

ADDENDUM TRAFFIC IMPACT STUDY

**SECTION OF LOTS 7,8 AND 9, CONCESSION 10
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON**

PREPARED FOR:

**TIMBERWORX CUSTOM HOMES INC., SLOOT
CONSTRUCTION LTD., JOHN SLOOT
INVESTMENTS LTD.**

PREPARED BY:

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FEBRUARY 2026

CFCA FILE NO. 2433-6646

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Revision Number	Date	Comments
Rev.0	March 2024	Issued for 1 st Submission
Rev.1	August 2025	Issued for 2 nd Submission
Rev.2	February 2026	Issued for 3 rd Submission

EXECUTIVE SUMMARY

C.F. Crozier & Associates Inc. (Crozier) was retained by Timberworx Custom Homes Inc., Sloat Construction Ltd., John Sloat Investments Ltd. to undertake a Traffic Impact Study in support of the Zoning By-Law Amendment application for the property located on sections of Lots 7, 8 and 9 of Concession 10, in the Township of Puslinch, County of Wellington. The purpose of the study is to assess the impacts of the proposed development on the boundary road network and to recommend required mitigation measures, if warranted. This study has been completed in accordance with the County of Wellington's Traffic Impact Study Guidelines (2021).

A Traffic Impact Study and an Addendum Traffic Impact Study were previously prepared in March 2024 and August 2025, respectively. The addendum herein, addresses the Town staff comments on previous submission.

As illustrated on the conceptual site plan prepared by Stovel and Associates Inc. dated July 2025, the development proposal includes the following:

- Forty-four (44) Single detached residential properties.
- Associated internal roads.
- Proposed Site Accesses via Watson Road South and Arkell Road

The trip generation and traffic operations analysis summarized herein are based on an older site plan which had 50 residential properties. However, this was conservatively maintained as no material change in transportation operations or recommendations is expected.

Under 2023 existing traffic conditions, the study intersection of Arkell Road and Watson Road South is operating below capacity with minimal delay during both weekday a.m. and p.m. peak hours. The study intersections include Arkell Road and Watson Road South and the proposed access connection to Watson Road South.

The proposed development is expected to generate 40 and 52 two-way primary trips in the a.m. and p.m. peak hours, respectively.

Under the ultimate 2031 future total conditions,

- the all-way stop-controlled intersection of Arkell Road and Watson Road South is projected to operate below capacity at a LOS "A" and "B" during the weekday a.m. and p.m. peak hours, respectively. Average intersection control delays of 9.5 and 14.3 seconds in the a.m. and p.m. peak hours, respectively and maximum volume-to-capacity ratios of 0.27 (EB) and 0.54 (NB) are expected in the weekday a.m. and p.m. peak hours, respectively.
- The proposed site access connection at Watson Road South is forecast to operate at a LOS "A" and "B" during the a.m. and p.m. peak hours, respectively.
- The proposed site access connection at Arkell Road is forecast to operate at a LOS "A" during both a.m. and p.m. peak hours, respectively.
- Overall, the nearby road network is projected to operate adequately without any capacity constraints under the ultimate 2031 future total scenario. The nearby road network is expected to operate similarly or better under the 2026 horizon year.

- These operations are similar to the 2031 and 2026 Future Background traffic operations. Therefore, operations are expected to be similar with or without the proposed development.

The proposed access connections to Watson Road South and Arkell Road are satisfactory per the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) with regards to sight distance, access spacing, corner clearance and Transport Canada's Grade Crossing Standards with regards to access spacing.

Based on the study findings, the development application can be supported from a traffic operations perspective as the nearby road network can accommodate the increase in traffic volumes attributable to the proposed development located on sections of Lots 7, 8 and 9 of Concession 10, in the Township of Puslinch, County of Wellington.

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Timberworx Custom Homes Inc., Sloat Construction Ltd., John Sloat Investments Ltd. to undertake a Traffic Impact Study in support of the Zoning By-Law Amendment application for the property located on sections of Lots 7,8 and 9 of Concession 10, in the Township of Puslinch, County of Wellington. The purpose of the study is to assess the impacts of the proposed development on the boundary road network and to recommend required mitigation measures, if warranted.

The Traffic Impact Study assesses the impacts of the proposed development on the boundary road network and recommends required mitigation measures as warranted. In accordance with the procedures set out in the County of Wellington's Traffic Impact Study Guidelines (2021), a Traffic Impact Study and an Addendum Traffic Impact Study were previously prepared in March 2024 and August 2025, respectively. The addendum herein, addresses the Town staff comments on previous submission. The terms of reference correspondence and Town staff comments on previous submission are included in **Appendix A**.

2.0 DEVELOPMENT PROPOSAL

As illustrated on the conceptual site plan prepared by Stovel and Associates Inc. dated July 2025, the development proposal includes the following:

- Forty-four (44) Single detached residential properties.
- Associated internal roads.
- Proposed Site Accesses via Watson Road South and Arkell Road

Refer to **Appendix B** for the Site Plan.

3.0 EXISTING CONDITIONS

This section outlines the current conditions of the transportation network in the vicinity of the subject site. Details of the study road network, including traffic controls, lane configurations, speed limits, active transportation infrastructure and other relevant transportation elements are identified.

3.1 Development Lands

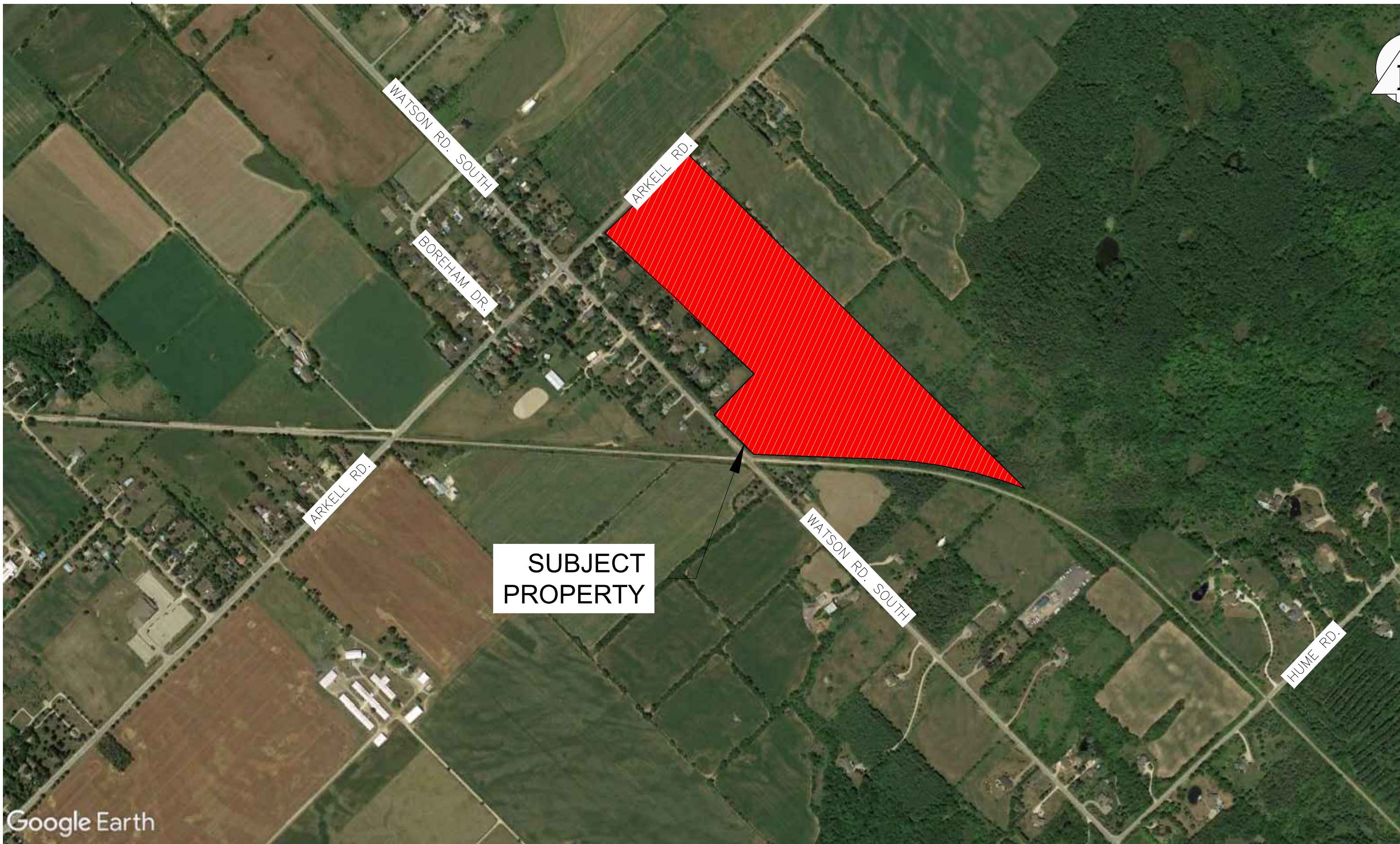
The subject lands cover an area of approximately 17 ha and currently consists of agricultural/vegetated land. The property, located on the northeast corner of the intersection at Arkell Road and Watson Road South, is bounded by a residential property to the west, agricultural/vegetated lands to the north, the Guelph Junction Railway to the east, and Watson Road/residential properties to the south. The site location and surrounding area are illustrated in **Figure 1**.

3.2 Study Area

The Traffic Impact Study analyzes the following study intersections as confirmed with Town of Puslinch and County of Wellington staff (refer to **Appendix A**).

- Watson Road South and Arkell Road
- Proposed Site Accesses via Watson Road South and Arkell Road

Details of the boundary road network is provided in **Section 3.3**.



Google Earth

TIMBERWORX CUSTOM HOMES
 PARTS OF LOTS 7 & 8, CONCESSION 10
 TOWNSHIP OF PUSLINCH

SITE LOCATION

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Drawn	R.L.	Design	Project No.	2433-6646
Date	08/05/2025	Check	Scale	N.T.S.
		M.I.	Dwg.	FIG. 1

3.3 Boundary Road Network

The boundary road network is described in **Table 1** below.

Table 1: Boundary Road Network

Feature	Roadway	
	Arkell Road	Watson Road South
Alignment	Two-Way (North-South)	Two-Way (East-West)
Classification ¹	Collector	Collector
Jurisdiction	County of Wellington	Town of Puslinch
Speed Limit	50 km/h	50 km/h
Pedestrian Facilities	Yes (Only available on the east side, north of Watson Road)	None
Cycling Facilities	None	None

Table 2 outlines the existing traffic control, configurations, at the study intersections on the boundary road network.

Table 2: Study Intersections

Intersection	Control	App. ¹	Major Street	Lane Configurations
Arkell Road and Watson Road South	All-Way Stop	4	Arkell Road	EBLTR; WBLTR; NBLTR; SBLTR

Note 1: App. - number of approaches for a given intersection.

Figure 2 illustrates the existing boundary road network, including lane configurations, lane storage lengths, and intersection control.

3.4 Existing Active Transportation Network

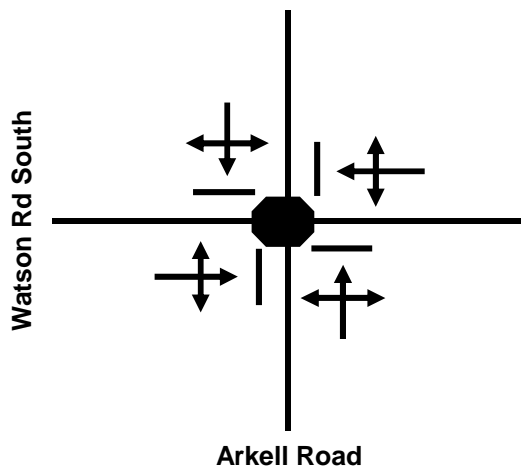
Sidewalks are available on the east side of Arkell Road, south of the intersection of Arkell Road and Watson Road, no cycling facilities exist on the boundary roads near the site.

3.5 Existing Transit Services

Given the rural nature and largely undeveloped surrounding lands, there are no transit services available within the study area currently.

3.6 Traffic Data

Turning movement counts (TMC) were collected at the study intersection from 7:00 a.m. to 7:00 p.m. on Thursday, July 28, 2022, by Wellington County. The traffic count data is summarized in **Appendix C**. 2023 existing traffic volumes were derived by applying annual growth rate of 2% to 2022 volumes. **Figure 3** illustrates the 2023 existing traffic volumes.



Legend

- xx A.M. Peak Hour Traffic Volumes
- {xx} P.M. Peak Hour Traffic Volumes
- {xx} Weekend Peak Hour Traffic Volumes

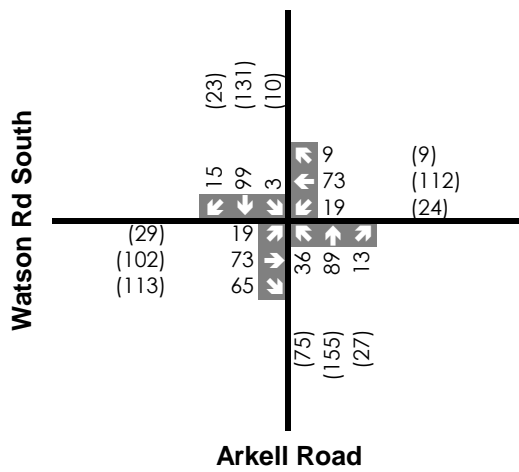
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Boundary Road Network



Figure 2

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 Date. 45321
 Analyst. Parth Bhatt



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes
- {xx} Weekend Peak Hour Traffic Volumes

Arkell Developments

Existing Traffic Volumes



Figure 3

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 Date. 45321
 Analyst. Parth Bhatt

3.7 Traffic Modeling

Synchro software (Version 11) was used for the intersection capacity and queueing analysis. Capacity Analysis per the general guidelines from the County and Town were used for the study intersections. All parameters for the intersection analysis were based on the Synchro default values.

The intersection assessment is based on the method outlined in the "Highway Capacity Manual, 2010" using Synchro modelling software. Intersections are assessed using a Level of Service metric, with ranges of delay assigned a letter from "A" to "F." For stop-controlled intersections, a Level of Service "A" or "B" would typically be measured during off-peak hours when lesser traffic volumes are on the roadways. Levels of Service "C" through "F" would typically be measured in the commuter peak hours when more significant vehicle volumes cause longer travel times. The Level of Service (LOS) definitions for signalized and stop control intersections are included in **Appendix D**.

3.8 Intersection Operations

The traffic operations at the study intersections were analyzed based on the 2023 existing traffic volumes illustrated in **Figure 3**. Detailed capacity analysis worksheets are included in **Appendix E. Table 4** outlines the 2023 existing traffic operations.

Table 4: 2023 Existing Traffic Operations Summary

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	v/c ratio ²	95 th Percentile Queue Length > Storage Length
Arkell Road and Watson Road South	All-Way Stop	A.M.	A	8.8s	0.21 (EB)	None
		P.M.	B	11.4s	0.42 (NB)	None

Note 1: Level of Service – The Level of Service (LOS) of a signalized intersection is based on the average control delay per vehicle. The LOS of unsignalized intersection is based on the critical control delay per approach.

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds.

As outlined in **Table 4**, under the 2023 existing conditions scenario, the all-way stop-controlled intersection of Arkell Road and Watson Road South is operating below capacity at a Level of Service (LOS) "A" and "B" during the weekday a.m. and p.m. peak hours, respectively. The average intersection control delay is 8.8s and 11.4s in the weekday a.m. and p.m. peak hours, respectively, and the maximum volume-to-capacity ratios are 0.21 (EB) and 0.42 (NB) in the weekday a.m. and p.m. peak hours, respectively.

4.0 FUTURE BACKGROUND CONDITIONS

This section summarizes the future background conditions of the study road network and provides details relating to growth rates, future transportation network improvements, and background developments within the study area.

4.1 Study Horizons

As confirmed through Terms of Reference correspondence, the full buildout year as well as five years beyond buildout is required, consistent with the County guidelines. Therefore, the 2026 horizon year (anticipated full buildout year) as well as 2031 were selected to assess future operations of the boundary road network.

4.2 Future Roadway Improvements

Currently, there are no planned improvements to roadway network within the study area. Therefore, the future background and future total analysis herein assumes the existing roadway configurations in the 2026 and 2031 horizon years.

4.3 Growth Rate

The Town recommended annual growth rate of 2%, compounded annually, was applied to all movements.

4.4 Background Developments

As confirmed by Town's staff, no background developments were identified in the vicinity of the site.

4.5 Intersection Operations

The traffic operations at the study intersections were analyzed based on the 2026 and 2031 future background traffic volumes illustrated in **Figures 4 and 5**. Detailed capacity analysis worksheets are included in **Appendix E. Tables 6 and 7** outline the 2026 and 2031 future background traffic operations.

Table 6: 2026 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	v/c ratio ²	95 th Percentile Queue Length > Storage Length
Arkell Road and Watson Road South	All-Way Stop	A.M.	A	9.0s	0.24(EB)	None
		P.M.	B	12.1s	0.46(NB)	None

Note 1: Level of Service – The Level of Service (LOS) of a signalized intersection is based on the average control delay per vehicle. The LOS of unsignalized intersection is based on the critical control delay per approach.

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds.

Table 7: 2031 Future Background Operations Summary

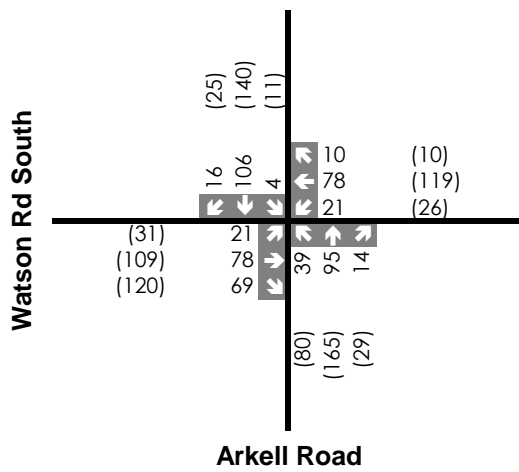
Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	v/c ratio ²	95 th Percentile Queue Length > Storage Length
Arkell Road and Watson Road South	All-Way Stop	A.M.	A	9.3s	0.27(EB)	None
		P.M.	B	13.7s	0.53(NB)	None

Note 1: Level of Service – The Level of Service (LOS) of a signalized intersection is based on the average control delay per vehicle. The LOS of unsignalized intersection is based on the critical control delay per approach.

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds.

As shown in **Table 7**, under 2031 future background conditions, the all-way stop-controlled intersection of Arkell Road and Watson Road South is projected to operate below capacity at a LOS "A" and "B" during the weekday a.m. and p.m. peak hours, respectively. Average intersection control delays of 9.3 and 13.7 seconds in the a.m. and p.m. peak hours, respectively and maximum volume-to-capacity ratios of 0.27 (EB) and 0.53 (NB) are expected in the weekday a.m. and p.m. peak hours, respectively. The intersection is forecast to operate efficiently with reserve capacity to accommodate future increases in traffic volumes.

The study intersection is forecast to operate similarly or better under the 2026 future background compared to the 2031 future background. No traffic operation issues are forecast on the boundary road network.



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes
- {xx} Weekend Peak Hour Traffic Volumes

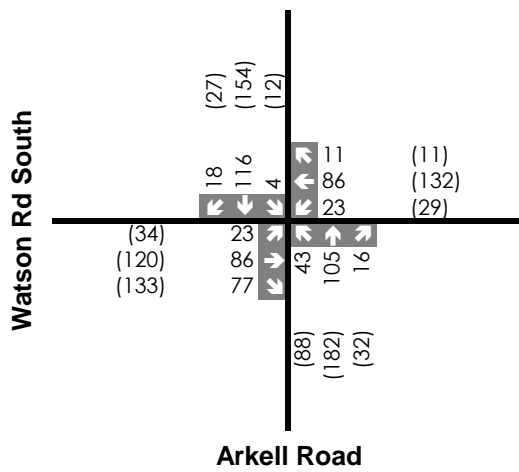
Arkell Developments

2026 Future Background Traffic Volumes



Figure 4

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 Date. 45321
 Analyst. Parth Bhatt



Legend

- xx A.M. Peak Hour Traffic Volumes
- {xx} P.M. Peak Hour Traffic Volumes
- {xx} Weekend Peak Hour Traffic Volumes

Arkell Developments

2031 Future Background Traffic Volumes



Figure 5

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 Date. 45321
 Analyst. Parth Bhatt

5.0 SITE GENERATED TRAFFIC

The proposed development will result in new traffic turning movements on the boundary road network that would otherwise not exist. This section presents the generated trips and trip assignment through the study intersections.

5.1 ITE Trip Generation

To forecast the trips generated by the development, the ITE Trip Generation Manual, 11th Edition was used. The ITE Trip Generation Manual is a compendium of industry collected trip generation data across North America for a variety of land uses and is used industry wide as a source for trip generation forecasts. Given the site location, the general urban/suburban setting was used; fitted curve estimates were used if available and deemed statistically valid per the ITE Trip Generation Manual (i.e., more than 20 data points and coefficient of determination $R^2 > 0.75$). The trips generated by the proposed development are presented in **Table 8**. It is noted that the trip generation is based on an older site plan which had 50 residential units. This was conservatively maintained as no material change in traffic operations or recommendations is expected.

Table 8: Total Site Generated Traffic

Land Use	Units	Peak Hour	Equation Used	Inbound	Outbound	Total
Single-Family Detached Housing (LUC 210)	50	A.M.	$\text{Ln}(T)=0.91*\text{Ln}(X)+0.12$	10 (25%)	30 (75%)	40
		P.M.	$\text{Ln}(T)=0.94*\text{Ln}(X)+0.27$	33 (63%)	19 (37%)	52

As shown in **Table 8**, the proposed residential development is expected to generate a total of 40 and 52 two-way trips in the a.m. and p.m. peak hours, respectively.

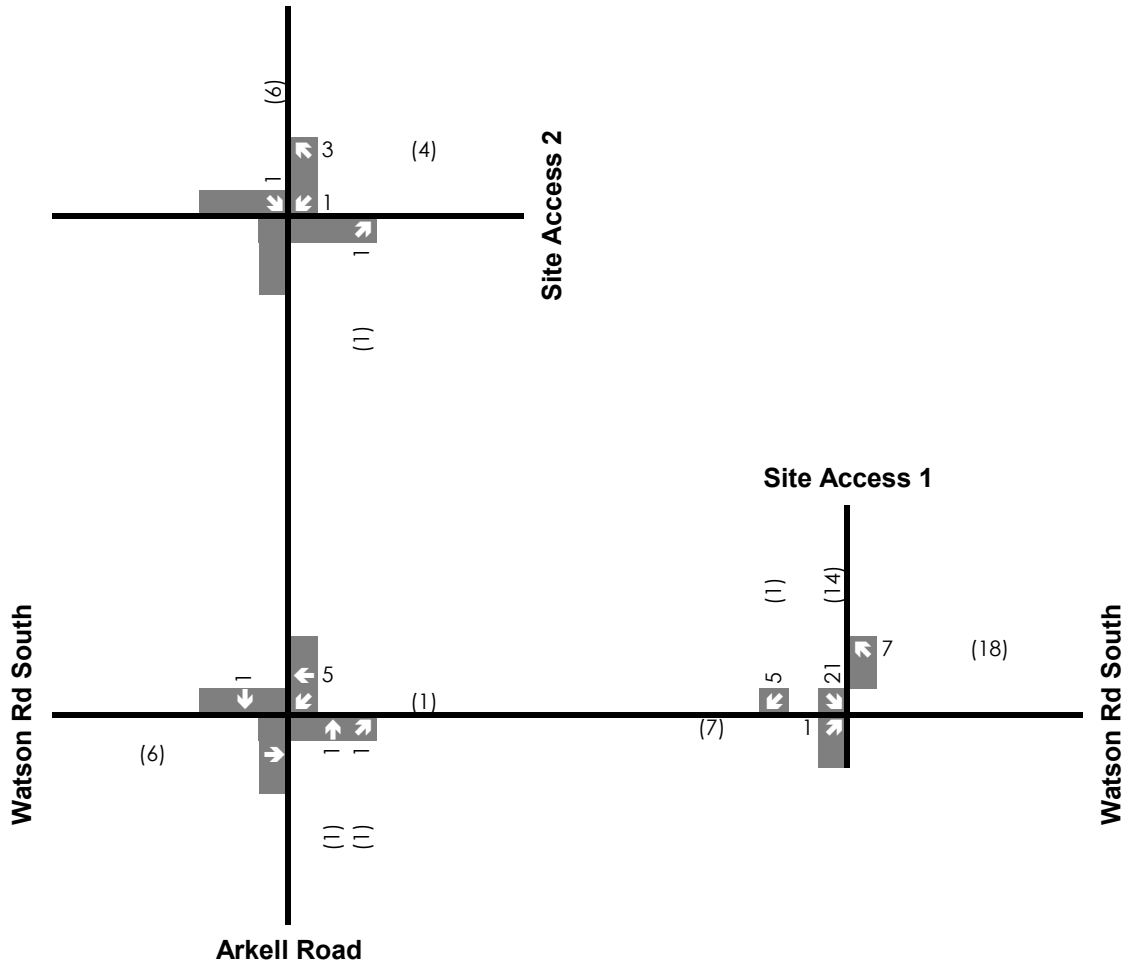
5.2 Trip Distribution and Assignment

The Transportation Tomorrow Survey (TTS) is a comprehensive travel data survey conducted in the Greater Toronto and Hamilton Area. Data from the 2016 TTS was used to determine the peak hour trip distribution at the site for the residential land use proposed at the site.

The inbound and outbound trip distributions were derived by filtering TTS data with a trip purpose of "Home", destined to and originating from the subject GTA Zone 8303. The A.M. and P.M. distributions were determined by filtering for trips starting during the periods of 6:30 A.M. – 9:30 A.M. and 3:30 P.M. – 6:30 P.M., respectively. **Appendix F** provides the TTS query used to determine the site trip distribution. **Table 9** summarizes the trip distribution at the site. **Figure 6** illustrates the trip assignment for the proposed development.

Table 9: Trip Distribution

Direction	A.M. Inbound	A.M. Outbound	P.M. Inbound	P.M. Outbound
Northwest	24%	18%	32%	40%
North	0%	0%	0%	0%
Northeast	0%	0%	7%	0%
East	0%	18%	15%	0%
Southeast	0%	0%	0%	0%
South	0%	0%	0%	0%
Southwest	38%	7%	12%	13%
West	38%	58%	35%	47%
Total	100%	100%	100%	100%



Legend

xx A.M. Peak Hour Traffic Volumes
 (xx) P.M. Peak Hour Traffic Volumes

Arkell Developments

Trip Assignment



Figure 6

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6.0 TOTAL TRAFFIC CONDITIONS

This section discusses the traffic operations of the study intersections with the addition of the new site generated trips. It's noted the future total analysis outlined herein is based on the trips generated for an older site plan with 50 residential units. This was conservatively maintained as no material change in traffic operations or recommendations is expected.

6.1 Intersection Operations

Traffic operations at the study intersections were assessed with the addition of the new site generated trips to the future background traffic volumes. The 2026 and 2031 future total traffic volumes are illustrated in **Figures 7 and 8**. **Tables 10 and 11** outline the future total traffic operations for the 2026 and 2031 horizon years, respectively. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 10: 2026 Future Total Traffic Operations Summary

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	v/c ratio ²	95 th Percentile Queue Length > Storage Length
Arkell Road and Watson Road South	All-Way Stop	A.M.	A	9.0s	0.24(EB)	None
		P.M.	B	12.3s	0.47(NB)	None
Site Access via Watson Road South	Stop (Minor Street)	A.M.	A(SB)	9.6s	0.07(WB)	None
		P.M.	B(SB)	10.3s	0.10(WB)	None
Site Access via Arkell Road	Stop (Minor Street)	A.M.	A (WB)	9.2s	0.08 (NB)	None
		P.M.	A (WB)	9.4s	0.12 (NB)	None

Note 1: Level of Service – The Level of Service (LOS) of a signalized intersection is based on the average control delay per vehicle. The LOS of unsignalized intersection is based on the critical control delay per approach.

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds.

Table 11: 2031 Future Total Operations Summary

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	v/c ratio ²	95 th Percentile Queue Length > Storage Length
Arkell Road and Watson Road South	All-Way Stop	A.M.	A	9.4s	0.27(EB)	None
		P.M.	B	14.1s	0.54(NB)	None
Site Access via Watson Road South	Stop (Minor Street)	A.M.	A(SB)	9.6s	0.07(WB)	None
		P.M.	B(SB)	10.5s	0.10(WB)	None
Site Access via Arkell Road	Stop (Minor Street)	A.M.	A (WB)	9.2s	0.08 (NB)	None
		P.M.	A (WB)	9.4s	0.12 (NB)	None

Note 1: Level of Service – The Level of Service (LOS) of a signalized intersection is based on the average control delay per vehicle. The LOS of unsignalized intersection is based on the critical control delay per approach.

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds.

Under the ultimate 2031 future total conditions, the study intersections are projected to operate similarly compared to the corresponding 2031 future background scenario, with minor additional delays attributable to the proposed development traffic.

As shown in **Table 11**, under 2031 future total conditions, the all-way stop-controlled intersection of Arkell Road and Watson Road South is projected to operate below capacity at a LOS “A” and “B”

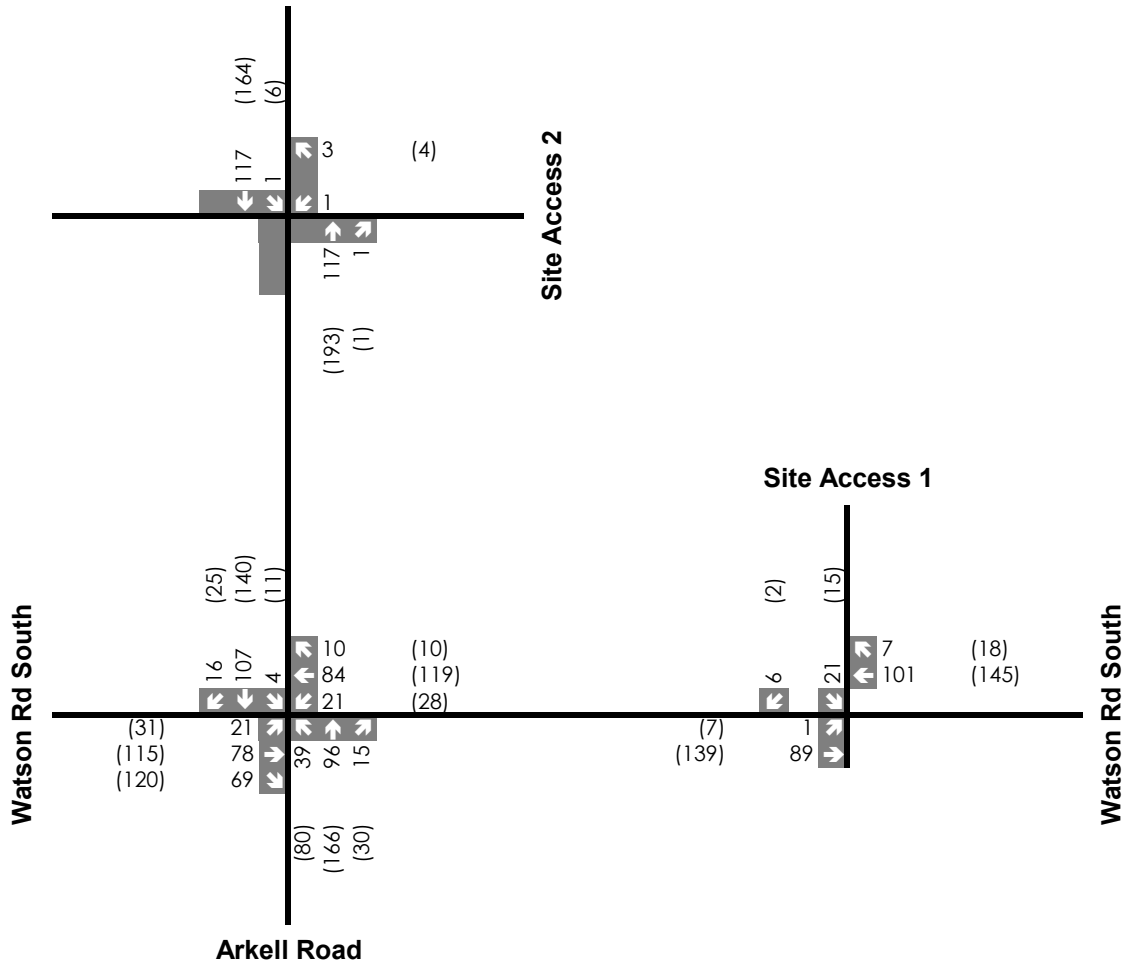
during the weekday a.m. and p.m. peak hours, respectively. Average intersection control delays of 9.5 and 14.3 seconds in the a.m. and p.m. peak hours, respectively and maximum volume-to-capacity ratios of 0.27 (EB) and 0.54 (NB) are expected in the weekday a.m. and p.m. peak hours, respectively.

The proposed Access Connection at Watson Road South is forecast to operate below capacity at a LOS "A" and LOS "B" during the a.m. and p.m. peak hours respectively.

The proposed Access Connection at Arkell is forecast to operate below capacity at a LOS "A" during both a.m. and p.m. peak hours respectively.

Overall, the boundary road network is projected to operate adequately without any capacity constraints under the ultimate 2031 future total scenario. The boundary road network is expected to operate similarly or better under the 2026 horizon year.

Based on the analysis herein, the proposed development is not expected to significantly alter the traffic operations of the study intersections. The proposed development can be supported from a traffic operations perspective.



Legend

xx A.M. Peak Hour Traffic Volumes
 (xx) P.M. Peak Hour Traffic Volumes

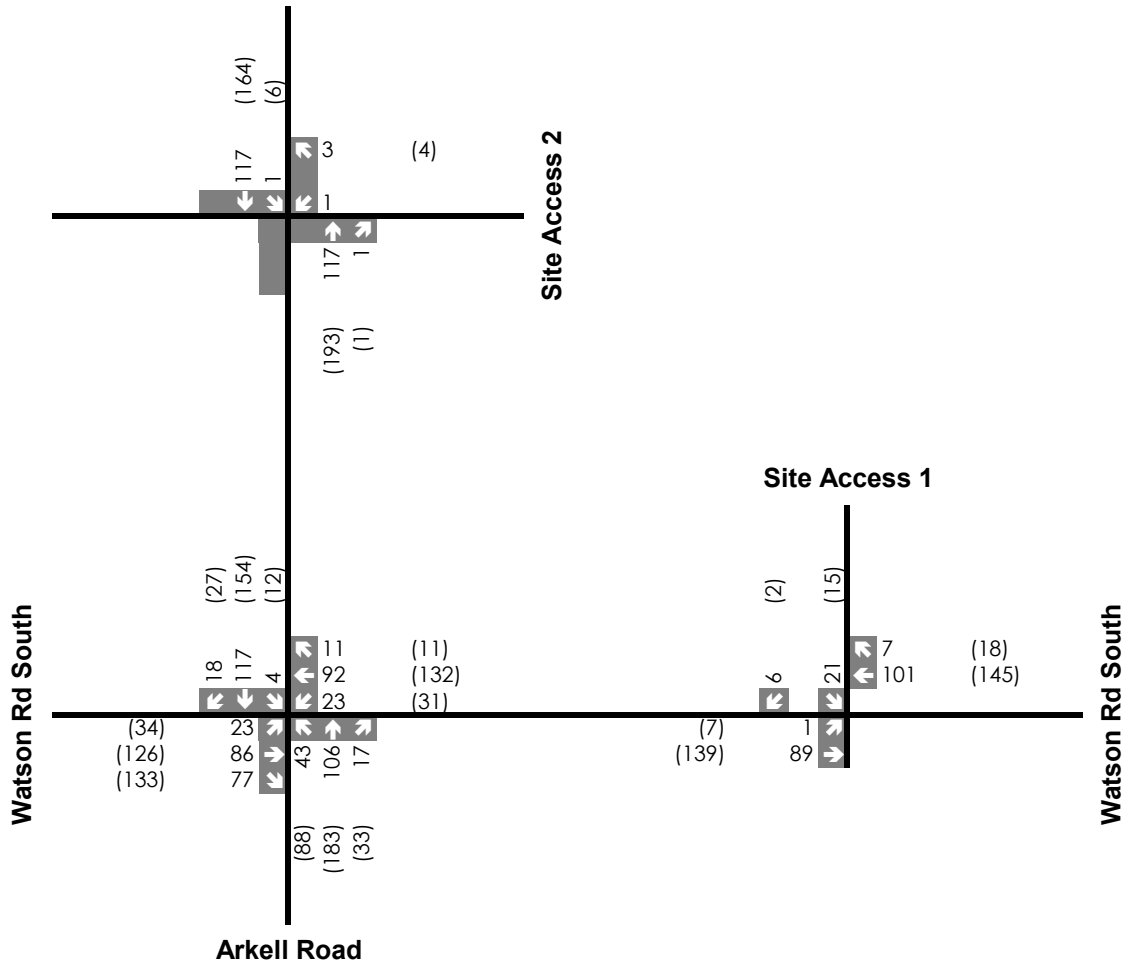
Arkell Developments

2026 Future Total Traffic Volumes



Figure 7

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Legend

xx A.M. Peak Hour Traffic Volumes
 (xx) P.M. Peak Hour Traffic Volumes

Arnell Developments

2031 Future Total Traffic Volumes



Figure 8

Project No. 2433-6646

7.0 SITE ACCESS SAFETY REVIEW

In the following section, the geometrics of the proposed site accesses were reviewed against the guidelines provided in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR).

7.1 Sight Distance Assessment

The available sightlines at the site access connections to Watson Road South and Arkell Road were measured and compared to the standards set out in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR). Sight distance was measured from the proposed site accesses using the following assumptions:

- A standard driver eye height of 1.08 metres for a passenger car, and
- A 4.4 metre setback from the approximate extension of the outer curb to represent a vehicle waiting to exit the site.

Intersection sight distance is calculated using equation 9.9.1 from the GDGCR as outlined below:

$$ISD = 0.278 * V_{major} * tg$$

Where;

ISD = Intersection Sight Distance

V major = design speed of roadway (km/h)

tg = assumed time gap for vehicles to turn from stop onto roadway (s)

The design speed of a Collector Road in a suburban environment is typically 10-20 km/h greater than posted speed limit. The posted speed limit on Watson Road South and Arkell Road at the site frontages are 50 km/h and 80 km/h, respectively. Therefore, design speeds of 60 km/h and 90 km/h were assumed for Watson Road South and Arkell Road, respectively. **Table 12** outlines the sight distance analysis for the proposed site accesses.

Table 12: Sight Distance Analysis

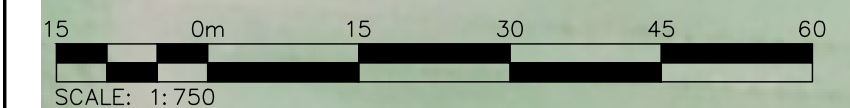
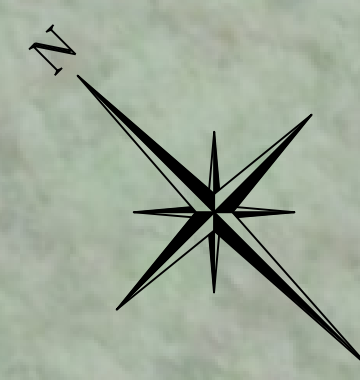
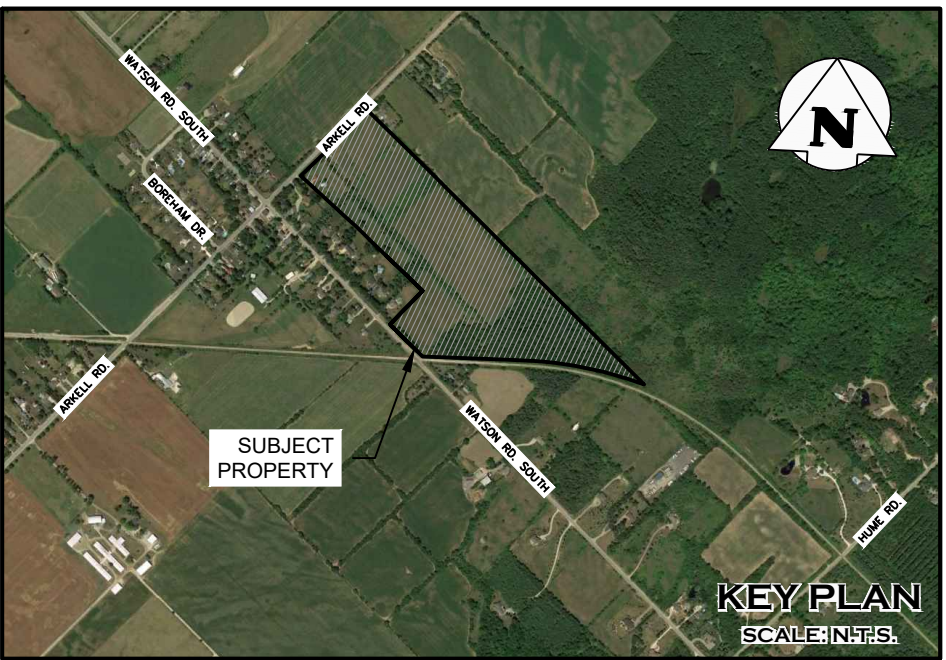
Feature	Site Access at Watson Road South	Site Access at Arkell Road
Access Type	Full moves	Full moves
Intersection Control	Stop Control on Minor Road	Stop Control on Minor Road
Speed Limit of Roadway	50 km/h	80 km/h
Assumed Design Speed	60 km/h	90 km/h
Design Vehicle	Passenger Car	Passenger Car
Base Time Gap	6.5 s (for right-turn) ¹ 7.5 s (for left turn) ²	6.5 s (for right-turn) ¹ 7.5 s (for left turn) ²
Vertical Alignment of Roadway	Fairly flat	Fairly flat
Grade of Roadway	Less than 3%	Less than 3%
Horizontal Alignment of Roadway	Straight	Straight
Sight Distance Required ³	110 m (right turn) 130 m (left turn)	165 m (right turn) 190 m (left turn)
Measured Sight Distance	> 150 m (looking right) 190 m (looking left)	> 190 m (looking right) > 165 m (looking left)
Minimum Sight Distance Satisfied?	Yes	Yes

Note 1: Time gap for right-turning passenger cars from a stop onto a two-lane highway with no median and with a grade less than 3%. Value from Table 9.9.5 in the GDGCR.

Note 2: Time gap for left-turning passenger cars from a stop onto a two-lane highway with no median and with a grade less than 3%. Value from Table 9.9.3 in the GDGCR.

Note 3: Sight distance value calculated from Intersection Sight Distance equation 9.9.1 in the GDGCR.

As outlined in **Table 12**, minimum sight distance requirements are satisfied at the location of the access connections to Watson Road South and Arkell Road. **Figures 9 and 10** contains Sight Distance Assessment Drawings.



NOTE:
AVAILABLE SIGHT DISTANCES WERE DETERMINED BASED ON A SITE VISIT.

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st SUBMISSION	03/08/2024
2	ISSUED FOR 2nd SUBMISSION	08/05/2025
3	ISSUED FOR 3rd SUBMISSION	10/29/2025
4	ISSUED FOR 4th SUBMISSION	02/27/2026

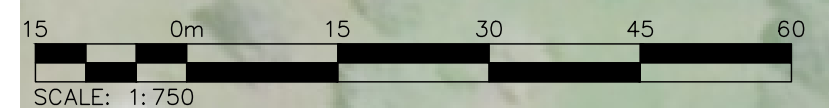
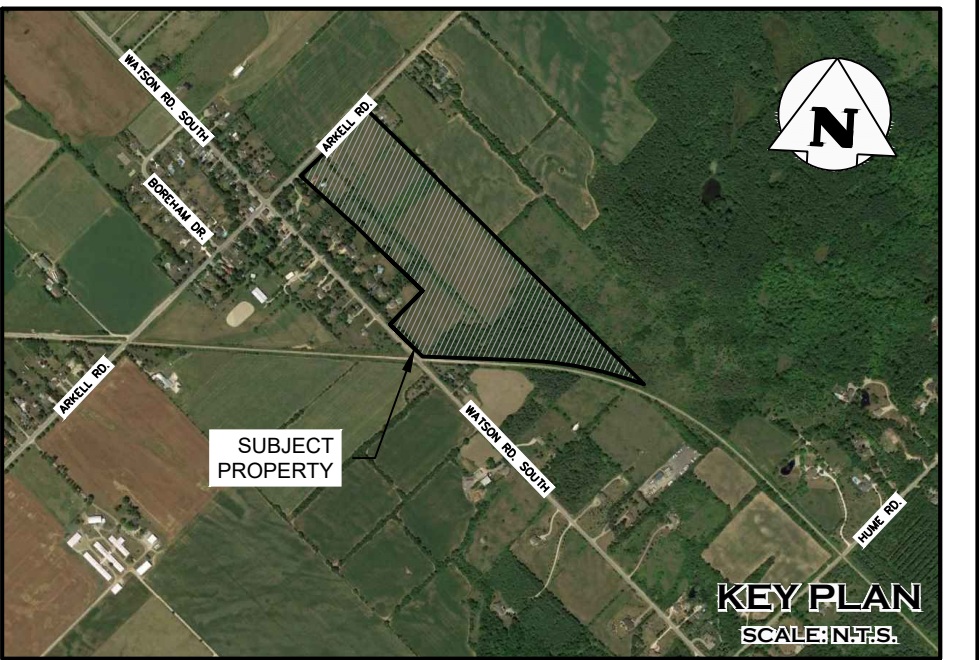
Project
**TIMBERWORX CUSTOM HOMES
 PARTS OF LOTS 7 & 8, CONCESSION 10
 TOWNSHIP OF PUSLINCH**

Drawing
**SIGHT DISTANCE ASSESSMENT
 ACCESS TO WATSON RD. S**

CROZIER
 CONSULTING ENGINEERS

211 YONGE STREET
 SUITE 600
 TORONTO, ON, M5B 1M4
 416-477-3392 T
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA

Drawn By	R.L.	Design By	Project	2433-6646
Check By	M.I.	Check By	Drawing	FIG. 9



NOTE:
AVAILABLE SIGHT DISTANCES WERE DETERMINED BASED ON A SITE VISIT.

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st SUBMISSION	03/08/2024
2	ISSUED FOR 2nd SUBMISSION	08/05/2025
3	ISSUED FOR 3rd SUBMISSION	10/29/2025
4	ISSUED FOR 4th SUBMISSION	02/27/2026

Project: **TIMBERWORX CUSTOM HOMES
PARTS OF LOTS 7 & 8, CONCESSION 10
TOWNSHIP OF PUSLINCH**

Drawing: **SIGHT DISTANCE ASSESSMENT
ACCESS TO ARKELL RD.**

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Drawn By: R.L. Design By: Project: **2433-6646**
Check By: M.I. Check By: Drawing: **FIG. 10**

7.2 Access Location and Spacing Review

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) and Transport Canada's Grade Crossing Standards were used to review access spacing and corner clearance for the proposed site access connections to Watson Road South and Arkell Road. The site access spacing requirements and proposed spacings are presented in **Table 13**.

Table 13: Access Spacing Review

Site Access	Available Spacing	Minimum Spacing Requirements	Evaluation	Source
Private Access connection to Watson Road South	Approximately 500 m (to Arkell Road and Watson Road South Intersection)	Minimum 60m spacing between adjacent intersections along a collector road	Satisfied	TAC-GDGCR Section 9.4.2.2
Private Access connection to Arkell Road	Approximately 250 m (to Arkell Road and Watson Road South Intersection)	Minimum 60m spacing between adjacent intersections along a collector road	Satisfied	TAC-GDGCR Section 9.4.2.2

The site corner clearance requirements, Transport Canada's Grade Crossing requirements and proposed clearances are presented in **Table 14**.

Table 14: Corner Clearance and distance from Grade Crossing Review

Site Access	Available Corner Clearance	Minimum Corner Clearance Requirements	Evaluation	Source
Private Access connection to Watson Road South	Approximately 500 m (to Arkell Road and Watson Road South Intersection)	Minimum 25m corner clearance from stop-controlled intersection	Satisfied	TAC-GDGCR Figure 8.8.2
	Approximately 50 m (to Grade Crossing)	Minimum 30m distance from Grade Crossing	Satisfied	Transport Canada's Grade Crossing Standards
Private Access connection to Arkell Road	Approximately 250 m (to Arkell Road and Watson Road South Intersection)	Minimum 25m corner clearance from stop-controlled intersection	Satisfied	TAC-GDGCR Figure 8.8.2

As presented in **Tables 13 and 14**, the proposed accesses are satisfactory compared to the minimum spacing and corner clearance requirements of the TAC-GDGCR and Transport Canada's Grade Crossing Standards.

8.0 PARKING REVIEW

The Township of Puslinch's Zoning By-Law No. 023-18, section 5.2.2 identifies a requirement of 2 parking spaces per unit for the proposed development. As part of the subdivision plan, the parking supply identified in the By-Law will be provided along with potential on-street visitor parking as applicable.

9.0 CONCLUSIONS AND RECOMMENDATIONS

This study has assessed the transportation impacts of the proposed residential development located on sections of Lots 7, 8 and 9 of Concession 10, in the Township of Puslinch, County of Wellington. It is noted that the trip generation and traffic operations analysis were based on an older site plan which had 50 residential units. This was conservatively maintained as no material change in traffic operations or recommendations is expected. The detailed analysis contained within this report has resulted in the following key findings:

- Under 2023 existing traffic conditions, the study intersection of Arkell Road and Watson Road South is operating below capacity with minimal delay during both weekday a.m. and p.m. peak hours.
- The proposed development is expected to generate 40 and 52 two-way primary trips in the a.m. and p.m. peak hours, respectively.
- Under the ultimate 2031 future total conditions:
 - The all-way stop-controlled intersection of Arkell Road and Watson Road South is projected to operate below capacity at a LOS "A" and "B" during the weekday a.m. and p.m. peak hours, respectively. Average intersection control delays of 9.4 and 14.1 seconds in the a.m. and p.m. peak hours, respectively and maximum volume-to-capacity ratios of 0.27 (EB) and 0.54 (NB) are expected in the weekday a.m. and p.m. peak hours, respectively.
 - The proposed site access connection at Watson Road South is forecast to operate at a LOS "A" and "B" during the a.m. and p.m. peak hours respectively.
 - The proposed site access connection at Arkell Road is forecast to operate at a LOS "A" during both a.m. and p.m. peak hours respectively.
 - Overall, the nearby road network is projected to operate adequately without any capacity constraints under the ultimate 2031 future total scenario. The nearby road network is expected to operate similarly or better under the 2026 horizon year.
 - These operations are similar to the 2031 and 2026 Future Background traffic operations. Therefore, operations are expected to be similar with or without the proposed development.
- The proposed access connections to Watson Road South and Arkell Road are satisfactory per the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) with regards to sight distance, access spacing, corner clearance and Transport Canada's Grade Crossing Standards with regards to access spacing.

Based on the study findings, the development application can be supported from a traffic operations perspective as the boundary road network can accommodate the increase in traffic volumes attributable to the proposed development located on sections of Lots 7, 8 and 9 of Concession 10, in the Township of Puslinch, County of Wellington. Further, the proposed accesses are forecast to be functionally adequate with immaterial impacts to the study intersections.

Prepared by,

C.F. CROZIER & ASSOCIATES INC.

C.F. CROZIER & ASSOCIATES INC.



Masoud Imaniboossejiri
Engineering Intern

Brandon Bradt, M.Eng. CEM, P.Eng.
Manager, Transportation Planning

\\Crozier-Files\Projects\2400\2433 - Timberworx Custom Homes\6646 - Arkell Developments\Reports\Traffic\3rd Submission\2026.02.27_ArkeII Developments TIS (CROZIER).Docx

APPENDIX A

Correspondence

Township of Puslinch	C.F. Crozier & Associates Inc. Comment Responses
Traffic	
<p>- The TIS continues to say that the proposed road connection to Arkell Road is for emergency purposes, but the site concept plan that was included with the application appears to include a fully open public road connection. As Arkell Road is a Wellington County Road, I will defer to the County to comment on the proposed road connection. The addition of a second road connection for the subdivision would result in more routing options for traffic and less traffic at the Watson Road South connection near the railway and reduced impacts on any one traffic movement at the Watson/Arkell intersection.</p>	<p>Noted. The Addendum TIS has assessed the impact of the proposed development on the boundary road network under the assumption that the site will be served by two access connections, one to Watson Road South and the other to Arkell Road.</p>
<p>- The study maintains analysis for 50 units when 44 are now proposed. A reduction in the number of units would result in fewer trips on the road network so the current analysis is conservative.</p>	<p>Noted. The addendum TIS maintains the trip generation based on an older site plan which had 50 residential properties. It's noted that this was conservatively maintained as no material change in transportation operations or recommendations is expected.</p>
<p>- The TIS indicates that the sight distance assessment was based on a review of base mapping and aerial mapping. The aerial mapping in the TIS illustrates the available sight distance in plan view, but does not confirm that there are no vertical curves in the road. Were vertical road plans reviewed to confirm the sight distance or did the consultant do a field visit to confirm? How was the available sight distance confirmed?</p>	<p>Noted. A field visit was conducted to confirm the adequacy of the available sightlines.</p> <p>The field visit confirmed the following:</p> <ul style="list-style-type: none"> • There were no visual obstructions along Arkell Road, with sight distances exceeding 190 meters to the right and 165 meters to the left. Given the design speed of 90 km/h, the minimum required sight distances are 165 meters for right turns and 190 meters for left turns. Since the available sight distances surpass these requirements in both directions, all safety standards are met and no concerns regarding site access are expected.

	<ul style="list-style-type: none"> On Watson Road South, the available sight distance was 190 m looking south and over 150 m looking north. With a design speed of 60 km/h, the required minimum sight distances are 110 m for right turns and 130 m for left turns. Since available sight distances are 150 m (right) and 190 m (left), all minimum requirements are met and no safety concerns are anticipated at the proposed site access.
<p>- Guelph Junction Railway provided comments indicating that additional signals may be required for the new driveway entrance. The consultant team has indicated that traffic signals will not be required at the new road connection to Watson Road, but it's possible that GJR was referring to railway signals or other technical requirements at the rail/road crossing. I would like to receive a copy of any further comments provided by GJR when and if they become available to understand if they are in agreement with the new road location.</p>	<p>Noted. The rail crossing currently consists of a warning system without gates, therefore, we have analyzed the rail crossing to determine whether an upgrade (to a warning system with gates) is warranted under the 2031 future total scenario. Information pertaining to the relevant rail crossing was obtained from GJR. The conditions outlined in Section 9.2 of Transport Canada's Grade Crossing Standards (January 2019) are not met. Therefore, no upgrades to the existing rail crossing are warranted. Refer to Appendix A of the Addendum TIS for email correspondence with GJR, relevant Grade Crossing Standards excerpts, and warrant analysis.</p>
<p>- The changes in the plan to include a new road connection and fewer units would impact how much traffic access the road network and how. Additionally, my previous comment about the routing of traffic applies to this study since the analysis is the same. It is still my opinion that updating the analysis to reflect an additional road connection, fewer units, and a modified assignment of traffic would not materially change the capacity analyses and would not change the recommendations in the report. The two study area intersections are forecast to operate at good levels of service and the traffic volumes generated by the proposal are low.</p>	<p>Noted.</p>

<p>-The County and their consultant may have additional comments based on their review of the proposed road connection to Arkell Road and the Watson/Arkell intersection.</p>	<p>Noted.</p>
<p>In response to the Township's request, I offer the following feedback:</p> <ol style="list-style-type: none"> 1. The Zoning By-law Amendment application can be deemed complete from a transportation perspective and I am in support of the application. 2. Conditions of approval should include: <ol style="list-style-type: none"> a. confirmation of how the sight distance was measured on Watson Road South, and b. confirmation from Guelph Junction Railway that they will support the location of the new road connection to Watson Road South adjacent to the at-grade railway crossing. 3. n/a 4. Technical requirements are described in point 2 above. 5. No additional requirements beyond those identified in point 2 above. 	<p>1. Noted.</p> <p>2.</p> <p>a: A field visit was conducted to confirm the adequacy of the available sightlines. The field visit confirmed the following:</p> <ul style="list-style-type: none"> • There were no visual obstructions along Arkell Road, with sight distances exceeding 190 meters to the right and 165 meters to the left. Given the design speed of 90 km/h, the minimum required sight distances are 165 meters for right turns and 190 meters for left turns. Since the available sight distances surpass these requirements in both directions, all safety standards are met and no concerns regarding site access are expected. • On Watson Road South, the available sight distance was 190 m looking south and over 150 m looking north. With a design speed of 60 km/h, the required minimum sight distances are 110 m for right turns and 130 m for left turns. Since available sight distances are 150 m (right) and 190 m (left), all minimum requirements are met and no safety concerns are anticipated at the proposed site access. <p>b: The rail crossing currently consists of a warning system without gates, therefore, we have analyzed the rail crossing to determine whether an upgrade (to a warning system with gates) is warranted under the 2031 future total scenario. Information pertaining to the relevant rail crossing was obtained from GJR. The conditions outlined in Section 9.2 of Transport Canada's Grade Crossing Standards (January 2019) are not met. Therefore, no upgrades to the existing rail crossing are warranted. Refer to Appendix A of the Addendum</p>

	<p>TIS for email correspondence with GJR, relevant Grade Crossing Standards excerpts, and warrant analysis.</p> <p>3. Noted. 4. Noted. 5. Noted.</p>
Guelph Junction Railway (GJR)	
<p>-Possibility of additional signals required for new driveway entrance to the development.</p>	<p>Noted. Given the traffic volumes generated by the proposed development are low and as detailed in Section 6.1 of the Addendum Traffic Impact Study, the proposed Access Connection at Watson Road South is forecast to operate below capacity at a LOS "A" and LOS "B" during the a.m. and p.m. peak hours respectively. Accordingly, signals are not warranted at this intersection and therefore not recommended.</p>

PART A – INTRODUCTION

1 CITATIONS

The following are the citations for documents referred to in the Standards:

“**62-GP-11M** is the standard for *Marking Material, Retroreflective Elements, Adhesive Backing*, 62-GP-11M, published by the Canadian General Standards Board (CGSB), dated May 1978 - as amended in July 1987 (Amendment No 1);

“**AREMA Communications and Signals Manual**” is the 2014 edition of the *Communications and Signals Manual of Recommended Practice*, published by the Communications and Signals Group of the American Railway Engineering and Maintenance of Way Association, in effect on December 31, 2013;

“**ASTM D4956**” is the 11th edition of the *Standard Specification for Retroreflective Sheeting for Traffic Control*, published by the American Society for Testing and Materials, dated March 30, 2011;

“**GCS**” means the *Grade Crossings Standards*;

“**Manual of Uniform Traffic Control Devices for Canada**” refers to the 4th ed. of the *Manual of Uniform Traffic Control Devices for Canada*, prepared by the Traffic Operations and Management Standing Committee, published by the Transportation Association of Canada, dated September 1998.

2 INTERPRETATION

The following definitions apply in this Standard:

“**crossing user**” means drivers of vehicles, pedestrians, cyclists and persons using assistive devices;

“**cross-product**” means the product of the average annual daily railway movements and the average annual daily traffic of vehicles on the road that pass across the grade crossing;

“**travelled way**” means that part of a road intended for vehicular use, excluding shoulders.

Grade Crossings Standards, January 2019

9 WARNING SYSTEMS SPECIFICATION

9.1 The specifications for a public grade crossing at which a warning system without gates is required are as follows:

- a) where the forecast cross-product is 2,000 or more;
- b) Where there is no sidewalk, path or trail and the railway design speed is more than 129 km/hr (80 mph);
- c) Where there is a sidewalk, path or trail and the railway design speed is more than 81 km/hr (50 mph); or
- d) where the railway design speed is more than 25 km/hr (15 mph) but less than the railway design speed referred to in b) or c), as the case may be, and
 - i. where there are two or more lines of railway where railway equipment may pass each other; or
 - ii. the distance as shown in Figure 9-1(a) between a Stop sign at an intersection and the nearest rail in the crossing surface is less than 30 m; or
 - iii. in the case of an intersection with a traffic signal, the distance between the stop line of the intersection and the nearest rail in the crossing surface, as shown in Figure 9-1(b), is less than 60 m, or where there is no stop line, the distance between the travelled way and the nearest rail in the crossing surface is less than 60 m.

9.2 The specifications for a public grade crossing at which a warning system with gates is required are as follows:

9.2.1 a warning system is required under article 9.1 and;

- (a) the forecast cross-product is 50,000 or more;
- (b) there are two or more lines of railway where railway equipment may pass each other;
- (c) the railway design speed is more than 81 km/hr (50 mph);
- (d) the distance as shown in Figure 9-1(a) between a Stop sign at an intersection and the nearest rail in the crossing surface is less than 30 m; or
- (e) in the case of an intersection with a traffic signal, the distance between the stop line of the intersection and the nearest rail in the crossing surface, as shown in Figure 9-1(b), is less than 60 m, or where there is no stop line, the distance between the travelled way and the nearest rail in the crossing surface is less than 60 m.

9.3 The specifications for a private grade crossing at which a warning system without gates is required are as follows:

9.3.1 where the forecast cross-product is 2,000 or more, or

9.3.2 where the railway design speed is more than 25 km/hr (15 mph), and;

- (a) the forecast cross-product is 100 or more and there are two or more lines of railway where railway equipment may pass each other;
- (b) the forecast cross-product is 100 or more and grade crossing does not includes a sidewalk, path or trail and the railway design speed is more than 129 km/hr (80 mph); or
- (c) the grade crossing includes a sidewalk, path or trail and the railway design speed is more than 81 km/hr (50 mph).

AHV 124.75 vehicles per hour
 AADT 1996 vehicles per day

avg annual daily railway movements 6 trains per day (provided by GJR)

cross-product 11976 < 50000

Method 1

The Average Hourly Volume for a typical day can be estimated from the Peak Hour Volumes using the following relationships:

$$AHV = \frac{PHV}{2} \text{ or } AHV = \frac{amPHV + pmPHV}{4}$$

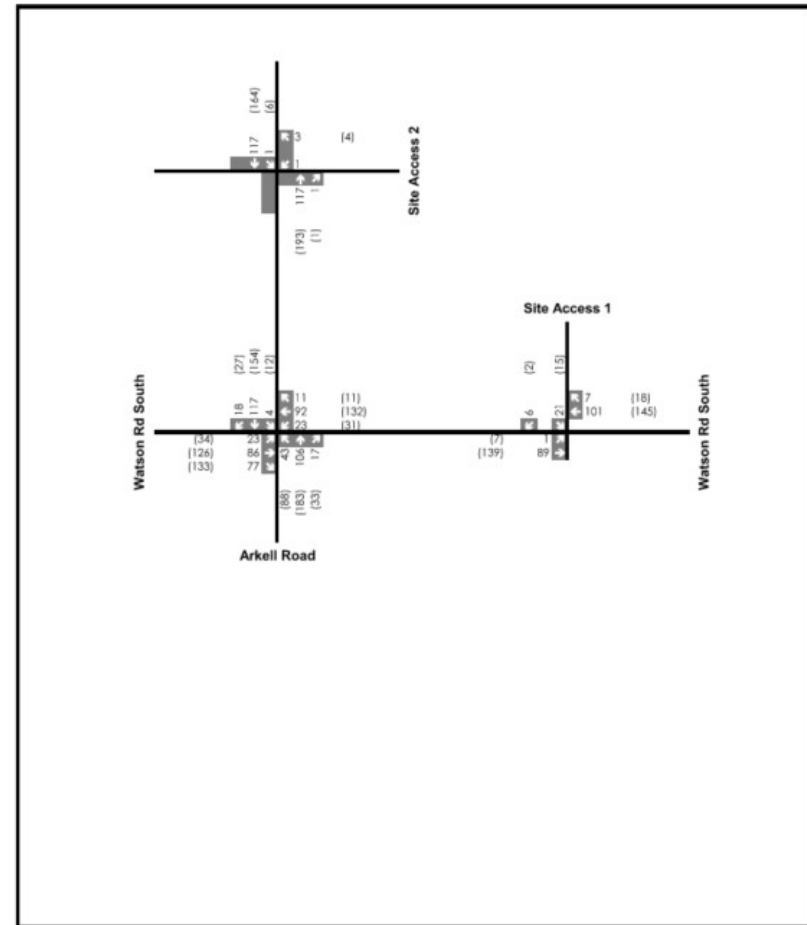
Alternately, the Average Hourly Volume for the eight highest hours of an average day can be estimated from Annual Average Daily Traffic (AADT) volume using the following relationship:

$$AHV = \frac{AADT}{16}$$

Method 2

Peak hour traffic volumes outlined above were converted to daily traffic projections using the following approach, which is generally accepted within the transportation industry:

$$AADT = PM \text{ Peak Hour Traffic} / 10\%$$



Legend xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	Arkell Developments		Figure 8 Project No. 2433-6446
	2031 Future Total Traffic Volumes		

From: Ryan Lafuente
Sent: February 24, 2026 11:39 AM
To: Les Petroczi
Cc: Masoud Imaniboossejin
Subject: RE: Arkell Subdivision – Proposed Public Road Access Near Watson Road South Grade Crossing

Hi Les,

Thank you for your prompt response. The information you've provided will be helpful.

Best regards,

Ryan Lafuente
Engineering Intern, Transportation
Office: 905.876.7111
Collingwood | Burlington | Toronto | Bradford | Guelph

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From: Les Petroczi <Les.Petroczi@guelph.ca>
Sent: February 24, 2026 11:16 AM
To: Ryan Lafuente <rlafuente@cfcrozier.ca>
Cc: Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>
Subject: Re: Arkell Subdivision – Proposed Public Road Access Near Watson Road South Grade Crossing

Please see below Ryan

Thank you
Les

From: Ryan Lafuente <rlafuente@cfcrozier.ca>
Sent: Tuesday, February 24, 2026 10:35 AM
To: Les Petroczi <Les.Petroczi@guelph.ca>
Cc: Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: Arkell Subdivision – Proposed Public Road Access Near Watson Road South Grade Crossing

[EXTERNAL EMAIL] This email originates outside the City of Guelph. Do not click links or attachments unless you recognize the sender and know the content is safe.

Hi Les,

I am writing on behalf of the Arkell Subdivision project, located at a section of Lots 7, 8, and 9, Concession 10, in the Township of Puslinch, County of Wellington.

As part of the proposed development, a new public road access is being planned approximately 50 metres from the existing railway crossing at Watson Road South. We would like to confirm that the proposed location of this access is acceptable and to determine whether any upgrades to the existing railway crossing may be warranted as a result of the development.

With a 50m distance additions signals will not be required.

Question:

Will a turning lane for the new proposed driveway be installed?

To support our assessment, we are seeking the following information related to the Watson Road South crossing:

- Whether the existing grade crossing is classified as a **public or private crossing**

Public Crossing

- The **average annual daily railway movements** at the Watson Road South crossing GJR can have up to 6 train movements per day through the crossing, 3 northbound and 3 southbound moves

- The **railway design speed** in the vicinity of the Watson Road South crossing Railway design speed is 25mph.

Please let us know if you require any additional information. Would be happy to coordinate further or discuss this in more detail if helpful.

Kind regards,

Ryan Lafuente

Engineering Intern, Transportation

Office: 905.876.7111

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Archived: September 19, 2023 1:46:22 PM

From: julia@salviniconsulting.com

Sent: Mon, 18 Sep 2023 14:41:57 +0000Received: from YT3PR01CA0145.CANPRD01.PROD.OUTLOOK.COM (2603:10b6:b01:83::14) by MN2PR03MB4992.namprd03.prod.outlook.com (2603:10b6:208:1aa::15) with Microsoft SMTP Server (version=TLS1_2, cipher=TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384) id 15.20.6792.26; Mon, 18 Sep 2023 14:41:54

+0000Received: from YT3CAN01FT019.eop

To: 'Lynne Banks'; Parth Bhatt

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Importance: Normal

Hi Parth,

Generally I'm okay with the Terms of Reference you've proposed. We will also be circulating to the rail authority to get their comments – I'll be curious to see how the new road connection works relative to the rail crossing.

There are no active developments in the area for you to include specifically so we are okay with the background growth rates recommended by the County.

I look forward to reviewing your study and feel free to reach out with any other questions.


Julia

Julia Salvini (she, her), PEng, FITE

President

julia@salviniconsulting.com

519-591-0426



From: Lynne Banks <lbanks@puslinch.ca>

Sent: Monday, September 18, 2023 10:33 AM

To: Parth Bhatt <pbhatt@cfcrozier.ca>

Cc: julia@salviniconsulting.com

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Parth –

I can confirm that Julia Salvini of Salvini Consulting will be reaching out to you directly regarding the TOR.

Thanks –

Lynne



Lynne Banks

Development and Legislative Coordinator

Township of Puslinch

7404 Wellington Rd 34, Puslinch ON N0B 2J0

519-763-1226 ext. 226 Fax 519-736-5846 www.puslinch.ca

From: Parth Bhatt <pbhatt@cfcrozier.ca>

Sent: Thursday, September 7, 2023 9:42 AM

To: Lynne Banks <lbanks@puslinch.ca>; Mike Fowler <mfowler@puslinch.ca>

Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Lynne,

Hope you are doing well. I am following up for the background development information. Did you hear anything? Let us know

Thanks

Parth

Parth Bhatt, M.Eng., P.Eng.

Project Engineer, Transportation

Office: 416.477.3392

Collingwood | Milton | Toronto | Bradford | Guelph

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From: Lynne Banks <lbanks@puslinch.ca>

Sent: Tuesday, August 29, 2023 2:09 PM

To: Parth Bhatt <pbhatt@cfcrozier.ca>; Mike Fowler <mfowler@puslinch.ca>

Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Parth –

Our consultant was on vacation for 2 weeks, but is reviewing your proposal now that she is back. I will forward comments to you once I receive them.

Regards –

Lynne



Lynne Banks
Development and Legislative Coordinator
Township of Puslinch
7404 Wellington Rd 34, Puslinch ON N0B 2J0
519-763-1226 ext. 226 Fax 519-736-5846 www.puslinch.ca

From: Parth Bhatt <pbhatt@cfcrozier.ca>

Sent: Thursday, August 24, 2023 10:04 AM

To: Lynne Banks <lbanks@puslinch.ca>; Mike Fowler <mfowler@puslinch.ca>

Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Lynne,

Hope you are doing well. I am following up with this email for my request on background development information. Did you hear anything? Let us know.

Thanks

Parth

Parth Bhatt, M.Eng., P.Eng.
Project Engineer, Transportation
Office: 416.477.3392
Collingwood | Milton | Toronto | Bradford | Guelph

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From: Parth Bhatt

Sent: Friday, August 18, 2023 4:24 PM

To: Lynne Banks <lbanks@puslinch.ca>; Mike Fowler <mfowler@puslinch.ca>

Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Lynne,

Please find the draft plan of subdivision attached. Thanks

Parth

From: Lynne Banks <lbanks@puslinch.ca>

Sent: Friday, August 18, 2023 3:54 PM

To: Parth Bhatt <pbhatt@cfcrozier.ca>; Mike Fowler <mfowler@puslinch.ca>

Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>

Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Parth –

Can you please provide me with a copy of the draft plan of subdivision and I will forward it, and the information below, to the Township's traffic consultant for review and comments regarding anything else that should be considered.

Thanks –

Lynne



Lynne Banks
Development and Legislative Coordinator
Township of Puslinch
7404 Wellington Rd 34, Puslinch ON N0B 2J0
519-763-1226 ext. 226 Fax 519-736-5846 www.puslinch.ca

From: Parth Bhatt <pbhatt@cfcrozier.ca>
Sent: Friday, August 18, 2023 3:19 PM
To: Mike Fowler <mfowler@puslinch.ca>; Lynne Banks <lbanks@puslinch.ca>
Cc: Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>
Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Mike and Lynne,
Can you please advise if any background developments should be accounted for in our analysis based on email chain below and also let us know if there are any comments on our Terms of Reference ? Thanks
Parth

Parth Bhatt, M.Eng., P.Eng.
Project Engineer, Transportation
Office: 416.477.3392
Collingwood | Milton | Toronto | Bradford | Guelph

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From: Pasquale Costanzo <pasqualec@wellington.ca>
Sent: Friday, August 18, 2023 1:49 PM
To: Parth Bhatt <pbhatt@cfcrozier.ca>; Kooistra, Tim <tkooistra@dillon.ca>
Cc: mfowler@puslinch.ca; Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>; Meagan Ferris <meaganf@wellington.ca>; Lynne Banks <lbanks@puslinch.ca>
Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Parth,

The Township would be your contact to provide you background developments for your study.

Pasquale Costanzo, C.E.T., CMMII Infrastructure Specialist
Technical Services Supervisor
County of Wellington, Roads Division
T 519.837.2601 x 2250
E pasqualec@wellington.ca

From: Parth Bhatt <pbhatt@cfcrozier.ca>
Sent: Friday, August 18, 2023 12:24 PM
To: Kooistra, Tim <tkooistra@dillon.ca>
Cc: mfowler@puslinch.ca; Pasquale Costanzo <pasqualec@wellington.ca>; Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>
Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you know the contents to be safe.

Hi Tim,

Hope you are doing well. I am following up regarding my email below for the background developments. Let us know if you have the information. Thanks

Parth

Parth Bhatt, M.Eng., P.Eng.
Project Engineer, Transportation
Office: 416.477.3392
Collingwood | Milton | Toronto | Bradford | Guelph

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From: Parth Bhatt
Sent: Tuesday, August 15, 2023 11:21 AM
To: Kooistra, Tim <tkooistra@dillon.ca>
Cc: mfowler@puslinch.ca; pasqualec@wellington.ca; Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>
Subject: RE: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Hi Tim,

Thanks for your feedback and TMC, can you please let us know the background developments that needs to be accounted and provide us with the respective traffic impact studies.

Parth

From: Kooistra, Tim <tkooistra@dillon.ca>
Sent: Tuesday, August 15, 2023 10:47 AM
To: Parth Bhatt <pbhatt@cfcrozier.ca>

Cc: mfwlower@puslinch.ca; pasqualec@wellington.ca; Brandon Bradt <bbradt@cfcrozier.ca>; Masoud Imaniboossejin <mimaniboossejin@cfcrozier.ca>
Subject: Re: Terms of Reference for residential development on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington

Good morning Parth,

Thank you for reaching out regarding the planned Transportation Impact Assessment you are looking to prepare for a proposed residential subdivision found within the community of Arkell in the Township of Puslinch. As you are aware, Dillon Consulting Limited has been retained by the County of Wellington to review the proposed scope of work for various traffic impact studies that may impact the County road network and associated intersections. As a result, this response is being provided on behalf of the County of Wellington for your consideration.

The scope you have identified is generally acceptable from the County's perspective, noting that the following needs to be considered in the study:

- Rather than having to collect a new turning movement count (TMC) at the Wellington Road 37 and Wellington Road 41 intersection in Arkell, you may be pleased to know that a TMC was completed at this intersection in 2022. This TMC is attached for your reference.
- A 2.0% per annum growth rate is required within the study area.
- The Township of Puslinch will need to identify any other background developments and/or associated traffic impact studies that have been previously submitted that may impact the future traffic volumes that need to be considered in the study.

Thank you,

Tim

Tim Kooistra, C.E.T.
Dillon Consulting Limited
130 Dufferin Avenue Suite 1400
London, Ontario, N6A 5R2
T - 519.438.1288 ext. 1330
F - 519.672.8209
M - 519.851.5403

TKooistra@dillon.ca
www.dillon.ca

On Fri, Aug 11, 2023 at 12:32\u00a0PM Parth Bhatt <pbhatt@cfcrozier.ca> wrote:

Good Evening Mike, Tim and Pasquale,

C.F. Crozier has been retained to complete a Traffic Impact Study (TIS) for a proposed residential development located on sections of Lots 7 and 8 of Concession 10, in the Township of Puslinch, County of Wellington. The subject lands cover an area of approximately 17 ha and currently consist of agricultural/vegetated land. The property, located on the southeast corner of the intersection at Arkell Road and Watson Road South, is bounded by a residential property to the north, agricultural/vegetated lands to the east, the Guelph Junction Railway to the south, and Watson Road/residential properties to the west.

The elements envisioned for this development include:

- Forty (40) Single detached residential properties (each lot will be 0.2 ha or larger).
- Associated internal public road network.
- Proposed Site Accesses via Watson Road South

For additional detail please refer to the preliminary Draft Plan of Subdivision attached here but note that it is subject to change prior to the submission.

Below are the proposed terms of reference for this developments Traffic impact Study (TIS). The TIS will be completed as per the County of Wellington's Traffic Impact Study Guidelines with the following assumptions:

Please provide feedback at the earliest possible. Should you have any questions or concerns, please feel free to contact us, we would be happy to discuss.

Thanks,

Parth

Based on the preliminary ITE Trip Generation estimates, approximately 32 and 42 new two-way a.m. and p.m. peak hour trips, respectively, are generated by the development. The TIS will evaluate the potential impacts of traffic generated by the proposed development during the weekday a.m. and p.m. peak hours. The study will consider the existing 2023, full build-out year (2026 assumed) as well as five years (2031) beyond full build-out in accordance with the County of Wellington's Traffic Impact Study Guidelines. The following intersections will be analyzed.

- Watson Road South and Arkell Road
- Proposed Site Accesses via Watson Road South

- Existing, future background and future total traffic operations will be analyzed using Synchro 11. Standard traffic operations metrics for signalized and unsignalized intersections including delays, volume-to-capacity ratios, and 95th percentile queue length will be analyzed and reported on.
- Existing counts will be undertaken to establish the 2023 existing traffic volumes.
- Based on AADT data; otherwise please advise the appropriate growth rates for the roadways listed above.
- Please advise if any background developments should be accounted for in our analysis.
- Trip distribution will be derived from a combination of 2016 Transportation Tomorrow Survey (TTS) data and existing travel patterns.
- Future total traffic operations will be compared to future background traffic operations under the future study horizon(s) to determine what mitigation measures are required on the boundary road network to accommodate the development. These mitigation measures may include auxiliary turn lanes, signalization, etc. as warranted.
- The proposed site accesses will be reviewed from a safety perspective with regards to design vehicle maneuverability (ie. waste vehicles and fire trucks), driver sight lines, intersection spacing and access configuration. The safety assessment will be based on the standards set out by the Transportation Associates of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) and the Transport Canada Grade Crossing Standards.
- The minimum vehicle parking requirements will be reviewed per the Township of Puslinch Zoning By-law 023-18 and compare with the proposed supply.
- The study findings regarding traffic operations, recommendations and conclusions will all be compiled for review.

Confirmation regarding traffic counts survey

We would like to confirm regarding traffic counts survey, as we are currently in month of August, does Township of Puslinch / County of Wellington permit traffic counts done in August as schools are currently closed and usually opens in September ?

Parth Bhatt, M.Eng., P.Eng.
Project Engineer, Transportation
Office: 416.477.3392
Collingwood | Milton | Toronto | Bradford | Guelph

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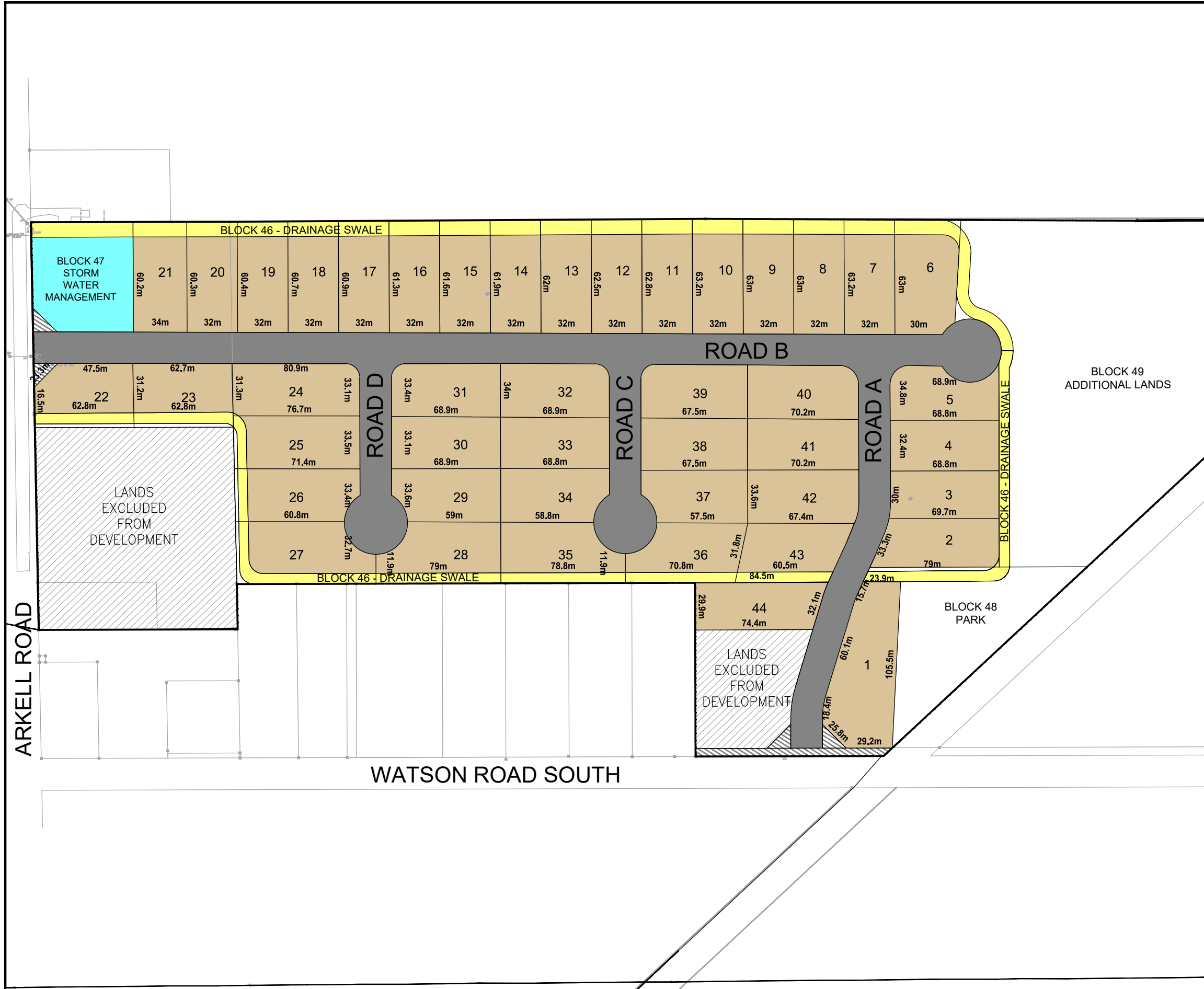
This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

Ce message est destiné uniquement aux personnes indiquées dans l'entête et peut contenir une information privilégiée, confidentielle ou privée et ne pouvant être divulguée. Si vous n'êtes pas le destinataire de ce message ou une personne autorisée à le recevoir, veuillez communiquer avec le soussigné et ensuite détruire ce message.

APPENDIX B

Site Plan

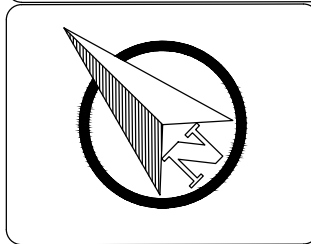
Lot No	Frontage (m)	Depth (m)	Area (ha)
1	94.2	44	0.39
2	33.3	79	0.23
3	30	69.7	0.21
4	32.4	68.8	0.21
5	34.8	68.8	0.21
6	37.9	63	0.24
7-20	32	63.2-60.3	0.2
21	34	60.2	0.21
22	47.5	31.2	0.19
23	62.7	31.2	0.19
24	33.1	76.7	0.26
25	33.5	71.4	0.24
26	33.4	60.8	0.23
27	32.7	60.8	0.23
28	32.5	79	0.22
29	33.6	59	0.22
30	33.1	68.9	0.23
31	33.4	68.9	0.23
32	34	68.9	0.22
33	32.5	68.8	0.22
34	33.9	58.8	0.22
35	32.5	78.8	0.22
36	32.5	70.8	0.2
37	33.6	57.5	0.22
38	32.5	67.5	0.22
39	34	67.5	0.23
40	34	70.2	0.24
41	32.5	70.2	0.23
42	33.6	67.4	0.24
43	33.5	60.5	0.2
44	32.1	74.4	0.24



Conceptual Plan
44 Lots
 PART OF LOTS 7, 8, & 9, CONCESSION 10
 ASSESSMENT ROLL NUMBER 2301000008034800000
 ARKELL, ONTARIO

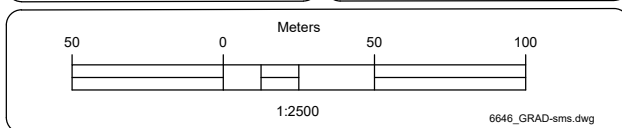
1. This is Not a Plan Of Survey.
2. Locations of Natural Features Have Been Extracted From The Government of Ontario: Land Information Ontario Open Data.
3. Distances Shown on This Plan Are Adjusted Ground Distances and Can Be Converted To Grid Distances by Multiplying by An Averaged Combined Scale Factor of 0.999636.
4. Coordinates on This Plan Are UTM, ZONE 17, NAD83 (CSRS-2010) Adjustment and Are Based on GPS Observations From a Network of Permanent GPS Reference Stations.

SAI Stovel and Associates Inc.
 651 Orangeville Road,
 Fergus ON
 N1M 1T9
 P: 519-766-8042
 E: stovel.associates@outlook.com
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DRAFT

July 29, 2025



ARKELL ROAD

WATSON ROAD SOUTH

BLOCK 49
 ADDITIONAL LANDS

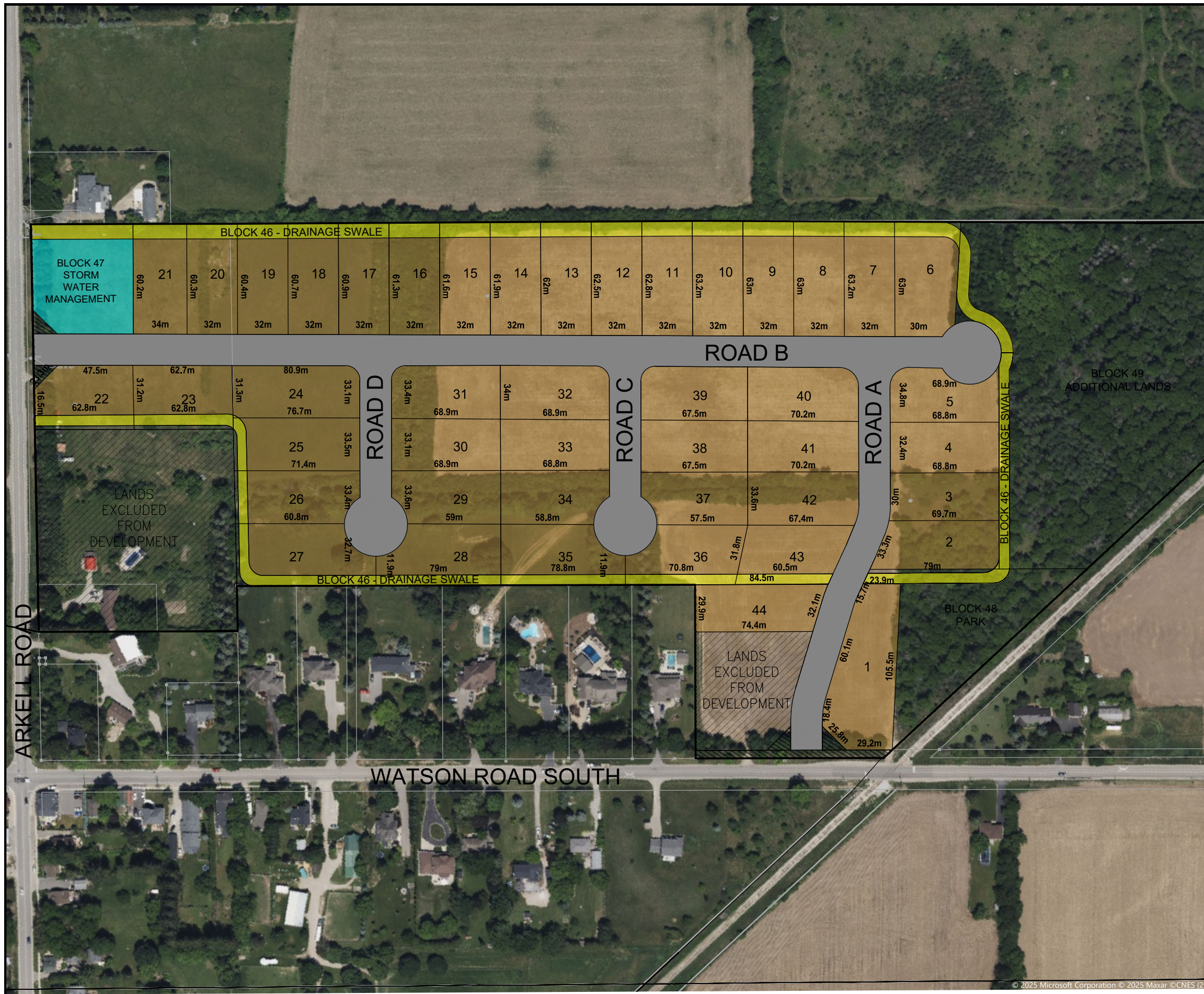
BLOCK 48
 PARK

LANDS
 EXCLUDED
 FROM
 DEVELOPMENT

LANDS
 EXCLUDED
 FROM
 DEVELOPMENT

BLOCK 47
 STORM
 WATER
 MANAGEMENT

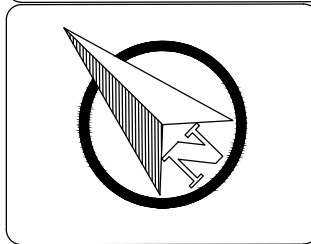
Lot No	Frontage (m)	Depth (m)	Area (ha)
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7-20	32	63.2-60.3	0.2
21	34	60.2	0.21
22	47.5	31.2	0.19
23	62.7	31.2	0.19
24	33.1	76.7	0.26
25	33.5	71.4	0.24
26	33.4	60.8	0.23
27	32.7	60.8	0.23
28	32.5	79	0.22
29	33.6	59	0.22
30	33.1	68.9	0.23
31	33.4	68.9	0.23
32	34	68.9	0.22
33	32.5	68.8	0.22
34	33.9	58.8	0.22
35	32.5	78.8	0.22
36	32.5	70.8	0.2
37	33.6	57.5	0.22
38	32.5	67.5	0.22
39	34	67.5	0.23
40	34	70.2	0.24
41	32.5	70.2	0.23
42	33.6	67.4	0.24
43	33.5	60.5	0.2
44	32.1	74.4	0.24



Conceptual Plan
44 Lots
 PART OF LOTS 7, 8, & 9, CONCESSION 10
 ASSESSMENT ROLL NUMBER 230100008034800000
 ARKELL, ONTARIO

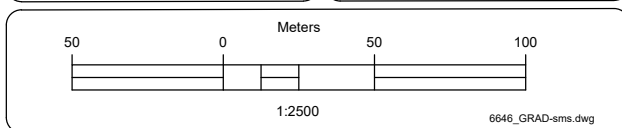
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DRAFT

July 29, 2025



APPENDIX C

Traffic Data

WELLINGTON COUNTY TRAFFIC COUNT SUMMARY

Intersection: WR 37 at WR 41 (Puslinch)
Site code: 00004137
Count date: 07/28/2022
Counted by: Shayna - student

North approach: WR 37 (major)					N/S totals	South approach: WR 37 (major)				
Hour	Right	Thru	Left	Peds		Hour	Right	Thru	Left	Peds
7:00	10	72	6	8	207	7:00	11	81	27	0
8:00	15	97	3	1	250	8:00	13	87	35	1
9:00	0	0	0	0	0	9:00	0	0	0	0
10:00	0	0	0	0	0	10:00	0	0	0	0
11:00	9	62	4	2	207	11:00	22	75	35	1
12:00	21	74	7	1	251	12:00	33	75	41	2
13:00	18	76	4	0	244	13:00	25	88	33	1
14:00	0	0	0	0	0	14:00	0	0	0	0
15:00	0	0	0	0	0	15:00	0	0	0	0
16:00	23	128	10	2	413	16:00	26	152	74	2
17:00	14	122	12	6	352	17:00	22	136	46	3
18:00	18	100	6	1	303	18:00	28	89	62	3
Totals	128	731	52	21		Totals	180	783	353	13

East approach: WR 41 (minor)					E/W totals	West approach: WR 41 (minor)				
Hour	Right	Thru	Left	Peds		Hour	Right	Thru	Left	Peds
7:00	3	43	9	3	176	7:00	42	65	14	1
8:00	9	72	19	2	255	8:00	64	72	19	1
9:00	0	0	0	0	0	9:00	0	0	0	0
10:00	0	0	0	0	0	10:00	0	0	0	0
11:00	11	49	25	5	182	11:00	39	41	17	4
12:00	7	60	25	3	199	12:00	41	44	22	1
13:00	13	70	21	0	209	13:00	40	47	18	2
14:00	0	0	0	0	0	14:00	0	0	0	0
15:00	0	0	0	0	0	15:00	0	0	0	0
16:00	9	110	24	0	382	16:00	111	100	28	1
17:00	9	87	27	0	300	17:00	66	83	28	6
18:00	8	79	29	4	219	18:00	41	47	15	26
Totals	69	570	179	17		Totals	444	499	161	42

Calculated values for traffic crossing major street

Hour:	7:00	8:00	11:00	12:00	13:00	16:00	17:00	18:00
Value:	186	222	176	197	201	364	316	257

WR 37 at WR 41 (Puslinch)

Count date: 07/28/2022
 Intersection: WR 37 at WR 41
 Major road: WR 37
 Major road runs: north/south (one lane each way)
 Speed of major road: 80 km/h
 Operating conditions: Free flow

WARRANT #1 MINIMUM VEHICULAR VOLUMES

SATISFIED

A. All approaches

No. of lanes	Minimum requirements					Hours								Percentage warrant
	1 lane each way		2 lanes each way		3+ lanes	7:00	8:00	11:00	12:00	13:00	16:00	17:00	18:00	
Flow cond'n	f. flow (code 1)	r. flow (code 2)	f. flow (code 3)	r. flow (code 4)	r. flow (code 5)									
100%	480	720	600	900	1125	383	505	389	450	453	795	652	522	100%
80%	385	575	480	720	900									NO
All approaches	100% fulfilled					0	100	0	0	0	100	100	100	400
	80% fulfilled					0	0	80	80	80	0	0	0	240
	Actual % if below 80%					80	0	0	0	0	0	0	0	80
													Total:	720
													Actual average (total/8):	90

B. Minor street both approaches

100%	120	170	120	170	170	176	255	182	199	209	382	300	219	100%
80%	95	135	95	135	135									YES
Both approaches	100% fulfilled					100	100	100	100	100	100	100	100	800
	80% fulfilled					0	0	0	0	0	0	0	0	0
	Actual % if below 80%					0	0	0	0	0	0	0	0	0
													Total:	800
													Actual average (total/8):	100

WR 37 at WR 41 (Puslinch)

Count date: 07/28/2022
 Intersection: WR 37 at WR 41
 Major road: WR 37
 Major road runs: north/south (one lane each way)
 Speed of major road: 80 km/h
 Operating conditions: Free flow

WARRANT #2 DELAY TO CROSS TRAFFIC

NOT SATISFIED

A. Major street both approaches

No. of lanes	Minimum requirements					Hours								Percentage warrant
	1 lane each way		2 lanes each way		3+ lanes	7:00	8:00	11:00	12:00	13:00	16:00	17:00	18:00	
Flow cond'n	f. flow (code 1)	r. flow (code 2)	f. flow (code 3)	r. flow (code 4)	r. flow (code 5)									
100%	480	720	600	900	1125	207	250	207	251	244	413	352	303	100%
80%	385	575	480	720	900									NO
All approaches	100% fulfilled					0	0	0	0	0	0	0	0	0
	80% fulfilled					0	0	0	0	0	80	0	0	80
	Actual % if below 80%					43	52	43	52	51	0	73	63	378
													Total:	458
													Actual average (total/8):	57

B. Traffic crossing major street

100%	50	75	50	75	75	186	222	176	197	201	364	316	257	100%
80%	40	60	40	60	60									YES
All approaches	100% fulfilled					100	100	100	100	100	100	100	100	800
	80% fulfilled					0	0	0	0	0	0	0	0	0
	Actual % if below 80%					0	0	0	0	0	0	0	0	0
													Total:	800
													Actual average (total/8):	100

WR 37 at WR 41 (Puslinch)	
Count date:	07/28/2022
Intersection:	WR 37 at WR 41
Major road:	WR 37
Major road runs:	north/south (one lane each way)
Speed of major road:	80 km/h
Operating conditions:	Free flow

WARRANT #3 ACCIDENT EXPERIENCE

A. Reportable accidents within a 12 month period averaged over 36 consecutive months susceptible to correction by a traffic signal			
Minimum requirements per year	Actual number of accidents in 36 months	Average number of accidents per year	Fulfilled
5	2	0.67	13%
B. Adequate trial of less restrictive remedies has failed to reduce accident frequency			No
C. Either Warrant 1 or Warrant 2 satisfied 80% or more			Yes

WARRANT #4 COMBINATION WARRANT (used if no warrant satisfied 100%)

Minimum requirements	Warrant satisfied 80% or more	Fulfilled
At least two warrants satisfied 80%	Warrant 1 (Minimum Vehicular Volume)	Yes
	Warrant 2 (Delay to Cross Traffic)	No
	Warrant 3 (Accident Experience)	No

CONCLUSION

Traffic signal is not warranted

APPENDIX D

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

















Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX E

Detailed Capacity Analysis Reports

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2023 Existing AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	73	65	19	73	9	36	89	13	3	99	15
Future Volume (vph)	19	73	65	19	73	9	36	89	13	3	99	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.944			0.988			0.987			0.983	
Flt Protected		0.994			0.991			0.987			0.999	
Satd. Flow (prot)	0	1748	0	0	1824	0	0	1815	0	0	1829	0
Flt Permitted		0.994			0.991			0.987			0.999	
Satd. Flow (perm)	0	1748	0	0	1824	0	0	1815	0	0	1829	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			515.6			455.7			424.1	
Travel Time (s)		29.9			37.1			32.8			30.5	
Confl. Peds. (#/hr)	2		1	1		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	79	71	21	79	10	39	97	14	3	108	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	171	0	0	110	0	0	150	0	0	127	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.6%
Analysis Period (min)	15
	ICU Level of Service A

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

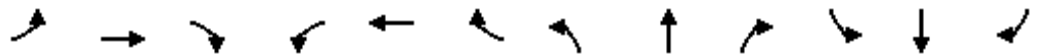
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	73	65	19	73	9	36	89	13	3	99	15
Future Vol, veh/h	19	73	65	19	73	9	36	89	13	3	99	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	79	71	21	79	10	39	97	14	3	108	16
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	8.6	9	8.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	12%	19%	3%
Vol Thru, %	64%	46%	72%	85%
Vol Right, %	9%	41%	9%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	157	101	117
LT Vol	36	19	19	3
Through Vol	89	73	73	99
RT Vol	13	65	9	15
Lane Flow Rate	150	171	110	127
Geometry Grp	1	1	1	1
Degree of Util (X)	0.197	0.214	0.146	0.166
Departure Headway (Hd)	4.738	4.506	4.781	4.7
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	755	795	748	760
Service Time	2.783	2.546	2.826	2.747
HCM Lane V/C Ratio	0.199	0.215	0.147	0.167
HCM Control Delay	9	8.8	8.6	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.8	0.5	0.6

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2023 Existing PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	29	102	113	24	112	9	75	155	27	10	131	23
Future Volume (vph)	29	102	113	24	112	9	75	155	27	10	131	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.991			0.986			0.981	
Flt Protected		0.994			0.992			0.986			0.997	
Satd. Flow (prot)	0	1737	0	0	1831	0	0	1811	0	0	1822	0
Flt Permitted		0.994			0.992			0.986			0.997	
Satd. Flow (perm)	0	1737	0	0	1831	0	0	1811	0	0	1822	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			513.9			455.7			424.1	
Travel Time (s)		29.9			37.0			32.8			30.5	
Confl. Peds. (#/hr)			1	1			2		2	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	111	123	26	122	10	82	168	29	11	142	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	266	0	0	158	0	0	279	0	0	178	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	50.2%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	102	113	24	112	9	75	155	27	10	131	23
Future Vol, veh/h	29	102	113	24	112	9	75	155	27	10	131	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	111	123	26	122	10	82	168	29	11	142	25
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.5	10.5	12.3	10.6
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	12%	17%	6%
Vol Thru, %	60%	42%	77%	80%
Vol Right, %	11%	46%	6%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	257	244	145	164
LT Vol	75	29	24	10
Through Vol	155	102	112	131
RT Vol	27	113	9	23
Lane Flow Rate	279	265	158	178
Geometry Grp	1	1	1	1
Degree of Util (X)	0.418	0.384	0.247	0.272
Departure Headway (Hd)	5.383	5.211	5.631	5.484
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	668	690	635	652
Service Time	3.427	3.258	3.682	3.534
HCM Lane V/C Ratio	0.418	0.384	0.249	0.273
HCM Control Delay	12.3	11.5	10.5	10.6
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2.1	1.8	1	1.1

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Background AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	78	69	21	78	10	39	95	14	4	106	16
Future Volume (vph)	21	78	69	21	78	10	39	95	14	4	106	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.988			0.987			0.983	
Flt Protected		0.994			0.990			0.987			0.999	
Satd. Flow (prot)	0	1750	0	0	1822	0	0	1815	0	0	1829	0
Flt Permitted		0.994			0.990			0.987			0.999	
Satd. Flow (perm)	0	1750	0	0	1822	0	0	1815	0	0	1829	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			515.6			455.7			424.1	
Travel Time (s)		29.9			37.1			32.8			30.5	
Confl. Peds. (#/hr)	2		1	1		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	85	75	23	85	11	42	103	15	4	115	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	183	0	0	119	0	0	160	0	0	136	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	36.7%
Analysis Period (min)	15
	ICU Level of Service A

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

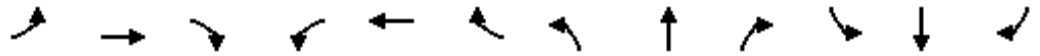
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	21	78	69	21	78	10	39	95	14	4	106	16
Future Vol, veh/h	21	78	69	21	78	10	39	95	14	4	106	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	85	75	23	85	11	42	103	15	4	115	17
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9	8.8	9.2	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	12%	19%	3%
Vol Thru, %	64%	46%	72%	84%
Vol Right, %	9%	41%	9%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	148	168	109	126
LT Vol	39	21	21	4
Through Vol	95	78	78	106
RT Vol	14	69	10	16
Lane Flow Rate	161	183	118	137
Geometry Grp	1	1	1	1
Degree of Util (X)	0.215	0.232	0.16	0.182
Departure Headway (Hd)	4.809	4.579	4.856	4.775
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	743	780	735	748
Service Time	2.862	2.629	2.911	2.83
HCM Lane V/C Ratio	0.217	0.235	0.161	0.183
HCM Control Delay	9.2	9	8.8	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.8	0.9	0.6	0.7

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Background PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	31	109	120	26	119	10	80	165	29	11	140	25
Future Volume (vph)	31	109	120	26	119	10	80	165	29	11	140	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.991			0.986			0.981	
Flt Protected		0.994			0.992			0.986			0.997	
Satd. Flow (prot)	0	1737	0	0	1831	0	0	1811	0	0	1822	0
Flt Permitted		0.994			0.992			0.986			0.997	
Satd. Flow (perm)	0	1737	0	0	1831	0	0	1811	0	0	1822	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			513.9			455.7			424.1	
Travel Time (s)		29.9			37.0			32.8			30.5	
Confl. Peds. (#/hr)			1	1			2		2	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	118	130	28	129	11	87	179	32	12	152	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	282	0	0	168	0	0	298	0	0	191	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	52.8%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

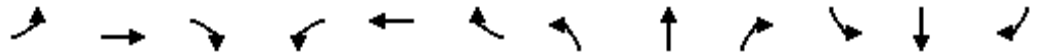
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	31	109	120	26	119	10	80	165	29	11	140	25
Future Vol, veh/h	31	109	120	26	119	10	80	165	29	11	140	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	118	130	28	129	11	87	179	32	12	152	27
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.3	11	13.2	11.1
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	12%	17%	6%
Vol Thru, %	60%	42%	77%	80%
Vol Right, %	11%	46%	6%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	274	260	155	176
LT Vol	80	31	26	11
Through Vol	165	109	119	140
RT Vol	29	120	10	25
Lane Flow Rate	298	283	168	191
Geometry Grp	1	1	1	1
Degree of Util (X)	0.457	0.421	0.271	0.3
Departure Headway (Hd)	5.525	5.36	5.798	5.644
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	649	670	617	633
Service Time	3.58	3.417	3.863	3.707
HCM Lane V/C Ratio	0.459	0.422	0.272	0.302
HCM Control Delay	13.2	12.3	11	11.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2.4	2.1	1.1	1.3

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Background AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	23	86	77	23	86	11	43	105	16	4	116	18
Future Volume (vph)	23	86	77	23	86	11	43	105	16	4	116	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.944			0.988			0.987			0.982	
Flt Protected		0.994			0.990			0.987			0.999	
Satd. Flow (prot)	0	1748	0	0	1822	0	0	1815	0	0	1827	0
Flt Permitted		0.994			0.990			0.987			0.999	
Satd. Flow (perm)	0	1748	0	0	1822	0	0	1815	0	0	1827	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			515.6			455.7			424.1	
Travel Time (s)		29.9			37.1			32.8			30.5	
Confl. Peds. (#/hr)	2		1	1		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	93	84	25	93	12	47	114	17	4	126	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	202	0	0	130	0	0	178	0	0	150	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.3%
Analysis Period (min)	15
	ICU Level of Service A

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

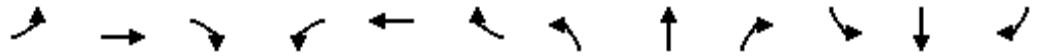
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	86	77	23	86	11	43	105	16	4	116	18
Future Vol, veh/h	23	86	77	23	86	11	43	105	16	4	116	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	93	84	25	93	12	47	114	17	4	126	20
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	9.1	9.6	9.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	12%	19%	3%
Vol Thru, %	64%	46%	72%	84%
Vol Right, %	10%	41%	9%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	164	186	120	138
LT Vol	43	23	23	4
Through Vol	105	86	86	116
RT Vol	16	77	11	18
Lane Flow Rate	178	202	130	150
Geometry Grp	1	1	1	1
Degree of Util (X)	0.243	0.263	0.18	0.204
Departure Headway (Hd)	4.912	4.679	4.971	4.885
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	726	762	716	729
Service Time	2.982	2.744	3.042	2.957
HCM Lane V/C Ratio	0.245	0.265	0.182	0.206
HCM Control Delay	9.6	9.4	9.1	9.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	1.1	0.7	0.8

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Background PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	120	133	29	132	11	88	182	32	12	154	27
Future Volume (vph)	34	120	133	29	132	11	88	182	32	12	154	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.937			0.991			0.986			0.981	
Flt Protected		0.994			0.992			0.986			0.997	
Satd. Flow (prot)	0	1735	0	0	1831	0	0	1811	0	0	1822	0
Flt Permitted		0.994			0.992			0.986			0.997	
Satd. Flow (perm)	0	1735	0	0	1831	0	0	1811	0	0	1822	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			513.9			455.7			424.1	
Travel Time (s)		29.9			37.0			32.8			30.5	
Confl. Peds. (#/hr)			1	1			2		2	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	130	145	32	143	12	96	198	35	13	167	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	312	0	0	187	0	0	329	0	0	209	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.0%
Analysis Period (min)	15
	ICU Level of Service B

Intersection	
Intersection Delay, s/veh	13.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	34	120	133	29	132	11	88	182	32	12	154	27
Future Vol, veh/h	34	120	133	29	132	11	88	182	32	12	154	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	130	145	32	143	12	96	198	35	13	167	29
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	14	12	15.2	12.2
HCM LOS	B	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	12%	17%	6%
Vol Thru, %	60%	42%	77%	80%
Vol Right, %	11%	46%	6%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	302	287	172	193
LT Vol	88	34	29	12
Through Vol	182	120	132	154
RT Vol	32	133	11	27
Lane Flow Rate	328	312	187	210
Geometry Grp	1	1	1	1
Degree of Util (X)	0.526	0.486	0.316	0.346
Departure Headway (Hd)	5.772	5.612	6.089	5.933
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	620	636	585	600
Service Time	3.855	3.697	4.188	4.027
HCM Lane V/C Ratio	0.529	0.491	0.32	0.35
HCM Control Delay	15.2	14	12	12.2
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	3.1	2.7	1.3	1.5

Lanes, Volumes, Timings
1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Total AM



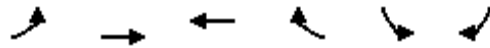
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	21	78	69	21	84	10	39	96	15	4	107	16
Future Volume (vph)	21	78	69	21	84	10	39	96	15	4	107	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.988			0.987			0.983	
Flt Protected		0.994			0.991			0.987			0.999	
Satd. Flow (prot)	0	1750	0	0	1824	0	0	1815	0	0	1829	0
Flt Permitted		0.994			0.991			0.987			0.999	
Satd. Flow (perm)	0	1750	0	0	1824	0	0	1815	0	0	1829	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			515.6			455.7			275.0	
Travel Time (s)		29.9			37.1			32.8			19.8	
Confl. Peds. (#/hr)	2		1	1		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	85	75	23	91	11	42	104	16	4	116	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	183	0	0	125	0	0	162	0	0	137	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.0%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings
 2: Watson Road S. (WR 41) & Site Access 1

2026 Future Total AM












Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	89	101	7	21	6
Future Volume (vph)	1	89	101	7	21	6
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991		0.968	
Flt Protected		0.999			0.963	
Satd. Flow (prot)	0	1861	1846	0	1736	0
Flt Permitted		0.999			0.963	
Satd. Flow (perm)	0	1861	1846	0	1736	0
Link Speed (k/h)		50	50		30	
Link Distance (m)		515.6	23.5		109.1	
Travel Time (s)		37.1	1.7		13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	97	110	8	23	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	98	118	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.7%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings
3: Arkell Road (WR 37) & Site Access 2

2026 Future Total AM

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	3	117	1	1	117
Future Volume (vph)	1	3	117	1	1	117
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.899		0.999			
Flt Protected	0.988					
Satd. Flow (prot)	1655	0	1861	0	0	1863
Flt Permitted	0.988					
Satd. Flow (perm)	1655	0	1861	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	178.3		275.0			149.1
Travel Time (s)	12.8		19.8			10.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	3	127	1	1	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	128	0	0	128
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Total AM



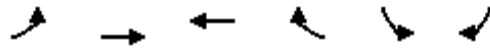
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	78	69	21	84	10	39	96	15	4	107	16
Future Volume (vph)	21	78	69	21	84	10	39	96	15	4	107	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	85	75	23	91	11	42	104	16	4	116	17

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	183	125	162	137
Volume Left (vph)	23	23	42	4
Volume Right (vph)	75	11	16	17
Hadj (s)	-0.19	0.02	0.03	-0.03
Departure Headway (s)	4.6	4.9	4.9	4.8
Degree Utilization, x	0.24	0.17	0.22	0.18
Capacity (veh/h)	721	678	691	687
Control Delay (s)	9.1	8.9	9.2	8.9
Approach Delay (s)	9.1	8.9	9.2	8.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay		9.0	
Level of Service		A	
Intersection Capacity Utilization	37.0%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 2: Watson Road S. (WR 41) & Site Access 1










2026 Future Total AM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	1	89	101	7	21	6
Future Volume (Veh/h)	1	89	101	7	21	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	97	110	8	23	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	118				213	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118				213	114
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	99
cM capacity (veh/h)	1470				775	939
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	98	118	30			
Volume Left	1	0	23			
Volume Right	0	8	7			
cSH	1470	1700	808			
Volume to Capacity	0.00	0.07	0.04			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.1	0.0	9.6			
Lane LOS	A		A			
Approach Delay (s)	0.1	0.0	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			15.7%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 3: Arkell Road (WR 37) & Site Access 2

2026 Future Total AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	3	117	1	1	117
Future Volume (Veh/h)	1	3	117	1	1	117
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	3	127	1	1	127
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	256	128			128	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	128			128	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	732	923			1458	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	4	128	128			
Volume Left	1	0	1			
Volume Right	3	1	0			
cSH	866	1700	1458			
Volume to Capacity	0.00	0.08	0.00			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	9.2	0.0	0.1			
Lane LOS	A		A			
Approach Delay (s)	9.2	0.0	0.1			
Approach LOS	A					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			17.0%		ICU Level of Service	A
Analysis Period (min)			15			

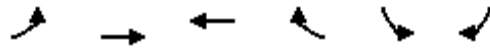
Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Total PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	115	120	28	119	10	80	166	30	11	140	25
Future Volume (vph)	31	115	120	28	119	10	80	166	30	11	140	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.939			0.991			0.985			0.981	
Flt Protected		0.994			0.991			0.986			0.997	
Satd. Flow (prot)	0	1739	0	0	1829	0	0	1809	0	0	1822	0
Flt Permitted		0.994			0.991			0.986			0.997	
Satd. Flow (perm)	0	1739	0	0	1829	0	0	1809	0	0	1822	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			513.9			455.7			281.0	
Travel Time (s)		29.9			37.0			32.8			20.2	
Confl. Peds. (#/hr)			1	1			2		2	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	125	130	30	129	11	87	180	33	12	152	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	170	0	0	300	0	0	191	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	53.0%						ICU Level of Service A					
Analysis Period (min)	15											

Lanes, Volumes, Timings
 2: Watson Road S. (WR 41) & Site Access 1

2026 Future Total PM












Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	139	145	18	15	2
Future Volume (vph)	7	139	145	18	15	2
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.985		0.985	
Flt Protected		0.997			0.957	
Satd. Flow (prot)	0	1857	1835	0	1756	0
Flt Permitted		0.997			0.957	
Satd. Flow (perm)	0	1857	1835	0	1756	0
Link Speed (k/h)		50	50		30	
Link Distance (m)		513.9	23.5		109.1	
Travel Time (s)		37.0	1.7		13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	151	158	20	16	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	159	178	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.0%
Analysis Period (min)	15
	ICU Level of Service A

















Lanes, Volumes, Timings
3: Arkell Road (WR 37) & Site Access 2

2026 Future Total PM

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	4	193	1	6	164
Future Volume (vph)	0	4	193	1	6	164
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865		0.999			
Flt Protected						0.998
Satd. Flow (prot)	1611	0	1861	0	0	1859
Flt Permitted						0.998
Satd. Flow (perm)	1611	0	1861	0	0	1859
Link Speed (k/h)	50		50			50
Link Distance (m)	190.1		281.0			143.1
Travel Time (s)	13.7		20.2			10.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	4	210	1	7	178
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	211	0	0	185
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.5%		ICU Level of Service A			
Analysis Period (min)	15					

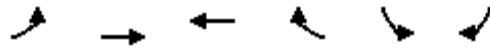
HCM Unsignalized Intersection Capacity Analysis
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2026 Future Total PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	31	115	120	28	119	10	80	166	30	11	140	25
Future Volume (vph)	31	115	120	28	119	10	80	166	30	11	140	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	125	130	30	129	11	87	180	33	12	152	27
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	289	170	300	191								
Volume Left (vph)	34	30	87	12								
Volume Right (vph)	130	11	33	27								
Hadj (s)	-0.21	0.03	0.03	-0.04								
Departure Headway (s)	5.4	5.9	5.6	5.7								
Degree Utilization, x	0.44	0.28	0.47	0.30								
Capacity (veh/h)	611	545	595	564								
Control Delay (s)	12.6	11.1	13.4	11.2								
Approach Delay (s)	12.6	11.1	13.4	11.2								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay			12.3									
Level of Service			B									
Intersection Capacity Utilization			53.0%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 2: Watson Road S. (WR 41) & Site Access 1

2026 Future Total PM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	7	139	145	18	15	2
Future Volume (Veh/h)	7	139	145	18	15	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	151	158	20	16	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	178				335	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	178				335	168
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	100
cM capacity (veh/h)	1398				656	876
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	159	178	18			
Volume Left	8	0	16			
Volume Right	0	20	2			
cSH	1398	1700	675			
Volume to Capacity	0.01	0.10	0.03			
Queue Length 95th (m)	0.1	0.0	0.7			
Control Delay (s)	0.4	0.0	10.5			
Lane LOS	A		B			
Approach Delay (s)	0.4	0.0	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			23.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Arkell Road (WR 37) & Site Access 2

















2026 Future Total PM



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	4	193	1	6	164
Future Volume (Veh/h)	0	4	193	1	6	164
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	210	1	7	178
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	402	210			211	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	402	210			211	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	601	830			1360	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	4	211	185			
Volume Left	0	0	7			
Volume Right	4	1	0			
cSH	830	1700	1360			
Volume to Capacity	0.00	0.12	0.01			
Queue Length 95th (m)	0.1	0.0	0.1			
Control Delay (s)	9.4	0.0	0.3			
Lane LOS	A		A			
Approach Delay (s)	9.4	0.0	0.3			
Approach LOS	A					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			23.5%	ICU Level of Service	A	
Analysis Period (min)			15			

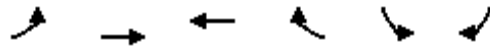
Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Total AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	86	77	23	92	11	43	106	17	4	117	18
Future Volume (vph)	23	86	77	23	92	11	43	106	17	4	117	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.944			0.988			0.986			0.982	
Flt Protected		0.994			0.991			0.987			0.999	
Satd. Flow (prot)	0	1748	0	0	1824	0	0	1813	0	0	1827	0
Flt Permitted		0.994			0.991			0.987			0.999	
Satd. Flow (perm)	0	1748	0	0	1824	0	0	1813	0	0	1827	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			515.6			455.7			273.7	
Travel Time (s)		29.9			37.1			32.8			19.7	
Confl. Peds. (#/hr)	2		1	1		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	93	84	25	100	12	47	115	18	4	127	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	202	0	0	137	0	0	180	0	0	151	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	39.6%					ICU Level of Service A						
Analysis Period (min)	15											

Lanes, Volumes, Timings
 2: Watson Road S. (WR 41) & Site Access 1

2031 Future Total AM












Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	89	101	7	21	6
Future Volume (vph)	1	89	101	7	21	6
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991		0.968	
Flt Protected		0.999			0.963	
Satd. Flow (prot)	0	1861	1846	0	1736	0
Flt Permitted		0.999			0.963	
Satd. Flow (perm)	0	1861	1846	0	1736	0
Link Speed (k/h)		50	50		30	
Link Distance (m)		515.6	23.5		109.1	
Travel Time (s)		37.1	1.7		13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	97	110	8	23	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	98	118	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.7%
Analysis Period (min)	15
	ICU Level of Service A

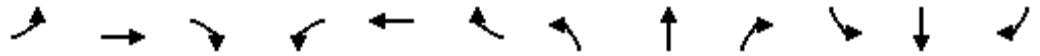
Lanes, Volumes, Timings
3: Arkell Road (WR 37) & Site Access 2

2031 Future Total AM

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	3	117	1	1	117
Future Volume (vph)	1	3	117	1	1	117
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.899		0.999			
Flt Protected	0.988					
Satd. Flow (prot)	1655	0	1861	0	0	1863
Flt Permitted	0.988					
Satd. Flow (perm)	1655	0	1861	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	168.4		273.7			150.4
Travel Time (s)	12.1		19.7			10.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	3	127	1	1	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	128	0	0	128
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Total AM



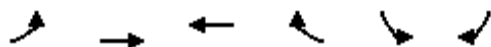
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	86	77	23	92	11	43	106	17	4	117	18
Future Volume (vph)	23	86	77	23	92	11	43	106	17	4	117	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	93	84	25	100	12	47	115	18	4	127	20

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	202	137	180	151
Volume Left (vph)	25	25	47	4
Volume Right (vph)	84	12	18	20
Hadj (s)	-0.19	0.02	0.03	-0.04
Departure Headway (s)	4.8	5.0	5.0	5.0
Degree Utilization, x	0.27	0.19	0.25	0.21
Capacity (veh/h)	701	654	669	665
Control Delay (s)	9.5	9.2	9.6	9.3
Approach Delay (s)	9.5	9.2	9.6	9.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay		9.4	
Level of Service		A	
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 2: Watson Road S. (WR 41) & Site Access 1










2031 Future Total AM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	89	101	7	21	6
Future Volume (Veh/h)	1	89	101	7	21	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	97	110	8	23	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	118				213	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118				213	114
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	99
cM capacity (veh/h)	1470				775	939
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	98	118	30			
Volume Left	1	0	23			
Volume Right	0	8	7			
cSH	1470	1700	808			
Volume to Capacity	0.00	0.07	0.04			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.1	0.0	9.6			
Lane LOS	A		A			
Approach Delay (s)	0.1	0.0	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			15.7%	ICU Level of Service	A	
Analysis Period (min)			15			

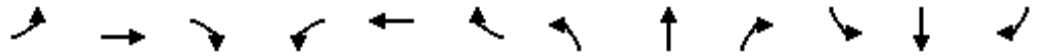
HCM Unsignalized Intersection Capacity Analysis
3: Arkell Road (WR 37) & Site Access 2

2031 Future Total AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	3	117	1	1	117
Future Volume (Veh/h)	1	3	117	1	1	117
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	3	127	1	1	127
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	256	128			128	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	128			128	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	732	923			1458	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	4	128	128			
Volume Left	1	0	1			
Volume Right	3	1	0			
cSH	866	1700	1458			
Volume to Capacity	0.00	0.08	0.00			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	9.2	0.0	0.1			
Lane LOS	A		A			
Approach Delay (s)	9.2	0.0	0.1			
Approach LOS	A					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			17.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Total PM



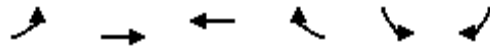
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	34	126	133	31	132	11	88	183	33	12	154	27
Future Volume (vph)	34	126	133	31	132	11	88	183	33	12	154	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.939			0.991			0.985			0.981	
Flt Protected		0.994			0.991			0.986			0.997	
Satd. Flow (prot)	0	1739	0	0	1829	0	0	1809	0	0	1822	0
Flt Permitted		0.994			0.991			0.986			0.997	
Satd. Flow (perm)	0	1739	0	0	1829	0	0	1809	0	0	1822	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		415.4			513.9			455.7			278.3	
Travel Time (s)		29.9			37.0			32.8			20.0	
Confl. Peds. (#/hr)			1	1			2		2	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	137	145	34	143	12	96	199	36	13	167	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	319	0	0	189	0	0	331	0	0	209	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.2%
ICU Level of Service	B
Analysis Period (min)	15

Lanes, Volumes, Timings
 2: Watson Road S. (WR 41) & Site Access 1

2031 Future Total PM












Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	139	145	18	15	2
Future Volume (vph)	7	139	145	18	15	2
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.985		0.985	
Flt Protected		0.997			0.957	
Satd. Flow (prot)	0	1857	1835	0	1756	0
Flt Permitted		0.997			0.957	
Satd. Flow (perm)	0	1857	1835	0	1756	0
Link Speed (k/h)		50	50		30	
Link Distance (m)		513.9	23.5		109.1	
Travel Time (s)		37.0	1.7		13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	151	158	20	16	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	159	178	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.0%
Analysis Period (min)	15
	ICU Level of Service A

















Lanes, Volumes, Timings
3: Arkell Road (WR 37) & Site Access 2

2031 Future Total PM

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	4	193	1	6	164
Future Volume (vph)	0	4	193	1	6	164
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865		0.999			
Flt Protected						0.998
Satd. Flow (prot)	1611	0	1861	0	0	1859
Flt Permitted						0.998
Satd. Flow (perm)	1611	0	1861	0	0	1859
Link Speed (k/h)	50		50			50
Link Distance (m)	172.3		278.3			145.8
Travel Time (s)	12.4		20.0			10.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	4	210	1	7	178
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	211	0	0	185
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.5%		ICU Level of Service A			
Analysis Period (min)	15					

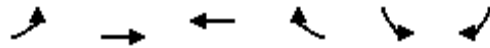
HCM Unsignalized Intersection Capacity Analysis
 1: Arkell Road (WR 37) & Watson Road S. (WR 41)

2031 Future Total PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	34	126	133	31	132	11	88	183	33	12	154	27
Future Volume (vph)	34	126	133	31	132	11	88	183	33	12	154	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	137	145	34	143	12	96	199	36	13	167	29
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	319	189	331	209								
Volume Left (vph)	37	34	96	13								
Volume Right (vph)	145	12	36	29								
Hadj (s)	-0.22	0.03	0.03	-0.04								
Departure Headway (s)	5.7	6.3	5.9	6.1								
Degree Utilization, x	0.51	0.33	0.54	0.35								
Capacity (veh/h)	579	502	566	519								
Control Delay (s)	14.6	12.3	15.7	12.4								
Approach Delay (s)	14.6	12.3	15.7	12.4								
Approach LOS	B	B	C	B								
Intersection Summary												
Delay			14.1									
Level of Service			B									
Intersection Capacity Utilization			57.2%	ICU Level of Service	B							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 2: Watson Road S. (WR 41) & Site Access 1

2031 Future Total PM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	139	145	18	15	2
Future Volume (Veh/h)	7	139	145	18	15	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	151	158	20	16	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	178			335	168	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	178			335	168	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			98	100	
cM capacity (veh/h)	1398			656	876	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	159	178	18			
Volume Left	8	0	16			
Volume Right	0	20	2			
cSH	1398	1700	675			
Volume to Capacity	0.01	0.10	0.03			
Queue Length 95th (m)	0.1	0.0	0.7			
Control Delay (s)	0.4	0.0	10.5			
Lane LOS	A		B			
Approach Delay (s)	0.4	0.0	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			23.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Arkell Road (WR 37) & Site Access 2

2031 Future Total PM



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	4	193	1	6	164
Future Volume (Veh/h)	0	4	193	1	6	164
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	210	1	7	178
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	402	210			211	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	402	210			211	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	601	830			1360	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	4	211	185			
Volume Left	0	0	7			
Volume Right	4	1	0			
cSH	830	1700	1360			
Volume to Capacity	0.00	0.12	0.01			
Queue Length 95th (m)	0.1	0.0	0.1			
Control Delay (s)	9.4	0.0	0.3			
Lane LOS	A		A			
Approach Delay (s)	9.4	0.0	0.3			
Approach LOS	A					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			23.5%	ICU Level of Service		A
Analysis Period (min)			15			

APPENDIX F

TTS Data

Wed Aug 16 2023 22:26:10 GMT-0400 (Eastern Daylight Time) - Run Time: 2393ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

2006 GTA zone of destination - gta06_dest In 8303

and

Start time of trip - start_time In 0630-0930

and

Trip purpose of destination - purp_dest In H

Trip 2016

Table:

	8303
8057	15
8171	24
8195	24

Wed Aug 16 2023 22:42:01 GMT-0400 (Eastern Daylight Time) - Run Time: 2432ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

2006 GTA zone of origin - gta06_orig In 8303

and

Start time of trip - start_time In 0630-0930

and

Trip purpose of origin - purp_orig In H

Trip 2016

Table:

	8303
52	12
3357	36
4126	13
7016	24
8035	12
8057	36
8086	24
8091	12
8092	22
8107	36
8151	12
8165	30
8195	24
8199	49

Wed Aug 16 2023 22:56:15 GMT-0400 (Eastern Daylight Time) - Run Time: 2512ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

2006 GTA zone of destination - gta06_dest In 8303

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of destination - purp_dest In H

Trip 2016

Table:

	8303
52	12
3357	36
4143	24
7016	24
8029	36
8035	12
8048	21
8057	36
8086	24
8107	36
8165	30
8195	24
8307	15

Wed Aug 16 2023 23:15:50 GMT-0400 (Eastern Daylight Time) - Run Time: 2427ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

2006 GTA zone of origin - gta06_orig In 8303

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of origin - purp_orig In H

Trip 2016

Table:

	8303
8029	36
8048	21
8057	15
8082	72
8169	12
8195	24

Township of Puslinch	C.F. Crozier & Associates Inc. Comment Responses
Traffic	
<p>- The TIS continues to say that the proposed road connection to Arkell Road is for emergency purposes, but the site concept plan that was included with the application appears to include a fully open public road connection. As Arkell Road is a Wellington County Road, I will defer to the County to comment on the proposed road connection. The addition of a second road connection for the subdivision would result in more routing options for traffic and less traffic at the Watson Road South connection near the railway and reduced impacts on any one traffic movement at the Watson/Arkell intersection.</p>	<p>Noted. The Addendum TIS has assessed the impact of the proposed development on the boundary road network under the assumption that the site will be served by two access connections, one to Watson Road South and the other to Arkell Road.</p>
<p>- The study maintains analysis for 50 units when 44 are now proposed. A reduction in the number of units would result in fewer trips on the road network so the current analysis is conservative.</p>	<p>Noted. The addendum TIS maintains the trip generation based on an older site plan which had 50 residential properties. It's noted that this was conservatively maintained as no material change in transportation operations or recommendations is expected.</p>
<p>- The TIS indicates that the sight distance assessment was based on a review of base mapping and aerial mapping. The aerial mapping in the TIS illustrates the available sight distance in plan view, but does not confirm that there are no vertical curves in the road. Were vertical road plans reviewed to confirm the sight distance or did the consultant do a field visit to confirm? How was the available sight distance confirmed?</p>	<p>Noted. A field visit was conducted to confirm the adequacy of the available sightlines.</p> <p>The field visit confirmed the following:</p> <ul style="list-style-type: none"> • There were no visual obstructions along Arkell Road, with sight distances exceeding 190 meters to the right and 165 meters to the left. Given the design speed of 90 km/h, the minimum required sight distances are 165 meters for right turns and 190 meters for left turns. Since the available sight distances surpass these requirements in both directions, all safety standards are met and no concerns regarding site access are expected.

	<ul style="list-style-type: none"> On Watson Road South, the available sight distance was 190 m looking south and over 150 m looking north. With a design speed of 60 km/h, the required minimum sight distances are 110 m for right turns and 130 m for left turns. Since available sight distances are 150 m (right) and 190 m (left), all minimum requirements are met and no safety concerns are anticipated at the proposed site access.
<p>- Guelph Junction Railway provided comments indicating that additional signals may be required for the new driveway entrance. The consultant team has indicated that traffic signals will not be required at the new road connection to Watson Road, but it's possible that GJR was referring to railway signals or other technical requirements at the rail/road crossing. I would like to receive a copy of any further comments provided by GJR when and if they become available to understand if they are in agreement with the new road location.</p>	<p>Noted. The rail crossing currently consists of a warning system without gates, therefore, we have analyzed the rail crossing to determine whether an upgrade (to a warning system with gates) is warranted under the 2031 future total scenario. Information pertaining to the relevant rail crossing was obtained from GJR. The conditions outlined in Section 9.2 of Transport Canada's Grade Crossing Standards (January 2019) are not met. Therefore, no upgrades to the existing rail crossing are warranted. Refer to Appendix A of the Addendum TIS for email correspondence with GJR, relevant Grade Crossing Standards excerpts, and warrant analysis.</p>
<p>- The changes in the plan to include a new road connection and fewer units would impact how much traffic access the road network and how. Additionally, my previous comment about the routing of traffic applies to this study since the analysis is the same. It is still my opinion that updating the analysis to reflect an additional road connection, fewer units, and a modified assignment of traffic would not materially change the capacity analyses and would not change the recommendations in the report. The two study area intersections are forecast to operate at good levels of service and the traffic volumes generated by the proposal are low.</p>	<p>Noted.</p>

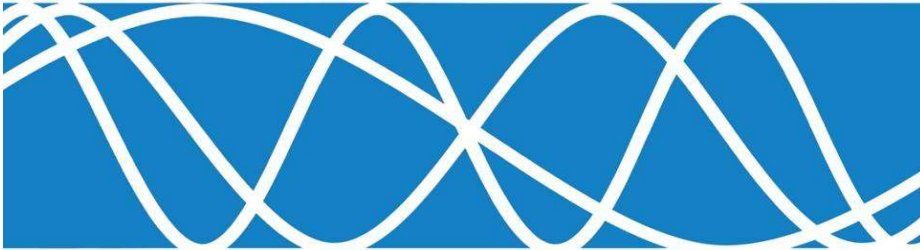
<p>-The County and their consultant may have additional comments based on their review of the proposed road connection to Arkell Road and the Watson/Arkell intersection.</p>	<p>Noted.</p>
<p>In response to the Township's request, I offer the following feedback:</p> <ol style="list-style-type: none"> 1. The Zoning By-law Amendment application can be deemed complete from a transportation perspective and I am in support of the application. 2. Conditions of approval should include: <ol style="list-style-type: none"> a. confirmation of how the sight distance was measured on Watson Road South, and b. confirmation from Guelph Junction Railway that they will support the location of the new road connection to Watson Road South adjacent to the at-grade railway crossing. 3. n/a 4. Technical requirements are described in point 2 above. 5. No additional requirements beyond those identified in point 2 above. 	<p>1. Noted.</p> <p>2.</p> <p>a: A field visit was conducted to confirm the adequacy of the available sightlines. The field visit confirmed the following:</p> <ul style="list-style-type: none"> • There were no visual obstructions along Arkell Road, with sight distances exceeding 190 meters to the right and 165 meters to the left. Given the design speed of 90 km/h, the minimum required sight distances are 165 meters for right turns and 190 meters for left turns. Since the available sight distances surpass these requirements in both directions, all safety standards are met and no concerns regarding site access are expected. • On Watson Road South, the available sight distance was 190 m looking south and over 150 m looking north. With a design speed of 60 km/h, the required minimum sight distances are 110 m for right turns and 130 m for left turns. Since available sight distances are 150 m (right) and 190 m (left), all minimum requirements are met and no safety concerns are anticipated at the proposed site access. <p>b: The rail crossing currently consists of a warning system without gates, therefore, we have analyzed the rail crossing to determine whether an upgrade (to a warning system with gates) is warranted under the 2031 future total scenario. Information pertaining to the relevant rail crossing was obtained from GJR. The conditions outlined in Section 9.2 of Transport Canada's Grade Crossing Standards (January 2019) are not met. Therefore, no upgrades to the existing rail crossing are warranted. Refer to Appendix A of the Addendum</p>

	<p>TIS for email correspondence with GJR, relevant Grade Crossing Standards excerpts, and warrant analysis.</p> <p>3. Noted. 4. Noted. 5. Noted.</p>
Guelph Junction Railway (GJR)	
<p>-Possibility of additional signals required for new driveway entrance to the development.</p>	<p>Noted. Given the traffic volumes generated by the proposed development are low and as detailed in Section 6.1 of the Addendum Traffic Impact Study, the proposed Access Connection at Watson Road South is forecast to operate below capacity at a LOS "A" and LOS "B" during the a.m. and p.m. peak hours respectively. Accordingly, signals are not warranted at this intersection and therefore not recommended.</p>

Noise and Vibration Feasibility Study

Proposed Residential Development, Arkell Subdivision, South of Arkell Road and East of Watson Road South, Puslinch, Ontario

April 7, 2026
HGC Project #: 02600117



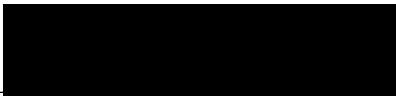
Prepared for:

Timberworx Custom Homes Inc.
and Sloat Construction Ltd.
#201-1 Queen Street North
Kitchener, Ontario
N2H 2G7

Version Control
Noise and Vibration Feasibility Study, Proposed Residential Development, Arkell Subdivision, Puslinch, Ontario

Ver.	Date	Version Description	Prepared By
1.0	April 7, 2026	Noise and Vibration Study in support of the approvals process.	E. Jaklic / S. Paul

Prepared by:



Elise Jaklic, BEng

Reviewed by:



Sheeba Paul, MEng, P.Eng



Howe Gastmeier Chapnik Limited

Limitations

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Figure 1 – Key Plan

Figure 2 – Proposed Concept Plan Showing Prediction Locations

Figure 3 – Proposed Concept Plan Showing Brick Exterior Façade Construction Requirements

Figure 4 – Proposed Concept Plan Showing Ventilation and Barrier Requirements

APPENDIX A – GJR Spur Line Requirements

APPENDIX B – Road Traffic Data

APPENDIX C – Rail Traffic Data

APPENDIX D – Sample STAMSON 5.04 Output

APPENDIX E – Detailed Plots of Measured Vibration Levels and Peak Acceleration Spectra



1 INTRODUCTION AND SUMMARY

HGC Noise Vibration Acoustics was retained by Timberworx Custom Homes Inc. and Sloop Construction Ltd. to conduct a noise and vibration feasibility study for a proposed residential development to be located south of Arkell Road and East of Watson Road South, in Puslinch, Ontario. The development concept includes 44 low-density dwellings. The study is required as part of the planning and approvals process by the municipality and the railway.

The primary source of noise in the area is rail traffic on the Guelph Junction Railway (GJR) to the south. Road traffic on Watson Road South and Arkell Road, located to the west and north, respectively, are secondary sources of noise. Rail traffic data for the GJR railway was obtained from GJR railway personnel. Road traffic data for Watson Road South was obtained from the Town of Puslinch, and the road traffic data for Arkell Road was obtained by County of Wellington. The data was used to predict future traffic sound levels at various locations at the development. The predicted sound levels were compared to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP) and the railway.

The sound level predictions indicate that with suitable noise control measures integrated into the design of the residential buildings, it is feasible to achieve the MECP guideline sound levels for transportation noise. Central air conditioning systems and upgraded window glazing assemblies are required for the future dwelling on the lot closest to the railway line. The provision for the future installation of air conditioning at the occupant's discretion is required for dwellings with exposure to roadway/railway. Physical mitigation in the form of acoustic barrier is required for the southern dwelling closest to the railway line. The first row of dwellings nearest the railway requires a brick veneer or masonry equivalent construction for the façade facing the railway line. When final lotting and grading plans are available for the proposed development, window glazing requirements and acoustic barrier heights should be refined.



Ground-borne vibration levels from rail pass-bys were measured on grade at the site at the closest lot to the railway line and were found to exceed CN/GJR limits for some of the train pass-bys. It is recommended that the future dwelling on Lot 1 have a minimum distance of 45 m from the railway right-of-way, to reduce the vibration levels. Further mitigation is not recommended at this time. When architectural drawings are available, they should be reviewed to confirm the exterior wall construction and location of the residential unit which form the basis for this report. In any event, warning clauses are required in the property and tenancy agreements of the dwelling units to inform the future owners and tenants of the possible vibration excesses.

The MECP and CN/GJR guidelines also recommend that warning clauses be used to inform future residents of the traffic noise impacts.

2 SITE DESCRIPTION AND NOISE SOURCES

Figure 1 is a key plan showing the location of the proposed development. The development is south of Arkell Road and east of Watson Road South in Puslinch, Ontario. Figure 2 is a proposed concept plan dated January 2026. The proposed development consists of 44 lots of low-density dwellings and associated at-grade roadways.

Site visits were made by HGC personnel in March 2026, to make observations of the acoustical environment and to perform ground-borne vibration measurements. During the site visit, it was observed that the rail pass-bys are the primary noise source and road traffic on Watson Road South and Arkell Road are secondary sources of noise.

Lands to the east and northwest are existing residential lands. To the north, south and west of the subject site, are agricultural lands. There are a few small commercial facilities to the west of the subject site including a small engine repair shop, a bicycle store, and a pet boarding service. No sounds were audible at these facilities during the time of the site visit. Additionally, there are



residential uses closer to these facilities than the subject site, thus, there are no significant sources of stationary noise within 500 m of the subject site.

3 TRAFFIC NOISE ASSESSMENT

3.1 Road and Rail Traffic Noise Criteria

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A weighted decibels [dBA]. The Federation of Canadian Municipalities (FCM) and Railway Association of Canada (RAC) "Guidelines for New Development in Proximity to Railway Operations", dated May 2013 (RAC/FCM guidelines were also reviewed and considered in both the rail traffic and Stationary Noise assessments.

Table 1: Road Traffic Noise Criteria

Space	Daytime $L_{EQ}(16 \text{ hour})$ Road / Rail	Nighttime $L_{EQ}(8 \text{ hour})$ Road / Rail
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	45 / 40 dBA	45 / 40 dBA
Inside Bedrooms	45 / 40 dBA	40 / 35 dBA

Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MECP guidelines.

The guidelines in the MECP publication allow the sound level in an OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to

below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible. Note that not all OLA's necessarily require protection, if there are other protected outdoor areas accessible to future residents.

Indoor guidelines are 5 dBA more stringent for rail noise than for road noise, to account for the low frequency (rumbling) character of locomotive sound, and its greater potential to transmit through exterior wall/window assemblies.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels at the façade exceed 60 dBA or daytime sound levels at the façade exceed 65 dBA. Forced air ventilation with ducts sized to accommodate the future installation of air conditioning by the occupant is required when nighttime sound levels at the façade are in the range of 51 to 60 dBA or when daytime sound levels at the façade are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve the indoor sound level criteria when the nighttime sound level at the façade is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise; and when the nighttime sound level at the façade is greater than 55 dBA or the daytime sound level at the façade is greater than 60 dBA due to rail traffic noise.

MECP guidelines recommend brick veneer or a masonry equivalent construction from foundation to rafters as a minimum construction for any dwellings which are within 100 m of the right of way of the railway, where the 24-hour L_{EQ} is greater than 60 dBA. GJR/CN typically requires brick veneer or a masonry equivalent construction for the first row of dwellings regardless of setback and sound level.

The railways also provide minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. These refer to minimum required setbacks, berms, fencing and warning clauses. The reader is referred to a copy of GJR/CN requirements for a new development adjacent to a spur line, which is provided in Appendix A.



Warning clauses are required to notify future residents of possible excesses when nighttime sound levels exceed 50 dBA at the plane of the bedroom window and daytime sound levels exceed 55 dBA in the outdoor living area and at the façade due to road and rail traffic.

3.2 Traffic Noise Assessment

3.2.1 Road Traffic Data

Road traffic volume data for Watson Road South was obtained from the Town of Puslinch in the form of Annual Average Daily Traffic (AADT) volumes for the year 2025 and is included in Appendix B. The roadway is designated as a no-truck route, resulting in the absence of commercial vehicle traffic. A speed limit of 50 km/h was applied for the roadway along with a day/night traffic volume split of 90/10.

Road traffic data for Arkell Road was provided by the County of Wellington in the form of AADT volumes for the year 2025, and is included in Appendix B. A commercial vehicle percentage of 3.7% further split into 1.2% for medium trucks and 2.5% for heavy truck was calculated from the data and used for the analysis. A speed limit of 80 km/h was applied for the roadway along with a day/night traffic volume split of 90/10.

Traffic volumes were conservatively assumed to grow at a rate of 2.5% per year for ten years (to 2036). Table 2 summarises the road traffic volume data used in this study.

Table 2: Projected Road Traffic Data to 2036

Roadway	AADT	Day / Night Split [%]	Trucks Percentage (%)		Speed Limit [km/h]
			Medium	Heavy	
Arkell Road	5 933	90 / 10	1.2	2.5	80
Watson Road South	2 755	90 / 10	0	0	50

3.2.2 Rail Traffic Data

Updated rail traffic volumes for the GJR rail line located to the south was provided by Les Petroczi from the City of Guelph and are provided in Appendix C.

The GJR railway line is used for freight and way freight operations and is classified as a spur line. The maximum train speed of 40 kph (25 mph) for freight and way freight trains was used in the analysis. In conformance with GJR assessment requirements, these maximum speeds, number of cars and maximum locomotives per train were used in the traffic noise analysis to yield a worst-case estimate of train noise. The data was projected to the year 2036 using a 2.5% per year growth rate as per the guidelines. Table 3 summarises the rail traffic data used in the assessment.

Table 3: Rail Traffic Data Projected to 2036

Rail Line	Train Type	Number of Trains Day/Night	Number of Locomotives	Number of Cars	Maximum Speed [km/h]
GJR	Freight	5.2 / 2.6	2	24	40

3.2.3 Road and Rail Traffic Noise Predictions

To assess the levels of road and rail traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix D.

Since building envelopes were not provided on the concept site plan, a 6 m front yard setback was used in the analysis. Sound levels were predicted at a height of 4.5 m for 2nd storey windows, assuming each lot has 2-storey dwellings. Prediction locations were chosen around the residential site, as shown in Figure 2, to obtain a good representation of the future sound levels at various dwellings. The results of these predictions are summarized in Table 4. The

acoustic requirements may be subject to modifications if the site plan is changed significantly.

Table 4: Future Traffic Sound Levels, [dBA], Without Mitigation

Prediction Location	Description	Daytime in OLA	Daytime at Façade	Nighttime at Façade
		LEQ(16 hour) Road/Rail/Total	LEQ(16 hour) Road/Rail/Total	LEQ(8 hour) Road/Rail/Total
[A]	Southernmost dwelling with exposure to Watson Road South and the Railway	<55 / 64 / 64	<55 / 63 / 63	<50 / 63 / 63
[B]	Southern dwelling with exposure to the railway	<55 / 59 / 59	<55 / 58 / 58	<50 / 58 / 58
[C]	Fourth row dwelling with exposure to the railway	<55 / 55 / 55	<55 / 55 / 55	<50 / 55 / 55
[D]	Dwellings adjacent to Arkell Road	59 / <55 / 59	61 / <55 / 61	54 / <50 / 54
[E]	Second row of dwellings closest to Arkell Road	<55 / <55 / <55	<55 / <55 / <55	<50 / <50 / <50

3.3 Traffic Noise Recommendations

The predictions indicate that the future road and rail traffic sound levels will exceed MECP guidelines in the proposed development. Recommendations to address these excesses are discussed below.

3.3.1 Building Façade Constructions

Future sound levels in the proposed development will exceed 55 dBA at night and 60 dBA during the daytime due to rail traffic noise. MECP guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with MECP noise criteria.

Calculations were performed to determine the building envelope requirements to maintain indoor sound levels within MECP guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, the anticipated area ratios

of the facade components (walls, windows and doors) to the floor area of the adjacent room.

Exterior Wall Constructions

CN/GJR guidelines recommend brick exterior walls from foundation to rafters as a minimum construction for any dwellings that are in the first row of dwellings with exposure to their rail lines. This applies to the southeast and/or southwest façades of the dwellings located closest to the railway line to the south portion of the proposed development as indicated in Figure 3. Additionally, the by-law includes a holding provision that all residential buildings with exposure to the railway be provided with brick or masonry equivalent construction. A precast wall construction can be considered a masonry equivalent construction. This applies to the southeast and southwest façades of the residential buildings at the southern end of the development.

Acoustical Requirements for Glazing for Traffic Noise Sources

Since future sound levels at some façades of the proposed dwellings are predicted to exceed criteria, sound attenuating building constructions (windows and walls) need to be specified.

Detailed floor plans and building elevations for the proposed dwellings were not yet available. Window to floor area ratios of 50% (30% fixed, 20% operable) for living/dining rooms and bedrooms were assumed. The minimum STC results are shown in Table 4 below assuming sound entering through windows and walls.



Table 4: Preliminary Glazing Requirements

Prediction Location	Description	^{1,2,3} Minimum STC Requirements for Glazing
[A]	Lot 1 – Southernmost dwelling with exposure to the railway	*STC-35
[B]	Lot 2 – Southern dwelling with exposure to the railway	STC-32
	Remaining dwellings	OBC

Note:

¹ Assumed window to floor area ratios of 50% for living/dining rooms and bedrooms; and assumed 100% wall to floor area ratio.

² STC requirement refers to fixed glazing. Small leaks through operable doors and windows are assumed, however, tight weather seals should be provided to reduce such leakage to the extent feasible.

³ When detailed floor plans and building elevations are available, the drawings should be reviewed to confirm exterior façade constructions and refine window glazing requirements based on actual window to floor area ratio.

* Sound entering through windows and brick veneer or a masonry equivalent construction facades
 OBC – Ontario Building Code

Note that this rating is a minimum for the entire assembly and test data should be provided to verify. If more glazing is incorporated, higher STC requirements may apply.

Once detailed floor plans and building elevations are finalized for Lots 1 – 6, 44, acoustical requirements for the building façades could be optimized as part of the detailed design of the dwellings.

Further Work

When final setbacks and building elevations are available for the proposed development, the glazing requirements should be refined and exterior wall constructions verified. If window to floor area ratios exceed those used above, the window glazing requirements may be higher.

3.3.2 Indoor Living Areas

Air Conditioning

The predicted daytime and nighttime sound levels outside the façades of the dwelling closest to the railway (prediction location [A]) will be greater than 60 dBA at night and/or greater than 65 dBA during the daytime hours. To address these excesses, the MECP guidelines recommend that this dwelling be

equipped with central air conditioning systems, so that the windows can be closed.

Window or through-the-wall air conditioning units are not recommended for any commercial or residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-216 and NPC-300, as applicable. The guidelines also recommend warning clauses for all units with ventilation requirements.

Provision for Adding Central Air Conditioning

The predicted future sound levels outside the façade of dwellings with exposure to the GJR railway (prediction locations [B] to [D]) will be between 56 and 65 dBA during the daytime hours and/or between 51 and 60 dBA during the nighttime. To address this excess, the MECP guidelines recommend that these dwellings be equipped with the provision for the future installation of air conditioning at the occupant's discretion.

Remaining Dwellings

The predicted future sound levels outside at the facade of the proposed residential dwellings/buildings (prediction location [E]) will be less than 55 dBA during the day and less than 50 dBA during the night. There are no specific ventilation requirements for these proposed dwellings.

Ventilation requirements for the proposed development are shown in Figure 4.

3.3.3 Outdoor Living Areas

The predicted sound levels in the rear yard of the southernmost dwelling unit (Lot 1) with exposure to the railway (prediction location [A]) will be up to 64 dBA, 9 dBA in excess of the MECP limit of 55 dBA. An acoustic barrier is required for the rear yard of this dwelling.

The predicted sound levels in the remaining rear yards of the proposed dwelling units with exposure to the roadways and railway will be up to 59 dBA (prediction locations [B] and [D]), 4 dBA in excess of the MECP limit of 55 dBA. The predicted sound level is within the allowable 5 dBA discretionary range of the MECP’s limit of 55 dBA, provided that a warning clause be included in the property and tenancy agreements.

The barrier heights required to meet 55 to 59 dBA for the rear yards are summarized in Table 5 below and the location of the required barriers are shown in Figure 4. According to MECP guidelines, a minor (4 dB) excess of the criteria may be addressed by including a warning clause in sale and lease agreements for the development.

Table 5: Summary of Barrier Heights Required to Meet Various Desired Sound Levels

Prediction Location	Barrier Height (m) to Achieve Desired Sound Level				
	55 dBA	56 dBA	57 dBA	58 dBA	59 dBA
A _{OLA}	4.5	4.1	3.8	3.3	2.7

When final setbacks are determined and detailed grading is available, the acoustic barrier heights should be refined.

4 VIBRATION ASSESSMENT

4.1 Criteria for Ground-borne Vibration from Rail Traffic

The Federation of Canadian Municipalities (FCM) and Railway Association of Canada (RAC) “Guidelines for New Development in Proximity to Railway Operations”, dated May 2013 require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres from a railway corridor. The GJR generally follows the standard of CN for noise and vibration.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The limits for acceptable ground-borne vibration are an RMS velocity of 0.14 mm/s (17 dB re 1 mm/s) between frequencies of 4 and 200 Hz.

CN limits for acceptable ground-borne vibration are also presented as a curve of maximum allowable vibratory acceleration levels, in units of decibels relative to the acceleration due to gravity (dB re 1g), versus one-third octave band frequency. The criteria have been overlaid on the graphs of measured vibration for easy reference (Appendix E).

4.2 Rail Vibration Assessment

Vibration measurements were conducted using a Svantek SV977 Sound and Vibration Meter outfitted with a Wilcoxon Research type 793V velocity transducer correctly field calibrated before and after the measurements between March 10, 2026, to March 20, 2026.

Measurements were performed at 15 m (M1) and 30 m (M2) from the railway right-of-way between March 10, 2026, and March 13, 2026, and 45 m (M3) from railway right-of-way between March 16, 2026, and March 20, 2026, representing the location of the possible nearest residential dwelling façades. The measurement locations, M1, M2, and M3, are indicated in Figure 2. The results of the measurements are presented in Appendix E. Table 5 shows the maximum RMS vibration velocity measurements during each of the train pass-bys.

The results of the measurements are presented in Appendix E which shows the date and time of the vibration measurements, and the maximum RMS velocity in units of mm/s recorded at each location. Several train pass-bys were measured during the measurement periods. Table 6 shows the maximum vibration level measurements during the pass-bys at each vibration location.

Table 6: Maximum RMS Vibration Measurements of Freight Train Pass-bys

Train Pass-by	Measured Vibration Level (mm/s)			Criteria (mm/s)
	M1	M2	M3	
1	0.31	0.19	--	
2	0.36	0.21	--	
3	0.26	0.15	--	
4	0.30	0.16	--	
5	0.41	0.23	--	
6	0.48	0.25	--	0.14
7	--	--	0.15	
8	--	--	0.16	
9	--	--	0.15	
10	--	--	0.17	
11	--	--	0.13	
12	--	--	0.18	

The maximum RMS vibration levels are up to 0.48 mm/s at M1, 0.25 mm/s at M2, and 0.18 mm/s at M2. On average, the maximum RMS vibration levels at M3 were 0.13 mm/s with a median of 0.12 mm/s.

The detailed plots of the RMS velocity over time and the frequency spectrum of RMS acceleration for the six highest intrusions at Location M1, M2, and M3 are presented in Appendix E. The CN RMS velocity criteria and ISO RMS acceleration curves are overlaid on the figures. Examining the graphs show a couple of interesting points. The duration when the vibration exceeds the 0.14 mm/s criteria is relatively short, ranging between 4 and 15 seconds at M2, and between 1 and 5 seconds at M3. In all cases at M2 and M3, the excesses over the vibration criteria the trains included in the table above occurred at frequencies in the 20 to 31.5 Hz one-third octave bands.

Since the dwelling setbacks have not yet been determined, we recommend that the closest façades be situated at a minimum distance of 45 m from the railway right-of-way. Regardless of the above, a vibration warning clause must be

included in the property and tenancy agreements of the closest dwelling units to inform the future owners and tenants of possible vibration excesses.

5 WARNING CLAUSES

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements for all the dwellings with anticipated traffic noise sound level excesses. The following noise warning clauses are required.

A suggested wording for future dwellings with sound level excesses of the MECP criteria but do not require physical mitigation measures is given below.

Type A:

Purchasers/tenants are advised that sound levels due to increasing road traffic and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.

A suggested wording for future dwellings for which physical mitigation has been provided is given below.

Type B:

Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.

Suitable wording for future dwellings requiring the provision for the future installation of air conditioning at the occupant's discretion is given below.

Type C:

This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed,

thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.

A suggested wording for future dwellings requiring central air conditioning systems is given below.

Type D:

This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.

These sample clauses are provided by the MECP as examples and can be modified by the Municipality as required.

The following sample clause is typical of those included in agreements of purchase and sale or lease on the Lands that are within 300 meters of the railway right-of-way.

Type GJR:

Warning: Guelph Junction Railway or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). GJR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

Suggested wording for future dwellings where vibration excesses is given below.

Type II:

Purchasers/tenants are advised that due to the proximity of this dwelling to the nearby railway tracks, vibration from rail pass-bys will occasionally be perceptible within this unit.



6 SUMMARY AND RECOMMENDATIONS

The following list and Table 7 summarize the recommendations made in this report. The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

1. For the dwellings with exposure to the railway, upgraded building and glazing constructions are required to ensure adequate indoor sound levels from traffic noise, as outlined in Section 3.3.1.
2. Ventilation requirements in the form of the provision for the future installation of air conditioning at the occupant's discretion are recommended for dwellings in the proposed development. Details are included in Section 3.3.2 and summary table below.
3. Acoustic barrier requirements are required for dwellings with OLAs with exposure to the roadway and/or railway. See section 3.3.3 for detailed requirements
4. Acoustic barrier requirements are required for dwellings with OLAs with exposure to the roadway and/or railway. See section 3.3.3 for detailed requirements
5. Extensive measurements and analysis of ground-borne vibration from train movements illustrate the vibration criteria of GJR will be achieved within occupied residential spaces within the development, when dwellings are greater than 45 m away from the railway right-of-way. When building setbacks are determined, the drawings should be reviewed to confirm the requirements.
6. Warning clauses are required for dwellings in the proposed development with noise and/or vibration excesses and/or within 300 m from the railway line.



Table 7: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Lot Numbers	Acoustic Barrier	Ventilation Requirement	Type of Warning Clause	Required Minimum STC for Glazing
[A]	Lot 1	✓	A/C	B, D, GJR, II	STC-37
[B]	Lots 2 and 3	--	Provision for A/C	A, C, GJR, II	STC-32
[C]	Lot 4	--	Provision for A/C	A, C, GJR, II	OBC
[D]	Lot 22	--	Provision for A/C	A, C	OBC
[E]	Lots 5 to 21, and Lots 23 to 44	--	--	A	OBC

7 IMPLEMENTATION

To ensure that the noise control recommendations outlined above are properly implemented, it is recommended that:

1. When siting, lotting information is available, a detailed noise study should be performed to refine the acoustic requirements for the site.
2. Prior to an application for a building permit, a Professional Engineer qualified to provide acoustical engineering services in the Province of Ontario or the Municipality's building inspector shall review the unit plans (floor plans and building elevations) for future dwellings closest to the noise sources and the grading plan, to ensure that the windows and building constructions, and berms/barriers are adequately designed to ensure acceptable indoor and outdoor noise levels.
3. Prior to assumption of the subdivision, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly installed and constructed.

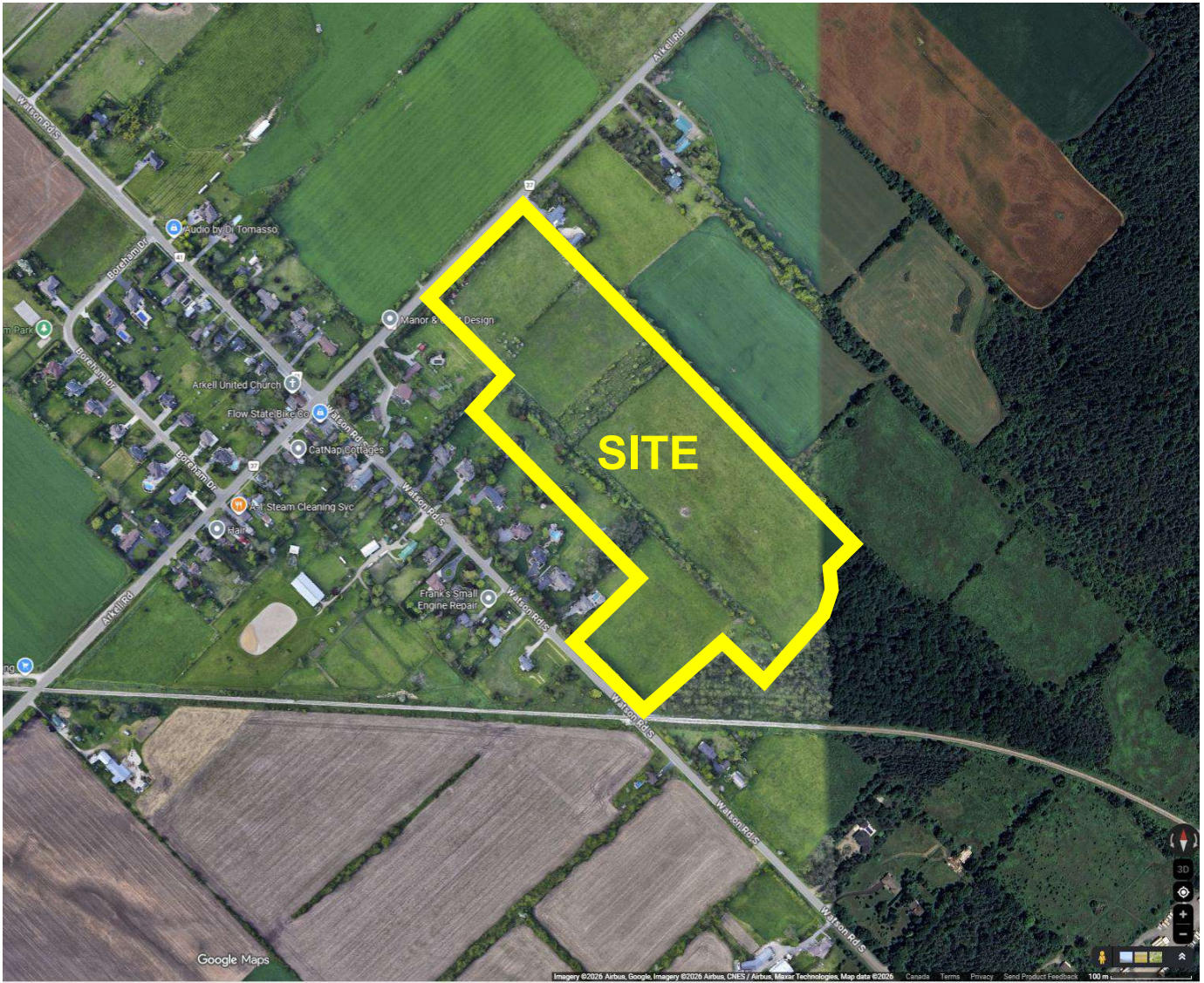


Figure 1: Key Plan

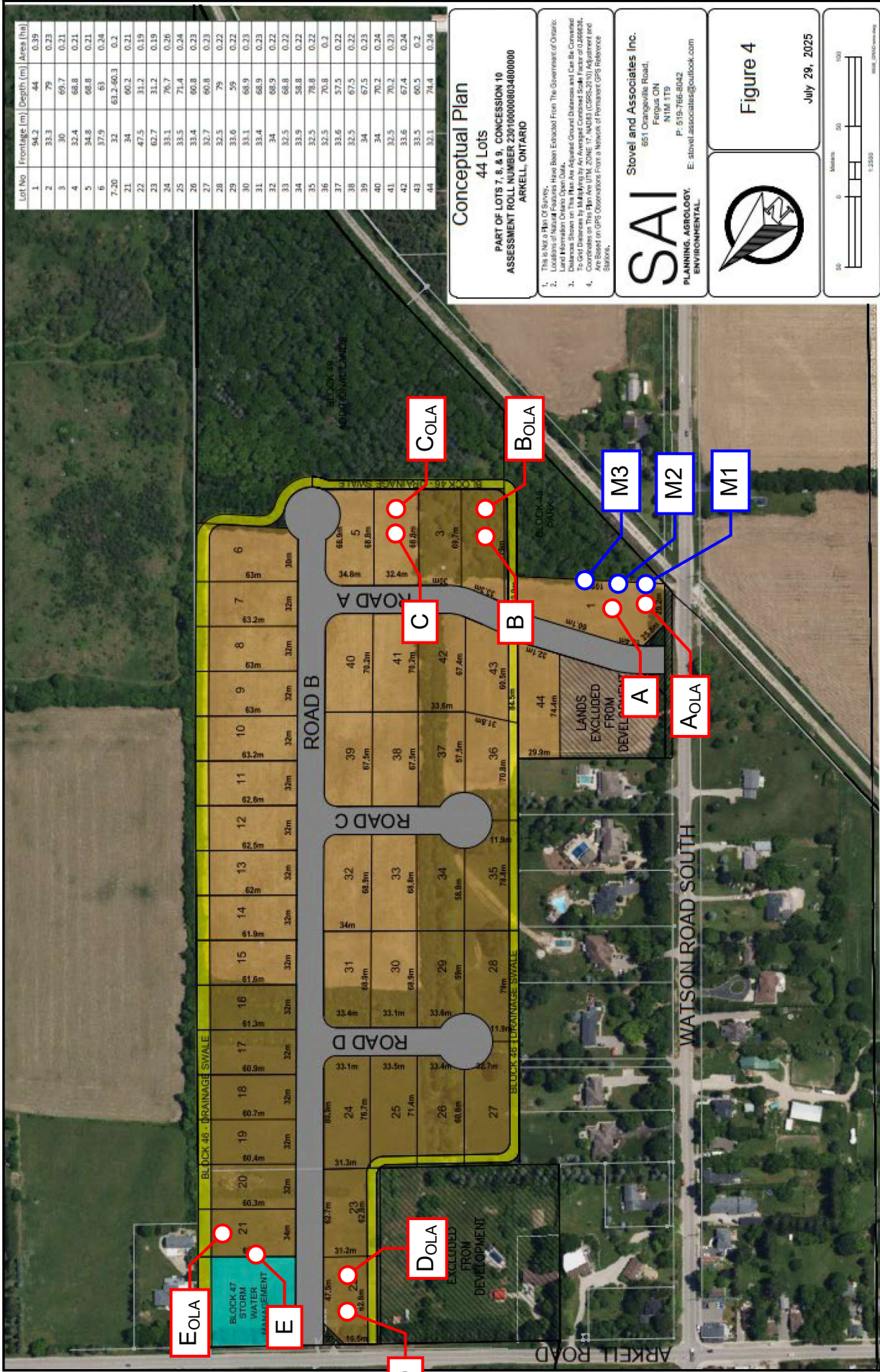


Figure 2: Proposed Concept Plan Showing Prediction Locations

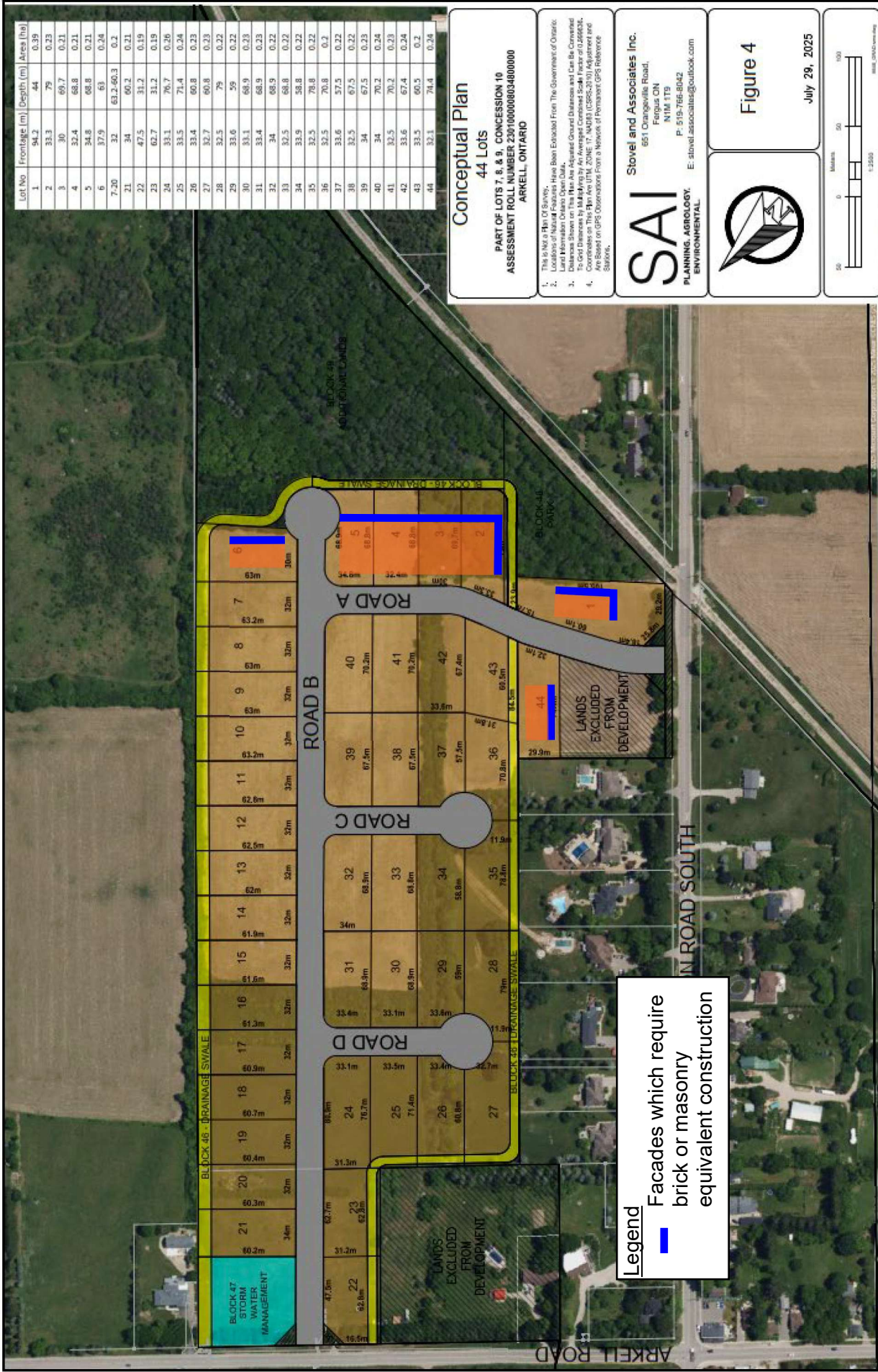


Figure 4: Proposed Concept Plan Showing Ventilation and Acoustic Barrier Requirements

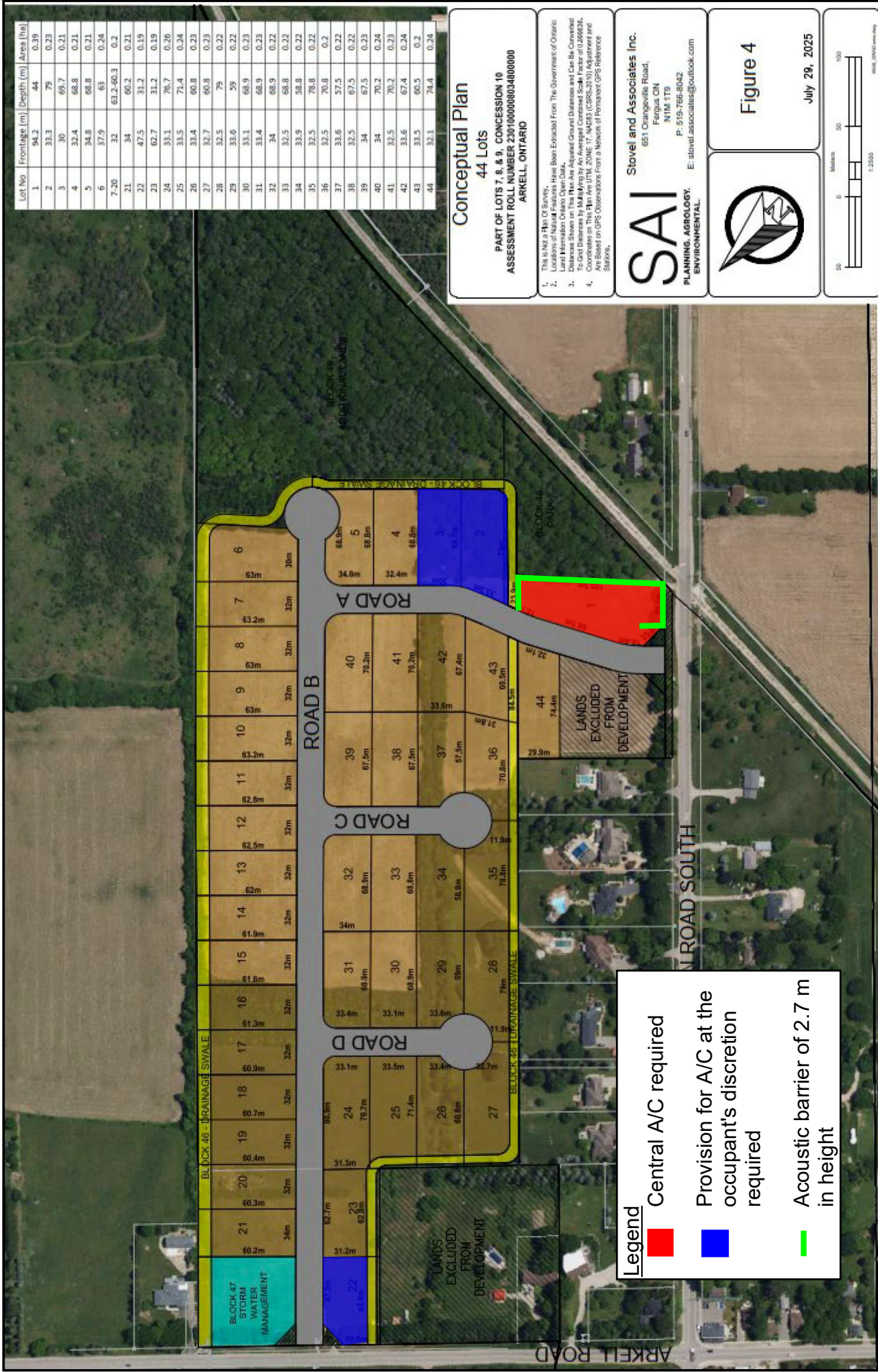


Figure 4: Proposed Concept Plan Showing Ventilation and Acoustic Barrier Requirements

Appendix A

GJR Spur Line Requirements



NOISE



VIBRATION



ACOUSTICS

Canadian National Railway Properties Inc. Propriétés ferroviaires du Canadien National Inc.

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Toronto, Ontario
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SIPUR LINE REQUIREMENTS

- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 15 metres.
- B. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- C. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- D. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.

April 1996

Appendix B

Road Traffic Data



NOISE



VIBRATION



ACOUSTICS

The content of this email and any attachments prepared by HGC Noise Vibration Acoustics have [limitations](#).

From: Planning <planning@puslinch.ca>
Sent: March 26, 2026 1:20 PM
To: Elise Jaklic <ejaklic@hgcacoustics.com>
Subject: RE: Road Traffic Data Request - Arkell Rd and Watson Rd S

Hello Elise,
I spoke with our Roads Director who advised that the average daily traffic count on Watson Rd S is 2152.
We do not have any commercial vehicle data as this is technically a no truck route.

He was not able to provide me any data for Arkell Rd.
If you need to follow up with him, please email Mike Fowler at mfowler@puslinch.ca

Thank you,



PUSLINCH Monika Farncombe
EST. 1850

Planning and Corporate Services Coordinator
Township of Puslinch

7404 Wellington Rd 34, Puslinch ON N0B 2J0
519-763-1226 ext. 207 Fax 519-736-5846 www.puslinch.ca

My hours may not match your working hours. If you received this email outside of regular business hours, I do not expect an immediate response.

From: Elise Jaklic <ejaklic@hgcacoustics.com>
Sent: March 26, 2026 1:07 PM
To: Planning <planning@puslinch.ca>
Subject: Road Traffic Data Request - Arkell Rd and Watson Rd S

Good afternoon,

We are conducting a noise feasibility study for a site located south of Arkell Road and East of Watson Road South, in Puslinch, ON. A google maps link is provided below for reference:

[Google Maps](#)

We are specifically seeking the Annual Average Daily Traffic (AADT) data (or, alternatively, turning movement counts), along with commercial vehicle percentages for Arkell Road and Watson Rd S in this area.

Could you please direct me to the appropriate contact who can provide the traffic data required for this study?

RE: Road Traffic Data Request - Watson Rd S & Arkell Rd

From Kayla Martin <kaylam@wellington.ca>
 Date Thu 2026-03-26 2:02 PM
 To Elise Jaklic <ejaklic@hgcaoustics.com>

Hi Elise,

Apologies for not getting back to you about this sooner. Below is a quick chart of the traffic count data we have. I've also provided a map of where the count stations are located. Let me know if you need anything else!

Counting Station ID	SPRING					SUMMER					FALL				
	Total of Passenger Car	Total Small Truck	Total Truck/Busses	Total Tractor Trailer	Total	Total of Passenger Car	Total Small Truck	Total Truck/Busses	Total Tractor Trailer	Total	Total of Passenger Car	Total Small Truck	Total Truck/Busses	Total Tractor Trailer	Total
3702 (Count year = 2025)	4306	45	18	104	4473	4144	18	8	99	4269	4355	38	18	111	4522
3704 (Count year = 2024)	5566	48	57	217	5888	5221	37	40	187	5485	5439	55	42	226	5762



Kayla Martin
 Engineering Technologist
 County of Wellington
 74 Woolwich Street, Guelph, ON N1H 3T9
 T: 519.837.2600 x 2261 | E: kaylam@wellington.ca

From: Elise Jaklic <ejaklic@hgcaoustics.com>
Sent: Wednesday, March 11, 2026 9:17 AM
To: Kayla Martin <kaylam@wellington.ca>
Subject: Road Traffic Data Request - Watson Rd S & Arkell Rd

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you know the contents to be safe.

Good morning Kayla,

We are preparing a noise study for a site near the intersection of Arkell Road and Watson Road South. A google maps link is provided for reference.

[Google Maps](#)

Could you please provide road traffic information, specifically AADT and commercial vehicle percentages for both roadways?

Let me know, thanks!

Elise

Elise Jaklic, BEng

Project Consultant

HGC NOISE VIBRATION ACOUSTICS

2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7

t: 905-826-4044 x271 e: ejaklic@hgcacoustics.com

Visit our website – www.hgcacoustics.com Follow Us – [LinkedIn](#) | [X](#) | [YouTube](#)

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Appendix C

Rail Traffic Data



NOISE



VIBRATION



ACOUSTICS

Re: Rail Traffic Request - Watson and Arkell

From Elise Jaklic <ejaklic@hgcacoustics.com>

Date Thu 2026-03-12 3:15 PM

To Les Petroczi <Les.Petroczi@guelph.ca>

Hi Les,

Thank you for providing this!

Have a great weekend 😊

Elise

Elise Jaklic, BEng

Project Consultant

HGC NOISE VIBRATION ACOUSTICS

t: 905-826-4044 x271 e: ejaklic@hgcacoustics.com

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From: Les Petroczi <Les.Petroczi@guelph.ca>

Sent: March 12, 2026 3:04 PM

To: Elise Jaklic <ejaklic@hgcacoustics.com>

Subject: Re: Rail Traffic Request - Watson and Arkell

Please see below

Les Petroczi

General Manager

Guelph Junction Railway

City of Guelph

519-822-1260 extension 2825

Mobile 519-766-7121

les.petroczi@guelph.ca

From: Elise Jaklic <ejaklic@hgcacoustics.com>

Sent: Thursday, March 12, 2026 2:40 PM

To: Les Petroczi <Les.Petroczi@guelph.ca>

Subject: Re: Rail Traffic Request - Watson and Arkell

[EXTERNAL EMAIL] This email originates outside the City of Guelph. Do not click links or attachments unless you recognize the sender and know the content is safe.

Hi Les,

Thank you for getting back, we are looking for the following information:

- Number of trains per day/night
- 4 day 2 night
- Max number of train cars
- max 24
- Max number of locomotives
- two each train
- Speed
- 15-25MPH
- Welded rail (yes or no)
- no rail is bolted
- Electric or diesel
- diesel powering generators for traction units
- Whistle on/off
- whistle on

Thank you!

Elise

Elise Jaklic, BEng

Project Consultant

HGC NOISE VIBRATION ACOUSTICS

t: 905-826-4044 x271 e: ejaklic@hgcacoustics.com

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From: Les Petroczi <Les.Petroczi@guelph.ca>

Sent: March 12, 2026 2:26 PM

To: Elise Jaklic <ejaklic@hgcacoustics.com>

Subject: RE: Rail Traffic Request - Watson and Arkell

Hi Elise

You will not be permitted to utilize the Alice/Morris data.

New tests will need to be completed.

Are you looking for vehicle traffic data or the amount of trains, train times car volumes with train speeds.

Thank you

Les Petroczi

General Manager

Guelph Junction Railway

City of Guelph

519-822-1260 extension 2825

Mobile 519-766-7121

les.petroczi@guelph.ca

From: Elise Jaklic <ejaklic@hgcacoustics.com>
Sent: Tuesday, March 10, 2026 5:06 PM
To: Les Petroczi <Les.Petroczi@guelph.ca>
Subject: Rail Traffic Request - Watson and Arkell

[EXTERNAL EMAIL] This email originates outside the City of Guelph. Do not click links or attachments unless you recognize the sender and know the content is safe.

Good afternoon,

We are preparing a noise feasibility study for a development located near the intersection of Watson Road South and Arkell Road in Puslinch, Ontario. A google link is included below for your reference:

[Google Maps](#)

We currently having the attached data for a site located to the west (Alice Street and Morris Street, Guelph, ON). Can you please confirm if the data is valid at this location? If not, can you please provide updated traffic data?

Thank you!

Best,
Elise

Elise Jaklic, BEng
Project Consultant

HGC NOISE VIBRATION ACOUSTICS

2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7

t: 905-826-4044 x271 e: ejaklic@hgcacoustics.com

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Appendix D

Sample STAMSON 5.04 Output



NOISE



VIBRATION



ACOUSTICS

Filename: a.te Time Period: Day/Night 16/8 hours
Description: Prediction Location A

Rail data, segment # 1: GJR (day/night)

Train Type	! Trains ! (Left)	! Trains ! (Right)	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng ! type	!Cont !weld
* 1. Freight	! 2.6/1.3	! 2.6/1.3	! 40.0	! 2.0	! 24.0	!Diesel!	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	! Name	! Unadj. Trains ! Left	! Trains ! Right	! Annual % ! Increase	! Years of ! Growth
1.	Freight	! 2.0/1.0	! 2.0/1.0	! 2.50	! 10.00 !

Data for Segment # 1: GJR (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Whistle Angle : 0 deg Track 1
Reference angle : 0.00

Results segment # 1: GJR (day)

LOCOMOTIVE (0.00 + 52.03 + 0.00) = 52.03 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	59.56	-6.37	-1.17	0.00	0.00	0.00	52.03

WHEEL (0.00 + 46.15 + 0.00) = 46.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	54.32	-6.82	-1.35	0.00	0.00	0.00	46.15

LEFT WHISTLE (0.00 + 59.17 + 0.00) = 59.17 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.50	69.79	-6.37	-4.25	0.00	0.00	0.00	59.17

RIGHT WHISTLE (0.00 + 59.17 + 0.00) = 59.17 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.50	69.79	-6.37	-4.25	0.00	0.00	0.00	59.17

Segment Leq : 62.68 dBA

Total Leq All Segments: 62.68 dBA

Results segment # 1: GJR (night)

LOCOMOTIVE (0.00 + 52.03 + 0.00) = 52.03 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	59.56	-6.37	-1.17	0.00	0.00	0.00	52.03

WHEEL (0.00 + 46.15 + 0.00) = 46.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	54.32	-6.82	-1.35	0.00	0.00	0.00	46.15

LEFT WHISTLE (0.00 + 59.17 + 0.00) = 59.17 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.50	69.79	-6.37	-4.25	0.00	0.00	0.00	59.17

RIGHT WHISTLE (0.00 + 59.17 + 0.00) = 59.17 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.50	69.79	-6.37	-4.25	0.00	0.00	0.00	59.17

Segment Leq : 62.68 dBA

Total Leq All Segments: 62.68 dBA

Road data, segment # 1: watson (day/night)

Car traffic volume : 1837/918 veh/TimePeriod
 Medium truck volume : 0/0 veh/TimePeriod



Heavy truck volume : 0/0 veh/TimePeriod
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: watson (day/night)

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 46.00 / 45.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: watson (day)

 Source height = 0.50 m

ROAD (0.00 + 43.56 + 0.00) = 43.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	52.70	0.00	-7.79	-1.35	0.00	0.00	0.00	43.56

 Segment Leq : 43.56 dBA

Total Leq All Segments: 43.56 dBA

Results segment # 1: watson (night)

 Source height = 0.50 m

ROAD (0.00 + 43.71 + 0.00) = 43.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	52.70	0.00	-7.63	-1.35	0.00	0.00	0.00	43.71

 Segment Leq : 43.71 dBA

Total Leq All Segments: 43.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.73
 (NIGHT): 62.73



Appendix E

Detailed Plots of Acceleration Spectra



NOISE

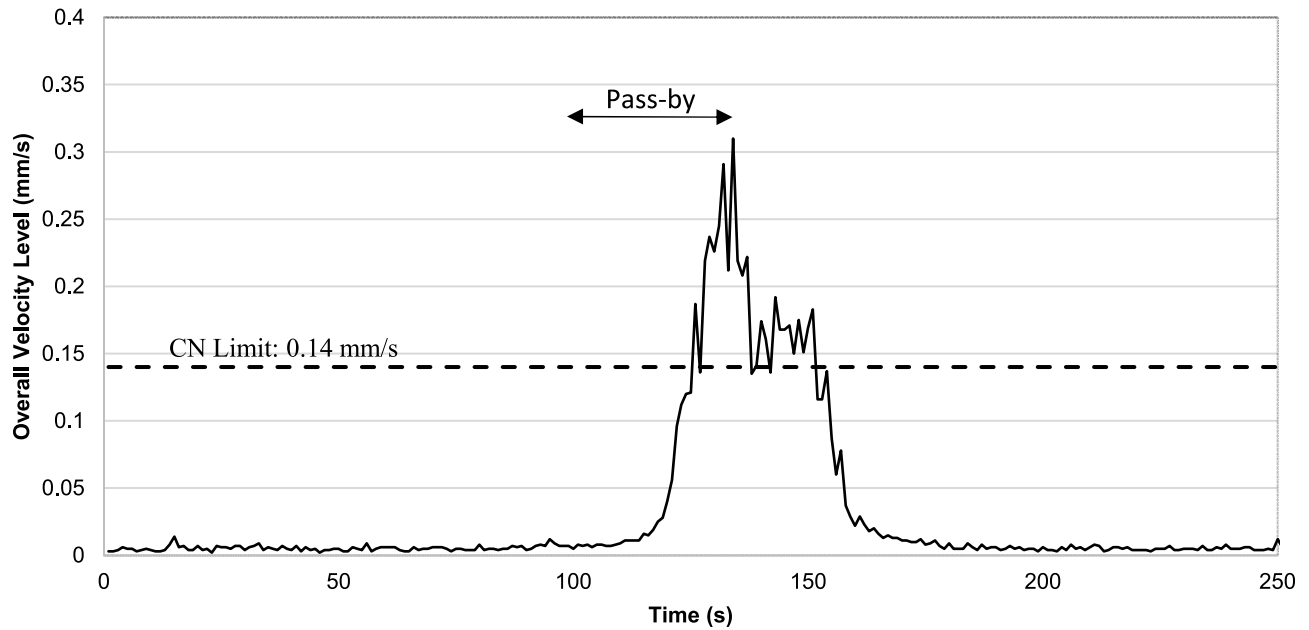


VIBRATION

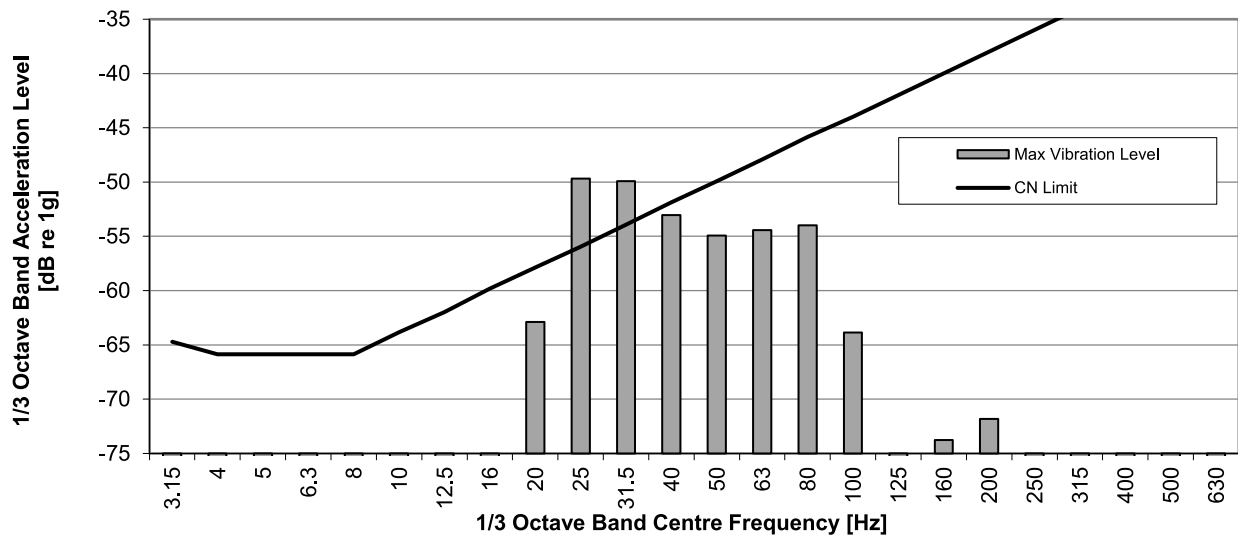


ACOUSTICS

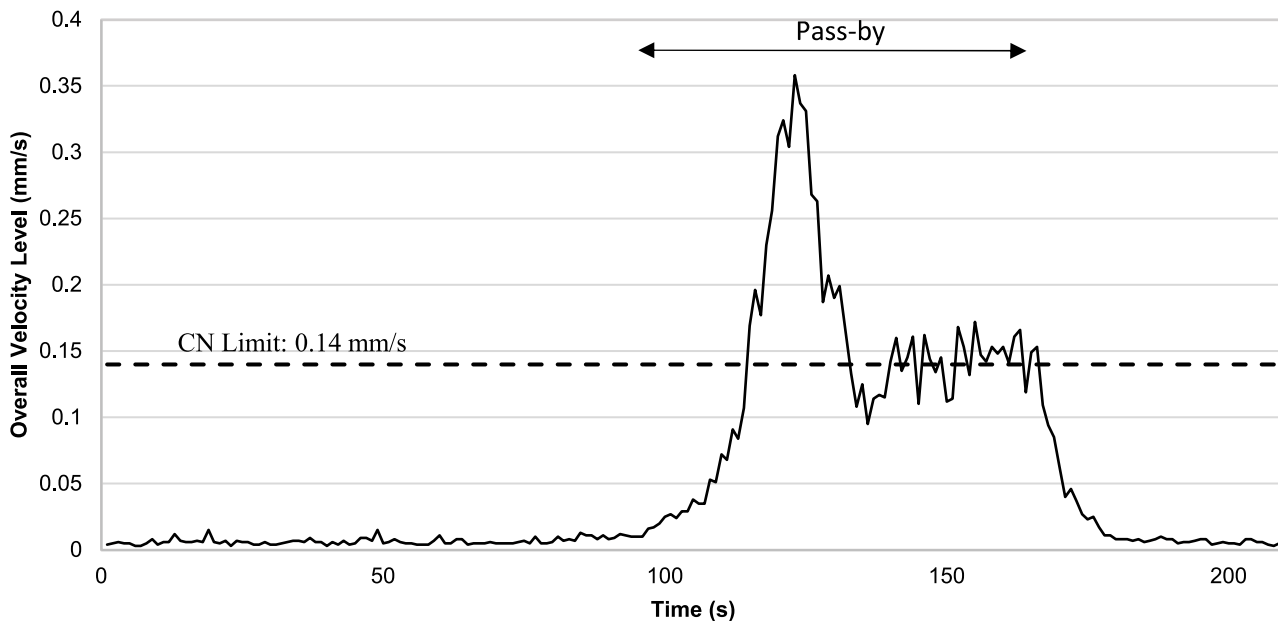
**Pass-by 1 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



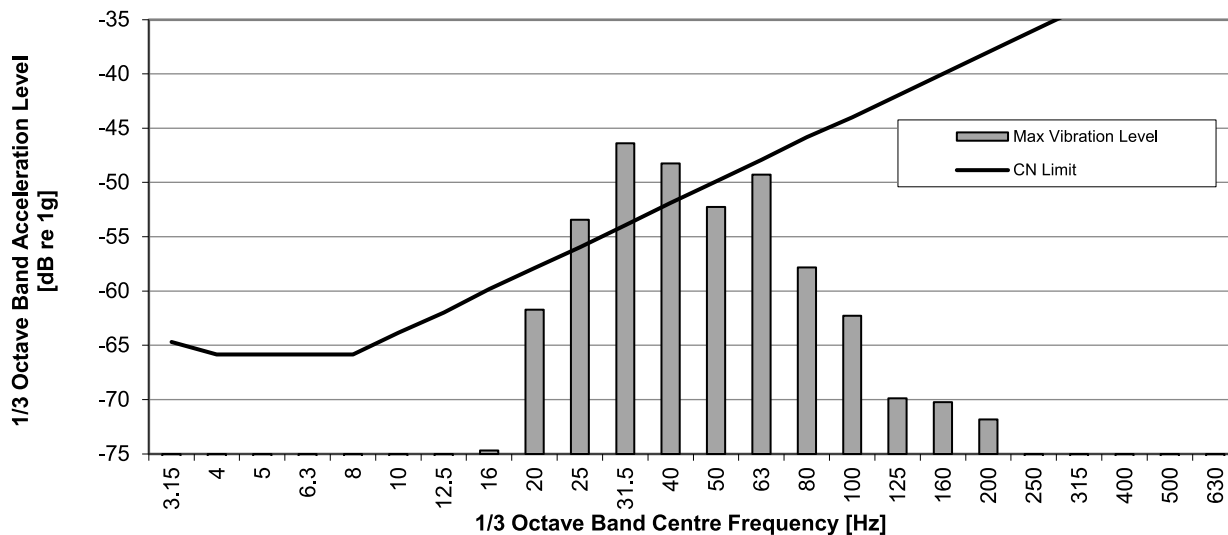
**Pass-by 1 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



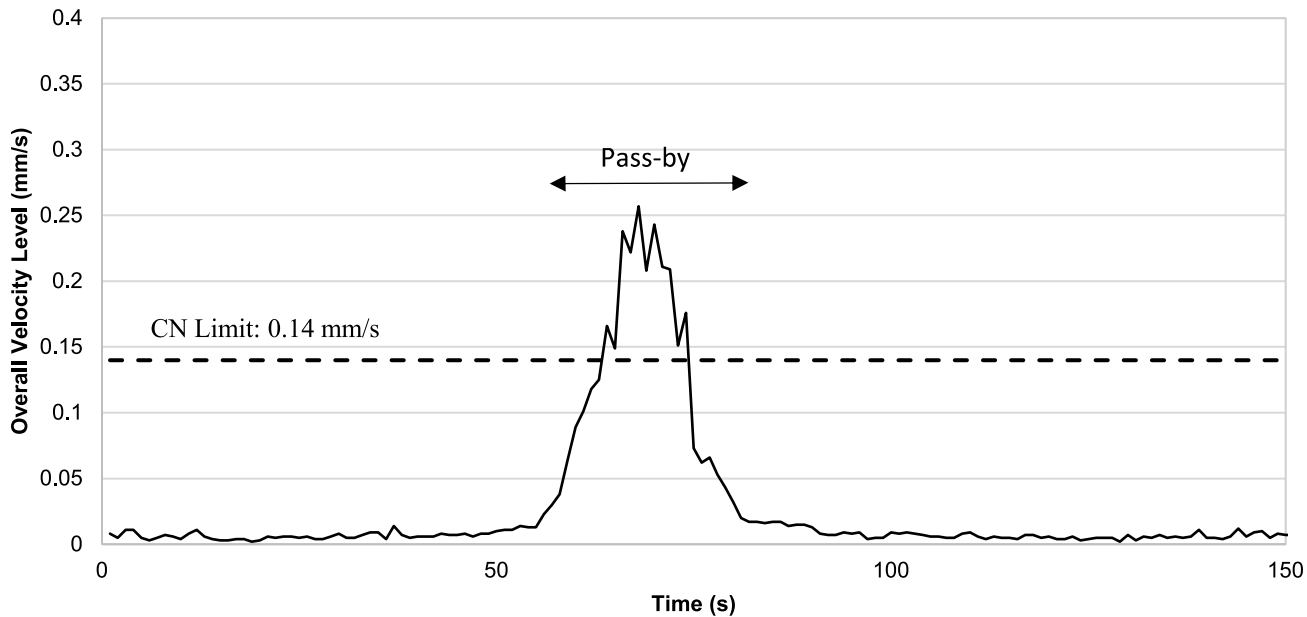
**Pass-by 2 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



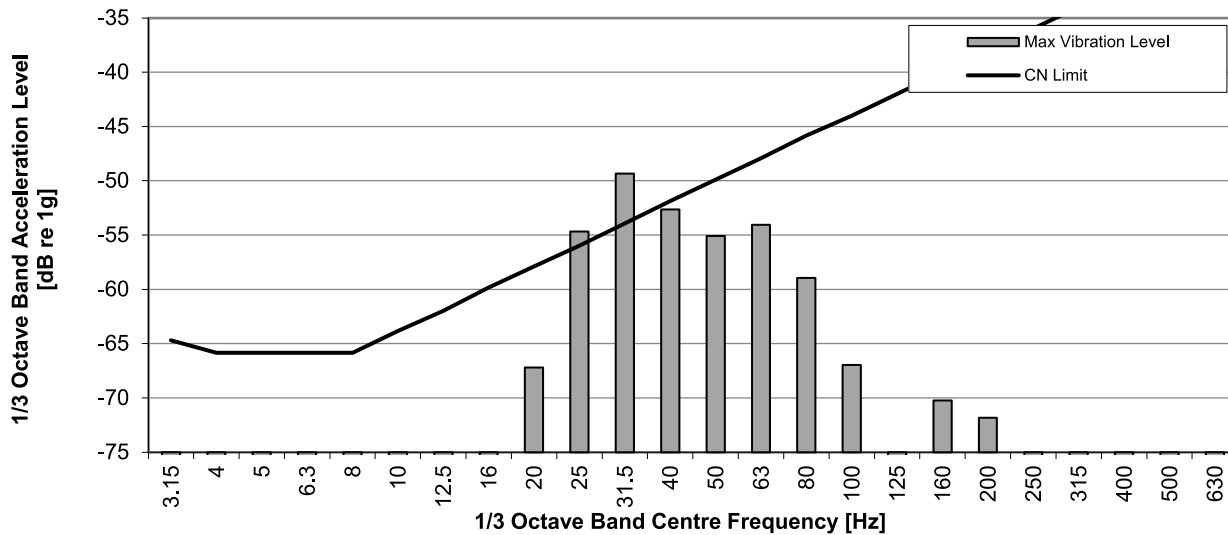
**Pass-by 2 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



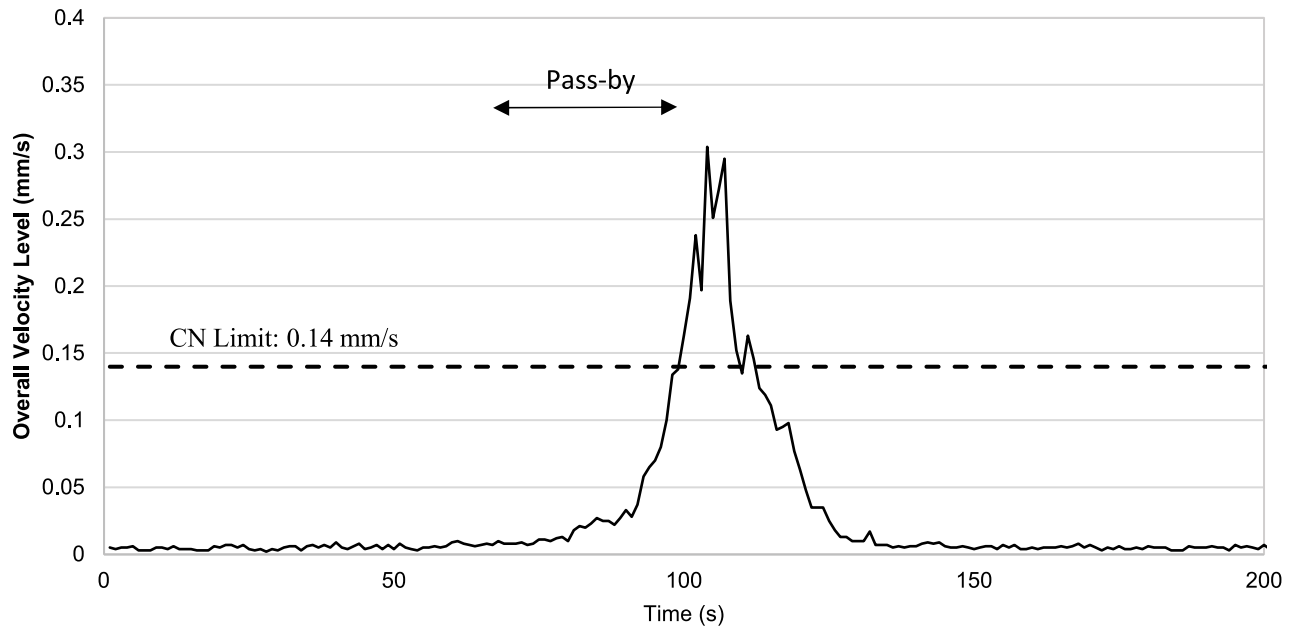
**Pass-by 3 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



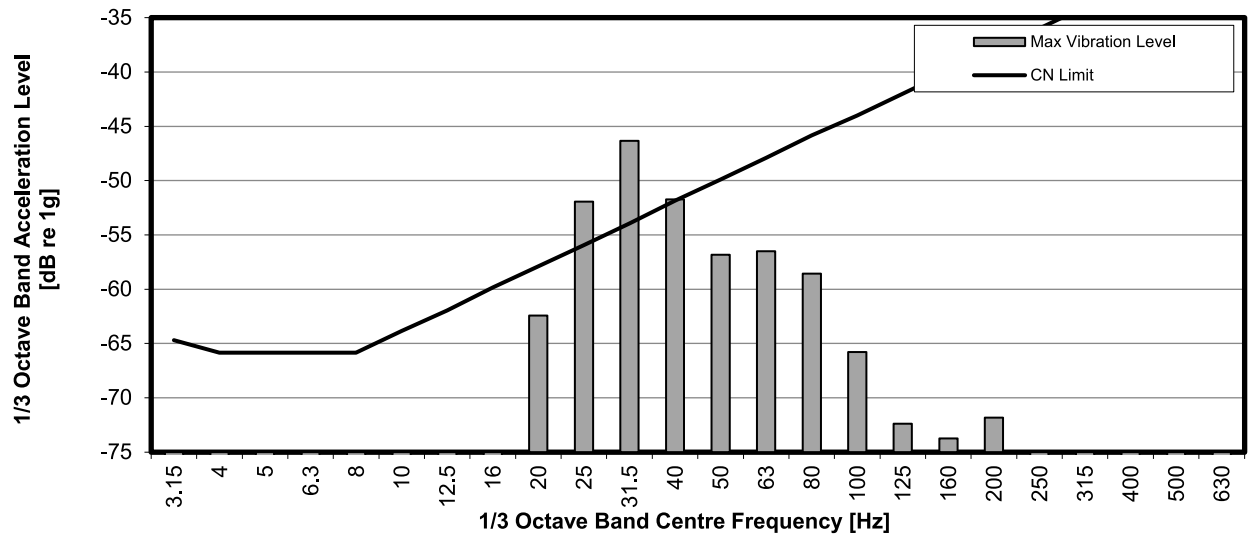
**Pass-by 3 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



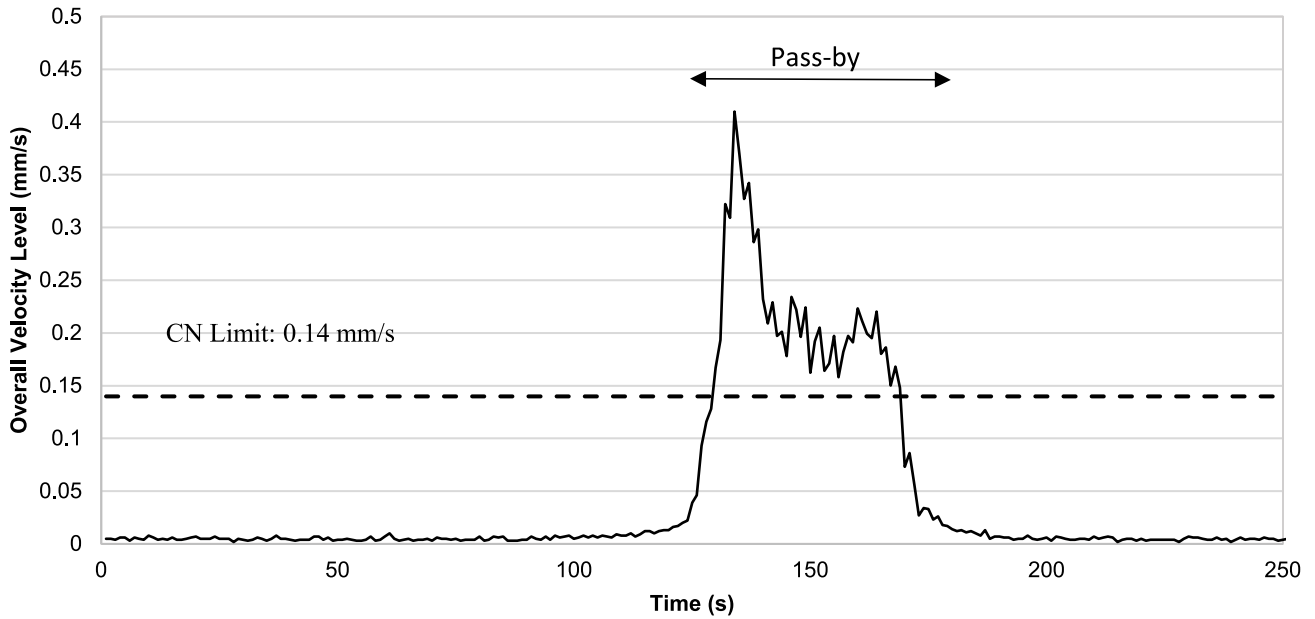
**Pass-by 4 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



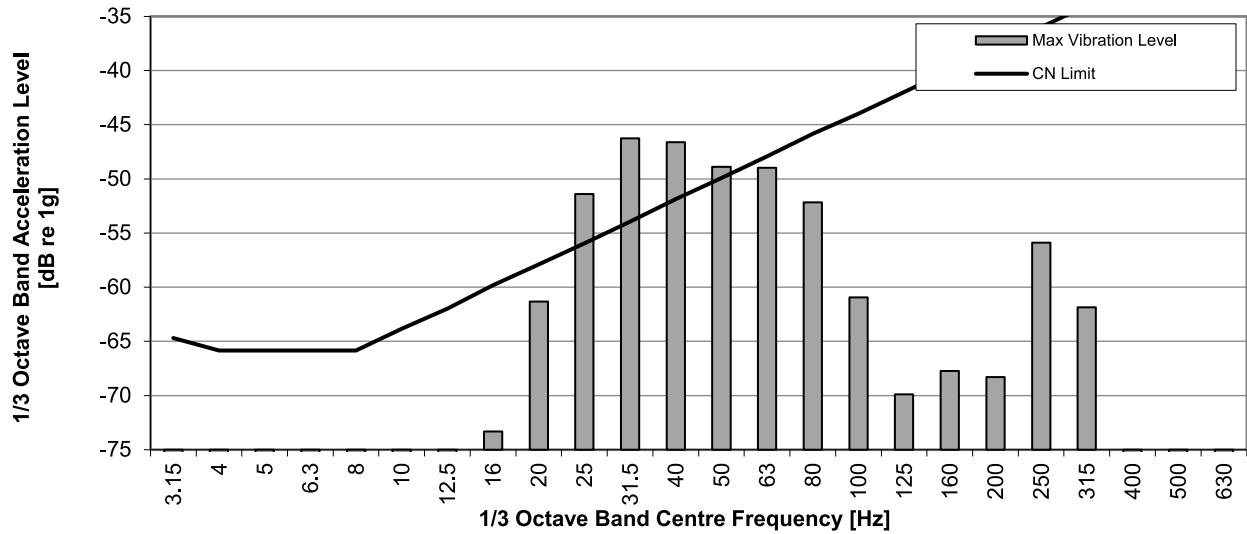
**Pass-by 4 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



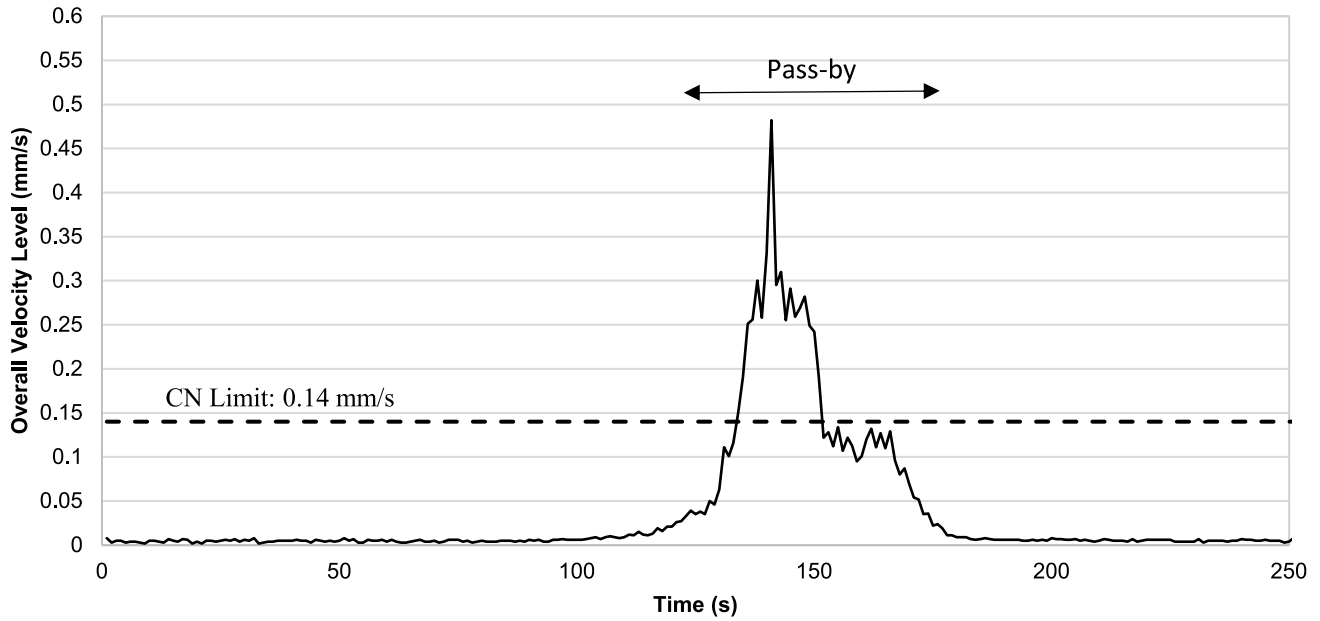
**Pass-by 5 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



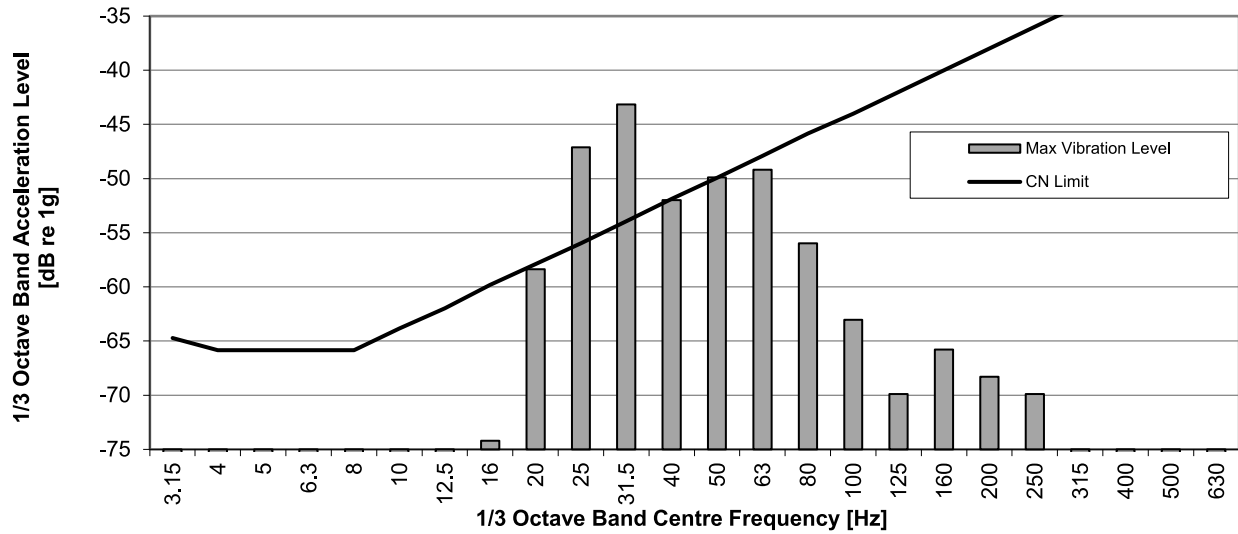
**Pass-by 5 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



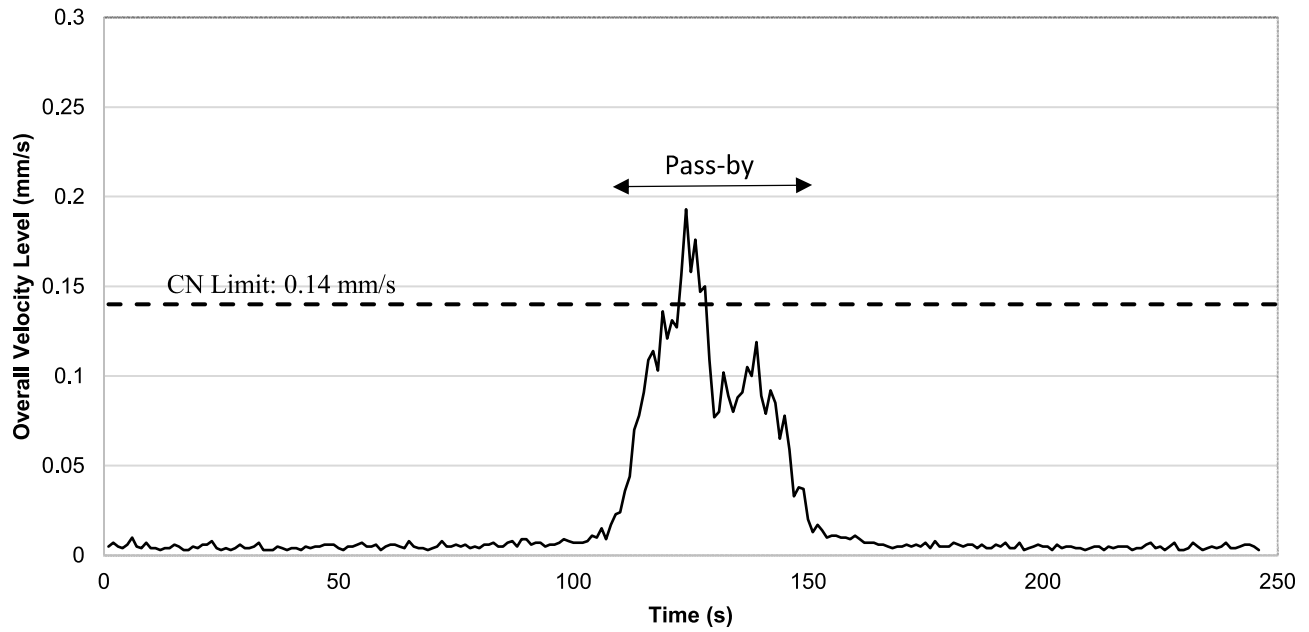
**Pass-by 6 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



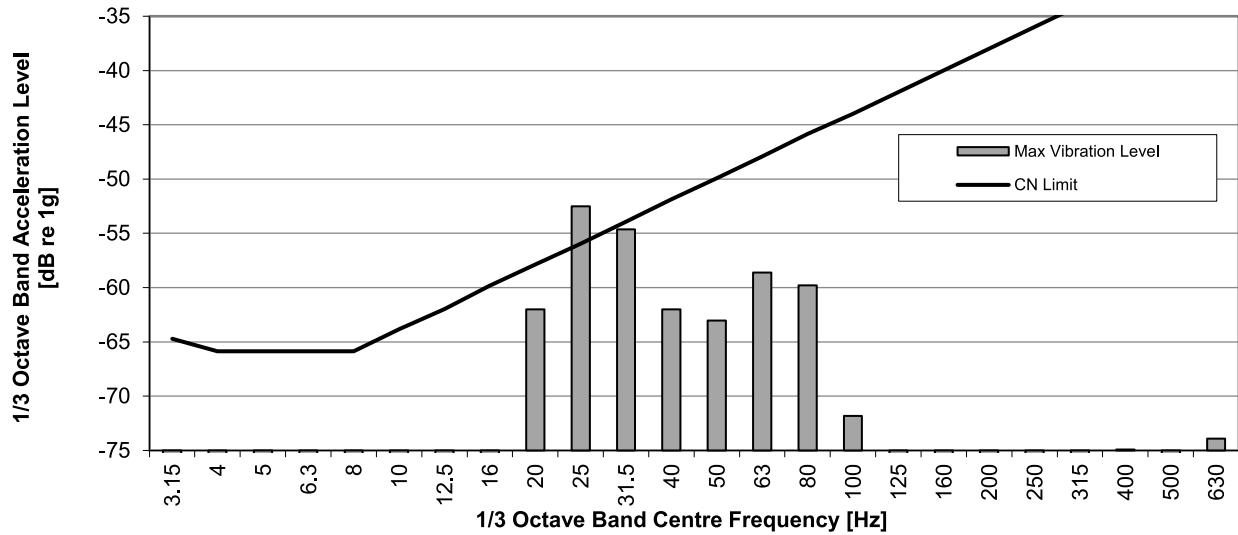
**Pass-by 6 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



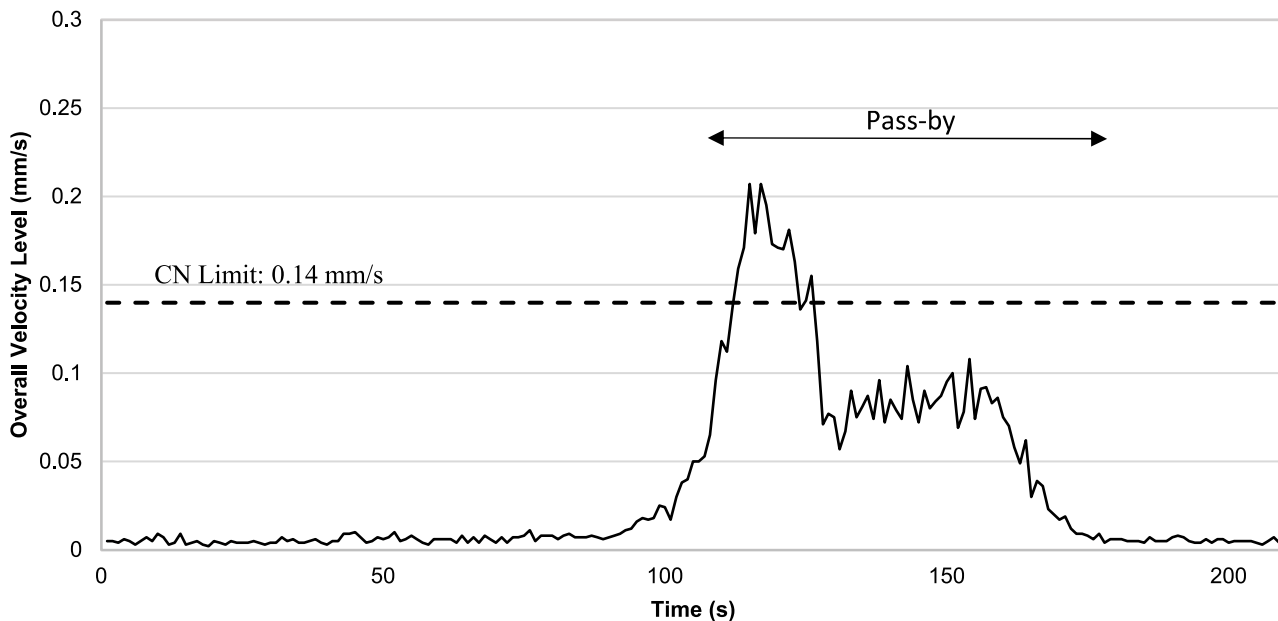
**Pass-by 1 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



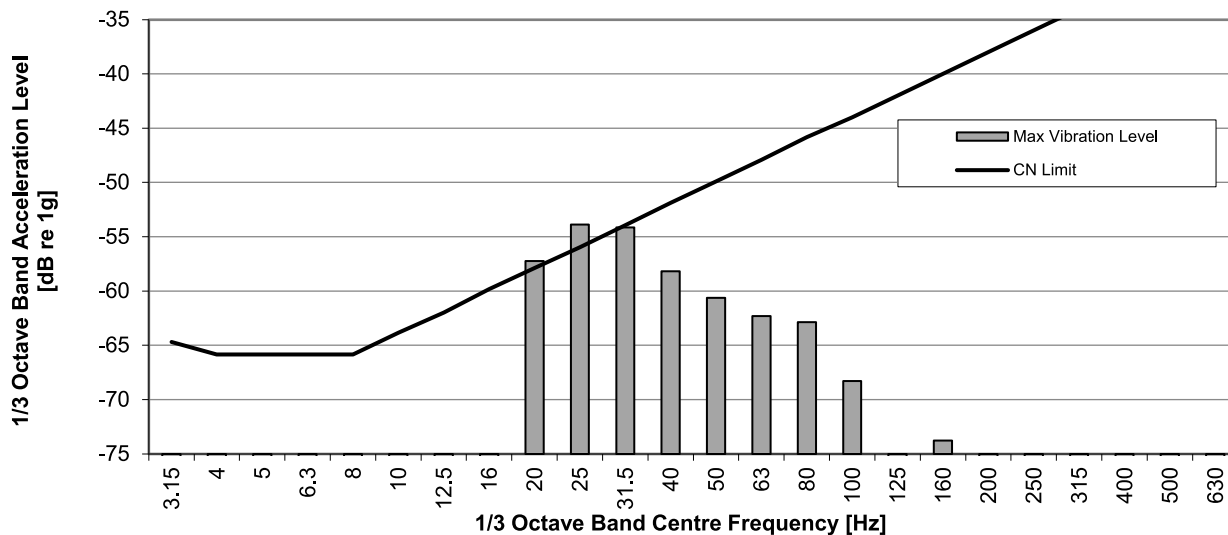
**Pass-by 1 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



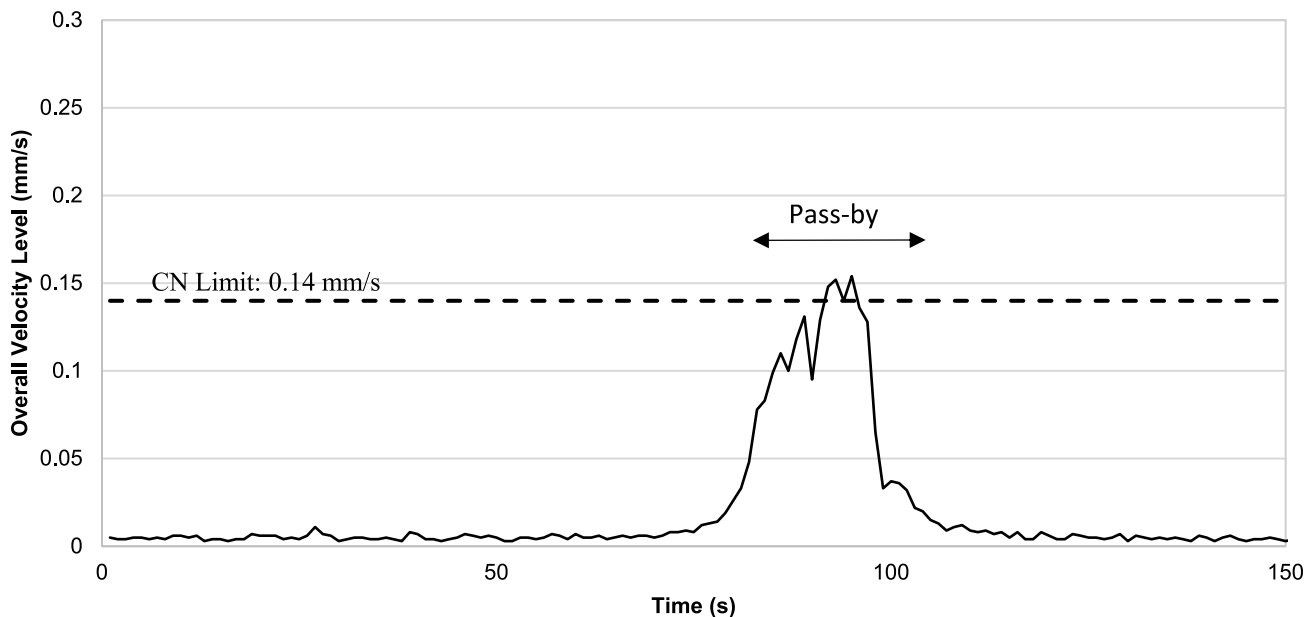
**Pass-by 2 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



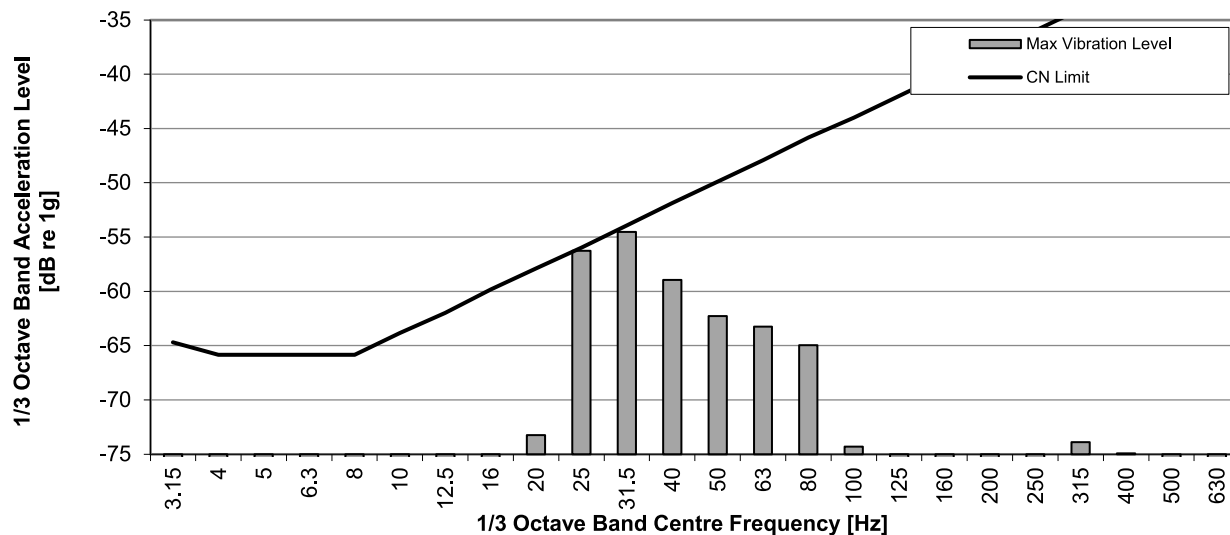
**Pass-by 2 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



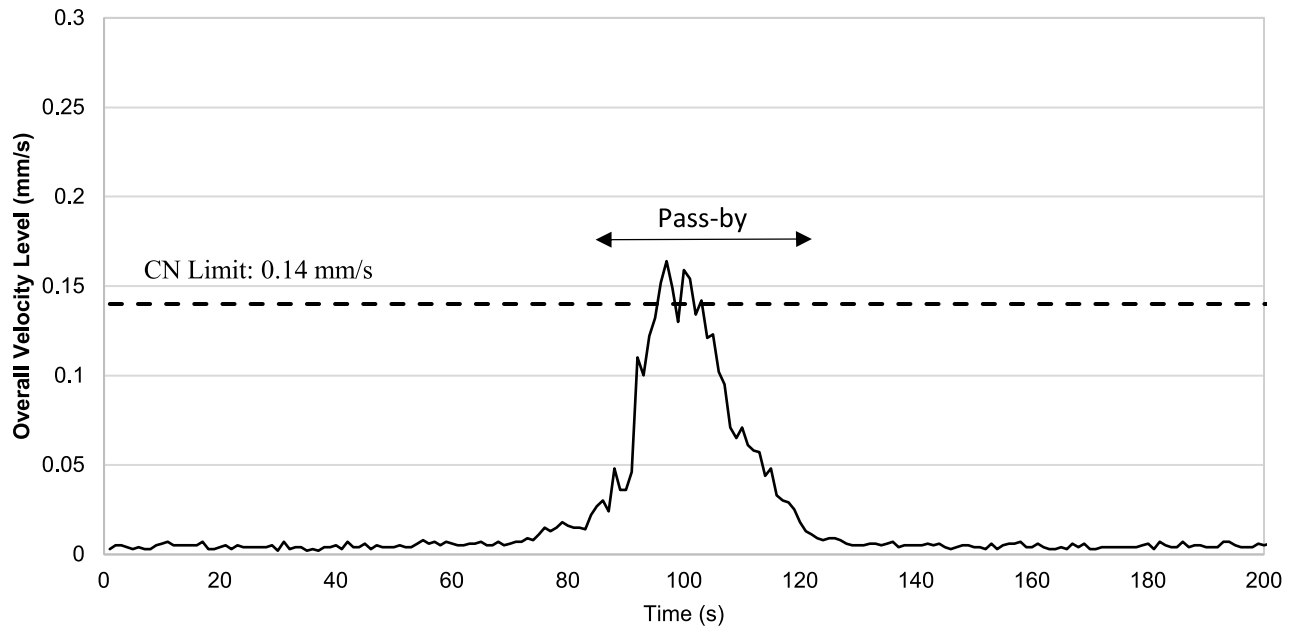
**Pass-by 3 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



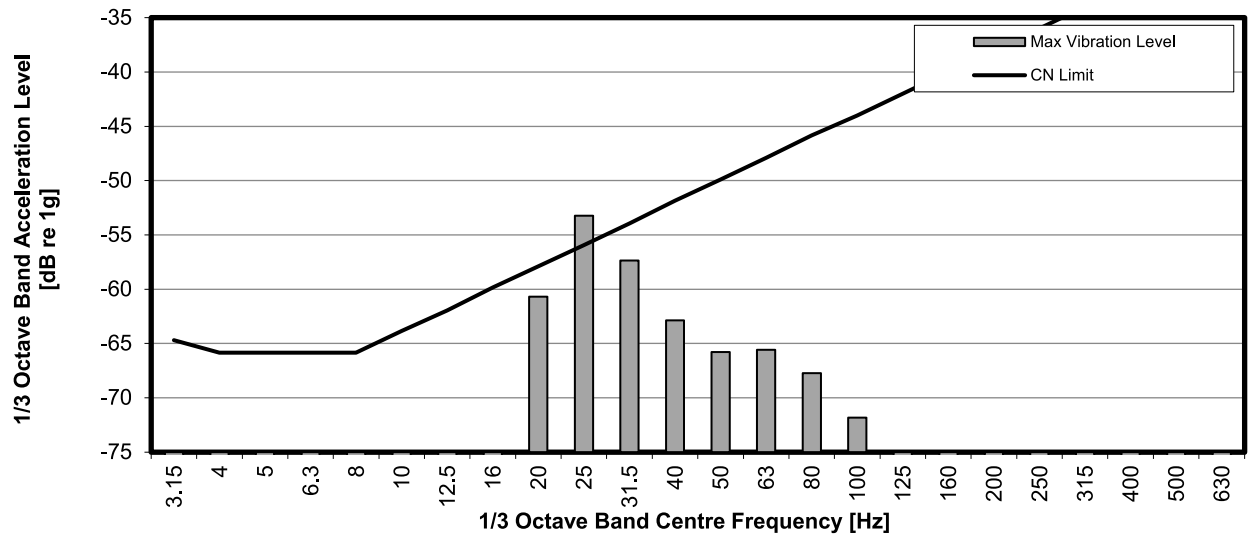
**Pass-by 3 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



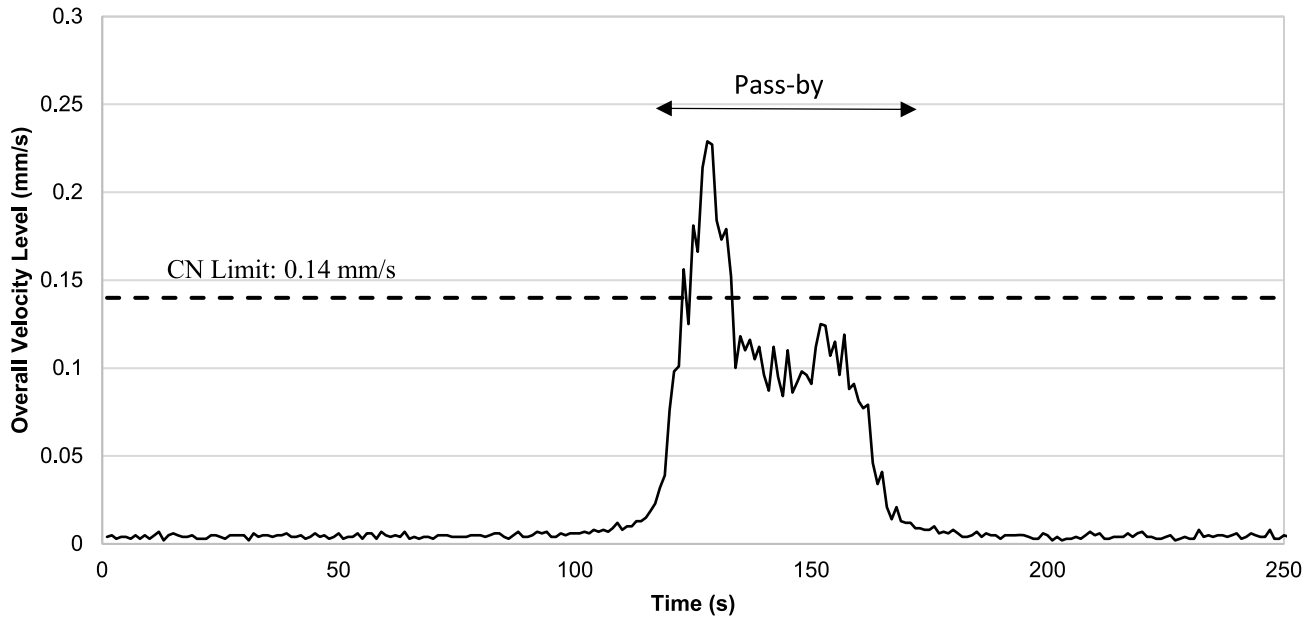
**Pass-by 4 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



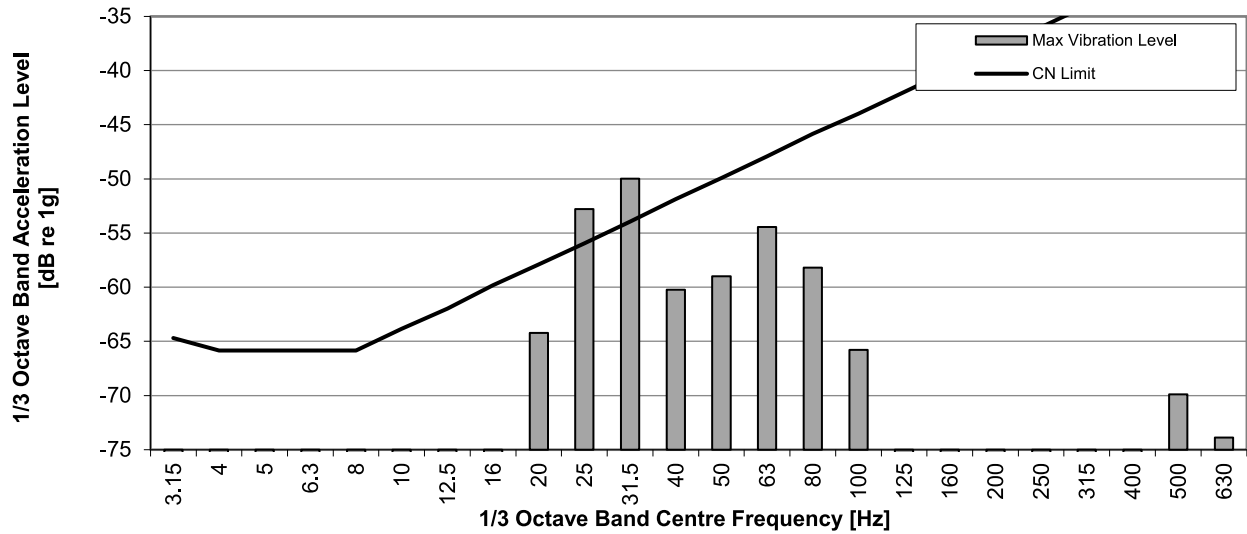
**Pass-by 4 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



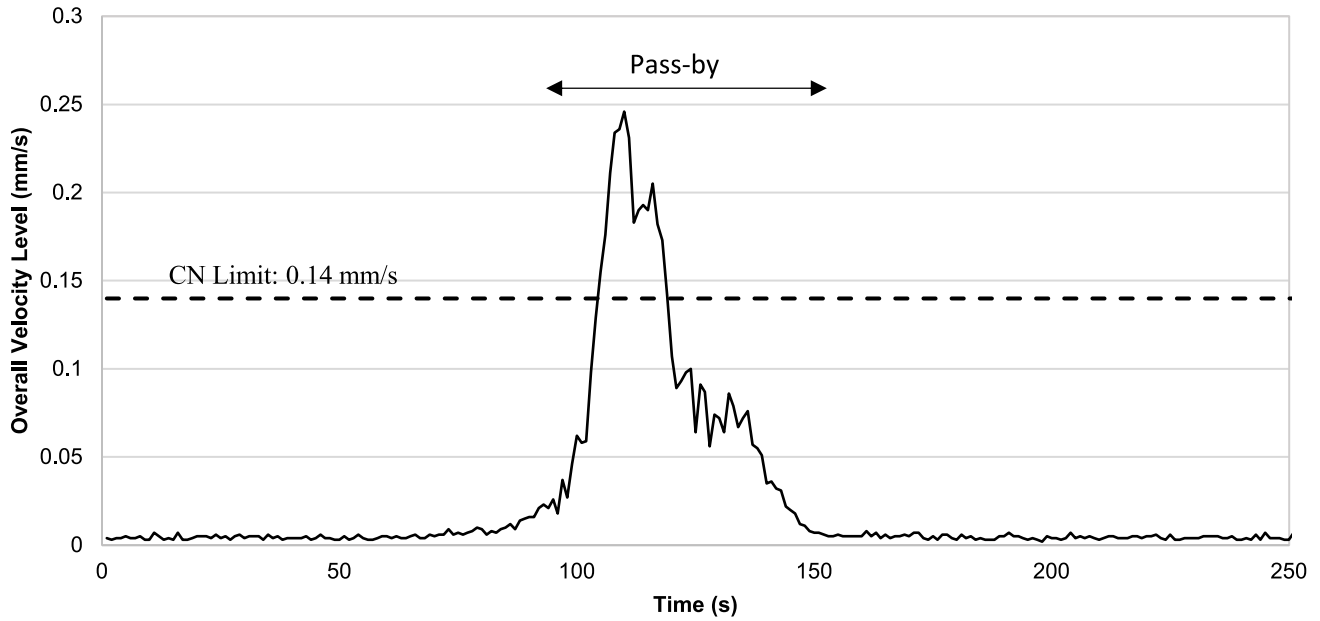
**Pass-by 5 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



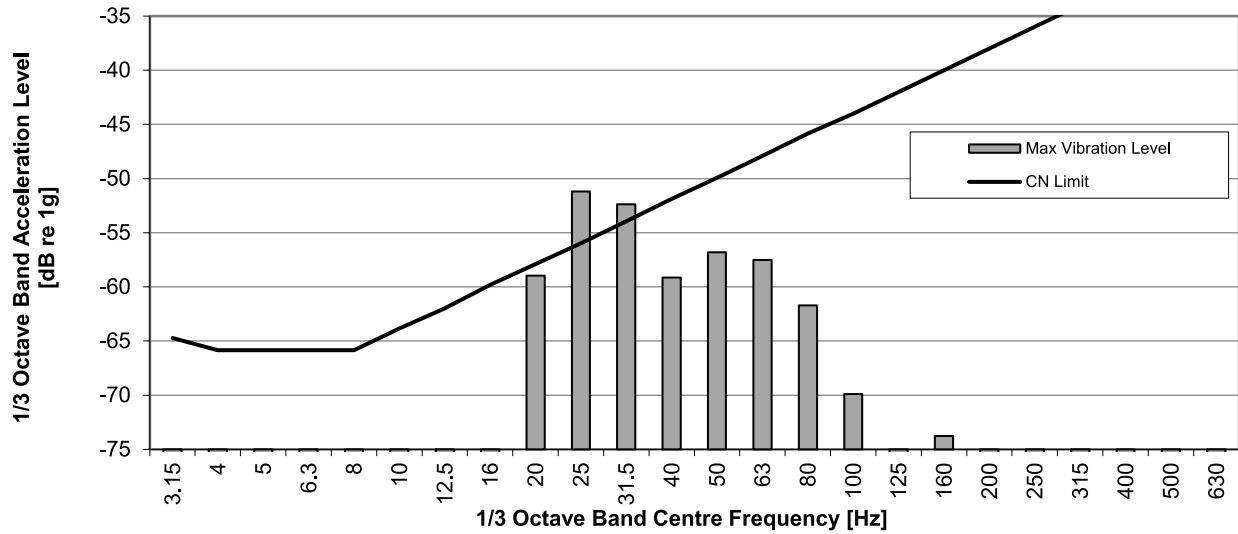
**Pass-by 5 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



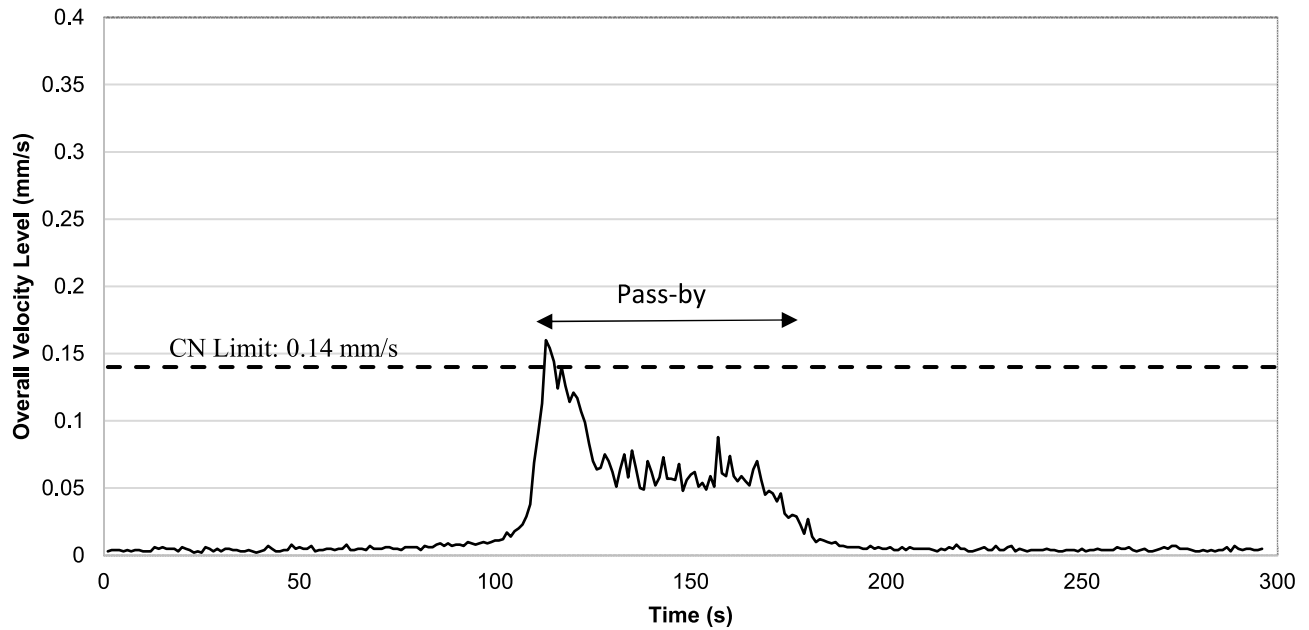
**Pass-by 6 at 30 m from ROW at M2
Measured Vibratory Velocity Level**



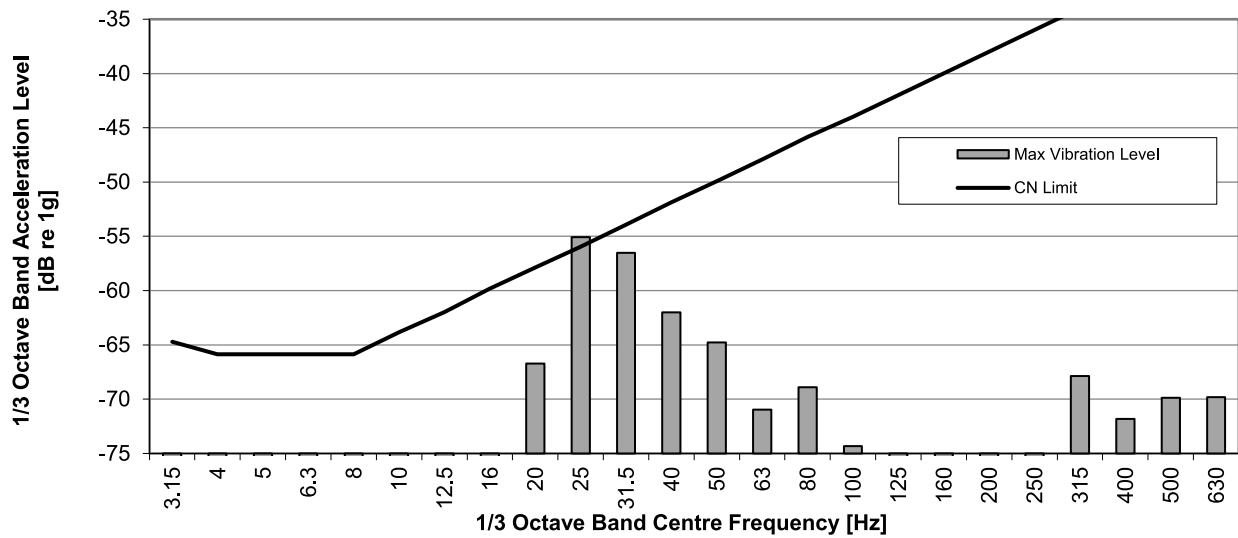
**Pass-by 6 at M2
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



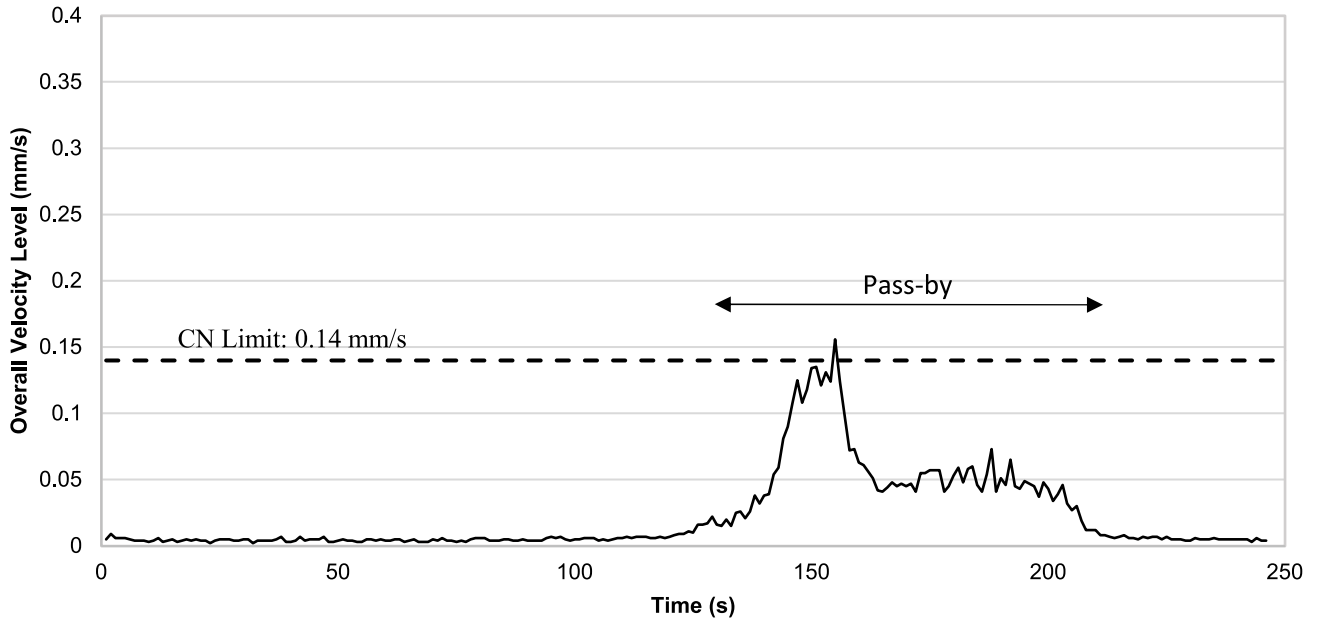
**Pass-by 1 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



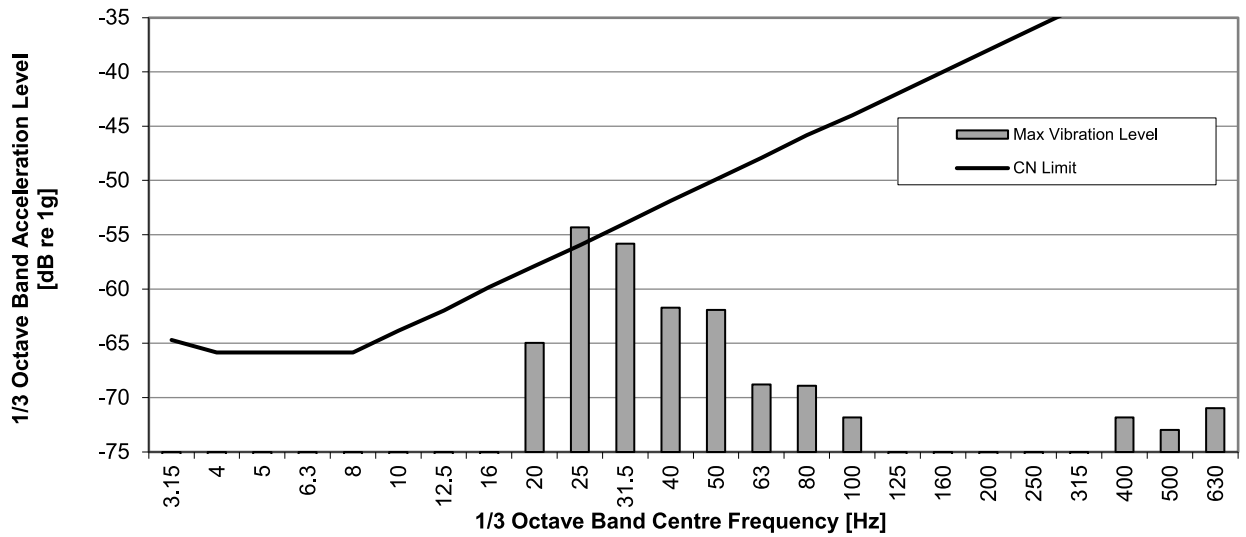
**Pass-by 1 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



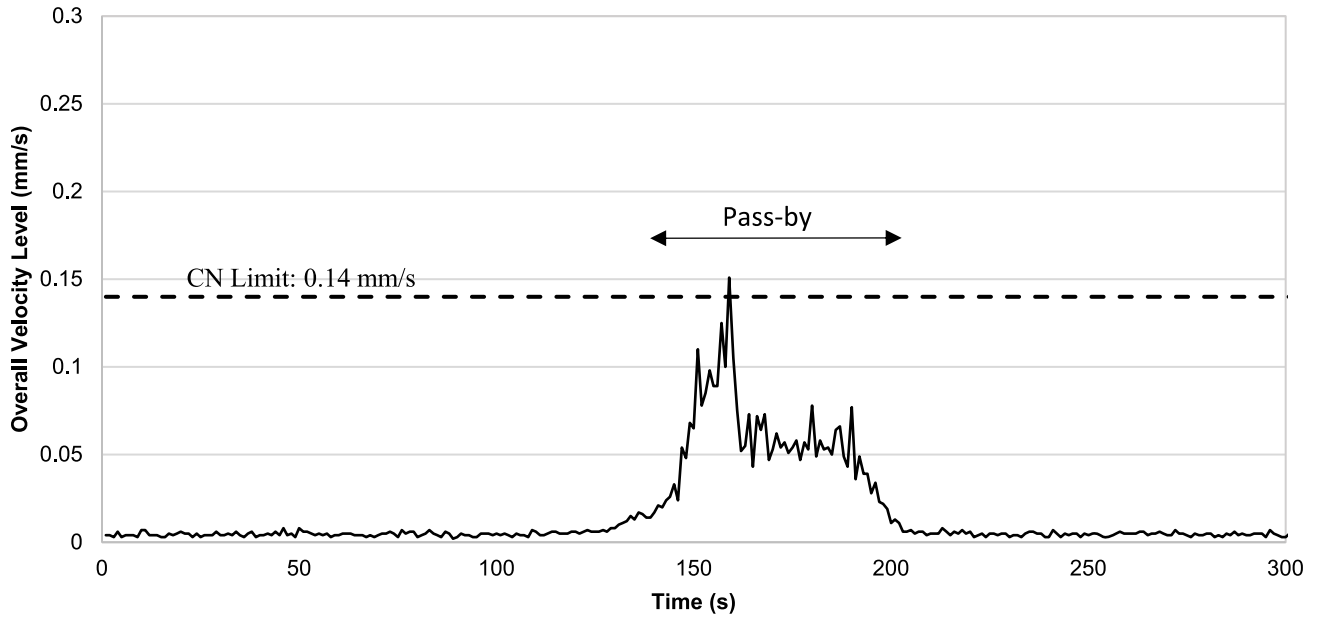
**Pass-by 2 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



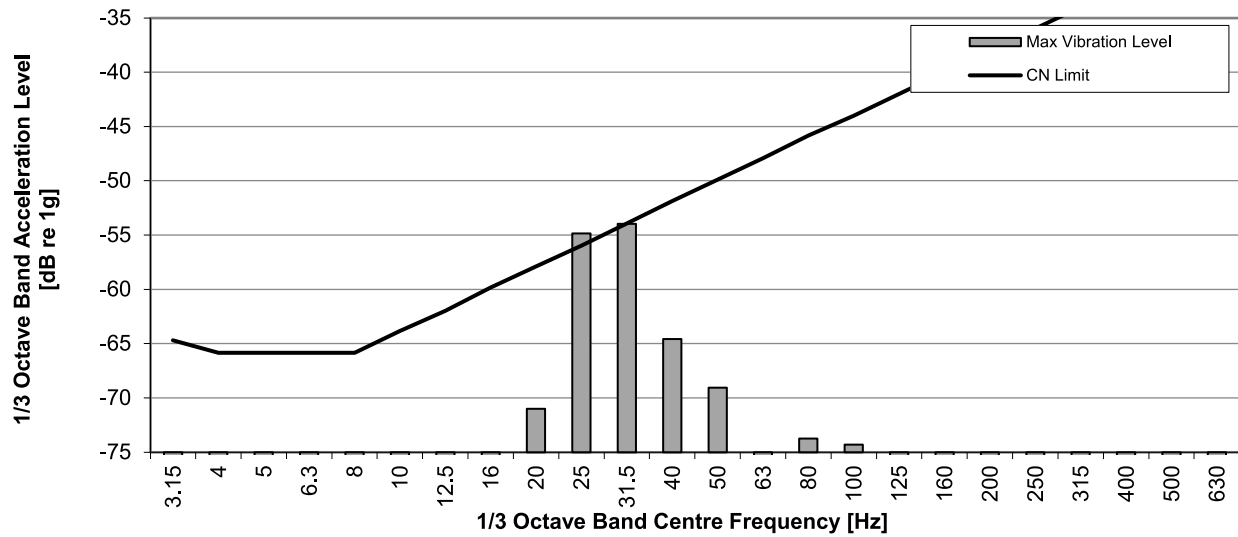
**Pass-by 2 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



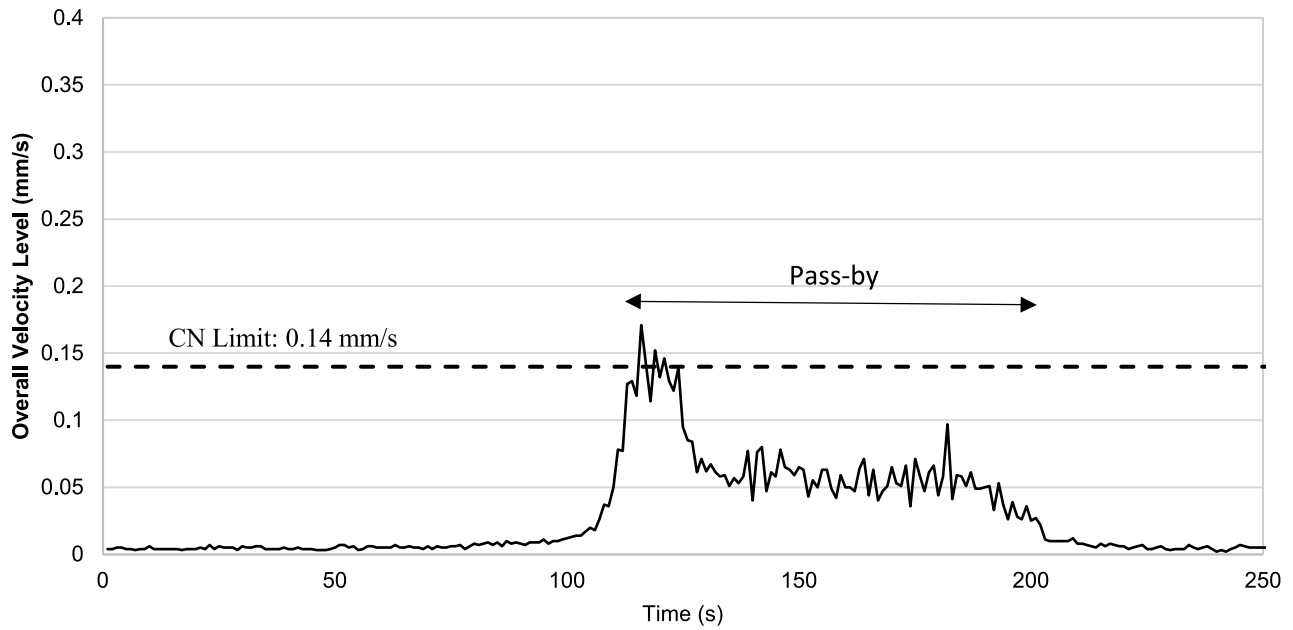
**Pass-by 3 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



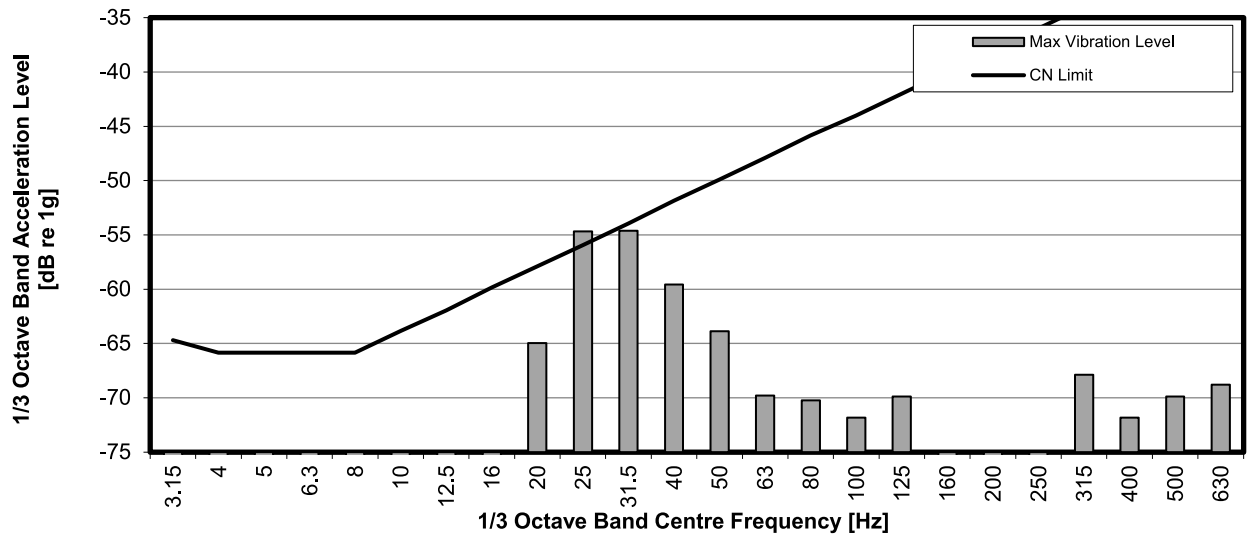
**Pass-by 3 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



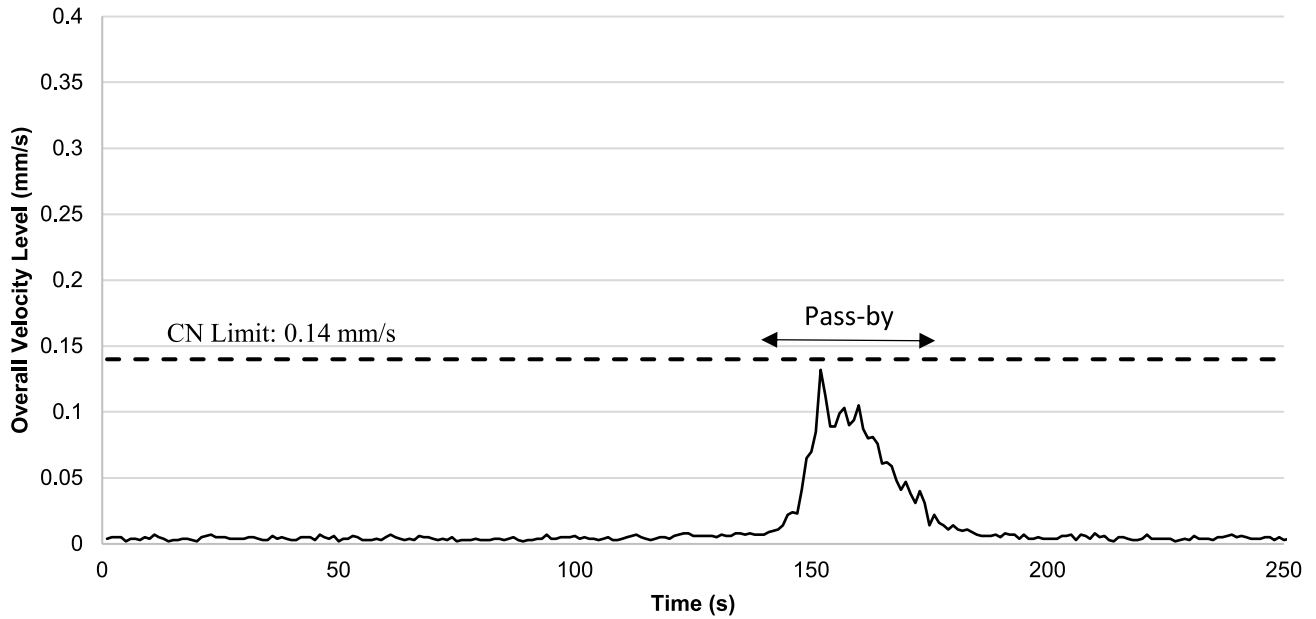
**Pass-by 4 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



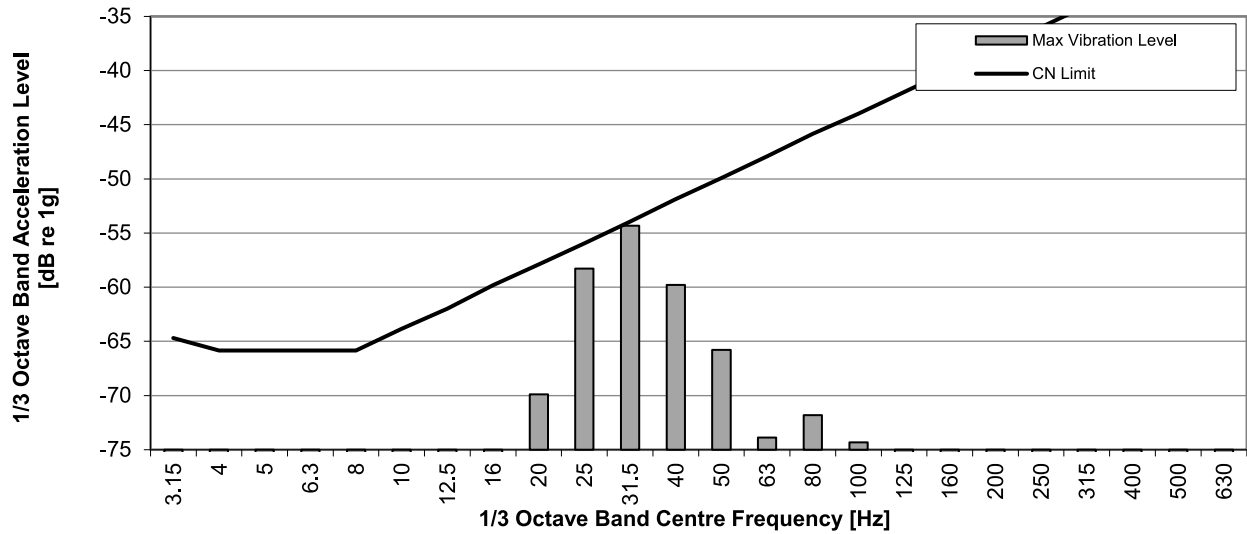
**Pass-by 4 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



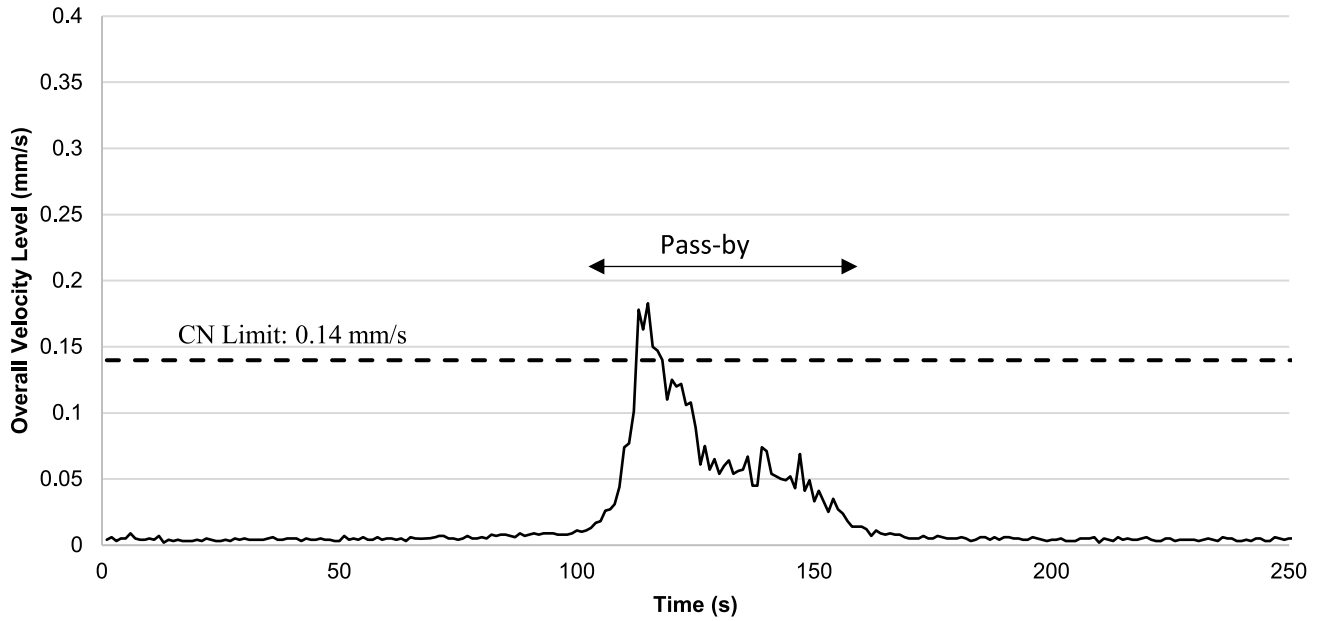
**Pass-by 5 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



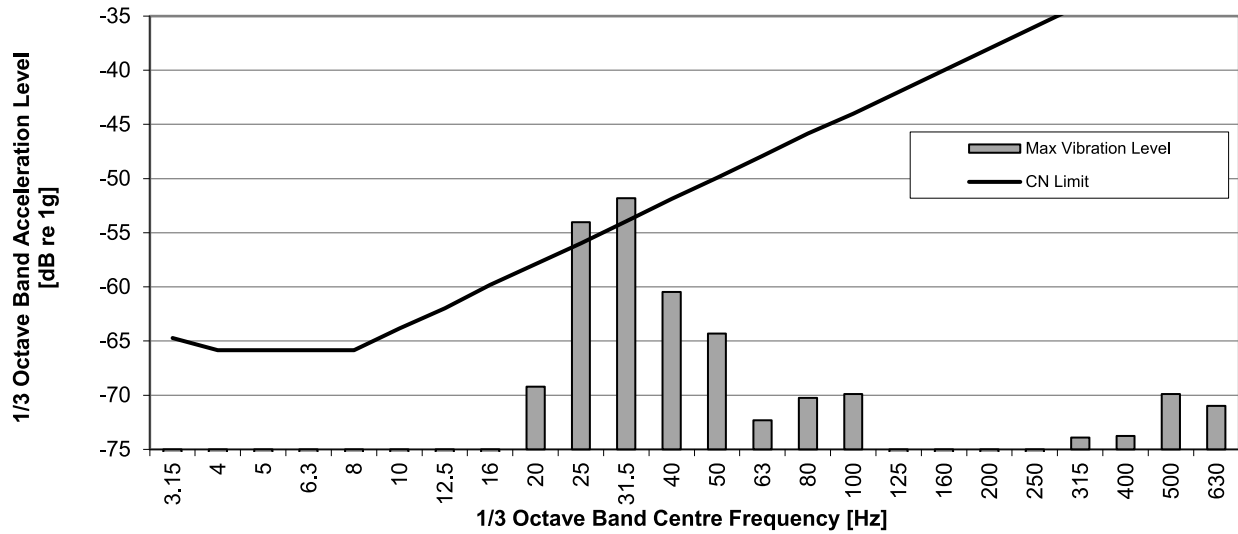
**Pass-by 5 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



**Pass-by 6 at 45 m from ROW at M3
Measured Vibratory Velocity Level**



**Pass-by 6 at M3
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



Stovel and Associates Inc.
Planners, Agrologists and Environmental Consultants

April 10, 2026

Dan Stuart, M.Env.Sc.
Azimuth Environmental Consulting, Inc.
624 Welham Road
Barrie, ON
L4N 9A1

**RE: Part of Lots 7–9, Concession 10 (Arkell), Township of Puslinch
Terms of Reference and Table of Contents - Scoped Environmental Impact
Study**

Dear Mr. Stuart:

This Terms of Reference (ToR) outlines the scope of work for the preparation of a scoped Environmental Impact Study (EIS) in support of the proposed residential development on lands described as Part of Lots 7–9, Concession 10 (Arkell), Township of Puslinch.

The purpose of the Scoped EIS is to evaluate potential impacts of the proposed development on natural heritage features and functions, and to demonstrate conformity with applicable policies of the Provincial Planning Statement, 2024 (PPS), the Wellington County Official Plan (OP) and the Township of Puslinch Zoning Bylaw (ZB).

This ToR is informed by agency comments and peer review, including the natural heritage review completed by Azimuth Environmental Consulting, Inc.

Background and Study Rationale

Recent peer reviews have identified:

- Presence of a plantation (~7–7.5 ha) that may qualify as Significant Woodland.
- Potential habitat for Species at Risk (SAR) (e.g., Black Ash, Butternut).
- Observations of Eastern Wood-pewee, indicating potential Significant Wildlife Habitat (SWH).
- Concerns related to the use of outdated environmental data (2007) requiring updated (but scoped) field investigations.

As such, Azimuth Environmental Consulting, Inc. has determined that a scoped EIS is required to:

- Confirm feature significance.
- Assess potential development impacts (including potential encroachment into woodland areas).

-
- Identify mitigation measures, including the need for future studies that could be implemented via a condition of Draft Plan approval.

Policy and Legislative Context

The scoped EIS will address:

- Provincial Planning Statement, 2024 (PPS) – Natural Heritage Policies.
- Wellington County Official Plan, including:
 - Section 4.6.3 (EIS requirements)
 - Section 5.4 (Species at Risk)
 - Section 5.5 (Natural Heritage System)

The following surveys will not be conducted:

- Wetland survey (the site is comprised of tableland areas).
- Offsite surveys (only the breeding bird survey conducted by Colville Consulting described offsite findings).
- Amphibian surveys (the site is comprised of tableland areas).
- Bat acoustic surveys will not be conducted; however, a leaf-off bat habitat assessment will be completed.
- Fisheries survey (the site is comprised of tableland areas).

These scoped exclusions reflect the absence of aquatic and wetland features on the subject lands and are consistent with a risk-based approach to addressing natural heritage constraints identified through background review and previous field investigations.

Scope of Work

A. Background Review

1. Describe the proposed development. Include map of current lot fabric making note of the areas of the plantation that could be encroached by the proposed development plan (i.e. building envelope, road network, drainage channels as a result of the SWM plan, noise mitigation features such as berms and fences).
2. Review relevant background information, including:
 - Previous environmental studies (e.g., GWS 2007; Arborland Forestry Consulting 2023).
 - Wellington County OP mapping and planning provisions and Puslinch Township ZB mapping and provisions.
 - Natural Heritage Information Centre (NHIC) and MNR Natural Areas mapping.
 - Results from Species atlases (breeding birds – appendix material).
3. Complete a MECP/MNRF information request for Species at Risk and natural heritage features.

B. Field Investigations

4. Breeding Bird Surveys

- Two breeding bird surveys were completed by Colville Consulting.
- The results of the surveys will be described.
- Assess significance of Eastern Wood-pewee observation with respect to Significant Wildlife Habitat criteria.

5. Vegetation Community Mapping

- Classify vegetation communities using Ecological Land Classification (ELC) system.
- Description of onsite vegetation and species list.

6. Woodland/Plantation Survey

- Document stocking density and health of plantation.
- Delineate woodland boundaries (dripline).
- Confirm presence of Butternut and Black Ash.
- Assess for Significant Woodland criteria (Wellington OP).

7. Bat Survey (limited to leaf-off survey)

8. Wildlife and Habitat Assessment

- Identify Significant Wildlife Habitat (SWH).
- Identify Species at Risk habitat.
- Record incidental wildlife observations.

C. Scoped Environmental Impact Study (EIS)

9. Mapping and Analysis – identify potential environmental constraints.

10. Impact Assessment – assess potential for environmental impacts based on the potential for encroachment into the plantation (including drainage channels that will be graded in the woodland as part of the SWM program).

11. Mitigation Measures

12. Edge Management and Restoration

13. Policy Conformity

14. Recommendations for future studies (condition of draft plan approval) if needed.

Please confirm that this approach is satisfactory. We will be conducting the leaf-off survey and SAR investigation (butternut and black ash) next week.

Yours truly,



Robert P. Stovel, M.Sc., M.C.I.P., R.P.P., P. Ag.

cc. Shawn Marsh

D14-KUK – 4th Submission Comment Summary

April 27, 2026

Consultant	Comments
NPG Planning – Township Planner	See attached letter
Azimuth – Township Ecologist	See attached letter
Salvini Consulting – Township Traffic Consultant	See attached letter
Valcoustics – Township Noise Consultant	See attached letter
Guelph Junction Railway	GJR is satisfied with the reports. GJR did not receive a response on an additional signal related to driveway on Watson. Gates not required acceptable although gates were not a request for the development. GJR will be approving based on our warning clause terms.



April 23, 2026

Monika Farncombe
7404 Wellington Road 34,
Puslinch, Ontario

Dear Monika Farncombe,

RE: **NPG Comments**
605 Arkell Road & Part of Lots 7,8,9, and Concession 10
RE: Application for Zoning By-law Amendment – Determination if Required
Information and Materials Have Been Provided

NPG Planning Solutions Inc. (NPG) has been retained to provide comments on whether required information and materials have been provided regarding a Zoning By-law Amendment Application on lands known as Part of Lots 7, 8, 9 and Concession 10 and part of the lands municipally known as 605 Arkell Road (“Subject Lands”).

The applicant is proposing a residential subdivision consisting of 44 single detached dwelling lots, a park, and a stormwater management block on The Subject Lands. The Subject Lands are approximately 20.57 hectares in size and have 260 meters of frontage along Arkell Road and 118 meters of frontage along Watson Road South. The Subject Lands contain a single detached dwelling and an accessory structure on the 605 Arkell Road Property, the rest of the Subject Lands are vacant. Surrounding uses consist of agricultural and rural residential uses. In addition, the southwestern portion of the Subject Lands abut the Guelph Junction Railway.

The Subject Lands are located outside of the Grand River Conservation Authority’s (GRCA) regulation limit, however, there appear to be woodland features on the Subject Lands in accordance with the GRCA’s mapping.

This is the third submission for a Zoning By-law Amendment (ZBA) application. As part of the submission, NPG has reviewed the following documents:

- Addendum Traffic Impact Study prepared by C.F Crozier & Associates Inc., dated February 2026;
- Comment response matrix prepared by C.F Crozier & Associates Inc., dated February 2026;

- Noise and Vibration Feasibility Study prepared HGC Noise Vibration Acoustics, dated April 7, 2026; and
- Scoped Environmental Impact Study Terms of Reference and Table of Contents prepared Stovel and Associates Inc., dated April 10, 2026.

We understand that there are two (2) *Planning Act* applications with the County of Wellington as it relates to the Subject Lands - an Official Plan Amendment to facilitate the expansion to the Hamlet of Arkell and a Draft Plan of Subdivision. Once the Official Plan Amendment application and/or Draft Plan of Subdivision application are circulated by the County, we will provide comments for those applications accordingly. The comments provided in this comment's letter pertain solely to the ZBA application.

1. Determination of Completeness:

- a. The application for Zoning By-law Amendment should be deemed incomplete until the items outlined in #2 are provided.

2. Additional Requirements:

- a. An Environmental Impact Study/Environmental Impact Assessment (EIS) was identified as still required by the Township's ecologist in their comment's dated October 14, 2025.

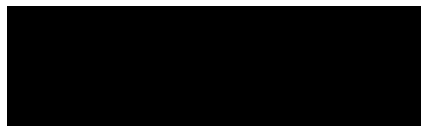
3. Comments:

- a. Once the ZBA application has been deemed complete, we will conduct a detailed review of the submitted materials for consistency with the PPS and conformity with the County Official Plan.
- b. We note that our previous comments included in our letter dated February 13, 2026, remain outstanding. Please provide a comment response matrix addressing our comments in the next submission.
- c. The Planning Justification Report should be updated to reflect the conclusions and recommendations included in the Noise Study.
- d. With respect to the Noise and Vibration Feasibility Study (NVFS), we offer the following high-level comments:
 - i. There appear to be incorrect references in this study that should be updated. For instance, references of "Table 5" on page 16 and "0.18 mm/s at M2" on page 17 should have been "Table 6" and "0.18 mm/s at M3", respectively.
 - ii. Please provide clarification why the outdoor landscape area noise receptors A_{OLA}, B_{OLA} and C_{OLA} are not located at the closest possible locations for outdoor landscape area on their respective lots relative from

the railway. The same clarification is requested for D_{OLA} and E_{OLA} in relation from Arkell Road.

- iii. Figure 1 outlines the extent of the proposed development that is subject to the evaluation of this study and Figure 2 shows locations of potential noise receptors. This is, however, different from the extent of lands subject to the ZBA application as detailed in the schedule of the draft Zoning By-law. Please ensure alignment between the extent of the study area of the NVFS and the extent of lands subject to the proposed ZBA application;
 - iv. It is noted that the study assumed a front yard setback of 6 metres. However, the applicant is proposing a minimum front yard setback of 3 metres. Please confirm if the assumption needs to be revised to be consistent with the proposed provision of the Draft Zoning By-law.
 - v. Part of the proposed 2.7-metre-high acoustic barrier for Lot 1 is located at the southwest corner of this lot. Please confirm that this barrier does not lie within the required sight triangle for this lot. Otherwise, either a zoning amendment to provide relief from section 4.26 of the Puslinch Zoning By-law or this recommendation should be revised to comply with the Zoning By-law; and
 - vi. Please review and incorporate the recommendations of the NVFS into the draft Zoning By-law as appropriate.
- e. Parkland dedication and Development Charges may be required in accordance with the prevailing Township's by-laws.
- f. The following information is available to assist with a submission:
- i. Site Plan and Drawing Requirements - https://puslinch.ca/wp-content/uploads/2020/09/Site-Plan-and-Drawing_Guidelines.pdf
 - ii. Municipal Development Standards - https://puslinch.ca/wp-content/uploads/2022/07/117006-3-Puslinch-Standards_FINAL-September-2019.pdf

Sincerely,



Jeremy Tran, MCIP, RPP
 Manager, Urban Design & Development Planning
NPG Planning Solutions Inc.
Jtran@npgsolutions.ca



Environmental Assessments & Approvals

April 21, 2026

AEC 24-348

Township of Puslinch
7404 Wellington Road 34
Puslinch, Ontario N0B 2J0

Attention: Monika Farncombe

Re: Natural Heritage Peer Review of a Terms of Reference for an Environmental Impact Study – Part of Lots 7-9, Concession 10 (Arkell), Township of Puslinch, County of Wellington

Monika Farncombe:

Azimuth Environmental Consulting, Inc. (Azimuth) is pleased to provide this natural heritage peer review letter for Stovel and Associates Inc. with regards to a Scoped Environmental Impact Study (EIS) Terms of Reference prepared for Part of Lots 7-9, Concession 10 (Arkell) in the Township of Puslinch (“Township”), County of Wellington (“County”). It is noted that applications for an Official Plan Amendment (OP-2006-06), Zoning By-law Amendment (P10/2006), and Draft Plan of Subdivision (23T-06003) were previously submitted in 2006.

Azimuth completed a Pre-consultation Ecology Peer Review for the proposed development (File #D00/KUK) on May 11, 2023 that provided a preliminary background review of natural heritage features and functions associated with the property and adjacent lands, and recommended that an Environmental Impact Study (EIS) be prepared including a suite of vegetation and wildlife surveys.

Azimuth subsequently reviewed relevant documents and issued comments as part of a natural heritage peer review letter dated October 14, 2025 as part of the initial submission package, on behalf of the Township. The initial submission natural heritage review letter reiterated the pre-consultation recommendation that an Environmental Impact Study/Environmental Impact Assessment (EIS/EIA) be prepared in accordance with Section 4.6.3 of the Wellington OP and the recommended field program initially described in the May 2023 pre-consultation peer review letter and updated in the October 2025 letter. In the initial submission natural heritage review it was noted



that the Results of Breeding Bird Surveys memo (Colville) is generally acceptable and can be incorporated into a future EIS/EIA report.

After the completion of the initial natural heritage review, Azimuth reviewed additional documents of potential relevance to natural heritage matters, on behalf of the Township, and issued comments as part of a natural heritage peer review letter dated February 12, 2026 (hereafter referred to as the “2nd Review”). It is noted that additional materials submitted January 2026 did not include an EIS/EIA or similar documentation. The 2nd Review continued to reiterate that an EIS/EIA be prepared in accordance with Section 4.6.3 of the Wellington OP and the recommended field program outlined in the May 2023 pre-consultation peer review letter and updated in the October 2025 letter.

Subsequent to 2nd Review, the following document has been reviewed:

- Part of Lots 7–9, Concession 10 (Arkell), Township of Puslinch Terms of Reference and Table of Contents - Scoped Environmental Impact Study (received April 10, 2026).

The document reviewed presents a Terms of Reference for the completion of a Scoped EIS pertaining to Part of Lots 7-9, Concession 10 (Arkell) in the Township of Puslinch, County of Wellington. Azimuth’s scope is to provide a technical peer review of the Terms of Reference for the development application from a natural heritage perspective. A site visit was not conducted as a component of this peer review. Therefore, the review and recommendations presented below are based on background sources and information provided by Stovel and Associates Inc., as well as recommendations provided by Azimuth in the May 2023, October 2025 and February 2026 letters.

Review of Terms of Reference

The Terms of Reference dated April 10, 2026 was prepared by Stovel and Associates Inc., and proposes the following background review, field investigations and Scoped EIS, as summarized below:

- Background Review;
 - Figure depicting proposed development and areas of encroachment into the woodland;
 - Review relevant background information;
 - Submit a Species at Risk (SAR) and natural heritage features information request to the Ministry of Environment, Conservation and Parks (MECP)/ Ministry of Natural Resources (MNR);
- Field Investigations;



- Summarize results of breeding bird surveys previously completed by Colville in spring 2023;
- Ecological Land Classification (ELC) and delineation of vegetation communities;
- Vascular plant inventory;
- Woodland boundary delineation and assess woodland health and tree density;
- Bat habitat survey during leaf conditions;
- Identify potential Significant Wildlife Habitat (SWH) and SAR, and record incidental wildlife observations;
- Scoped EIS;
 - Preparation of mapping identifying potential environmental constraints;
 - Impact assessment of the proposed development upon the woodland, including mitigation measures;
 - Recommendations for Edge Management and Restoration;
 - Policy conformity review; and
 - Recommendation for future studies should they be required.

Recommendations

Based on the above review, **Azimuth is accepting of the Terms of Reference proposed by Stovel and Associates Inc., pending incorporation of the following additional comments/requests into the EIS:**

- **MECP SAR and Information Request:** The Terms of Reference proposes issuing a SAR and natural heritage features information request to MECP/MNR. Given the low complexity of the site and the current direction from MECP, an information request is not likely necessary for this project, however Azimuth defers to the consultant's best judgement regarding MECP engagement with respect to SAR.
- **Environmental Features Mapping:** The Terms of Reference proposes mapping the current lot fabric, making note of areas of encroachment into the plantation, as well as including mapping potential environmental constraints. To provide a more comprehensive representation of the natural heritage features present and potential impacts, it is recommended that the Scoped EIS include a map of the environmental features (*e.g.* ELC and other mapped features) present on-site, as well as a figure overlaying the proposed development over the environment features.
- **Vascular Plant Inventory:** The field program proposes completing a vascular plant inventory but does not indicate the number or surveys or when survey(s) will be completed. Given the minor encroachment within natural features, a single vascular plant inventory during the spring or summer season (*i.e.* approximately late-May to



September) would be deemed sufficient. This survey can be completed in conjunction with the ELC mapping survey.

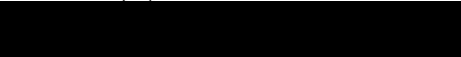
- **Natural Features Assessment:** The Terms of Reference verifies a review and assessment of impacts that will occur for woodlands, SAR, and SWH, as a component of the Scoped EIS. The report should also consider presence/absence of wetlands, Significant Valleyland, Areas of Natural and Scientific Interest, fish habitat, and natural linkages, and if determined to be present (or if treated as present), should be incorporated into the impact assessment and policy conformity reviews. It is understood that based on materials reviewed to date these features are unlikely to be present, however this should be acknowledged in the Scoped EIS.
- **Impact Assessment:** The Terms of Reference proposes assessing potential impacts based on the potential for encroachment into the plantation. While the significant natural heritage features present within the study area are anticipated to be primarily limited to within the plantation, the impact assessment should also consider features (*e.g.* hedgerows, open areas) located outside of the woodland where they occur.

Closure

Azimuth trusts this Terms of Reference peer review provides suitable natural heritage direction for the Township as the project application progresses toward submission of a Scoped EIS. If you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.


Alexa Pompilio-Grant, F.B.Sc.
Terrestrial Ecologist



April 24, 2026

Monika Farncombe
Planning and Corporate Services Coordinator
Township of Puslinch
7404 Wellington Road 34
Puslinch, ON · N0B 2J0

Re: Arkell Subdivison, D14-KUK, Roll Number - 2301000008034800000
Addendum Traffic Impact Study, February 2026, Crozier
Peer Review Comments, April 2026 ZBA Application

Dear Monika,

I've reviewed the Addendum Traffic Impact Study (TIS) prepared by Crozier for the lands identified above near the intersection of Watson Road South and Arkell Road and dated February 2026.

I had reviewed and commented on three previous versions of the TIS. This version has been modified to address comments provided in February 2026 about the sightline assessment and the rail crossing. After reviewing the updated February 2026 study, I provide the following comments:

1. The consultant has confirmed that they measured the sight distance at the proposed new road connection on Watson Road South and that the available sight distance meets Transportation Association of Canada requirements for intersection sight distance. I am satisfied with this assessment. The County will comment on the sightline assessment for the proposed access to Arkell Road.
2. Additional analysis and correspondence with Guelph Junction Railway (GJR) related to the new road connection on Watson Road South is provided suggesting the road location as proposed is satisfactory and that additional crossing infrastructure is not needed for the railway. Confirmation from GJR is needed that they agree with the consultant's assessment.

The County and their consultant may have additional comments based on their review of the proposed road connection to Arkell Road and the Watson/Arkell intersection.

In response to the Township's request, I offer the following feedback:

1. The Zoning By-law Amendment application can be deemed complete from a transportation perspective and I am in support of the application.

2. Conditions of approval should include:
 - a. confirmation from Guelph Junction Railway that they will support the location of the new road connection to Watson Road South adjacent to the at-grade railway crossing and that they do not require any upgrades to the existing crossing infrastructure.
3. n/a
4. Technical requirements are described in point 2 above.
5. No additional requirements beyond those identified in point 2 above.

Let me know if there is anything further you would like to discuss with respect to this application.

Sincerely,



Julia Salvini, MEng, PEng, FITE
President



April 21, 2026

Township of Puslinch
7404 Wellington Road 34
Puslinch, Ontario
N0B 2J0

Attention: Monika Farncombe
mfarncombe@puslinch.ca

VIA E-MAIL

**Re: Peer Review of Noise and Vibration Feasibility Study
 Proposed Residential Subdivision
 Arkell Subdivision
 South of Arkell Road and East of Watson Road South
 Puslinch, Ontario
 VCL File: 0267210.0131**

Dear Ms. Farncombe:

We have completed our review of “*Noise and Vibration Feasibility Study, Proposed Residential Development, Arkell Subdivision, South of Arkell Road and East of Watson Road South, Puslinch Ontario*”, dated April 7, 2026, prepared by Howe Gastmeier Chapnik Limited (HGC).

Our comments are outlined herein.

1. The noise study has appropriately applied the Ministry of Environment, Conservation and Parks (MECP), the Canadian National Railway/Guelph Junction Railway (CNR/GJR) and Railway Association of Canada/Federation of Canadian Municipalities (RAC/FCM) guidelines. This is considered appropriate.
2. There are a few items that require some additional clarification before we can agree with the findings and recommendations of the preliminary noise study:
 - a. The study recommends the future dwelling on Lot 1 be at least 45 m from the railway right-of-way to reduce vibration levels. Even at this setback distance, the vibration levels are above the CNR/GJR limit. In addition, the proposed building envelope shown on the Onsite Sewage Servicing Schematic has the setback at less than 45 m. Vibration mitigation to meet the limit is needed.
 - b. The noise study indicates there are existing stationary sources (i.e., small engine repair shop, bicycle store and pet boarding service) in the area. These need to be identified on a Key Plan to confirm there are existing noise sensitive uses that are closer to these than the proposed residential development as stated in the noise report.

- c. Road traffic information was obtained from the Town of Puslinch and the County of Wellington. The assumptions regarding the traffic information, such as no truck traffic on Watson Road South and the 2035 volumes, should be confirmed by Crozier who authored the Traffic Impact Study on behalf of the developer.
- d. The future sound levels at Prediction Location D presented in Table 4 assumes the dwelling is located to the north of the OLA which maximizes the distance from Arkell Road. However, the Onsite Sewage Servicing Schematic shows the dwelling at the southern portion of the lot with the OLA to the north and fully exposed to Arkell Road. An updated assessment for this location is needed.
- e. To calculate the exterior façade sound isolation requirements, the report states that a window to floor ratio of 50% was used. How was a corner room where there could be windows on two façades accounted for? What wall to floor ratio was used?
- f. The noise mitigation summary provided as Table 7 should include the locations where brick veneer or equivalent masonry construction is required for the exterior walls. Review of the recommended locations shown on the first Figure 4 indicate that in addition to the southeast façade, the southwest façade should also be brick veneer or equivalent masonry construction.
- g. The minimum window STC for Location A (Lot 1) in Table 7 is indicated as being 37. However, Table 4 recommends 35 for the same location. Clarification is needed.

Based on our review of the Noise and Vibration Feasibility Study, there are a few items, as outlined above, that require further clarification before we can agree with the findings and conclusions of the noise study.

If there are any questions, please do not hesitate to call.

Yours truly,

VALCOUSTICS CANADA LTD.

Per:


John Emeljanow, P.Eng.

JEV
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