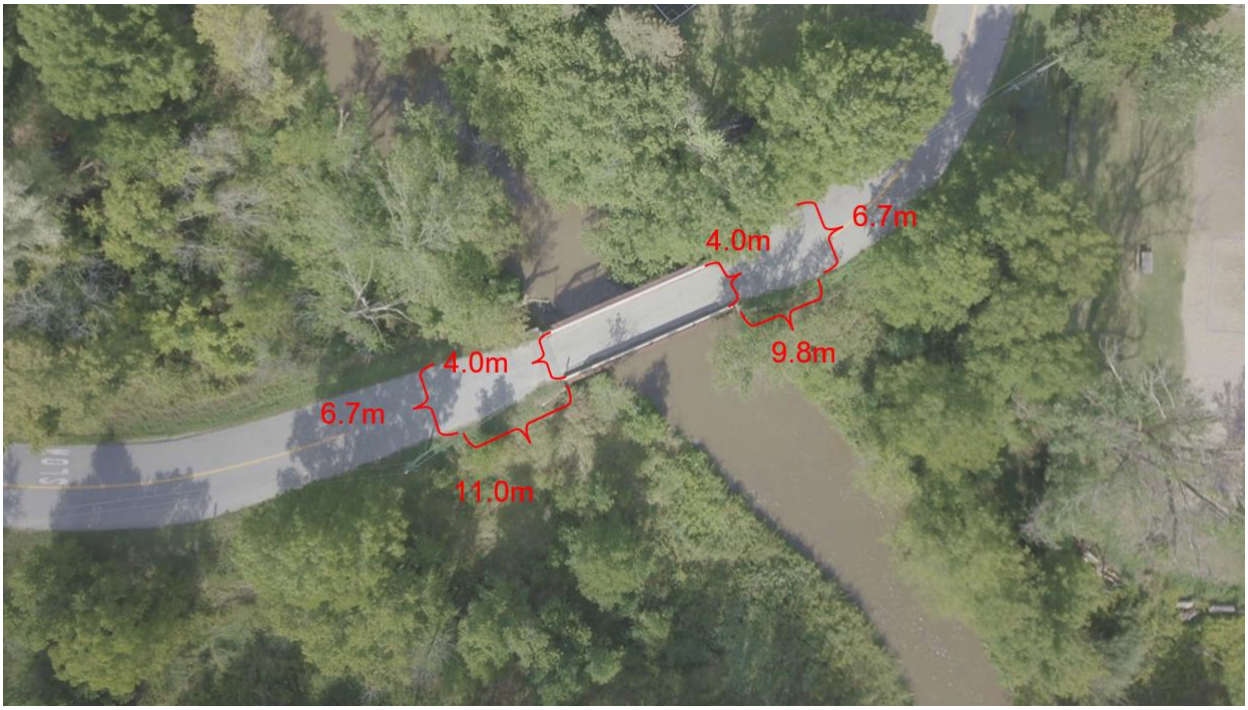


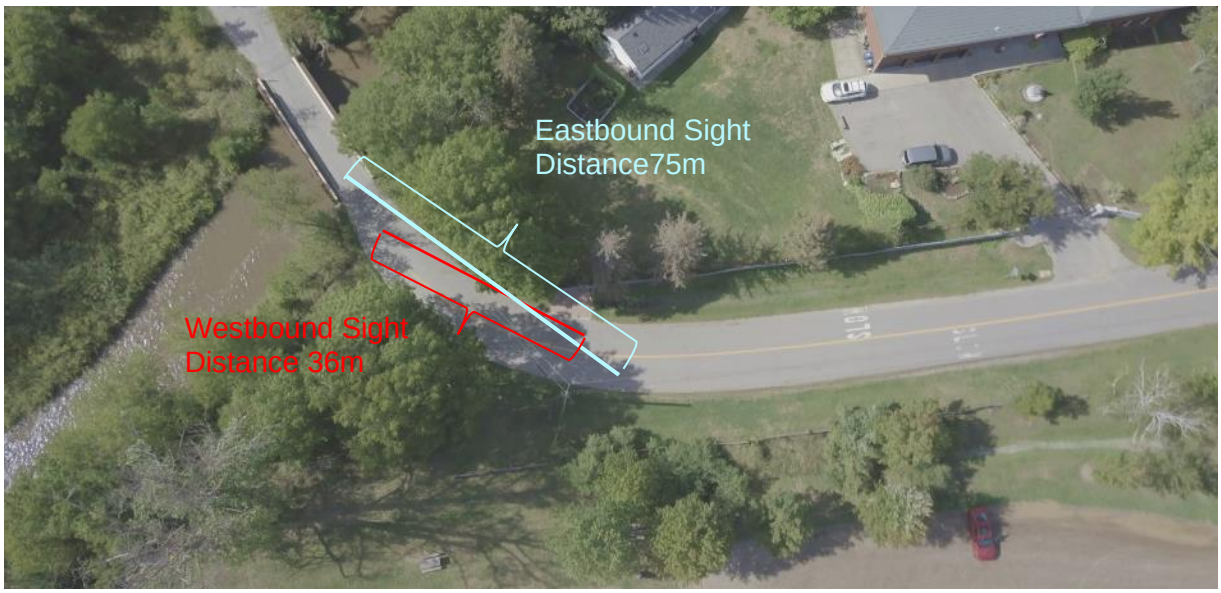
Figure 3: Transition between Roadway and Bridge

3.3.2 Sight Distance

Sightlines are obscured east of the bridge. As shown in the **Figure 4** below, the sight distance was measured to be 36 metres for westbound traffic and 75 metres for eastbound traffic at the bridge.

Based on the *Geometric Design Guide for Canadian Roads* published by Transportation Association of Canada, the required stopping sight distance on level roadways with a design speed of 50 km/h is 65 metres, while a 35-metre stopping sight distance is only adequate for roadways with design speed at 30 km/h. It is recommended for westbound traffic to yield to upcoming traffic or come to a full stop to reduce the operational speed near the bridge and avoid potential collisions due to insufficient stopping sight distance.

Figure 4: Sight distance at the Bridge



The sight distance for westbound traffic is significantly impacted by the fence and trees at the curve as shown in **Figure 5**.

Figure 5: Westbound Sightline before the Bridge

There is a horizontal curved alignment along the Humber River (260 to 350 metres west of Hickman Street), which has sight line distance constraints (approximately 60 metres) for eastbound traffic as shown in **Figure 6**. Based on the site observation, the vegetation on the north (east) bank affects sight lines, including an over-grown tree as shown in **Figure 7**.

Figure 6: Sight Distance for the Curve

Figure 7: Sightline for Westbound Traffic

3.3.3 Signage

Based on the observation, all signage is in good condition and have good visibility. Digital speed signs are installed for both eastbound and westbound traffic close to the bridge and the entrance of the parking lot entrance (next to the 255 Glasgow Road driveway) as shown in **Figure 8**.

Figure 8: Digital Speed Signs Close to the Bridge

Narrow road signs with “ONE LANE” warning as well as sharp turn warning signs were installed in advance of the bridge in both directions as shown in the following **Figure 9**.

Figure 9: Warning Signs Approaching the Bridge

There are 8 residential driveways along Glasgow Road within the study area. Two driveways, situated 400 metres east of Hickman Street, are situated west of a horizontal curve, with constrained sight distance for vehicles exiting driveways. A “Hidden Driveway” ahead warning sign has been installed for westbound traffic 60 metres before the first driveway (207 Glasgow Road); a speed limit sign is also provided as shown in **Figure 10**. The location of the signs is consistent with OTM Book requirements and the signs are sufficiently visible.

Figure 10: Hidden Driveway Sign and Speed Limit Sign

3.3.4 Pedestrians and Cyclists

During a 1.5-hour site observation, a total of 6 pedestrians and 3 cyclists were observed crossing the bridge. One event of interaction between vehicle and pedestrians was observed and is shown in the following **Figure 11**.

Figure 11: Pedestrians and Vehicle Sharing the Bridge

Based on the observation, the vehicle had to give right of way by occupying the opposite lane when encountering pedestrians close to the bridge.

It is noted that, there was no pedestrian or cyclist observed on the section east of the park entrance during the site visit.

4.0 Operational Needs and Opportunities

4.1 Operational Needs

Based on the data analysis and site observations, there are needs and opportunities for improvement to address points of conflict between road users. Given that the scope of this assignment is limited to traffic control measures, the operational needs and opportunities considered were focused on the following:

- Establishing clear right of way between conflicting traffic streams at the Humber River Bridge to improve road users' understanding of right of way conflict points;
- Addressing active transportation needs within the corridor;
- Improving sight-lines at driveways to reduce the likelihood of collisions at accesses; and
- Minimizing the severity of potential collisions through speed management features.

4.2 Traffic Control Solutions

4.2.1 Establish Clear Right of Way at the Humber River Bridge

Currently, the right of way between conflicting streams of traffic is not identified at the bridge; there is no demarcation or signage that indicates which direction of traffic must stop or yield. Drivers travelling in both directions may assume they are able to cross the bridge unobstructed. To establish clear right of way, it is recommended to add yield sign to the westbound traffic at the end of the centre line marking, to provide right of way to eastbound traffic. Alternatively, a stop sign could be installed. Westbound traffic is the preferred direction to yield (or stop) because a stopped westbound vehicle has a better view of on-coming traffic and is better positioned to choose to cross the bridge without encountering an on-coming vehicle.

Based on the site visit observations, the eastbound traffic has an unobstructed sightline approaching the bridge. Eastbound drivers should be able to make more informed decisions with more reaction time. During the site visit, it is noticed that westbound traffic tends to slow down to low speed (estimated at 15 km/h – 20 km/h) at the sharp horizontal curve before the bridge, while the eastbound traffic tends to slow after the bridge. it is recommended to install a YIELD sign for westbound traffic to formalize existing operations while clarifying the right of way, between conflicting traffic streams. It is also recommended to install another YIELD AHEAD sign for due to the sightline limitation.

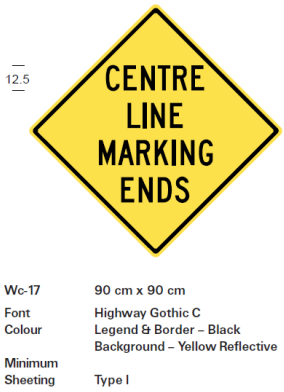
Alternatively, stop control could also be considered for westbound traffic if YIELD sign was considered insufficient at this location.

4.2.2 Warning Signage Recommendations

The Ontario Traffic Manual (OTM) provides current practices for traffic signs, pavement markings and signal control.

OTM Book 6 indicates that the CENTRE LINE MARKING ENDS sign “must be used in advance of where the centre line pavement marking ends.” Based on this requirement, the CENTRE LINE MARKING ENDS sign (as shown in **Figure 12**) should be installed for both directions before the ending of the centre line.

Figure 12: CENTRE LINE MARKING ENDS Sign



Town staff have indicated that the public is familiar with the existing Wa-24A Narrow Structure sign. Based on the OTM Book guidelines, the following signage is recommended to be added at both approaches to the bridge:

- CENTER LINE MARKING ENDS sign, and

The grouping of the following signage is to be confirmed at the design stage of implementation:

- NARROW BRIDGE sign,
- PEDESTRIANS AHEAD sign

If geometric improvements are planned in the longer term, consideration should be given to consultation with the property owner of 275 Glasgow Road and explore the possibility of removal of some vegetation on site and/or relocation of the fence (3 to 5 metres) to improve the sight distance east of the bridge. The relocation of the fence, as illustrated in Figure 5, could increase sight distance for westbound traffic has to potential for an additional 10 metres, increasing response time (approximately 1 second based on the posted speed limit at 40 km/h).

Based on the site observation, the width of the pavement narrows abruptly at both ends of the bridge. There is the potential for vehicles approaching the bridge to impact the bridge abutment resulting in a higher severity collision and damaging the bridge structure, or to run off the road into the creek. Energy attenuators (or other forms of crush cushion) or standard barrier protection are recommended to be installed on both sides of the bridge to protect vehicles as well as the structure. Implementation should be based on bridge structure program.

4.2.3 Addressing Active Transportation Needs

OTM Book 6 suggests that “The PEDESTRIANS AHEAD sign should be installed where field observations have indicated that a significant number of pedestrians frequently cross the road or adjacent to it, provided that pedestrian volumes are not high enough to justify the installation of a pedestrian crossover.” This sign is typically used for park areas.

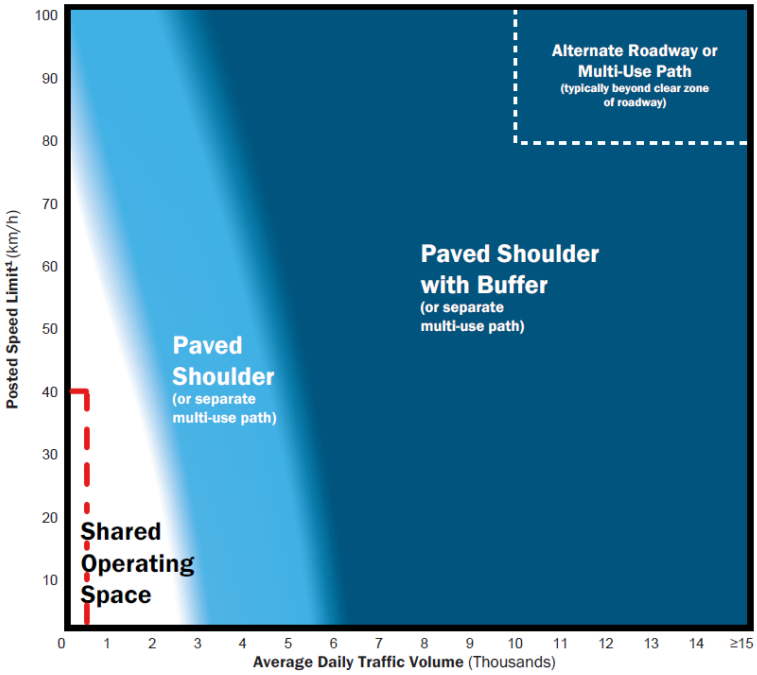
Based on the field observation, the pedestrian/cyclist volumes are not high enough to justify exclusive pedestrian facilities, however, due to the limited sight distance, the shared right of way on the narrow bridge, and the proximity to the park, the PEDESTRIANS AHEAD sign, as shown in the **Figure 13**, should be installed for both directions approaching the bridge.

Figure 13: PEDESTRIANS AHEAD Sign

Wc-7	75 cm x 75 cm
Font	N/A
Colour	Legend & Border – Black Background – Yellow Reflective
Minimum Sheeting	Type I

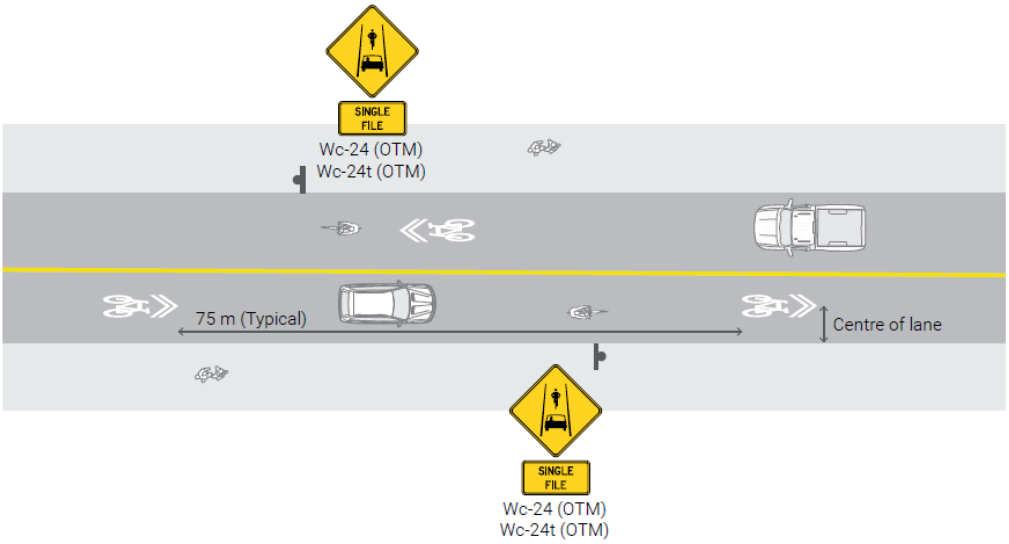
Although observed cycling activity along the road segment was limited, there are cyclist destinations within the corridor. If this road segment is used as a cycling route, shared operating space would be an appropriate recommended treatment based on OTM Book 18 as shown in the following **Figure 14**. It is noted that the appropriate cycling facility and treatment will be confirmed through a future environmental assessment process.

Figure 14: Desirable Cycling Facility Pre-selection Nomograph - Rural Context



Based on the pavement width and existing right of way, the recommended configuration would be mixed operation. If Town of Caledon cycling or active transportation master plans identify Glasgow Road as a cycling facility, then cycling accommodation could be provided with signage and pavement markings as shown in **Figure 15** based on OTM Book 18.

Figure 15: Mixed Traffic Operation with Cyclist Positioned in Centre of Lane



4.2.4 Addressing Sight Line Constraints

To improve the sight distance at the horizontal curve along the Humber River, it is recommended to trim or remove the tree over the river, as well as trim or remove all the vegetation on the north(east) side of the bank, 260 to 350 metres west of Hickman Street.

To address sight line constraints for exiting vehicles at driveways with sight distance constraints, the application of mirrors could be considered. For drivers who are exiting driveways (i.e. drivers who do not have the right of way, are in close proximity to the mirror and travelling slowly), well placed convex mirrors can help supplement sight-line for the exiting vehicle and improve safety. Supplementary signage is recommended to confirm that vehicles entering the roadway do not have the right of way and must yield to on-coming traffic

The reference *Operational Instruction – Concealed Driveways and Intersections* by Government of South Australia provides specific application guidance; it mentions that convex mirror could be used on public roads, but “should only be considered if all other attempts to improve sight distance fail”.

4.2.5 Speed Management

The 85th percentile speed is 49 km/h for northbound (westbound) traffic and 52 km/h for southbound (eastbound) traffic. The May 2020 Caledon Traffic Calming Strategy report states

that if “the results of the traffic study indicate an 85th percentile speed greater than 15 km/h over the posted speed limit, the location should be considered for review as part of the scoring process”. Traffic calming is not currently recommended for the study area based on recent 85th percentile speeds and the 40 km/h speed limit.

The “SLOW” pavement markings are recommended to be maintained on a regular basis consistent with the Town pavement marking program to maintain high visibility.

5.0 Implementation Recommendations

Based on the observation and analysis, all the recommended countermeasures are summarized in the Table 1 below, with the recommended level of priority and for implementation.

Table 1: Priority for the Recommended Countermeasures

Priority	Improvement	Cost
High	Clarify Right of Way (YIELD sign and YIELD AHEAD sign for westbound traffic at the Humber River bridge)	Low
	CENTERLINE MARKING ENDS Sign at the Humber River Bridge	Low
Medium	Pavement Marking Maintenance	Medium
	PEDESTRIANS AHEAD Sign	Low
	Remove vegetation to improve sight distance along the Humber River, 300 metres west of Hickman Street	Medium
Low	Remove vegetation to improve sight distance east of the Bridge. Town staff have also proposed consideration of mirrors at the horizontal curve to improve visibility.	Medium to High
To be determined based on bridge rehabilitation / capital program	Attenuators / Barriers at the Bridge Structure	High

High Priority treatments are recommended within the next year programs. Medium and Low priority treatments are recommended in the short term (within 10 years). The locations of required and high and medium priority treatments are illustrated in **Figure 16**.

Figure 16: Suggested Signages to be Installed close to the Bridge

Note: This figure is for illustration purpose only and is not an engineering drawing.

R.J. Burnside & Associates Limited

Nansen Feng, E.I.T.
Transportation Planner

Ray Bacquie, P.Eng.
Project Manager / Senior Vice President

NF:nf

Enclosure(s) Attachment 1 – Traffic Data
Attachment 2 – Collision Details Report

cc:

proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

R.J. Burnside & Associates Limited makes no warranties, either express or implied, of merchantability and fitness of the documents and other instruments of service for any purpose other than that specified by the contract.

Caledon - Glasgow Road Safety Review v9 Final.docx
4/14/2022 11:11 AM