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36 Years

Wateridge Village Phase 1B Block 19

Transportation Impact Assessment

Wateridge Village Phase 1B
Block 19

Transportation Impact Assessment

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

March 23, 2020

Novatech File: 117121
Ref: R-2018-015

NOVATECH
Engineers, Planners & Landscape Architects

March 23, 2020

City of Ottawa
Planning and Growth Management Department
110 Laurier Ave. W., 4th Floor,
Ottawa, Ontario K1P 1J1

Attention: **Wally Dubyk**
Project Manager, Infrastructure Approvals

Dear Sir:

Reference: **Wateridge Village Phase 1B - Block 19**
Transportation Impact Assessment Report
Novatech File No.117121

We are pleased to submit the following Transportation Impact Assessment Report in support of a Site Plan Control application for Block 19 in Phase 1B of Wateridge Village at the Rockcliffe Subdivision for your review and sign-off. The structure and format of this report is in accordance with the City of Ottawa Transportation Impact Assessment Guidelines (June 2017).

If you have any questions or comments regarding the report, please feel free to contact the undersigned, or Jennifer Luong.

Yours truly,

NOVATECH

Rochelle Fortier, B.Eng.
Engineering Intern | Transportation/Traffic

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TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering ☑ or transportation planning ☐.

[1,2] **License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

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Dated at Ottawa (City) this 23 day of March, 2020.

Name: Jennifer Luong, P.Eng. (Please Print)

Professional Title: Senior Project Manager, Transportation/Traffic

J Luong

Signature of individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)	
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EXECUTIVE SUMMARY

This Transportation Impact Assessment (TIA) report has been prepared in support of a Site Plan Control application for Block 19 (681 Mikinak Road) in Phase 1B of Wateridge Village at the Rockcliffe Subdivision. The Rockcliffe Subdivision is a Canada Lands Corporation (CLC) development, with the subject block developed by Mattamy Homes.

As part of the greater approved Plan of Subdivision, a Community Transportation Study was prepared by Parsons for the Former Canadian Forces Base (CFB) Rockcliffe Redevelopment in June 2014 and a Transportation Impact Study was prepared by Parsons for Phase 1B of the Wateridge Village in October 2016. The site traffic generated by Block 19 was included in the overall traffic estimate presented in the June 2014 CTS and the October 2016 TIS.

Block 19 is proposed to accommodate 4 mid-rise (6 and 7 storey) condominium buildings, with an estimated total of 421 residential units, 785m^2 (8,450ft^2) of ground floor commercial and underground parking. The development will have one full-movement access to Barielle-Snow Street.

The 2016 Phase 1B TIS assessed a total of 415 town/condo units for Blocks 15, 22 and 24 and 236 mid-rise condo units for Block 19. The December 2017 Transportation Overview Addendum and June 2019 TIA assessed a total of 368 townhouse units for Blocks 15, 22 and 24. The current submission for Block 19 of approximately 421 condo units represents an increase of approximately 185 units for that block, and an increase of approximately 138 units for the total number of units previously considered for all four Mattamy blocks (651 units initially versus 789 proposed units).

The increase in the number of units and commercial space for all four Mattamy blocks will increase the site generated trips by approximately 39 vehicle trips in the AM peak hour and 49 vehicle trips in the PM peak hour in comparison to the Wateridge Village Phase 1B TIS. This increase in vehicle trips will be spread across the two signalized intersections on Montreal Road. Background traffic volumes identified in the Phase 1B TIS indicate that the Montreal Road/Carsons Road/Codd's Road intersection carries approximately 2780 vehicles in the AM peak and 2740 vehicles in the PM peak, while the Montreal Road/Bathgate Drive/Wanaki Road intersection carries 2515 vehicles in the AM peak and 2342 vehicles in the PM peak. An increase of 50 vehicles per hour or less at either intersection will only increase the vehicular volumes by 1-2% of the total intersection volumes. As such, the intersection analysis conducted in the Phase 1B TIS is still considered valid and no new analysis is required.

The main conclusions and recommendations of this TIA can be summarized as follows:

<u>Development Design & Parking</u>

- The buildings' main entrances are accessed from Codd's Road, Hemlock Road, Mikinak Road, and Barielle-Snow Street from perimeter sidewalks. Pedestrian connectivity is provided to the existing sidewalks along the boundary streets. Pedestrian walkways are provided throughout the site, as shown on the Site Plan, in order to connect amenity space areas and building entrances. The landscaped area between the condominium buildings will provide pedestrian connectivity between buildings and the boundary streets. A depressed sidewalk will be constructed across the proposed vehicular site access on Barielle-Snow Street.

- A raised cycle track is approved along the north and south side of the Hemlock Road. Multi-use pathways are approved along the west side of Codd's Road adjacent to the Centre Park, and along the south side of Mikinak Road, east of Codd's Road and adjacent to the South Park.
- Block 19 is currently serviced by two OC Transpo bus routes at the intersection of Codd's Road and Mikinak Road at the southwest corner of the subject property. The pedestrian connections between buildings provide walking distances of less than 400m to the transit stops.
- All applicable and required Transportation Demand Management (TDM) supportive design and infrastructure measures in the TDM checklist are met.
- The access to/from Barielle-Snow Street will provide access to waste collection, loading spaces, commercial parking spaces, residential visitor parking spaces, and the underground parking garage.
- The drive lane from the site entrance on Barielle-Snow Street to the underground parking ramp is intended for two-way travel while the drive lane around the central courtyard is intended for one-way travel. A 'no left turns' sign and 'do not enter' signs are posted where the drive aisle transitions from two-way to one-way travel, in order to enforce the one-way travel condition. One-way signage is posted along the internal roadway. The recommended signage is shown on the Site Plan.
- Circulation around the courtyard incorporates raised crosswalks and corners with bollard lined drive aisles to guide vehicles and encourage slow vehicle speeds where pedestrian movements are intended. The raised crosswalks and the use of unit pavers are intended to increase the visibility of pedestrians at crosswalks. The raised corners are also intended to act as traffic calming. Drop-off zones are dedicated in front of each building to discourage vehicles from stopping in pedestrian zones.
- The proposed number of vehicular and bicycle parking spaces meet the minimum requirements of the Zoning By-Law.

Boundary Street Multi-Modal Level of Service (MMLOS)

- All MMLOS targets are met except for the BLOS target B on Codd's Road. The east side of Codd's Road operates with mixed traffic which earns a BLOS D while the west side has a MUP which earns a BLOS A. As cyclists have the option of using the MUP for northbound travel, no changes are recommended.

Access Design

- The proposed development will have one all movement access to Barielle-Snow Street (local street). The access will be 6.7m in width and located approximately 33m from the northern property line and approximately 93m from the southern property line. Stop control will be provided at the site's vehicular access, with free flow conditions on Barielle-Snow Street.
- No capacity or queuing problems are anticipated at the site's vehicular access and the clear throat length provided is sufficient. The proposed access meets all requirements of the Private Approach By-Law.
- The location of the parking ramp allows for two-way travel from the site driveway on Bareille-Snow Street to the parking ramp and garbage enclosure, and for a one-way drive aisle around the courtyard.

Transportation Demand Management

- To encourage travel by sustainable modes, the proponent agrees to provide a multi-modal travel option information package to new residents.

Neighbourhood Traffic Management

- The Phase 1B TIS indicates that minimal traffic is expected to cut-through the development south of Montreal Road, to/from Carson Road and Bathgate Drive. If cut-through traffic from the site becomes problematic, prohibiting north-south through movements by way of traffic signal design could be considered at the Montreal Road intersection.
- The added traffic generated by the proposed development is not anticipated to have a significant impact on the vehicular operations along Barielle-Snow Street and will not change the classification of Barielle-Snow Street from a local roadway to a collector roadway.

Transit

- The proposed development is anticipated to generate 58 transit trips (15 in, 43 out) during the AM peak hour and 78 transit trips (46 in, 32 out) during the PM peak hour.
- As concluded in the Phase 1B TIS, the Wateridge community will be well served by transit with potential transit priority provided at Montreal/Wanaki intersection.

Intersection MMLOS

- Both study area intersections are currently operating with a PLOS F, based on the Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) score. A reduction in the pedestrian crossing distance would have the greatest improvement to the PETSI score at these intersections. The crosswalks at the study area intersections can not achieve the target PLOS C without significantly reducing the crossing distance and restricting turning movements.
- Both study area intersections are currently operating with a BLOS F, based on left turn characteristics alone. The BLOS of the left-turning movements could meet the target BLOS C by implementing two-stage left turn bike boxes. This is identified for the City's consideration to address the existing conditions, and is not a result of the development.
- The Montreal Road/Carson's Road/Codd's Road intersection is currently operating with a TLOS F. The north approach experiences delays of 28 seconds which earns a TLOS D, while the south approach experiences delays of 42 seconds which earns a TLOS F. The north and south approaches do serve transit; however, they are not classified as transit priority corridors and do not have a TLOS target. The east and west approaches on Montreal Road experience delays of less than 20 seconds, thereby achieving the target TLOS C for an arterial mainstreet with a transit priority designation (continuous lanes).
- Both intersections are currently operating with a TkLOS E. To achieve the target TkLOS D, an effective turn radius greater than 15m is required on all four corners of the intersections, or an extra receiving lane would be required on Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road. However, as Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road are collector roadways that are not classified as truck routes, there are no TkLOS targets for these roads. Montreal Road has two receiving lanes and earns a TkLOS B, exceeding the target TkLOS D for a truck route on an arterial road.
- The existing auto operations for the study area intersections were completed as part of Wateridge Phase 1B TIS. The Phase 1B TIS noted a safety concern at the intersection of Montreal Road and Burma Road. Subject to further consultation with City of Ottawa staff, fully-protected left-turn phases in the westbound and northbound legs was recommended based on the existing collison records.

Intersection Capacity Analysis

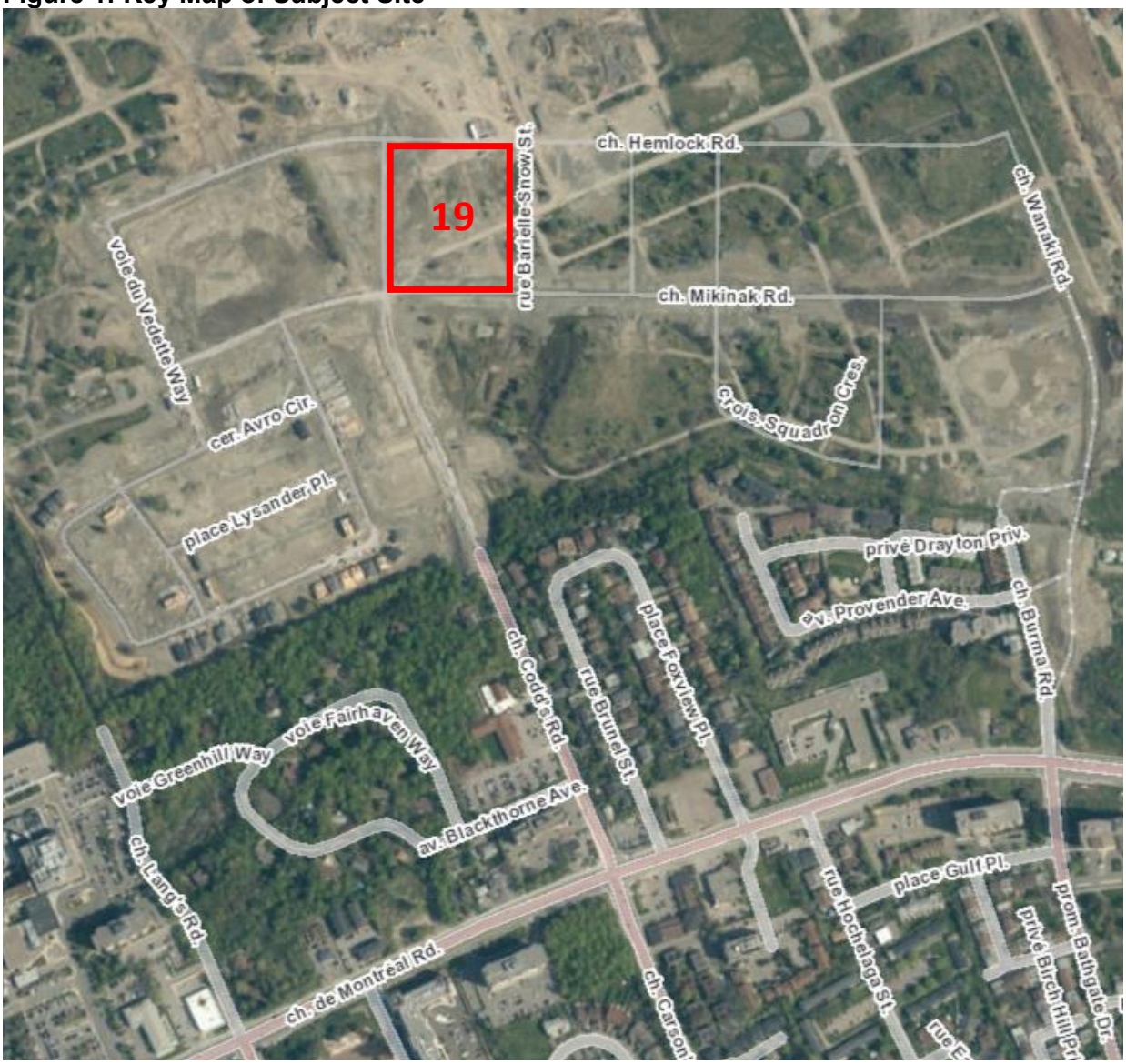
- The Phase 1B TIS identified the following roadway modifications at the Montreal Road at Wanaki Road intersection, at full build-out of Phase 1B:
    - an eastbound protected/permitted left-turn phase, and
    - a westbound right-turn lane.
- As indicated in the TIS, the projected increase in vehicle volume at the Montreal Road/Wanaki Road intersection is mainly related to the future office development (355,000 sq.ft.) located east of Wanaki Road in Phase 1B. Block 19 related traffic for the eastbound left turn movements at Wanaki Road would be negligible due to the site's location. With the addition of site traffic, it is not anticipated that the westbound right turn movement would trigger the need for a right turn lane. It is anticipated that the majority of vehicle trips would use the Montreal Road and Codd's Road intersection for access.
- No road improvements are required due to the development of Block 19.

1.0 INTRODUCTION

This Transportation Impact Assessment (TIA) report has been prepared in support of a Site Plan Control application for Block 19 (681 Mikinak Road) in Phase 1B of Wateridge Village at the Rockcliffe Subdivision. The Rockcliffe Subdivision is a Canada Lands Corporation (CLC) development, with the subject block developed by Mattamy Homes.

The subject lands, known as Block 19, has an area of 1.63 hectares (4.02 acres) and is bounded by Hemlock Road to the north, Barielle-Snow Street to the east, Mikinak Road to the south, and Codd's Road to the west, as shown in **Figure 1**.

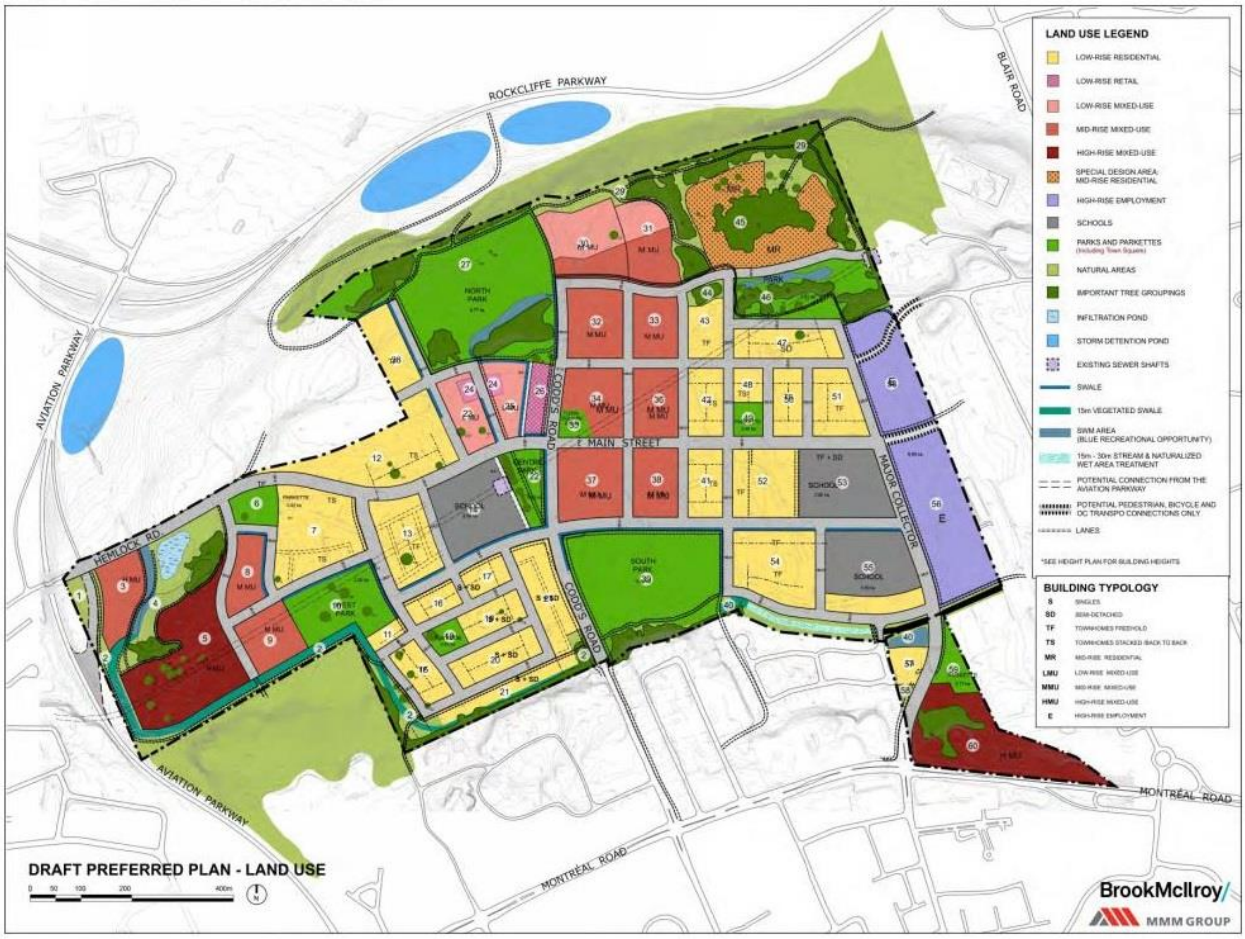
Figure 1: Key Map of Subject Site



maps.ottawa.ca/geoottawa

The approved Land Use and Phasing Plans for the Rockcliffe Subdivision are shown in **Figures 2** and **3**.

Figure 2: Rockcliffe Subdivision Land Use Plan



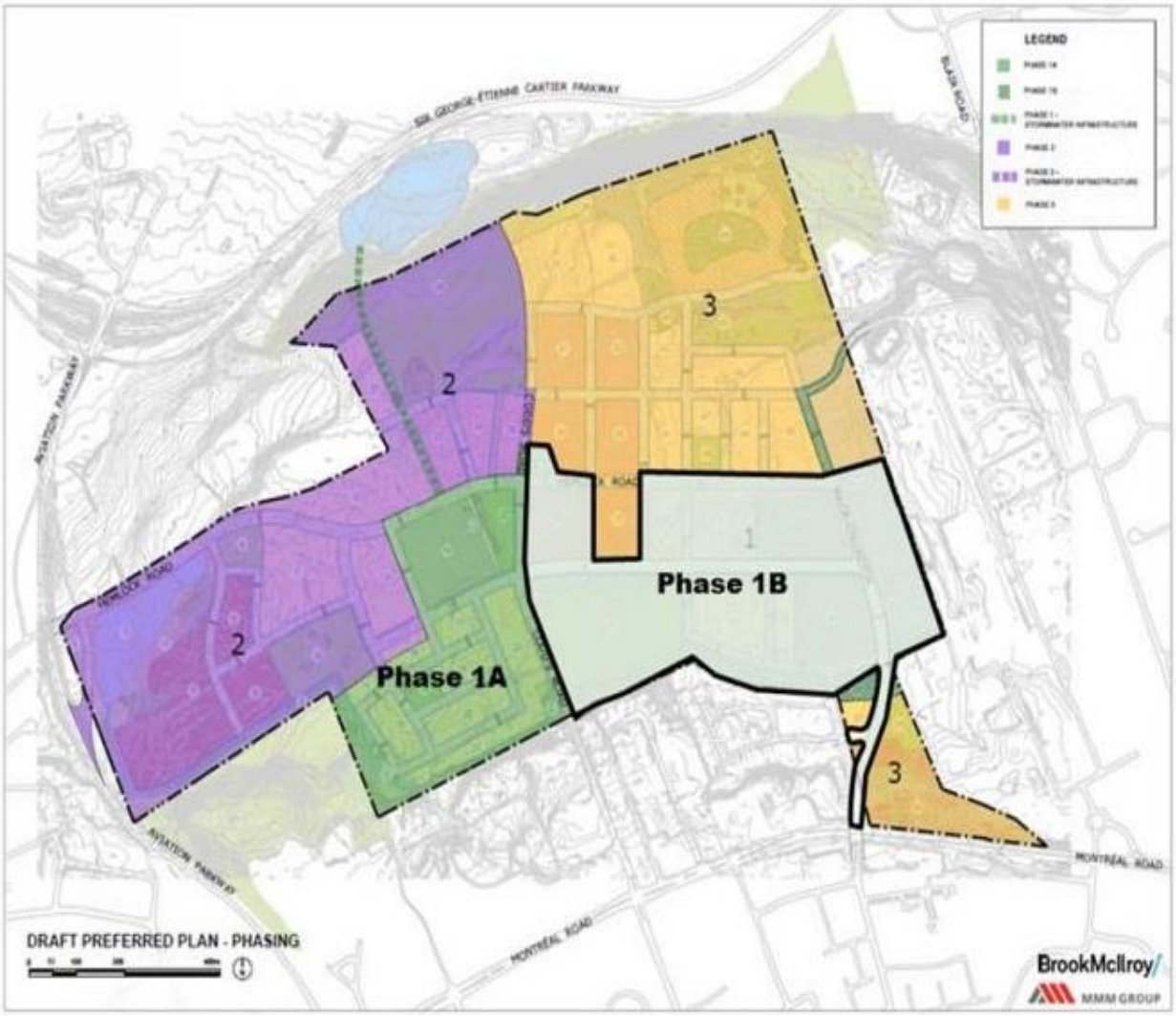
Community Transportation Study (June 2014)

As part of the greater approved Plan of Subdivision, a Community Transportation Study was prepared by Parsons for the Former Canadian Forces Base (CFB) Rockcliffe Redevelopment in June 2014 and a Transportation Impact Study was prepared by Parsons for Phase 1B of the Wateridge Village in October 2016. The site traffic generated by Block 19 was included in the overall traffic estimate presented in the June 2014 CTS and the October 2016 TIS. The body of the approved TIS for Phase 1B has been included in **Appendix A** for reference. Full copies of the June 2014 CTS and the October 2016 TIS have been included on a disk for City submission.

A Transportation Overview and subsequent Addendum were prepared by Novatech in August 2017 and December 2017 for Blocks 15, 22 and 24 of Phase 1B, also developed by Mattamy. A TIA report was prepared by Novatech in February 2019 and revised in June 2019 for Block 15 of Phase 1B.

The report layout will follow the City of Ottawa Transportation Impact Assessment Guidelines (June 2017). Required sections of the TIA report that have already been addressed and remain unchanged with the development proposal for Block 19 will reference the approved studies.

Figure 3: Overall Phasing Plan



Transportation Impact Study (October 2016)

2.0 PROPOSED DEVELOPMENT

Block 19 is proposed to accommodate 4 mid-rise (6 and 7 storey) condominium buildings, with an estimated total of 421 residential units, 785m^2 (8,450ft^2) of ground floor commercial and underground parking. The development will have one full-movement access to Barielle-Snow Street.

The development proposal is consistent with the Land Use Plan shown in **Figure 2** (i.e., mixed-use development**)**. The 2016 Phase 1B TIS assessed a total of 415 town/condo units for Blocks 15, 22 and 24 and 236 mid-rise condo units for Block 19. The December 2017 Transportation Overview Addendum and June 2019 TIA assessed a total of 368 townhouse units for Blocks 15, 22 and 24. The current submission for Block 19 of approximately 421 condo units represents an increase of approximately 185 units for that block, and an increase of approximately 138 units for the total number of units previously considered for all four Mattamy blocks (651 units initially versus 789 proposed units).

The proposed Site Plan for Block 19 is included in **Appendix B**.

3.0 SCREENING

The City of Ottawa Transportation Impact Assessment Guidelines (TIA) identify three triggers for completing a TIA report, including trip generation, location, and safety. The criteria for each trigger are outlined in the City's TIA Screening Form.

The trigger results are as follows:

- Trip Generation Trigger: A review of the proposed development and number of condominium units, greater than 90 units, indicates that further assessment is required based on this trigger.

- Location Triggers: A review of the proposed boundary street conditions indicates that no further assessment is required based on this trigger.

- Safety Triggers: A review of the proposed boundary street conditions indicates that no further assessment is required based on this trigger.

Based on the foregoing, the Trip Generation trigger is met. A Transportation Impact Assessment is required based on this trigger. A copy of the TIA Screening Form is included in **Appendix C**.

4.0 SCOPING

4.1 Existing and Planned Conditions

As identified above, the subject site forms part of the Phase 1B of Wateridge Village in the Rockcliffe Subdivision. A Community Transportation Study (CTS) was prepared for the Former Canadian Forces Base (CFB) Rockcliffe Redevelopment in June 2014 and a Transportation Impact Study (TIS) was prepared for Phase 1B of Wateridge Village (formerly CFB Rockcliffe) in October 2016.

The approved reports were prepared within the last five years and a review of the existing and planned conditions was provided in Section 2 and 4.4 of the 2014 CTS, and in Section 2 and 3.1 of the 2016 Phase 1B TIS.

Mikinak Road will be a collector road with a 26m right-of-way and a two-lane urban cross section. A multi-use pathway (MUP) will be provided on the south side of Mikinak Road, east of Codd's Road, and on the north side, west of Codd's Road.

Hemlock Road will be a collector road with a 24m right-of-way and a two-lane urban cross section. Sidewalks and cycle tracks are planned on both sides of Hemlock Road.

Barielle-Snow Street will be a local road with a 20m right-of-way and a two-lane urban cross section. Sidewalks are planned on both sides of Barielle-Snow Street.

Codd's Road will be a collector road with a 26m right-of way and a two-lane urban cross section. A sidewalk will be provided along the east side of Codd's Road and a MUP will be provided along the west side of Codd's Road, south of Hemlock Road.

It is anticipated that the intersections of Codd's Road/Hemlock Road and Codd's Road/Mikinak Road will be all-way stop controlled as the Rockcliffe Subdivision develops and the intersections of Hemlock Road/Barielle-Snow Street and Mikinak Road/Barielle Snow Street will be side-street stop controlled, with free flow on Hemlock Road and Mikinak Road.

Site access to and from Montreal Road will be provided via Codd's Road and Wanaki Road. The Codd's Road/Carsons Road/Montreal Road and Wanaki Road/Bathgate Drive/Montreal Road intersections are signalized.

4.2 Study Area and Time Periods

The study area for this report will include the proposed site access and the Phase 1B site accesses; Montreal Road at Wanaki Road/Bathgate Drive and Montreal Road at Codd's Road/Carson's Road. Intersection analysis for a larger study area was previously performed as part of the 2016 TIS for Phase 1B of the Wateridge Village and will be referenced in this report.

The selected time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. The proposed site development is anticipated to be constructed in a single phase with first occupancy in January 2022 and full buildout in May 2025. A rationale for excluding the Saturday peak period from further analysis is outlined in Section 5.1.

4.3 Exemptions Review

This module reviews possible exemptions from the final TIA, as outlined in the TIA Guidelines. The applicable exemptions for this site are shown in **Table 1**.

Table 1: TIA Exemptions

Module	Element	Exemption Criteria	Exemption Applies
Design Review Component			
4.1 Development Design	*4.1.2* Circulation and Access	• Only required for site plans	Not Exempt
	4.1.3 New Street Networks	• Only required for plans of subdivision	Exempt
4.2 Parking	*4.2.1* Parking Supply	• Only required for site plans	Not Exempt
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	Exempt

Module	Element	Exemption Criteria	Exemption Applies
Network Impact Component			
4.5 Transportation Demand Management	*All elements*	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Not Exempt
4.6 Neighbourhood Traffic Management	*4.6.1* Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Not Exempt
4.8 Network Concept	*All elements*	• Only required when the proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by the established zoning	Exempt

As the trip generation trigger is met, a TIA report reviewing the Design component and the Network Impact component is required. The following modules will be included in the TIA report:

- Module 4.1 – Development Design
- Module 4.2 – Parking
- Module 4.3 – Boundary Street Design
- Module 4.4 – Access Intersections Design
- Module 4.5 – Transportation Demand Management
- Module 4.6 – Neighbourhood Traffic Management
- Module 4.7 – Transit
- Module 4.9 – Intersection Design

As stated above, the report will follow the 2017 City of Ottawa Transportation Impact Assessment Guidelines. Required modules of the TIA report that have already been addressed and remain unchanged with the development proposal for Block 19 will compare and reference the approved studies. The body of the approved TIS for Phase 1B has been included in **Appendix A** for reference. Full copies of the June 2014 CTS and the October 2016 TIS have been included on a disk for City submission.

As identified above, the current submission for Block 19 of approximately 421 residential units and 8,450ft^2 of commercial space represents an increase of approximately 185 residential units and 3,600 ft^2 of commercial for that block, and an increase of approximately 138 units for the total number of units previously considered for all four Mattamy blocks (651 units initially versus 789 proposed units).The increase in the number of units and commercial space for all four Mattamy blocks will increase the site generated trips by approximately 39 vehicle trips in the AM peak hour and 49 vehicle trips in the PM peak hour in comparison to the Wateridge Village Phase 1B TIS. This increase in vehicle trips will be spread across the two signalized intersections on Montreal

Road. Background traffic volumes identified in the Phase 1B TIS indicate that the Montreal Road/Carsons Road/Codd's Road intersection carries approximately 2780 vehicles in the AM peak and 2740 vehicles in the PM peak, while the Montreal Road/Bathgate Drive/Wanaki Road intersection carries 2515 vehicles in the AM peak and 2342 vehicles in the PM peak. An increase of 50 vehicles per hour or less at either intersection will only increase the vehicular volumes by 1-2% of the total intersection volumes. As such, the intersection analysis conducted in the Phase 1B TIS is still considered valid and no new analysis is required.

The TIA will provide an on-site design review including provisions for non-auto modes, circulation, access and review parking provisions with respect to the Zoning by-law requirements. The report will provide a review of the TDM checklist for residential developments and conduct new MMLOS analysis for pedestrian/bike/transit/truck modes at the two study area intersections on Montreal Road. The study will reference the intersection analysis provided in the October 2016 Phase 1B TIS.

5.0 FORECASTING

5.1 Development-Generated Traffic

5.1.1 Trip Generation

Residential trips have been estimated by using two different methods below for comparison.

For the first method, trips have been estimated using the recommended rates from the TRANS *Trip Generation Manual*, prepared in 2009 by McCormick Rankin Corporation. The vehicle trip generation rates, taken from Table 6.3 in the report, correspond to mid-rise apartments in the Urban Area. The directional split between inbound and outbound trips is based on the blended splits presented in Table 3.17 of the report. The estimated number of residential trips generated by the proposed development is shown in **Table 2**.

Table 2: Residential Vehicle Trips Using TRANS Rates

Land Use	TRANS Rates	Units	AM Peak (VPH)			PM Peak (VPH)		
			IN	OUT	TOT	IN	OUT	TOT
Mid-Rise Apartments	AM: 0.24 PM: 0.28	421	23	78	101	73	45	118

The corresponding number of person trips generated by the development is based on the modal shares presented in Table 3.13 of the TRANS report. The estimated number of residential person trips generated is shown in **Table 3**.

Table 3: Residential Person Trips Using TRANS Rates

Land Use	TRANS Auto Share	AM Peak (PPH)			PM Peak (PPH)		
		IN	OUT	TOT	IN	OUT	TOT
Apartment	AM: 37% PM: 40%	62	211	273	183	112	295

From the previous table, the residential component is anticipated to generate 273 person trips in the AM peak, and 295 person trips in the PM peak, using the TRANS rates.

For the second method, residential trips generated by the proposed development have been estimated using the peak hour rates identified in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition. Land use code 221 (Multifamily Housing, Mid-Rise) of the *Trip Generation Manual* includes data from apartments, townhouses, and condominiums that have between three and ten levels (floors). Person trips were calculated using an ITE Trip to Person Trip factor of 1.28, consistent with the TIA Guidelines. The residential person trips generated by the proposed development are summarized in **Table 4**.

Table 4: Residential Person Trips Using ITE Rates

Land Use	ITE Code	Units	AM Peak (PPH)			PM Peak (PPH)			SAT Peak (PPH)		
			IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Multifamily Housing (Mid-Rise)	221	421	46	133	179	137	88	225	115	74	189

From the previous table, the residential component is estimated to generate 179 person trips in the AM peak, and 225 person trips in the PM peak, using the ITE rates.

Based on the foregoing, the TRANS rates are approximately 50% higher than the ITE rates during the AM peak hour and approximately 30% higher than the ITE rates during the PM peak hour. The TRANS rates are based on local data from 2009, using Origin-Destination survey data from 2005, and have a smaller sample size. The person trip conversion has not been as thoroughly tested as the conversion of ITE rates using a person trip adjustment factor of 1.28. The vehicle trip rates published by the ITE reflect a wide range of trip generation studies largely carried out in the United States and Canada. The ITE survey sites reported provide good coverage of the land use category and consequently the vehicle trip rates presented are reliable and a valuable source of trip generation data. Based on the foregoing, the trip generation values based on the ITE rates have been carried forward in this analysis.

Trips generated by the commercial component have been estimated by using land use code 820 for Shopping Center in the ITE *Trip Generation Manual,* 10th Edition. Person trips were calculated using an ITE Trip to Person Trip factor of 1.28, consistent with the TIA guidelines. The person trips generated by the commercial component are summarized in **Table 5**.

Table 5: Commercial Person Trips Using ITE Rates

Land Use	ITE Code	GFA	AM Peak (PPH)			PM Peak (PPH)			SAT Peak (PPH)		
			IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Commercial Retail	820	8,450 ft^2	6	4	10	19	22	41	26	23	49

The commercial land use is expected to generate two types of external peak hour trips: primary and pass-by trips. Primary trips are made for the specific purpose of visiting the site, and pass-by trips are made as intermediate stops on the way to another destination. Peak hour pass-by trips have been estimated based on a pass-by rate of 20%, consistent with the pass-by rate used in

the Phase 1B TIS. The pass-by trips generated by the development are part of the observed background traffic and do not constitute new trips on the adjacent road network.

The number of person trips has been categorized by modal share. The modal share values are consistent with the approved 2016 TIS for Phase 1B. The updated breakdown of projected person trips by modal share and arrival/departure is shown in **Table 6** below.

Table 6: Site-Generated Person Trips by Modal Share

Travel Mode	Modal Share	AM Peak			PM Peak			SAT Peak		
		IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Mid-Rise Apartment Person Trips		*46*	*133*	*179*	*137*	*88*	*225*	*115*	*74*	*189*
Auto Driver	**50%**	**25**	**71**	**96**	**73**	**47**	**120**	**58**	**37**	**95**
Auto Passenger	10%	5	13	18	14	9	23	12	7	19
Transit	30%	11	36	47	36	23	59	33	23	56
Non-Motorized	10%	5	13	18	14	9	23	12	7	19
Commercial Retail Person Trips		*6*	*4*	*10*	*19*	*22*	*41*	*26*	*23*	*49*
Auto Driver	50%	3	2	5	10	11	21	13	12	25
Less 20% Pass-By Trips		-1	0	-1	-2	-2	-4	-3	-2	-5
Total Retail Auto Driver Trips		**2**	**2**	**4**	**8**	**9**	**17**	**10**	**10**	**20**
Auto Passenger	10%	1	0	1	1	3	4	3	2	5
Transit	20%	1	1	2	4	4	8	5	5	10
Non-Motorized	20%	1	1	2	4	4	8	5	4	9
Auto Driver (total)		**27**	**73**	**100**	**81**	**56**	**137**	**68**	**47**	**115**
Auto Passenger (total)		**6**	**14**	**20**	**16**	**12**	**28**	**15**	**9**	**24**
Transit (total)		**15**	**43**	**58**	**46**	**32**	**78**	**38**	**28**	**66**
Non-Motorized (total)		**6**	**15**	**21**	**19**	**13**	**32**	**17**	**11**	**28**

Based on the foregoing, the proposed development is anticipated to generate 100 new vehicle trips (27 in, 73 out) during the AM peak hour, 137 new vehicle trips (81 in, 56 out) during the PM peak hour, and 115 new vehicle trips (68 in, 47 out) during the Saturday peak hour.

The site generated traffic is anticipated to be the highest during the Saturday and PM peak hours. However, it is anticipated that traffic along Montreal Road is higher on during the weekday PM peak hour than the Saturday peak hour. Based on the foregoing, the weekday AM and PM peak hours have been chosen for analysis as they represent the 'worst case' combination of site generated traffic and adjacent street traffic.

The Wateridge Village Phase 1B TIS considered 236 mid-rise apartment units and 4,844 ft^2 of commercial retail for Block 19. As stated in Section 2.0, the current submission for Block 19 of

approximately 421 condo units represents an increase of approximately 185 units for that block, and 138 for all four Mattamy blocks. The increase in the number of units and commercial space for all four Mattamy blocks will increase the site generated trips by approximately 39 vehicle trips in the AM peak hour and 49 vehicle trips in the PM peak hour in comparison to the Wateridge Village Phase 1B TIS.

5.1.2 Trip Distribution

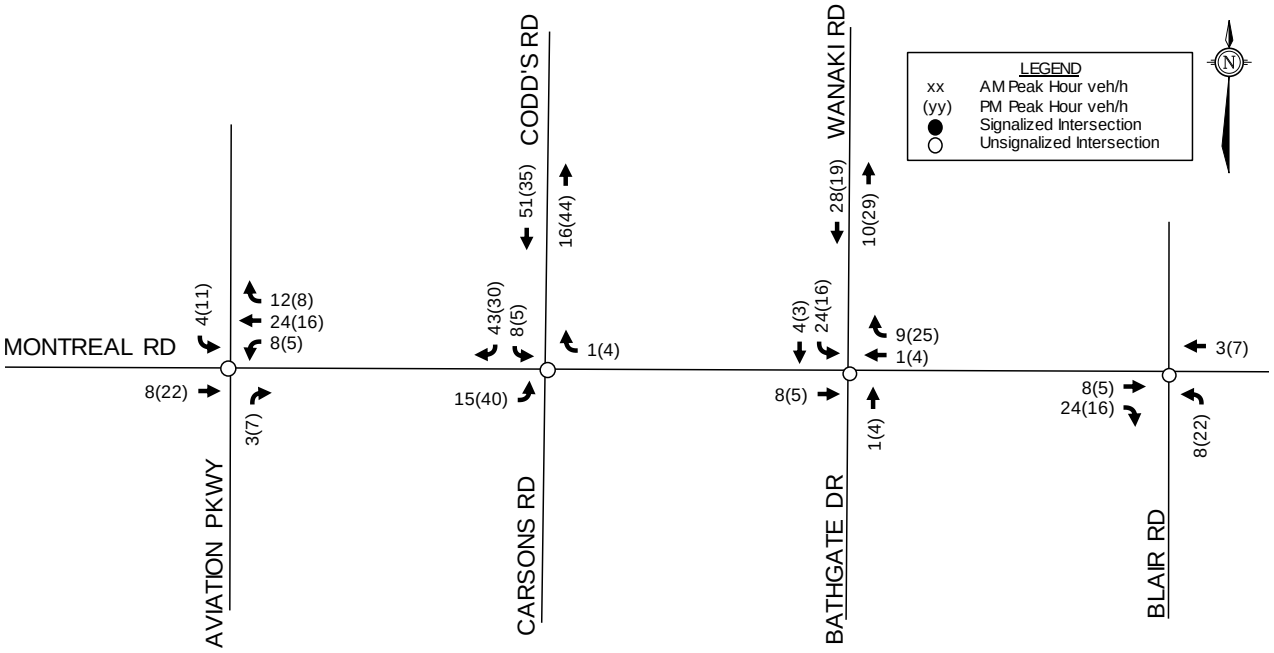
The distribution for the proposed development has been assumed to be consistent with the trip distribution as outlined in the 2016 TIS for Phase 1B. The distribution can be described as follows:

- 45% to/from the west via Montreal Road, Rockcliffe Parkway, and Hemlock Road;
- 45% to/from the south via Blair Road, Aviation Parkway, and Bathgate Drive; and
- 10% to/from the east via Montreal Road

5.1.2 Trip Assignment

Based on the above trip distribution, it is assumed that approximately 60% of site generated trips would access Montreal Road to/from Codd's Road, with the balance traveling via Wanaki Road to/from Montreal Road. Site generated traffic volumes are shown in **Figure 4** for the weekday AM and PM peak hours.

Figure 4: Site Generated Traffic Volumes



5.2 Background Traffic

A review of background traffic and other area developments was provided in Section 3.2 and 3.3 of the 2016 Phase 1B TIS.

A Site Plan application was submitted in October 2018 for a three storey 40-unit apartment building at 745 Mikinak Road. Trip generation for 49 residential units was considered for this block in the 2016 Phase 1B TIS. A Screening form dated July 2018 confirmed that no further TIA assessment was required for the Site Plan Application.

A Site Plan application was submitted in July 2019 for a low-rise (three storey) apartment building at 455 Wanaki Road. The development will serve Habitat for Humanity, a non-profit low-income housing organization. The proposed apartment building will accommodate fewer than 13 dwelling units and the anticipated traffic impact will be negligible.

A Transportation Overview and subsequent Addendum were prepared by Novatech in August 2017 and December 2017 for Blocks 15, 22 and 24 of Phase 1B. A TIA report was later prepared by Novatech in February 2019 and revised in October 2019 for Block 15 of Phase 1B. Block 22 is proposed to accommodate 51 townhouses, Block 24 is proposed to accommodate 125 townhouses, and Block 15 is proposed to accommodate 192 townhouses, for a total of 368 units across the three sites. Trip generation for 415 residential units was considered for these blocks in the 2016 Phase 1B TIS.

6.0 ANALYSIS

6.1 Development Design

6.1.1 Design for Sustainable Modes

The proposed Site Plan, included in **Appendix B**, indicates the layout of the proposed site.

Walking and Cycling

The buildings' main entrances are accessed from Codd's Road, Hemlock Road, Mikinak Road, and Barielle-Snow Street from perimeter sidewalks. Pedestrian connectivity is provided to the existing sidewalks along the boundary streets (Bareille-Snow Street, Mikinak Road, Codd's Road, and Hemlock Road). Pedestrian walkways are provided throughout the site, as shown on the Site Plan, in order to connect amenity space areas and building entrances. The landscaped area between the condominium buildings will provide pedestrian connectivity between buildings and the boundary streets. A depressed sidewalk will be constructed across the proposed vehicular site access on Barielle-Snow Street.

A raised cycle track is approved along the north and south side of the Hemlock Road. Multi-use pathways are approved along the west side of Codd's Road adjacent to the Centre Park, and along the south side of Mikinak Road, east of Codd's Road and adjacent to the South Park.

Bike racks for visitors and the commercial component will be located near the entrances to each building (i.e., internal to the site) and are shown on the Site Plan. Further bicycle storage for residents is provided in the underground parking garage. Bicycle parking requirements will be reviewed further in Section 6.2.

Transit

Block 19 is currently serviced by two OC Transpo bus routes at the intersection of Codd's Road and Mikinak Road at the southwest corner of the subject property. The pedestrian connections between buildings provide walking distances of less than 400m to the transit stops.

Existing OC Transpo routes 17 and 27 which provide peak period service on weekdays, have been extended into the Rockcliffe Subdivision. The routes generally run on 15-minute headways between 6:00AM and 8:00AM, and between 4:00PM and 6:00PM. OC Transpo transit services will be further expanded in the Rockcliffe Subdivision as Phase 1 of the development proceeds.

A review of the Transportation Demand Management (TDM) – Supportive Development Design and Infrastructure Checklist has been conducted. A copy of the TDM checklist is included in **Appendix C**. All applicable and required TDM-supportive design and infrastructure measures in the TDM checklist are met.

6.1.2 Circulation and Access

The proposed development will be served by one all-movement access along Barielle-Snow Street. This access will be 6.7m wide, measured at the property line. Stop control will be provided at the site's vehicular access, with free flow conditions on Barielle-Snow Street.

The access to/from Barielle-Snow Street will provide access to waste collection, loading spaces, commercial parking spaces, residential visitor parking spaces, and the underground parking garage. The drive lane from the site entrance on Barielle-Snow Street to the underground parking ramp is intended for two-way travel while the drive lane around the central courtyard is intended for one-way travel. A 'no left turns' sign and 'do not enter' signs are posted where the drive aisle transitions from two-way to one-way travel, in order to enforce the one-way travel condition. One-way signage is posted along the internal roadway. The recommended signage is shown on the Site Plan.

Circulation around the courtyard incorporates raised crosswalks and corners with bollard lined drive aisles to guide vehicles and encourage slow vehicle speeds where pedestrian movements are intended. The raised crosswalks and the use of unit pavers are intended to increase the visibility of pedestrians at crosswalks. The raised corners are also intended to act as traffic calming. Drop-off zones are dedicated in front of each building to discourage vehicles from stopping in pedestrian zones.

The proposed fire route is shown on the Site Plan. Waste collection will occur just south of the proposed ramp to the underground parking structure (central to the site).

Turning movements for a Medium Single Unit (MSU) truck and a Heavy Single Unit (HSU) truck around the courtyard can be found in **Figures 5** and **6**. An MSU was used to represent moving vehicles and garbage trucks, and an HSU was used to represent a fire truck. Turning movements for a passenger car going into and out of the drop off zones can be found in **Figure 7**. Turning movements for waste removal and loading can be found in **Figure 8**.

CODD'S ROAD

Corner Side Yard

BAREILLE-SNOW STREET

Corner Side Yard

RETAIL A

RETAIL B

AMENITY AREA

BUILDING A
6 Storey
1,433.38m^2
Residential 102 Units
Commercial 347.48m^2

BUILDING B
6 Storey
1,537.97m^2
Residential
121 Units

BUILDING C
6 Storey
1,420.30m^2
Residential 107 Units

BUILDING D
6 Storey
1,550.07m^2
Residential
115 Units
Commercial
438.26m^2

LINE OF 5TH & 6TH STOREY SETBACK

LINE OF 2ND STOREY SETBACK

PATHWAY

RAMP DOWN

RAMP UP

LOADING (x2)

LOADING

ROLLED CURB

RAISED CROSSWALK

3m WIDE RAISED CROSSWALK

4m WIDE RAISED CROSSWALK

DROP OFF

IN-TAKE

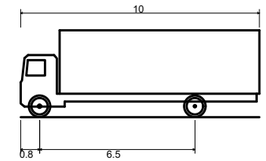
EXHAUST

WALL

L/A

HYD

112.84
Rear Yard



MSU VEHICLE PROFILE
N.T.S.

MSU - Medium Single Unit Truck	
Overall Length	10.000m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	11.100m

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Website www.novatech-eng.com

BLOCK 19 WATERIDGE VILLAGE

TURNING MOVEMENT MSU

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE FEB 2020

JOB 117121

FIGURE FIGURE 5

SHT11X17 DWG - 279mm X 432mm

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CODD'S ROAD

Corner Side Yard

BARRIE-SNOW STREET

Corner Side Yard

RETAIL A

RETAIL B

BUILDING A
6 Storey
1,433.38m^2
Residential 102 Units
Commercial 347.48m^2

BUILDING D
6 Storey
1,550.07m^2

Residential
115 Units
Commercial
438.26m^2

BUILDING B
6 Storey
1,537.97m^2

Residential
121 Units

BUILDING C
6 Storey
1,420.30m^2
Residential 107 Units

AMENITY AREA

AMENITY AREA

AMENITY AREA

LINE OF 5TH & 6TH STOREY SETBACK

LINE OF 2ND STOREY SETBACK

LINE OF 2ND STOREY SETBACK

LINE OF 5TH & 6TH STOREY SETBACK

LINE OF 5TH & 6TH STOREY SETBACK

PATHWAY

RAMP DOWN

RAMP UP

LOADING (x2)

LOADING

LOADING

WALL

DROP OFF

RAISED CROSSWALK

3m WIDE RAISED CROSSWALK

4m WIDE RAISED CROSSWALK

ROLLED CURB

IN-TAKE

EXHAUST

HYD

L/A

23.02

3.15

3.00

2.95

2.76

2.60

5.20

3.50

R14.75

R11.25

R6.65

R12.67

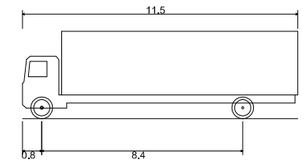
R15

R6

RB-12

RB-19

RB-21



HSU VEHICLE PROFILE
N.T.S.

HSU - Heavy Single Unit Truck	
Overall Length	11.500m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	14.100m

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BLOCK 19
WATERIDGE VILLAGE

TURNING MOVEMENT HSU

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE JAN 2020 | JOB 117121 | FIGURE FIGURE 6

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BUILDING A
6 Storey
1,433.38m^2
Residential 102 Units
Commercial 347.48m^2

BUILDING B
6 Storey
1,537.97m^2

Residential
121 Units

BUILDING C
6 Storey
1,420.30m^2
Residential 107 Units

BUILDING D
6 Storey
1,550.07m^2

Residential
115 Units
Commercial
438.26m^2

RETAIL A

RETAIL B

AMENITY AREA

PATHWAY

RAMP DOWN

RAMP UP

LOADING (x2)

LOADING

WALL

L/A

IN-TAKE

EXHAUST

HYD

RAISED CROSSWALK

ROLLED CURB

DROP-OFF

NE OF 5TH & 6TH TOREY SETBACK

LINE OF 2ND STOREY SETBACK

LINE OF 5TH & 6TH STOREY SETBACK

CODD'S ROAD

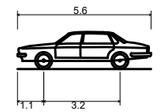
BAREILLE-SNOW STREET

Corner Side Yard

P - Passenger Car

3m WIDE RAISED CROSSWALK

4m WIDE RAISED CROSSWALK



PASSENGER CAR VEHICLE PROFILE
N.T.S.

P - Passenger Car	
Overall Length	5.600m
Overall Width	2.000m
Overall Body Height	1.555m
Min Body Ground Clearance	0.340m
Track Width	2.000m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m

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BLOCK 19
WATERIDGE VILLAGE

TURNING MOVEMENT PASSENGER CAR

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE FEB 2020
JOB 117121
FIGURE FIGURE 7

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CODD'S ROAD

Corner Side Yard

BAREILLE-SNOW STREET

Corner Side Yard

BUILDING A
6 Storey
1,433.38m²
Residential 102 Units
Commercial 347.48m²

RETAIL A

RETAIL B

BUILDING D
6 Storey
1,550.07m²

Residential
115 Units
Commercial
438.26m²

BUILDING B
6 Storey
1,537.97m²

Residential
121 Units

BUILDING C
6 Storey
1,420.30m²
Residential 107 Units

AMENITY AREA

PATHWAY

RAMP DOWN

RAMP UP

LOADING (x2)

LOADING

WALL

DROP OFF

RAISED CROSSWALK

4m WIDE RAISED CROSSWALK

ROLLED CURB

LINE OF 5TH & 6TH STOREY SETBACK

LINE OF 2ND STOREY SETBACK

IN-TAKE

EXHAUST

HYD

MSU - Medium Single Unit Truck

L/A

N-TAKE

23.02

3.15

3.00

3.02

2.95

2.76

2.60

3.50

5.20

R14.75

R11.25

R1.5

R6.65

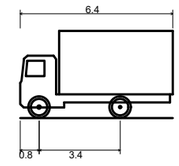
R12.67

R6

RB-19

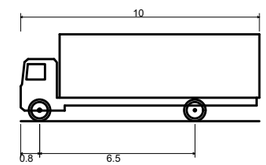
RB-21

RB-12



LSU VEHICLE PROFILE
N.T.S.

LSU - Light Single Unit Truck	
Overall Length	6.400m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m



MSU VEHICLE PROFILE
N.T.S.

MSU - Medium Single Unit Truck	
Overall Length	10.000m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	11.100m

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BLOCK 19 WATERIDGE VILLAGE

TURNING MOVEMENT WASTE REMOVAL/LOADING

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE FEB 2020 | JOB 117121 | FIGURE FIGURE 8

6.2 Parking

The subject site is located in Area B on Schedule 1 and Area X on Schedule 1A of the City's Zoning By-Law (ZBL). Minimum vehicular and bicycle parking rates for the proposed uses are identified in the ZBL and are summarized in the following table.

Table 7: Parking Requirements

Land Use	Rate	Units/GFA	Requirement	Provided
Vehicle Parking				
Residential[1]	0.5 spaces per dwelling unit	421	205	411 (all underground)
Residential Visitor	0.1 spaces per dwelling unit	421	41	41 (all surface)
Retail Store	1.25 per 100m^2 of GFA	785m^2	10	21 (all surface)
		Total	**256**	**473**
Bicycle Parking				
Residential	0.5 spaces per dwelling unit	421	211	517 (55 surface, 462 underground)
Retail	1 per 250m^2 of GFA	785m^2	3	3
		Total	**213**	**373**

1: within Area X, in the case of a building containing residential uses, no off-street motor vehicle parking is required to be provided for the first twelve dwelling units and the parking requirements only apply to dwelling units in excess of 12

Based on the foregoing, the proposed number of vehicular and bicycle parking spaces meet the minimum requirements of the ZBL.

The City of Ottawa *Accessibility Design Standards* identifies a minimum requirement of eleven accessible vehicle parking spaces (five Type A, six Type B) for the 411 underground parking spaces. Of the 62 surface parking spaces, three are required to be accessible parking spaces (one Type A, two Type B). When more than one parking facility is provided at a site, the number and type of accessible parking spaces must be determined based on the total number of parking spaces for each facility, however, the accessible spaces can be located and distributed among the off-street parking facilities in a manner that provides substantially equivalent or greater accessibility in terms of distance from an accessible entrance or user convenience. Based on the foregoing, a total of fourteen accessible parking spaces are required for the site. A total of sixteen accessible parking spaces are proposed, ten accessible spaces in the underground parking garage and six accessible spaces in the surface parking lot. Accessible parking has been distributed in a manner such that they are provided near all four building entrances.

For retail stores with less than 2,000m^2 of gross floor area and for all residential uses, no loading spaces are required as per the ZBL. Two loading spaces are proposed south of the courtyard in addition to the two loading spaces proposed in front of the garbage enclosure.

6.3 Boundary Street Design

This section provides a review of the boundary streets using complete streets principles. The Multi-Modal Level of Service (MMLOS) guidelines produced by IBI Group in 2015 were used to evaluate the level of service (LOS) of the boundary streets for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates all boundary streets are located in the General Urban Area.

The boundary streets are approved as part of the Phase 1B subdivision. The boundary street analysis is based on the approved cross-sections. Targets for the Pedestrian Level of Service (PLOS), Bicycle Level of Service (BLOS), Transit Level of Service (TLOS), Truck Level of Service (TkLOS) and Vehicular Level of Service (Auto LOS) for the study area roadways are based on the targets for roadways within the General Urban Area, as identified in Exhibit 22 of the MMLOS guidelines.

No TLOS target is suggested in Exhibit 22 the MMLOS guidelines for the classification of the boundary streets. Based on the Phase 1B TIS it is understood that Codd's Road, Hemlock Road and Mikinak Road will serve transit and have been evaluated for TLOS despite having no target.

No TkLOS target is suggested in Exhibit 22 of the MMLOS guidelines for the classification of the proposed boundary streets. The boundary streets (collectors and local) have not been evaluated for TkLOS.

A summary of the results of the segment MMLOS analysis for the boundary roadways is provided in the following table. Detailed segment MMLOS calculations can be found in **Appendix E**.

Table 8: Segment MMLOS Summary

Segment	PLOS	BLOS	TLOS	TkLOS	Auto LOS
Codd's Road (collector)	B	D	E	-	B
Target	**C**	**B**	**-**	**-**	**D**
Hemlock Road (collector)	B	A	E	-	A
Barielle-Snow Street (local)	B	B	-	-	A
Mikinak Road (collector)	B	D	E	-	A
Target	**C**	**D**	**-**	**-**	**D**

The results of the segment MMLOS analysis can be summarized as follows:

- All boundary streets meet the target PLOS C;
- Hemlock Road, Barielle-Snow Street, and Mikinak Road meet the target BLOS D;
- Codd's Road does not meet the target BLOS B; and
- All boundary streets meet the target Auto LOS D.

All MMLOS targets are met except for the BLOS target B on Codd's Road. The east side of Codd's Road operates with mixed traffic which earns a BLOS D while the west side has a MUP which earns a BLOS A. As cyclists have the option of using the MUP for northbound travel, no changes are recommended.

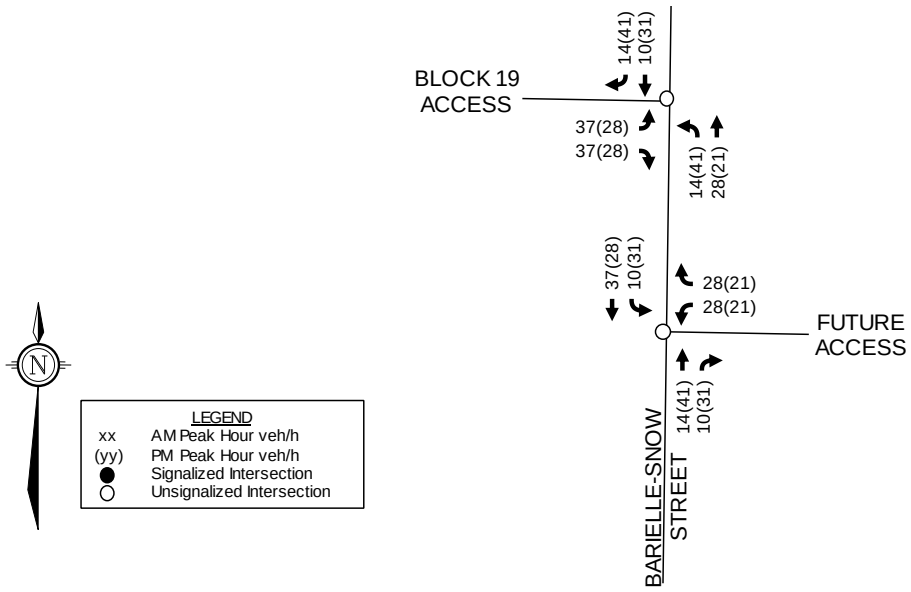
6.4 Access Intersections Design

The proposed development will have one all movement access to Barielle-Snow Street (local street). The access will be 6.7m in width and located approximately 33m from the northern property line and approximately 93m from the southern property line. Stop control will be provided at the site's vehicular access, with free flow conditions on Barielle-Snow Street.

The TAC *Geometric Design Guide for Canadian Roads* outlines minimum clear throat lengths for driveways based on land use, development size, and types of roadways. No guidelines are identified for local roadways but for collector roadways, the minimum clear throat length for a driveway to an apartment building with more than 200 units is 25m. The proposed clear throat length is approximately 30m, thereby exceeding the minimum identified for a collector roadway.

The block directly east of the subject site is classified as 'Mid-Rise Mixed-Use' in the Land Use Plan (**Figure 2**). Currently, there are no plans for development of this block but as its land area is approximately 75% of the area for Block 19 (based on GeoOttawa measurements), the traffic generated by the future development of this block has been assumed to be 75% of the traffic generated by Block 19. This block is bounded by two local roadways (Barielle-Snow Street and Michael Stoqua Street) and two collector roadways (Hemlock Road and Mikinak Road). For the purpose of this analysis, it is assumed that all vehicular access to/from this future development will be provided via Barielle-Snow Street. Total projected volumes along Barielle-Snow Street would therefore be in the order of 90 vehicles during the AM peak hour and 120 vehicles during the PM peak hour, as shown in **Figure 9**. The distribution shown below reflects full buildout of the Rockcliffe Subdivision when connectivity to Hemlock Road west of Phase 1 is provided. This results in more left turn traffic leaving the site and is considered more critical relative to delays leaving the site.

Figure 9: Total Projected Volumes – Barielle-Snow Street



A review of the intersection operations at the proposed access was conducted and is summarized in the following table. Detailed summary sheets are provided in **Appendix F**.

Table 9: Access Operations

Intersection	AM Peak			PM Peak		
	Delay	LOS	Max. Queue	Delay	LOS	Max. Queue
Barielle-Snow Street/Block 19 Site Access	9.0 sec.	A	2.1m	9.4 sec.	A	1.7m

Based on the foregoing, no capacity or queuing problems are anticipated at the site's vehicular access and the clear throat length provided is sufficient.

Section 25 (c) of the City of Ottawa's *Private Approach By-Law* identifies a requirement for two-way accesses to have a width no greater than 9m, as measured at the street line. Section 107 (1)(a) of the *Zoning By-Law* identifies a minimum width requirement of 6.7m for a two-way driveway to a parking lot, and a minimum width of 6.0m for a two-way driveway to a parking garage. The proposed vehicular access to Barielle-Snow Street will be 6.7m in width, and the access to the parking garage will be 6.0m in width, thereby meeting the requirements.

A review of the suggested minimum corner clearances to accesses at major intersections from the Transport Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* was conducted. For a local road with stop control at the cross road, a minimum clearance of 15m (from nearest edge to nearest edge) is suggested between the intersection and any access. Based on the proposed spacing of the access, this minimum requirement is satisfied.

Section 25 (p) of the *Private Approach By-Law* identifies a requirement to provide a minimum spacing of 3m between the nearest edge of the private approach and the property line, as measured at the street line. Based on the proposed spacing of the access, this minimum requirement is satisfied.

6.5 Transportation Demand Management

A review of the Transportation Demand Management (TDM) Measures checklist for residential developments was conducted and can be found in **Appendix E**. To encourage travel by sustainable modes, the proponent agrees to provide a multi-modal travel option information package to new residents.

6.6 Neighbourhood Traffic Management

The neighbourhood impacts have been described in Section 4.2 of the Phase 1B TIS. The report conclusions state that minimal traffic is expected to cut-through the development south of Montreal Road, to/from Carson Road and Bathgate Drive. If cut-through traffic from the site becomes problematic, prohibiting north-south through movements by way of traffic signal design could be considered at the Montreal Road intersection.

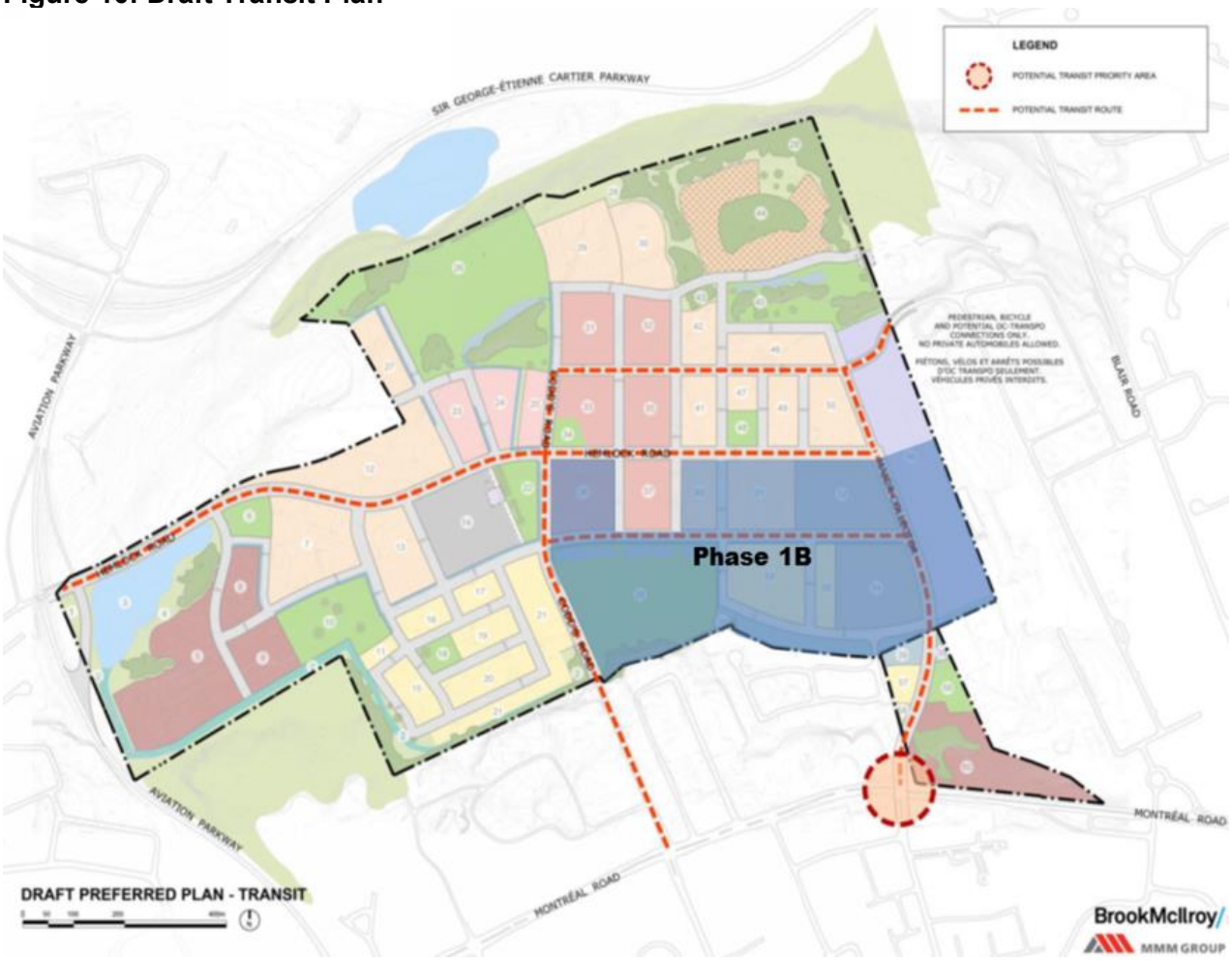
As discussed in Section 6.4, when the mid-rise mixed-use block to the east is developed, total two-way traffic volumes along Barielle-Snow Street are anticipated to be approximately 90 vehicles during the AM peak hour and 120 vehicles during the PM peak hour. The City's TIA guidelines identify an Area Traffic Management (ATM) threshold of 120 vehicles during the peak hour for a local roadway. The lane capacity along Barielle-Snow Street is estimated at 400 vehicles per hour per lane based on the City's TRANS Long Range Transportation Model. The added traffic generated by the proposed development is not anticipated to have a significant impact on the vehicular operations along Barielle-Snow Street and will not change the classification of Barielle-Snow Street from a local roadway to a collector roadway.

6.7 Transit

Based on the trip generation presented in Section 5.1, the proposed development is anticipated to generate 58 transit trips (15 in, 43 out) during the AM peak hour and 78 transit trips (46 in, 32 out) during the PM peak hour.

The Wateridge Community Draft Transit Plan which was presented in the 2016 Phase 1B TIS is included in this report as **Figure 10**. As concluded in the Phase 1B TIS, the Wateridge community will be well served by transit with potential transit priority provided at Montreal/Wanaki intersection.

Figure 10: Draft Transit Plan



Transportation Impact Study (October 2016)

6.8 Intersection Design

6.8.1 Intersection MMLOS Analysis

This section provides the existing MMLOS analysis for pedestrian/bike/transit/truck modes at the two study area intersections on Montreal Road. This section references the Auto LOS analysis provided in Section 2.5 of the Phase 1B TIS (page 6). The MMLOS guidelines produced by IBI Group in October 2015 were used to evaluate the multi-modal levels of service for each intersection.

Schedule B of the City of Ottawa's Official Plan indicates the study area is located in the General Urban Area. Montreal Road is also classified as an Arterial Mainstreet within the study area. The full intersection MMLOS analysis is included in **Appendix E**. A summary of the results is shown in **Table 10**.

Table 10: Intersection MMLOS Summary

Intersection	PLOS	BLOS	TLOS	TkLOS	Auto LOS
Montreal Road/Carson's Road/Codd's Road	F	F	F	E	B
Montreal Road/Bathgate Drive/Wanaki Road	F	F	B	E	A
Target	**C**	**C**	**C**	**D**	**D**

Selected worst condition as final LOS score

The results of the intersection MMLOS analysis can be summarized as follows:

- Neither intersection meets the target PLOS C;
- Neither intersection meets the target BLOS C;
- The Montreal Road/Carson's Road/Codd's Road intersection does not meet the target TLOS C;
- The Montreal Road/Bathgate Drive/Wanaki Road intersection meets the target TLOS C;
- Neither intersection meets the target TkLOS D; and
- Both intersections meet the target Auto LOS D.

Both study area intersections are currently operating with a PLOS F, based on the Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) score. A reduction in the pedestrian crossing distance would have the greatest improvement to the PETSI score at these intersections. The crosswalks at the study area intersections can not achieve the target PLOS C without significantly reducing the crossing distance and restricting turning movements.

Both study area intersections are currently operating with a BLOS F, based on left turn characteristics alone. The BLOS of the left-turning movements could meet the target BLOS C by implementing two-stage left turn bike boxes. This is identified for the City's consideration to address the existing conditions, and is not a result of the development.

The Montreal Road/Carson's Road/Codd's Road intersection is currently operating with a TLOS F. The north approach experiences delays of 28 seconds which earns a TLOS D, while the south approach experiences delays of 42 seconds which earns a TLOS F. The north and south approaches do serve transit; however, they are not classified as transit priority corridors and do not have a TLOS target. The east and west approaches on Montreal Road experience delays of less than 20 seconds, thereby achieving the target TLOS C for an arterial mainstreet with a transit priority designation (continuous lanes).

Both intersections are currently operating with a TkLOS E. To achieve the target TkLOS D, an effective turn radius greater than 15m is required on all four corners of the intersections, or an extra receiving lane would be required on Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road. However, as Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road are collector roadways that are not classified as truck routes, there are no TkLOS targets for these roads. Montreal Road has two receiving lanes and earns a TkLOS B, exceeding the target TkLOS D for a truck route on an arterial road.

The existing auto operations for the study area intersections were completed as part of Wateridge Phase 1B TIS. The Phase 1B TIS noted a safety concern at the intersection of Montreal Road and Burma Road. Subject to further consultation with City of Ottawa staff, fully-protected left-turn

phases in the westbound and northbound legs was recommended based on the existing collison records.

6.8.2 Intersection Capacity Analysis

The total projected traffic operations for the study area intersections were completed as part of Wateridge Phase 1B TIS. Total projected traffic conditions, from Section 4 of the Phase 1B TIS, are summarized in **Table 11** below.

Table 11: Auto LOS Intersection Analysis – Total Projected Traffic Operations

Intersection	AM Peak			PM Peak		
	v/c	LOS	Mvmt	v/c	LOS	Mvmt
Montreal and Carson's Road/Codd's Road	0.72	C	WBT	0.74	C	EBT
Montreal and Bathgate Drive/Wanaki Road	1.31	F	EBL	0.68	B	SBL
Montreal and Bathgate Drive/Wanaki Road [1]	0.83	D	WBT	0.68	B	SBL

1. With recommended (Phase 1B TIS) mitigation measure in place

The Phase 1B TIS identified the following roadway modifications at the Montreal Road at Wanaki Road intersection, at full build-out of Phase 1B:

- an eastbound protected/permitted left-turn phase, and
- a westbound right-turn lane.

As indicated in the TIS, the projected increase in vehicle volume at this intersection is mainly related to the future office development (355,000 sq.ft.) located east of Wanaki Road in Phase 1B. As identified in Section 5.1.2, Block 19 related traffic for the eastbound left turn movements at Wanaki Road would be negligible due to the site's location. With the addition of site traffic, it is not anticipated that the westbound right turn movement would trigger the need for a right turn lane. It is anticipated that the majority of vehicle trips would use the Montreal Road and Codd's Road intersection for access. No road improvements are required due to the development of Block 19.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing, the conclusions and recommendations of this TIA can be summarized as follows:

<u>Development Design & Parking</u>

- The buildings' main entrances are accessed from Codd's Road, Hemlock Road, Mikinak Road, and Barielle-Snow Street from perimeter sidewalks. Pedestrian connectivity is provided to the existing sidewalks along the boundary streets. Pedestrian walkways are provided throughout the site, as shown on the Site Plan, in order to connect amenity space areas and building entrances. The landscaped area between the condominium buildings will provide pedestrian connectivity between buildings and the boundary streets. A depressed sidewalk will be constructed across the proposed vehicular site access on Barielle-Snow Street.
- A raised cycle track is approved along the north and south side of the Hemlock Road. Multi-use pathways are approved along the west side of Codd's Road adjacent to the Centre Park, and along the south side of Mikinak Road, east of Codd's Road and adjacent to the South Park.

- Block 19 is currently serviced by two OC Transpo bus routes at the intersection of Codd's Road and Mikinak Road at the southwest corner of the subject property. The pedestrian connections between buildings provide walking distances of less than 400m to the transit stops.
- All applicable and required Transportation Demand Management (TDM) supportive design and infrastructure measures in the TDM checklist are met.
- The access to/from Barielle-Snow Street will provide access to waste collection, loading spaces, commercial parking spaces, residential visitor parking spaces, and the underground parking garage.
- The drive lane from the site entrance on Barielle-Snow Street to the underground parking ramp is intended for two-way travel while the drive lane around the central courtyard is intended for one-way travel. A 'no left turns' sign and 'do not enter' signs are posted where the drive aisle transitions from two-way to one-way travel, in order to enforce the one-way travel condition. One-way signage is posted along the internal roadway. The recommended signage is shown on the Site Plan.
- Circulation around the courtyard incorporates raised crosswalks and corners with bollard lined drive aisles to guide vehicles and encourage slow vehicle speeds where pedestrian movements are intended. The raised crosswalks and the use of unit pavers are intended to increase the visibility of pedestrians at crosswalks. The raised corners are also intended to act as traffic calming. Drop-off zones are dedicated in front of each building to discourage vehicles from stopping in pedestrian zones.
- The proposed number of vehicular and bicycle parking spaces meet the minimum requirements of the Zoning By-Law.

Boundary Street Multi-Modal Level of Service (MMLOS)

- All MMLOS targets are met except for the BLOS target B on Codd's Road. The east side of Codd's Road operates with mixed traffic which earns a BLOS D while the west side has a MUP which earns a BLOS A. As cyclists have the option of using the MUP for northbound travel, no changes are recommended.

Access Design

- The proposed development will have one all movement access to Barielle-Snow Street (local street). The access will be 6.7m in width and located approximately 33m from the northern property line and approximately 93m from the southern property line. Stop control will be provided at the site's vehicular access, with free flow conditions on Barielle-Snow Street.
- No capacity or queuing problems are anticipated at the site's vehicular access and the clear throat length provided is sufficient. The proposed access meets all requirements of the Private Approach By-Law.
- The location of the parking ramp allows for two-way travel from the site driveway on Bareille-Snow Street to the parking ramp and garbage enclosure, and for a one-way drive aisle around the courtyard.

Transportation Demand Management

- To encourage travel by sustainable modes, the proponent agrees to provide a multi-modal travel option information package to new residents.

Neighbourhood Traffic Management

- The Phase 1B TIS indicates that minimal traffic is expected to cut-through the development south of Montreal Road, to/from Carson Road and Bathgate Drive. If cut-

through traffic from the site becomes problematic, prohibiting north-south through movements by way of traffic signal design could be considered at the Montreal Road intersection.

- The added traffic generated by the proposed development is not anticipated to have a significant impact on the vehicular operations along Barielle-Snow Street and will not change the classification of Barielle-Snow Street from a local roadway to a collector roadway.

Transit

- The proposed development is anticipated to generate 58 transit trips (15 in, 43 out) during the AM peak hour and 78 transit trips (46 in, 32 out) during the PM peak hour.
- As concluded in the Phase 1B TIS, the Wateridge community will be well served by transit with potential transit priority provided at Montreal/Wanaki intersection.

Intersection MMLOS

- Both study area intersections are currently operating with a PLOS F, based on the Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) score. A reduction in the pedestrian crossing distance would have the greatest improvement to the PETSI score at these intersections. The crosswalks at the study area intersections can not achieve the target PLOS C without significantly reducing the crossing distance and restricting turning movements.
- Both study area intersections are currently operating with a BLOS F, based on left turn characteristics alone. The BLOS of the left-turning movements could meet the target BLOS C by implementing two-stage left turn bike boxes. This is identified for the City's consideration to address the existing conditions, and is not a result of the development.
- The Montreal Road/Carson's Road/Codd's Road intersection is currently operating with a TLOS F. The north approach experiences delays of 28 seconds which earns a TLOS D, while the south approach experiences delays of 42 seconds which earns a TLOS F. The north and south approaches do serve transit; however, they are not classified as transit priority corridors and do not have a TLOS target. The east and west approaches on Montreal Road experience delays of less than 20 seconds, thereby achieving the target TLOS C for an arterial mainstreet with a transit priority designation (continuous lanes).
- Both intersections are currently operating with a TkLOS E. To achieve the target TkLOS D, an effective turn radius greater than 15m is required on all four corners of the intersections, or an extra receiving lane would be required on Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road. However, as Carson's Road/Codd's Road and Bathgate Drive/Wanaki Road are collector roadways that are not classified as truck routes, there are no TkLOS targets for these roads. Montreal Road has two receiving lanes and earns a TkLOS B, exceeding the target TkLOS D for a truck route on an arterial road.
- The existing auto operations for the study area intersections were completed as part of Wateridge Phase 1B TIS. The Phase 1B TIS noted a safety concern at the intersection of Montreal Road and Burma Road. Subject to further consultation with City of Ottawa staff, fully-protected left-turn phases in the westbound and northbound legs was recommended based on the existing collison records.

Intersection Capacity Analysis

- The Phase 1B TIS identified the following roadway modifications at the Montreal Road at Wanaki Road intersection, at full build-out of Phase 1B:
    - an eastbound protected/permitted left-turn phase, and
    - a westbound right-turn lane.

- As indicated in the TIS, the projected increase in vehicle volume at the Montreal Road/Wanaki Road intersection is mainly related to the future office development (355,000 sq.ft.) located east of Wanaki Road in Phase 1B. Block 19 related traffic for the eastbound left turn movements at Wanaki Road would be negligible due to the site's location. With the addition of site traffic, it is not anticipated that the westbound right turn movement would trigger the need for a right turn lane. It is anticipated that the majority of vehicle trips would use the Montreal Road and Codd's Road intersection for access.
- No road improvements are required due to the development of Block 19.

NOVATECH

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APPENDIX A

Wateridge Village Phase 1B TIS

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

October 2016

Wateridge Village Phase 1B Transportation Impact Study

Prepared by:

PARSONS

Wateridge Village – Phase 1B

Transportation Impact Study

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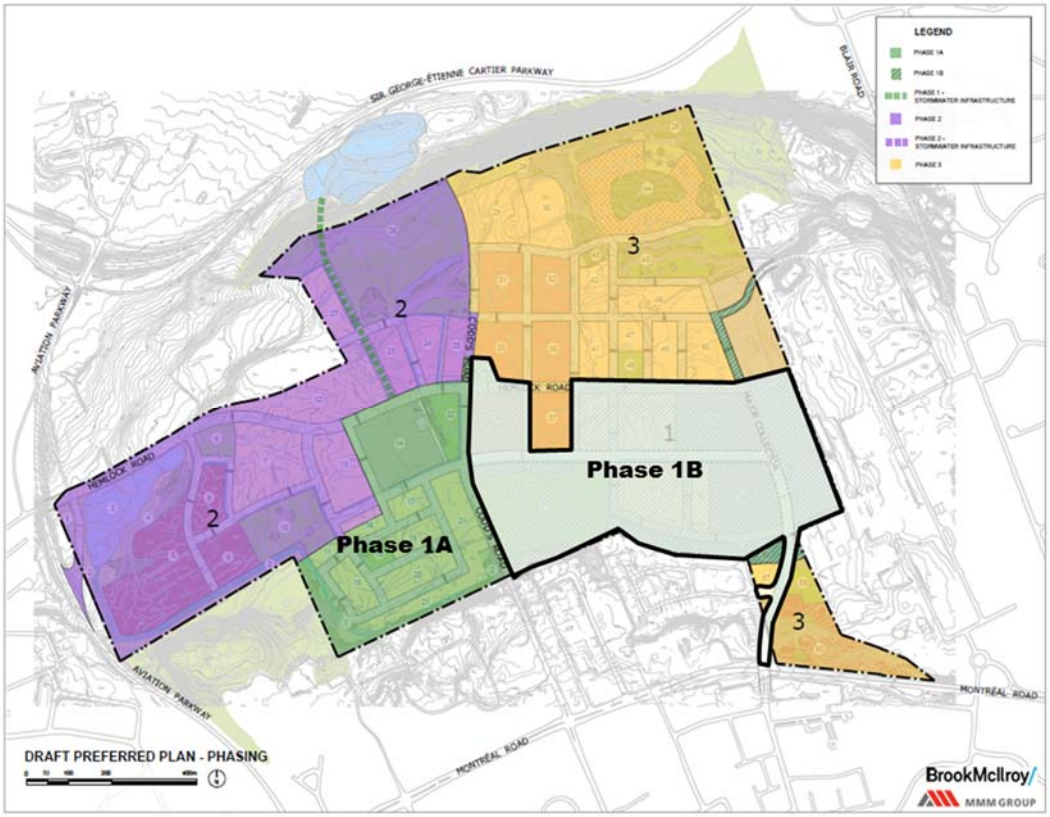
Transportation Impact Study

1. INTRODUCTION

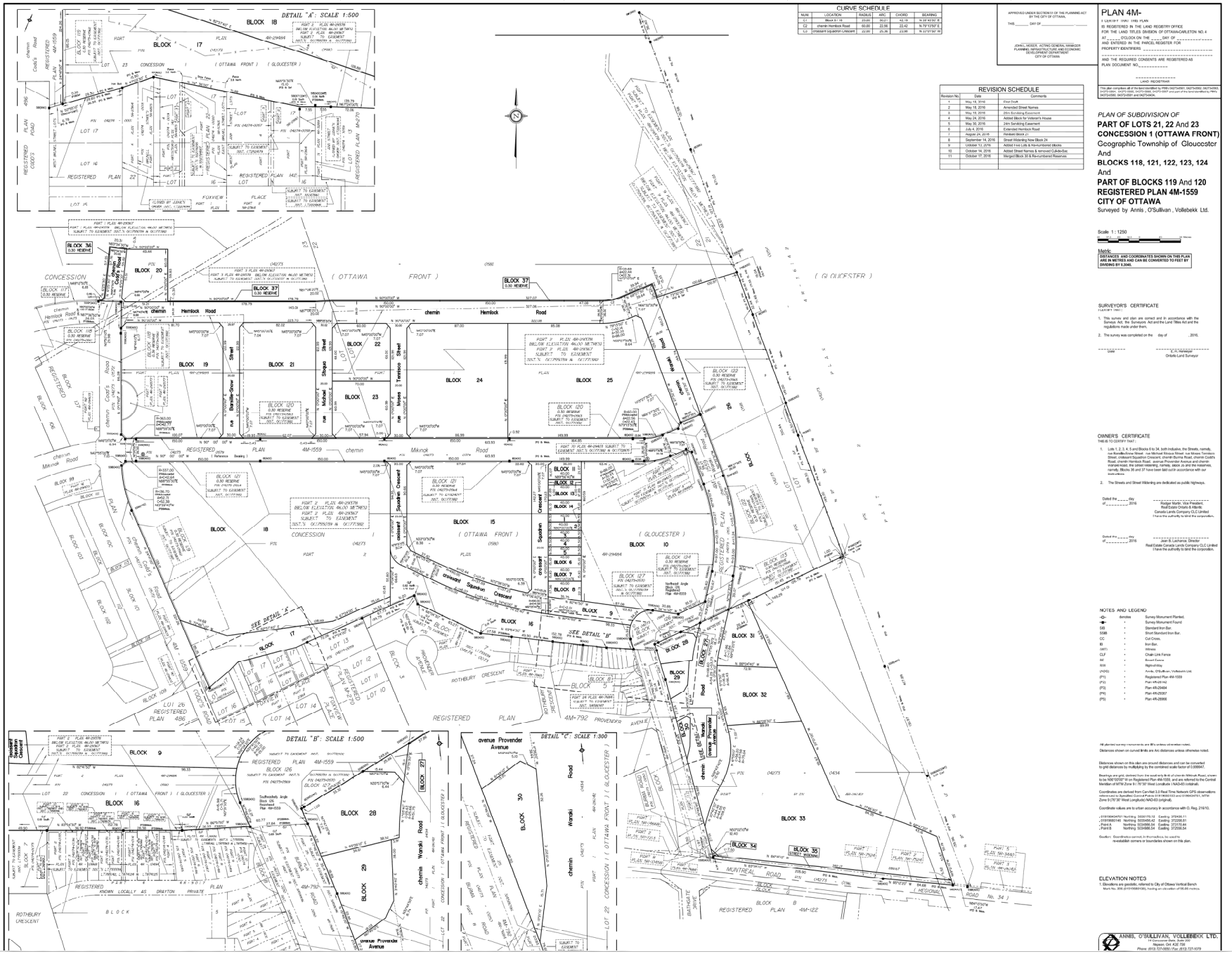
Canada Lands Company (the proponent) is intending to register Phase 1B of the overall subdivision approval process for the proposed redevelopment lands known as Wateridge Village (formally CFB Rockcliffe). The proposed Phase 1B will consist of approximately 725 dwelling units, as well as a notable office space component and some ground floor retail. This site is located north of Montreal Road between Codd's Road and the future Wanaki Road (Burma Road extension). Access to this phase of development will initially be provided via Codd's Road and Wanaki Road and their signalized intersections with Montreal Road. The new roads that will be constructed as part of this phase of development are Hemlock Road east of Codd's Road, and Wanaki Road from Montreal Road to Hemlock Road.

A Community Transportation Study (CTS) for the Former CFB Development Lands as a whole was completed (by Parsons) in 2014 and the Transportation Brief (TB) for Phase 1A of the Wateridge Development was completed (by Parsons) in 2015. This Transportation Impact Assessment for Phase 1B of the Wateridge Development was initially included as part of the analysis within the CTS, and as such, the analysis herein will update and verify the results and conclusions summarized in the CTS. It will also include the transportation impact from Phase 1A of the Wateridge development, which is not yet fully constructed and therefore its associated traffic demands are not reflected within existing conditions. The following Figure 1 depicts the site's local context and the proposed Phase 1B Plan of Subdivision is depicted as Figure 2.

Figure 1: Local Site Context



Given the size and context of the proposed development and following the City's guidance, a Transportation Impact Study (TIS), consistent with the City's 2006 Transportation Impact Assessment Guidelines, is considered to be the appropriate level of analysis for the proposed redevelopment.



PARSONS

Figure 2: Phase 1B Draft Plan of Subdivision

2. EXISTING CONDITIONS

2.1 AREA ROAD NETWORK

Montreal Road is an east-west arterial roadway that extends from Vanier Parkway in the west (where it continues west as Rideau Street) to Sir George-Etienne Cartier Parkway in the east (where it continues east as St. Joseph Boulevard). Within the study area, Montreal Road has a posted speed limit of 60 km/h. It has a four-lane cross section and auxiliary turn lanes are provided at major intersections.

Aviation Parkway is a north-south federally owned roadway, which extends from the Canada Aviation and Space Museum in the north to HWY 417 in the south. North of Montreal Road, Aviation Parkway has a two-lane cross section, which widens to a four-lane cross section south of Montreal Road. It has a posted speed limit of 60 km/h and auxiliary turn lanes are provided at major intersections.

Blair Road is a north-south arterial roadway south of Montreal Road and a collector roadway north of it. Between OR173 and Ogilvie Road, Blair Road has a six-lane cross section and a speed limit of 70 km/h. North of Ogilvie Road, the cross section is reduced to two-lanes and the posted speed limit is 50 km/h. Along Blair Road, auxiliary turn lanes are provided at major intersections.

Burma Road/Bathgate Drive are collector roadways with a two-lane cross section and auxiliary turn lanes provided at major intersections. Within the study area, the posted speed limit is 50 km/h.

Carsons Road/Codd's Road are collector roadways with a two-lane cross section and auxiliary turn lanes provided at major intersections. The posted speed limit is 50 km/h, which decreases to 40 km/h at the existing (closed) entrance to former CFB Rockcliffe.

2.2 TRANSIT NETWORK

The following Figure 3 summarizes the existing transit services provided within the vicinity of the site. Transit service is currently provided by OC Transpo Regular Routes #12 and 129, which provide frequent all-day service. Bus stops are located adjacent to the Montreal/Codd's and Montreal/Burma intersections approximately 400 to 750 m from the site.

Figure 3: Existing Transit Network

According to the Transportation Master Plan (TMP), there are a number of planned transit priority projects in close proximity to the former CFB Rockcliffe site, including continuous lanes on Montreal Road.

2.3 PEDESTRIAN & CYCLING NETWORK

With regard to area pedestrian connectivity, sidewalks exist along both sides of Montreal Road, Carsons Road, Bathgate Drive and along the west side of Burma Road. Along Codd's Road, a concrete sidewalk is currently provided on the west side for approximately 75 m linking Montreal Road to Blackthorne Avenue, and an asphalt sidewalk extends for another approximate 100 m. There is also an asphalt sidewalk on the east side of Codd's Road between Montreal Road and Blackthorne Avenue.

With regard to cycling, the City's 2013 *Transportation Master Plan* (TMP) identifies Montreal Road as a *Spine Route* and Codd's Road and Burma Road as *Local Routes.* According to the Ottawa Cycling Plan, Spine routes may provide a reserved space for cyclists (ideally either a cycle track or a buffered bike lane), whereas Local routes will typically provide on-road facilities. Bicycle lanes currently exist along Montreal Road between St. Laurent Boulevard and just east of Burma Road. A multi-use pathway is located along the west side of the Aviation Parkway that connects to the east-west multi-use pathway along the Ottawa River. Paved shoulders are provided along Blair Road (north of Montreal Road) and bicycle lanes are provided along Blair Road south of Montreal Road.

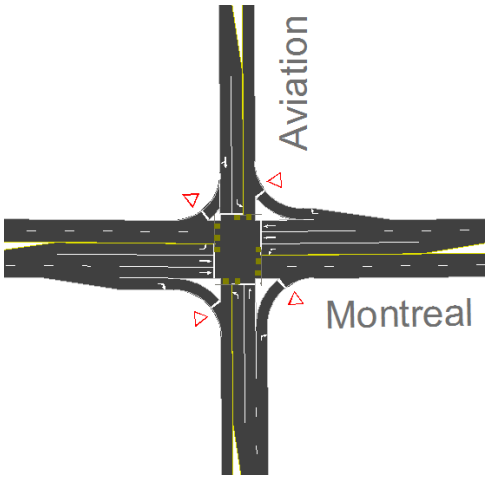
Planned cycling routes, according to the City's Cycling Plan, include a major pathway along the northern portion of the Former CFB Rockcliffe redevelopment (connecting St. Laurent Boulevard to Blair Road), as well as Hemlock Road as a Spine Route forming the eastern extent of the Number 2 Cross-Town Bikeway (linking to/from the Downtown Core). The City of Ottawa's ultimate cycling network is depicted in Figure 4.

Figure 4: City of Ottawa Cycling Network (Ultimate)

2.4 EXISTING STUDY AREA INTERSECTIONS

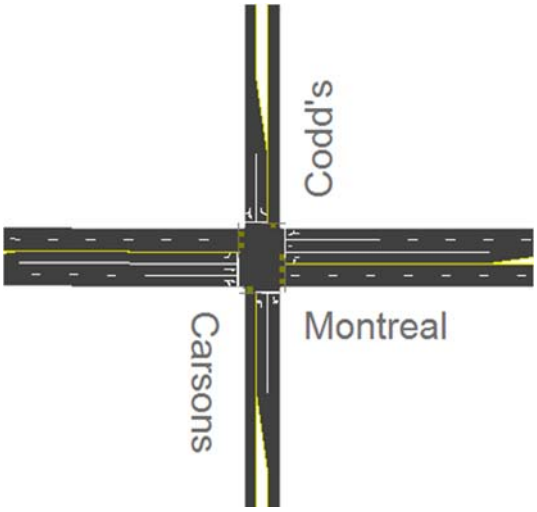
Montreal/Aviation

The Montreal/Aviation intersection is a signalized four-legged intersection. The eastbound and westbound approaches consist of a single left-turn lane, two through lanes and a channelized right-turn lane. The southbound approach consists of a single left-turn lane and a shared through/channelized right-turn lane. The northbound approach consists of a single left-turn lane, a through lane and a channelized right-turn lane. All movements are permitted at this location.



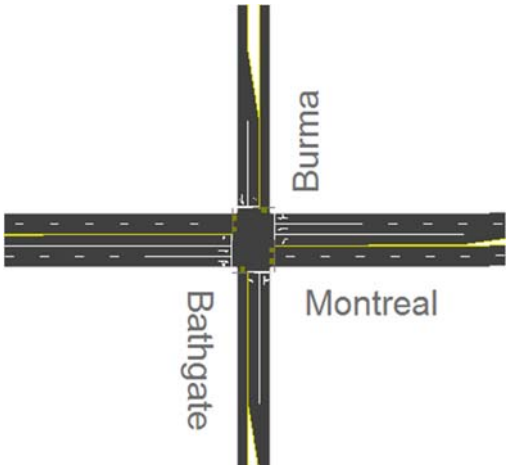
Montreal/Codd's/Carsons

The Montreal/Codd's/Carsons intersection is a signalized four-legged intersection. The eastbound and westbound approaches consist of a single left-turn lane, a single through lane and a shared through/right-turn lane. The southbound and northbound approaches both consist of a single left-turn lane and a shared through/right-turn lane. All movements are permitted at this location.



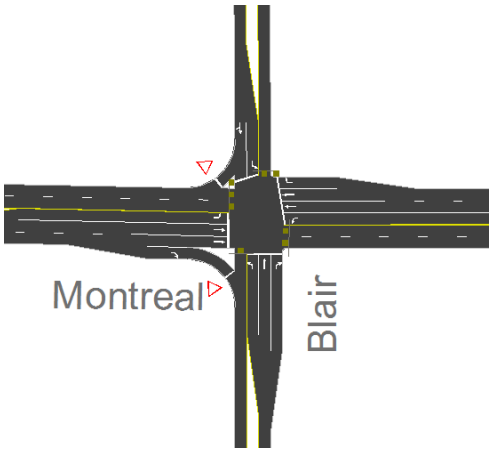
Montreal/Bathgate/Burma

The Montreal/Bathgate/Burma intersection is a signalized four-legged intersection. The eastbound and westbound approaches consist of a single left-turn lane, a through lane and a shared through/right-turn lane. The southbound and northbound approaches both consist of a single left-turn lane and a shared through/right-turn lane. All movements are permitted at this location.



Montreal/Blair

The Montreal/Blair intersection is a signalized four-legged intersection. The eastbound approach consists of a single left-turn lane, two through lanes, and a channelized right-turn lane. The westbound approach consists of a single left-turn lane, two through lanes and a right-turn lane. The southbound approach consists of a single left-turn lane and a shared through/channelized right-turn lane. The northbound approach consists of a single left-turn lane, a single through lane and a single right-turn lane. All movements are permitted at this location.



2.5 EXISTING TRAFFIC OPERATIONS

Illustrated as Figure 5, are the most recent weekday morning and afternoon peak hour traffic volumes (years 2014 - 2016) at the signalized study area intersections, which were obtained from the City of Ottawa and are included as Appendix A.

Figure 5: Existing Peak Hour Traffic Volumes

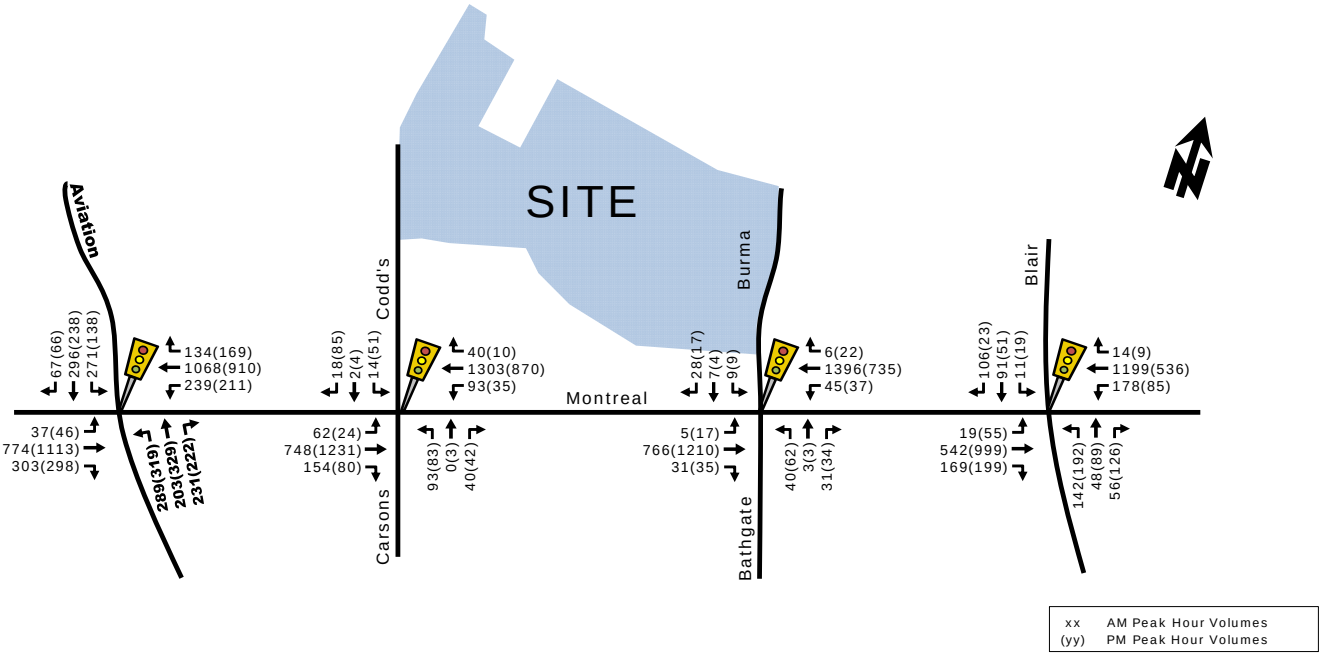


Table 1 provides a summary of the existing traffic operations at the study area intersections based on the SYNCHRO (V9) traffic analysis software. The signalized study area intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movements. The signalized study area intersections 'as a whole', were assessed based on a weighted v/c ratio. The detailed SYNCHRO model output of existing conditions is included as Appendix B.

Table 1: Existing Traffic Operations

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Montreal/Carsons/Codd's	B(B)	0.62(0.67)	WBT(EBT)	11.6(13.0)	A(B)	0.60(0.61)
Montreal/Bathgate/Burma	A(A)	0.55(0.49)	WBT(NBL)	5.0(7.5)	A(A)	0.53(0.46)
Montreal/Aviation Parkway	F(F)	1.16(1.19)	NBL(WBL)	42.3(52.8)	D(E)	0.86(0.96)
Montreal/Blair	B(B)	0.62(0.65)	WBT(NBL)	13.7(14.4)	A(A)	0.60(0.52)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 1, study area intersections 'as a whole' are currently operating at an acceptable LoS 'D' or better during the morning and afternoon peak hours, with the exception of the Montreal/Aviation intersection, which is operating close to or at capacity (LoS 'D' or LoS 'E') during peak hours.

The 'critical' movements at study area intersections are currently operating at an acceptable LoS 'C' or better, with the exception of the Montreal/Aviation intersection's 'critical' movements that are operating above capacity (LoS 'F') during both peak hours. These results are generally consistent with the results outlined in the original CTS, with the exception of the Montreal/Aviation intersection. Based on the 2011 volumes used as the basis of the analysis within the CTS, the Montreal/Aviation intersection was operating with 'critical' movements of LoS 'D' to LoS 'F' and overall intersection performance of LoS 'C'.

Mitigative measures to improve the performance of the 'critical' movements at the Montreal/Aviation intersection to an acceptable LoS 'D' would require the construction of additional auxiliary turn lanes along the Aviation Parkway, namely an additional northbound left-turn lane (double left-turn) and a southbound right-turn lane. Any widening to this intersection due to poor existing intersection performance would require further consultation and discussion with City of Ottawa and NCC Staff.

Following the City's new Multi-Modal Level of Service guidelines, the performance of passenger vehicles at intersections is becoming less of a priority over accommodating multi-modes. Providing space and facilities for pedestrians and cyclists at intersections and providing transit priority where applicable is becoming a larger focus for the City at major intersections. Widening the Montreal/Aviation intersection to accommodate the existing vehicle volume would likely decrease the existing level of service experienced at this intersection for non-auto modes. In addition, the City is focused on reducing the use of single-occupancy vehicles, and increasing the use of transit and active modes. As such, maintaining the existing cross-section of this intersection is recommended from a multi-modal transportation perspective.

2.6 EXISTING ROAD SAFETY CONDITIONS

Collision history for study area roads (2012 to 2014, inclusive) was obtained from the City of Ottawa and most collisions (69%) involved only property damage, indicating low impact speeds, 30% involved personal injuries and there was 1 fatal injury at the Montreal/Burma intersection. The accident involved a vehicle turning westbound left from Montreal Road onto Bathgate Drive and a motorcycle travelling eastbound through the intersection. It is understood that there are poor sightlines for drivers performing the westbound left-turn and the northbound left-turn movements at this intersection because of roadway geometry, which has been confirmed through field observation. As such, fully protected left-turn phases could be implemented for these movements to improve existing operations of the left-turn movements.

Within the study area, the primary causes of collisions cited by police include; rear end (41%), turning movement (31%), and angle (15%) type collisions. A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). At intersections within the study area, reported collisions have historically take place at a rate of:

- 1.58/MEV at the Montreal/Aviation intersection;
- 0.31/MEV at the Montreal/Codd's intersection;
- 1.02/MEV at the Montreal/Burma intersection; and
- 0.76/MEV at the Montreal/Blair intersection.

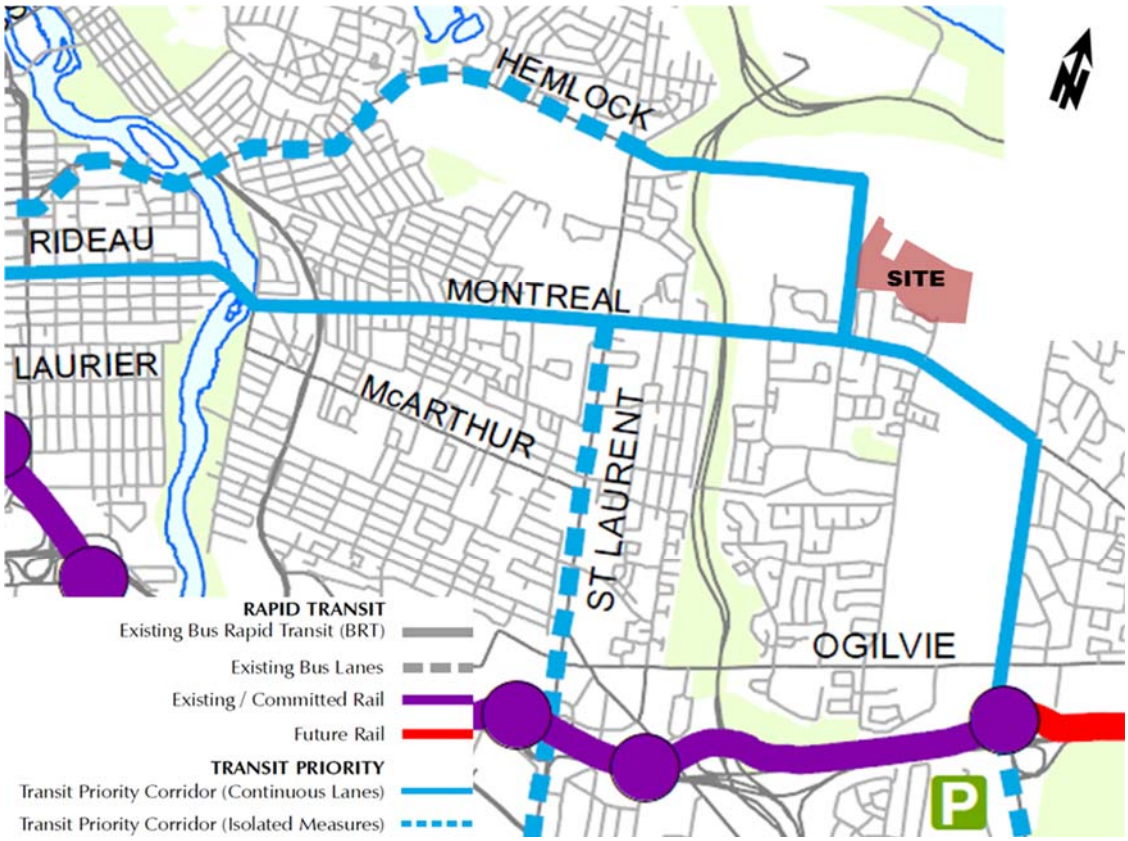
At the Montreal/Burma intersection, where there are poor sightlines for northbound and westbound left-turning vehicles, there were 18 collisions in the 3-year period. Of these 18 collisions, 9 (50%) were turning or angle type collisions involving a left-turning vehicle. The source collision data as provided by the City of Ottawa and related analysis is provided as Appendix C.

3. DEMAND FORECASTING

3.1 PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

According to the Transportation Master Plan (TMP) there are a number of planned transit priority projects in close proximity to the subject development. These are shown in Figure 6, and include continuous transit lanes on Montreal Road, as well as on Hemlock Road and Codd's Road through the Wateridge development. It is noteworthy that providing continuous lanes through the development area would require a widening of some internal roads to four lanes. As this is inconsistent with the envisioned road network being proposed within the recent City-approved Development Concept Plan, the Development Concept Plan's road/transit plan supersedes the TMP in this location. The planned LRT corridor is located south of the study area along Highway 417/OR174, with stations at Blair Road, Cyrville Road, St. Laurent Boulevard and Vanier Parkway.

Figure 6: Transit Priority and Rapid Transit – TMP Affordable Network



Source: City of Ottawa Transportation Master Plan

3.2 OTHER AREA DEVELOPMENT

With respect to other area development, the following development applications have been submitted to the City of Ottawa in the vicinity of the proposed site:

Wateridge Development Phase 1A
As mentioned previously, Site Plan Application of Phase 1A of the Wateridge development has been submitted to the City and the development is located directly adjacent to the west of the Phase 1B development. Phase 1A is expected to consist of approximately 214 dwelling units and 1 school. The Transportation Brief (prepared by Parsons) reported a projected increase in two-way traffic of 118 veh/h during both the weekday morning and afternoon peak hours. As Phase 1A is directly adjacent to the subject site, the traffic volumes generated by this development are included in the future traffic projections herein.

807, 811, 817, 825 Montreal Road
An office building with ground floor retail is planned on the above-noted property, located east of the Montfort Hospital along Montreal Road. The Transportation Impact Study (prepared by Novatech) projected 265 and 280 veh/h in the morning and afternoon peak hours, respectively.

The projected traffic generated by these developments will be accounted for in the subsequent background traffic growth section for the planned site build-out year.

3.3 BACKGROUND TRAFFIC GROWTH

The following background traffic growth through the study area (summarized in Table 2) was calculated based on historical traffic count data (years 2004, 2008, 2012, and 2015) provided by the City of Ottawa at the Montreal/Blair intersection. Detailed analysis is included as Appendix D.

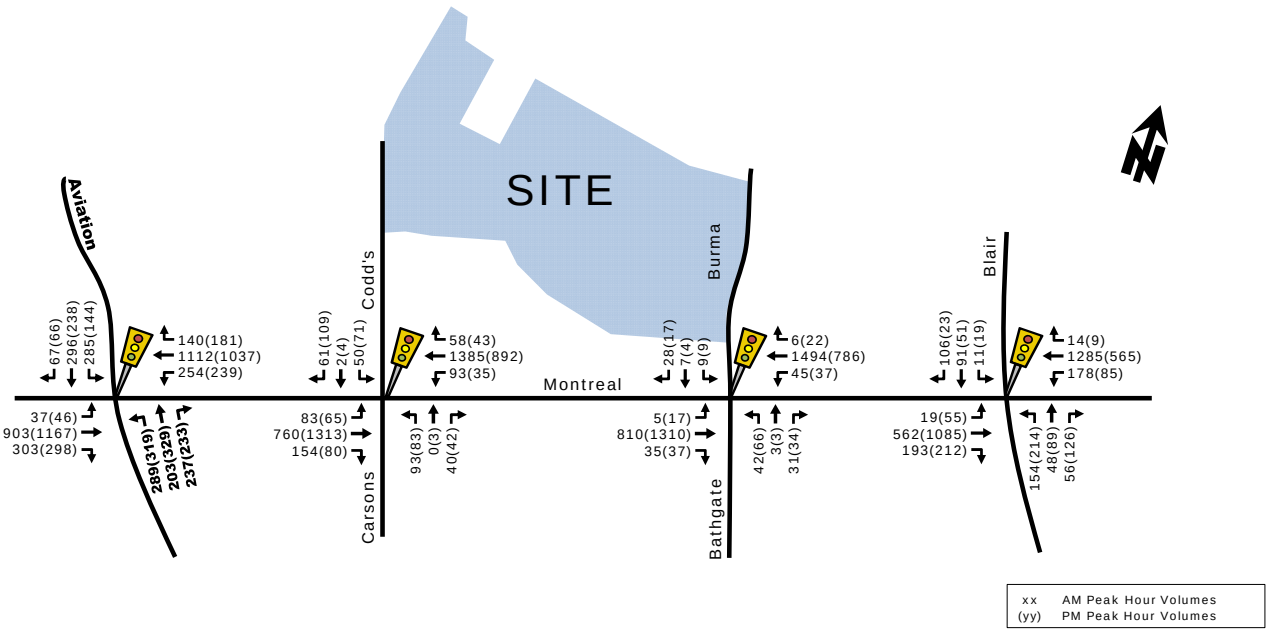
Table 2: Montreal/Blair Historical Background Growth (2004 – 2015)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	-0.37%	0.54%	1.78%	1.84%	**1.50%**
AM Peak	2.18%	2.01%	4.35%	4.89%	**4.14%**
PM Peak	-1.09%	1.53%	1.33%	1.75%	**1.41%**

As show in Table 2, the Montreal/Blair intersection has experienced an approximate 1.5% overall growth (calculated as weighted average) during the busiest 8 hour period and during the afternoon peak hour in recent years. The weekday morning peak hour has experienced a 4% increase in traffic volumes in recent years. A similar growth was calculated at the Montreal/Aviation intersection. However, the traffic count data that was obtained from the City of Ottawa was conducted during the spring and summer months in 2004, 2008 and 2012 and during the winter months in 2015. As such, it is likely that the increase in traffic volumes along Montreal Road is a seasonal variation and not a trend in annual growth. Given the existing intersection operations at the Montreal/Aviation intersection, it is reasonable to assume there will not be a steady increase in traffic volumes in the future, as there is an existing capacity constraint at this intersection.

Following the analysis included in the Former CFB Rockcliffe Development CTS, no background traffic growth was applied to the existing traffic volumes. The CTS analysis was based on historic traffic data at the Rideau River North Screenline (SL 33) located approximately 3 km west of the site. To account for local area developments, the traffic generated from the developments listed in Section 3.2 were added to the existing traffic volumes and will be included in the total projected traffic analysis, herein. The background traffic for the year 2020 (when Phase 1B is expected to be fully occupied) is depicted as Figure 7. This figure includes traffic volume projections for the adjacent Phase 1A of the Wateridge development and the 817 Montreal Road development.

Figure 7: Projected Baseline Traffic Volumes



3.4 SITE TRIP GENERATION

The proposed Phase 1B development consists of approximately 20 single family homes, 464 townhomes/condominiums, 236 mixed-use dwelling units (mid-rise apartments), 4,844 ft^2 of ground floor retail and a 344,445 ft^2 office building. It is noteworthy that the office building is not expected to be development in the near future and will be dependent on market demand for the ultimate timing. However, as this office building is proposed as part of Phase 1B, the traffic generated from this potential future development has been accounted for within the ensuing analysis.

Appropriate trip generation rates for the planned Phase 1B land uses were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual and are summarized in Table 3.

Table 3: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Single Family Homes	ITE 210	T = 0.75(du); T = 0.70(du) + 9.74	T = 1.00(du); Ln(T) = 0.90 Ln(du) + 0.51
Townhomes/ Condominiums	ITE 230	T = 0.44(du); Ln(T) = 0.80 Ln(du) + 0.26	T = 0.52(du); Ln(T) = 0.82 Ln(du) + 0.32
Mid-Rise Apartments	ITE 223	T = 0.30(du); T = 0.41(du) - 13.06	T = 0.39(du); T = 0.48(du) – 11.07
Specialty Retail	ITE 826	T = 1.36(X); T = 1.20(X) + 10.74	T = 2.71(X); T = 2.40(X) + 21.48
Office	ITE 710	T = 1.56(X); Ln(T) = 0.80 Ln(X) + 1.57	T = 1.49 (X); T = 1.12(X) + 78.84

Notes: T = Average Vehicle Trip Ends
du = dwelling units
X = 1,000 ft^2 Gross Floor Area
Specialty Retail AM Peak is assumed to be 50% of the PM Peak

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more urban study area context

were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for urban infill developments.

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. As such, the person trip generation for the proposed site is summarized in Table 4.

Table 4: Modified Person Trip Generation

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Single Family Homes	20 du	7	24	31	20	12	32
Townhomes/ Condominiums	464 du	38	191	229	184	91	275
Mid-Rise Apartments	236 du	33	76	109	77	56	133
Specialty Retail	4,844 ft²	12	10	22	18	25	43
Office	344,445 ft²	588	81	669	102	501	603
Total Person Trips		**678**	**382**	**1,060**	**401**	**685**	**1,086**

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

The person trips shown in Table 4 for the proposed redevelopment were then reduced by modal share values based on the site's location and proximity to adjacent communities, employment, other shopping uses and transit availability. These values have been previously derived as part of the Former CFB Rockcliffe Redevelopment CTS, however, for the purposes of Phase 1, we have assumed a higher vehicle mode share as the influence of the transit and active mode infrastructure serving the entire development is not likely to be fully realized until the development is fully matured. It is noteworthy, however, that transit will be provided for residents/tenants of Phase 1 once approximately 50 units are built and occupied. This transit plan is future outlined in Section 5 and provides interim transit service through the Phase 1 lands, only. Modal share values for the proposed residential, retail and office land uses are summarized in Tables 5, 6 and 7, respectively.

Table 5: Residential Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	40	146	186	141	80	221
Auto Passenger	10%	9	30	39	29	17	46
Transit	30%	23	87	110	84	47	131
Non-motorized	10%	6	28	34	27	15	42
Total Person Trips	100%	78	291	369	281	159	440
Total 'New' Auto Trips		**40**	**146**	**186**	**141**	**80**	**221**

Table 6: Retail Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	6	5	11	9	13	22
Auto Passenger	10%	2	1	3	2	3	5
Transit	20%	2	2	4	4	5	9
Non-motorized	20%	2	2	4	3	5	8
Total Person Trips	100%	12	10	22	18	25	43
Less 20% Pass-by Trips		-1	-1	-2	-2	-2	-4
Total 'New' Auto Trips		**5**	**4**	**9**	**7**	**11**	**18**

Table 7: Office Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	45%	265	37	302	46	226	272
Auto Passenger	10%	59	8	67	11	50	61
Transit	35%	206	28	234	35	175	210
Non-motorized	10%	58	8	66	10	50	60
Total Person Trips	100%	588	81	669	102	501	603
Total 'New' Auto Trips		**265**	**37**	**302**	**46**	**226**	**272**

The following Table 8 provides a summary of potential two-way vehicle trips to/from the proposed Phase 1B development. A 5% reduction for multi-purpose trips and live-work trips was applied to account for office or residential trips shopping at the retail within the development and for residents that live and work within the development lands.

Table 8: Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Residential Trip Generation	40	146	186	141	80	221
Retail Trip Generation	6	5	11	9	13	22
Office Trip Generation	265	37	302	46	226	272
Less Retail Pass-by (20%)	-1	-1	-2	-2	-2	-4
Less 5% live-work/multi-purpose trips	-15	-10	-25	-11	-15	-26
Total 'New' Auto Trips	**295**	**177**	**472**	**183**	**302**	**485**

As shown in Table 8, the resulting number of potential 'new' two-way vehicle trips for the proposed redevelopment is approximately 475 and 485 veh/h during the weekday morning and afternoon peak hours, respectively. This is similar to the Phase 1 projections from the Former CFB Rockcliffe Community Transportation Study.

It is noteworthy that the modal share values are higher for 'auto drivers' than what was assumed in the original CTS. As Phases 2 and 3 of the development are completed, improved transit and active mode connectivity will be implemented and these modes are expected to increase (while 'auto driver' is expected to decrease). As such, the trip-generation calculated in this TIS is considered conservative, and overtime, the impact of private automobiles will likely be reduced.

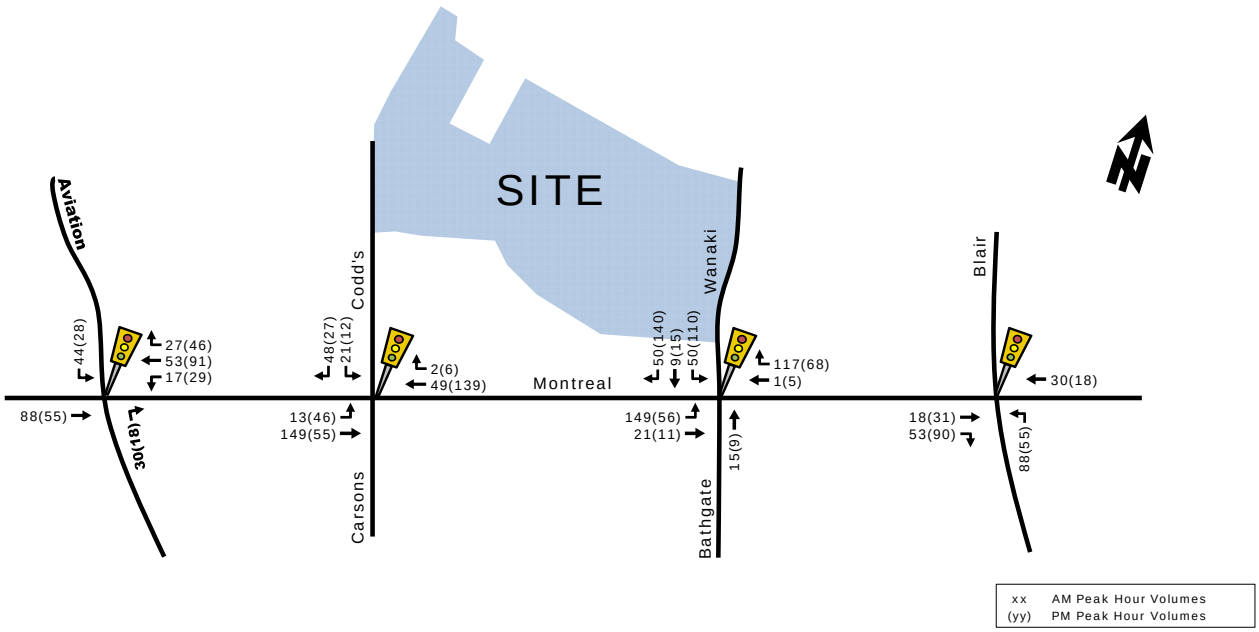
3.5 VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT

Traffic distribution was based on the existing volume splits at study area intersections, our knowledge of the surrounding area, and the Phase 1 distribution outlined in the Former CFB Rockcliffe Redevelopment CTS. The proposed access/egress to/from Phase 1B of the development will be provided via Codd's Road and Wanaki Road only. No site access is proposed via Hemlock Road for Phase 1B. As such, the Phase 1B distribution is as follows:

- 45% to/from the west via Montreal Road, Rockcliffe Parkway, and Hemlock Road;
- 45% to/from the south via Blair Road, Aviation Parkway, and Bathgate Drive; and
- 10% to/from the east via Montreal Road.

Based on these distributions, Phase 1B 'new' and 'pass-by' site-generated trips are assigned to study area intersections, which are illustrated as Figure 8.

Figure 8: 'New' and 'Pass-by' Site-Generated Traffic Volumes

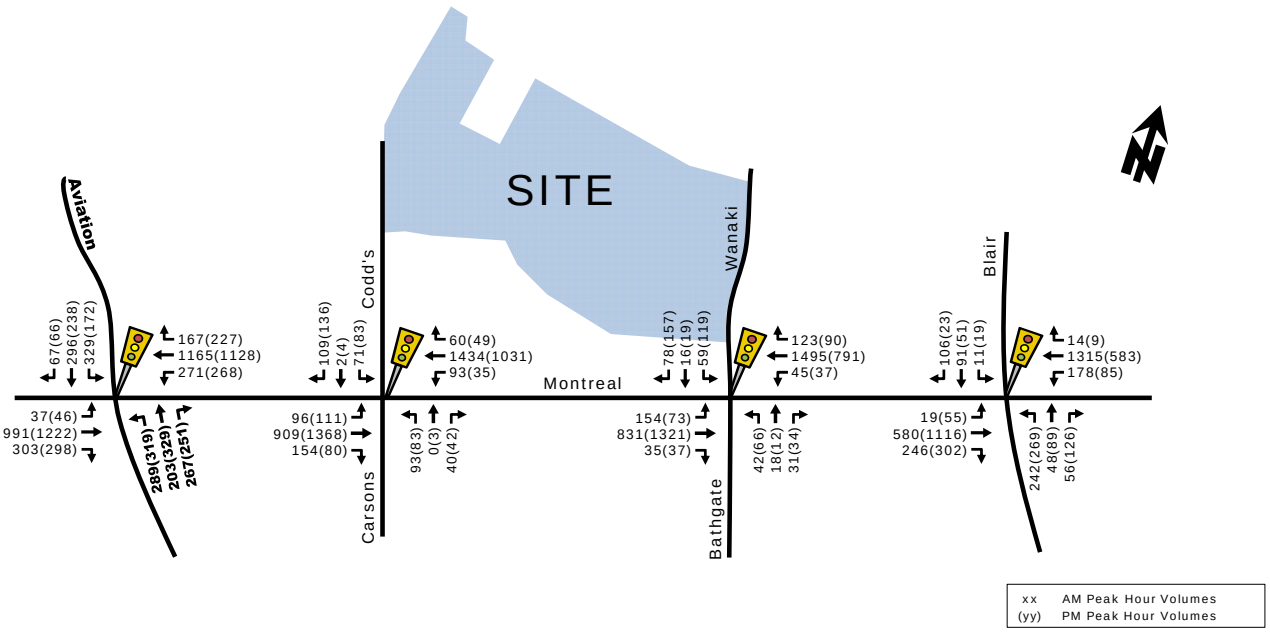


4. FUTURE TRAFFIC OPERATIONS

4.1 PROJECTED CONDITIONS AT FULL SITE DEVELOPMENT

The total projected volumes associated with the build-out of the proposed redevelopment were derived by superimposing 'new' and 'pass-by' site-generated traffic volumes (Figure 8) onto existing traffic volumes (Figure 4). The resulting total projected traffic volumes are illustrated as Figure 9.

Figure 9: Total Projected 2019 Peak Hour Traffic Volumes



The following Table 9 provides a projected performance summary for study area intersections, based on total projected traffic volumes. The detailed SYNCHRO model output of projected conditions is provided within Appendix E.

Table 9: Total Projected 2019 Traffic Operations

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Montreal/Carsons/Codd's	C(C)	0.72(0.74)	WBT(EBT)	14.0(16.2)	B(B)	0.68(0.67)
Montreal/Bathgate/Wanaki	F(B)	1.31(0.68)	EBL(SBL)	18.5(12.5)	C(A)	0.72(0.55)
Montreal/Aviation Parkway	F(F)	1.16(1.52)	NBL(WBL)	50.0(66.2)	E(F)	0.99(1.06)
Montreal/Blair	C(C)	0.78(0.75)	NBL(NBL)	17.7(17.3)	C(B)	0.72(0.64)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 9, the signalized study area intersections 'as a whole' are projected to continue to operate at an acceptable LoS 'C' or better during weekday morning and afternoon peak hours, with the exception of the Montreal/Aviation intersection which is projected to continue to operate at or above capacity (LoS 'E' or LoS 'F'). The 'critical' movements at the Montreal/Codd's and Montreal/Blair intersections are projected to operate at an acceptable LoS 'D' or better during peak hours. The 'critical' movements at the Montreal/Aviation intersection are projected to continue to operate above capacity (LoS 'F') and the 'critical' movement at the Montreal/Bathgate intersection is operating above capacity (LoS 'F') during the morning peak hour.

As mentioned in Section 2.5, additional northbound and southbound turn lanes could be provided as mitigative measures to improve the Aviation/Montreal intersection's existing performance. In addition to these, a double westbound left-turn lane would improve all movements to LoS 'E' or better during the peak hours. However, as mentioned previously, the City is focused on reducing the use of single-occupancy vehicles, and increasing the use of transit and active modes and widening this intersection to accommodate vehicles would reduce the space available to provide active mode facilities. As such, no mitigative measures are recommended for vehicles at this intersection. This is consistent with the conclusions and recommendations outlined in Novatech's TIS for the 817 Montreal Road development.

The 'critical' movement at the Montreal/Wanaki intersection is the eastbound left-turn movement during the morning peak hour. As shown in Figure 8, there is a notable increase in vehicle volume at this intersection, mainly because of the proposed 355,000 ft^2 office building located adjacent to Wanaki Road within Phase 1B. A mitigative measure to improve this movement is to provide an eastbound protected/permitted left-turn phase at this intersection.

As mentioned in Section 2.6, there are existing concerns with left-turn movements on the south and east legs of the Montreal/Wanaki intersection. If a westbound left-turn protected phase is installed, it is appropriate to provide the opposing eastbound left-turn protected phase as well. The resulting intersection would have protected left-turn phases on the east and westbound legs, as well as the north and potentially southbound legs. An increased cycle length would be required during the morning peak hour to accommodate these additional left-turn phases.

In addition to the protected left-turn phases, a westbound right-turn lane is recommended at the Montreal/Wanaki intersection based on the total projected volume during peak hours. The recommended storage length for a westbound right-turn lane at this location is 45 m with a 60 m taper[1], which is similar to the 40 m length identified in the CTS for Phase 1.

Given the above-noted mitigative measures, the resulting intersection performance for the Montreal/Wanaki intersection is summarized in Table 10.

Table 10: Modified Intersection Projected Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Montreal/Bathgate/Wanaki	D(B)	0.83(0.68)	WBT(SBL)	24.8(12.5)	C(A)	0.79(0.56)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

It is noteworthy that the only left-turn phase required in terms of traffic volume at the Montreal/Wanaki intersection is the eastbound left-turn into the proposed development, which is recommended to be a protected/permitted phase, as the eastbound sightlines appear acceptable. The fully protected left-turn phases for the west and northbound legs are recommended based on the poor sightlines of opposing traffic.

It is also noteworthy that with the future development of the Former CFB Rockcliffe Lands, an additional road access to the community will be provided via Hemlock Road, north of the Aviation/Montreal intersection. This future connection (expected to be implemented in 5 to 10 years) will provide some traffic congestion relief at the Aviation/Montreal intersection.

4.2 NEIGHBOURHOOD IMPACTS

The proposed residential/commercial development initially has only connections to Montreal Road via Codd's Road and Wanaki Road. Approximately 25 veh/h (or 1 every 2 minutes) is projected to travel along Bathgate Drive, south of Montreal Road. The existing Codd's Road, which carries approximately 140 to 175 veh/h two-way total during the morning and afternoon peak hours, respectively, will increase to approximately 360 to 420 veh/h two-way total during the peak hours. The existing Wanaki Road (currently known as Burma Road), carries approximately 60 to 70 veh/h two-way total during the morning and afternoon peak hours, respectively, is projected to increase to approximately 430 veh/h two-way total during both peak hours. These amounts of vehicle volume are well within the range expected for collector roadways.

[1] Taper length calculated with a 70 km/h design speed on Montreal Road and a 3.5 m lane width.

With regard to cut-through traffic along roadways south of Montreal Road, the total amount of additional traffic from Phase 1B that would use Bathgate Drive is projected to be approximately 25 veh/h during peak hours, which equates to approximately 1 'new' vehicle every 2 minutes. Carson's Road is considered more of a circuitous 'cut-through' route and as such, no traffic has been assigned to it. Should north-south cut through traffic from the site to Carson's Road or Bathgate Drive prove to be problematic, consideration can be given to prohibiting the north-south through movement. This is done via traffic signal design, which permits turning movements, but gives no green time for northbound or southbound through movements.

5. SITE DESIGN CHARACTERISTICS

This section provides an overview of site access/circulation, intersection control, and pedestrian/transit accessibility. The proposed Plan of Subdivision was previously illustrated as Figure 2.

Access Requirements
Site access/egress is provided via Codd's Road and Wanaki Road and their signalized intersections with Montreal Road. There is currently an approximate 30 m southbound left-turn lane along Wanaki Road at its intersection with Montreal Road. As this roadway is being realigned to connect to the Phase 1B development, the southbound left-turn lane should be maintained. The recommended storage length of the southbound left-turn lane based on the Phase 1 projected traffic volumes is 40 m. In addition to the southbound left-turn lane, a westbound right-turn lane is recommended based on traffic volumes, with a recommended storage length of 45 m. Based on the findings from the original CTS, the southbound left-turn storage for the full development is recommended to be 40 m and the westbound right-turn lane is recommended to have a storage length of 65 m. As such, it is recommended that the westbound right-turn lane be initially constructed with 65 m of storage.

The approximate 20 m southbound left-turn lane at the Montreal/Codd's intersection should be maintained and extended to approximately 30 m based on Phase 1 total projected traffic volumes. In the near-term, sufficient southbound left-turn storage can likely be achieved by extending the existing turn lane through paint and restricting on-street parking. The longer-term solution (associated with full development of the site) will require more extensive intersection modifications to provide the ultimate southbound left-turn storage of 75m noted in the CTS.

STOP control on Mikinak Road only is recommended at the site's driveway connections to Codd's Road and Wanaki Road. As the Former CFB Rockcliffe development is constructed, all-way STOP control at these locations may be warranted. Along Hemlock Road, all-way STOP control will likely be required at these locations with the future development of Former CFB Rockcliffe.

Parking
Parking should be provided in accordance with the City of Ottawa's By-Law requirements with respect to the City's Zoning By-Law requirements for Area X, identified in Schedule 1A of the City's Zoning By-Law. For single detached houses, one parking space should be provided, which can be in the form of a private driveway. For townhouses, a rate of 0.75 parking spaces per unit should be applied and for stacked dwelling units or low-rise apartments, a rate of 0.5 parking spaces per unit should be applied.

Active Modes
The Wateridge Community Mobility Plan, included in the Former CFB Rockcliffe CTS, is provided bellow as Figure 11. Based on this plan, a 3.6 m wide multi-use pathway (MUP) is proposed along the west side of Codd's Road from Hemlock Road in the north towards Montreal Road in the south. Just south of Phase 1A limits, it is understood that the MUP will need to be narrowed over a short section to 2.4 m (combined with a reduction in lane widths) because of the existing property fabric. Along Street 4, the MUP continues along the south side of the roadway, which connects to Wanaki Road.

Along Wanaki Road and Hemlock Road, adjacent to Phase 1B, uni-directional cycle tracks are planned for both sides of these roads.

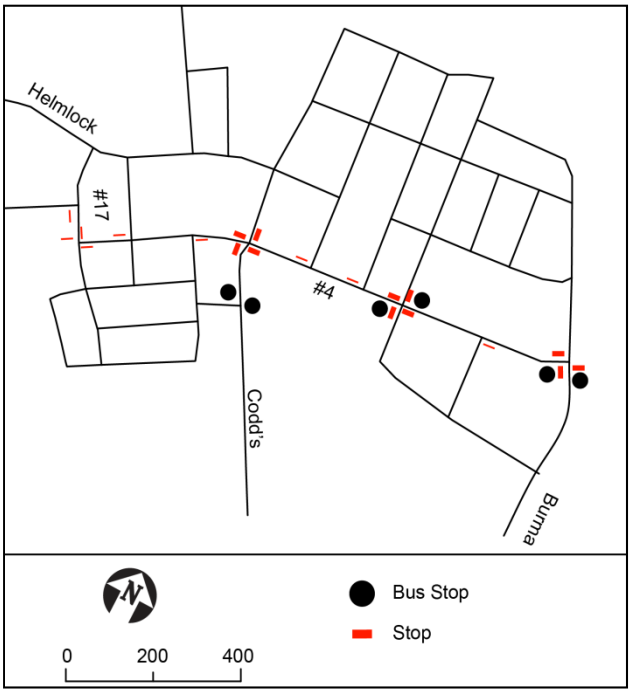
Transit

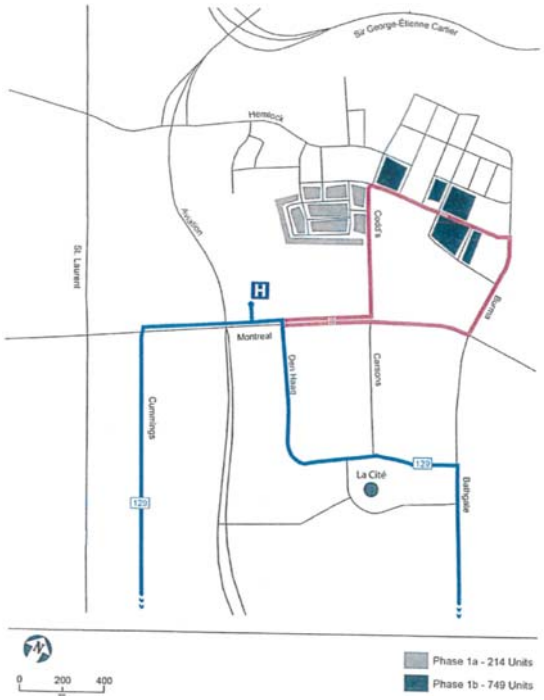
As previously mentioned, OC Transpo service in the vicinity of the Site is currently provided by Routes #12 and 129. Bus stops are located at the Montreal/Codd's and Montreal/Wanaki intersections, approximately 400 to 750 m from the Phase 1B development.

An interim transit service plan has been developed for Phases 1A and 1B, with input from OC Transpo, which identifies a temporary transit route (Route #129 extension) travelling on Codd's Road to Mikinak Road, along Mikinak Road and Wanaki Road connecting back to Montreal Road during the morning and afternoon peak periods only. This service will be implemented when at least 50 units are built and occupied within Phase 1. Bus stops will be provided along Codd's Road, Mikinak Road, and at the Wanaki/Mikinak intersection as shown in Figure 10, and along Wanaki Road (both sides) at the north side of the Provender Road extension.

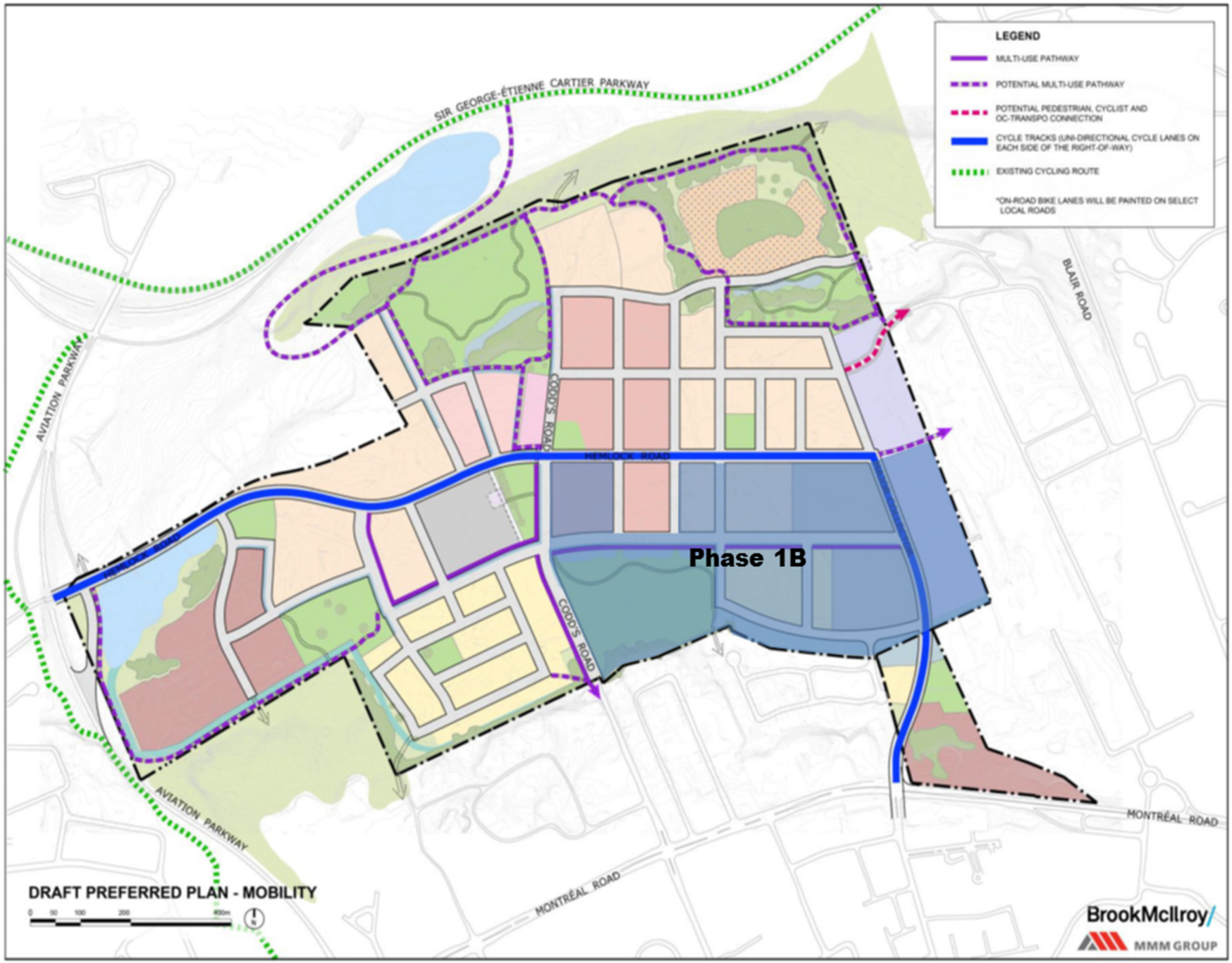
The Wateridge Community Draft Transit Plan is illustrated as Figure 12. As shown in Figure 12, Phase 1B will be well served by transit routes with potential transit priority provided at the Montreal/Wanaki intersection.

Figure 10: Proposed Interim Phase 1 Transit Plan



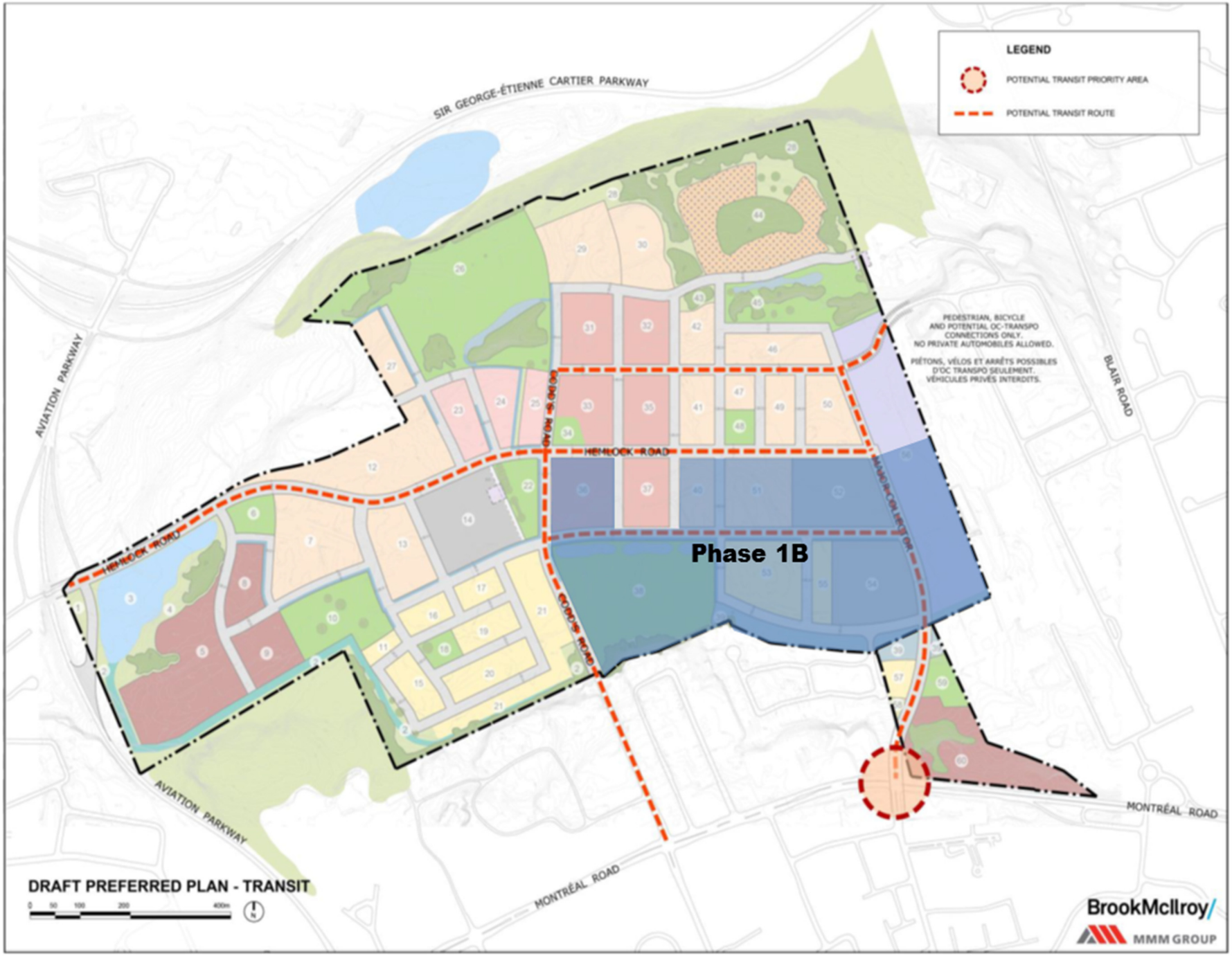


Source: OC Transpo



PARSONS

Figure 11: Proposed Mobility Plan



PARSONS

Figure 12: Draft Transit Plan

6. TRANSPORTATION DEMAND MANAGEMENT

Depending on the nature of a development, Transportation Demand Management (TDM) strategies have the potential to be an integral part of a planned development in order to address and support the City's policies with regard to TDM. For this particular development, its blend of residential and mixed-use development that includes office, commercial and residential is considered advantageous in lessening the reliance on the private automobile. The planned connectivity to alternative travel modes (i.e. walk, bike, transit) has been carefully considered, which combined with the mixed-use developments, will keep many person trips internal to the development area thereby reducing vehicle trips. A number of other TDM measures could also be considered to reduce vehicle use, including:

- ride-sharing programs (e.g. community forum where residents can register/arrange carpooling or on-site parking can be reserved for VRTUCAR cars);
- carpool incentives (e.g. reserved preferred parking for carpooling residents and carpool drop-off areas);
- providing preferential parking for hybrid vehicles that are less harmful to the environment;
- provide an on-site transit information booth to direct visitors and encourage residents to utilize transit; and
- on-site change room/shower facilities for any retail or office staff.

TDM strategies are important in encouraging active modes of transportation to/from the site, further lessening the reliance on the private automobile.

7. FINDINGS AND RECOMMENDATIONS

Based on the foregoing analysis of the proposed development, the following transportation-related conclusions are offered:

- The study area intersections within the vicinity of the site are currently operating 'as a whole' with an overall LoS 'D' or better during the weekday morning and afternoon peak hours, with the exception of the Montreal/Aviation intersection;

- With regard to 'critical' movements at study area intersections, they are noted as operating at an acceptable LoS 'D' or better during the peak hours, with the exception of the 'critical' movements at the Montreal/Aviation intersection;

- Mitigative measures to improve the existing performance at the Montreal/Aviation intersection include providing additional auxiliary turn lanes along Aviation Parkway. As the City is prioritizing the use of active modes and transit facilities throughout the City, the widening of this intersection is not recommended as it will potentially impact the level of service for active modes at this location;

- Based on the collision data received from the City of Ottawa, there would appear to be a potential safety concern at the Montreal/Burma intersection. Mitigative measures in the form of fully protected left-turn phases along the westbound and northbound legs is recommended (subject to further consultation with City Staff). This mitigation measure should address the known concerns at this location;

- Based on the background traffic analysis, no annual traffic growth rate was applied to the existing traffic volumes, however, to account for local area developments, the projected traffic volumes from Phase 1A of the Wateridge Development and the 817 Montreal development were added to the existing traffic volumes and included in the total projected analysis of study area intersections;

- The proposed redevelopment is projected to generate 'new' two-way vehicle volumes of approximately 475 and 485 veh/h during the weekday morning and afternoon peak hours, respectively. As the entire CFB Rockcliffe lands

are developed there will be increased transit and active mode connectivity and the impact of passenger vehicles on study area intersections is expected to be reduced;

- At full Phase 1B build-out, study area intersections are projected to operate at an acceptable LoS 'D' or better during peak hours, with the exception of the Montreal/Aviation intersection, which is expected to continue to operate at or above capacity (similar to existing conditions);

- At full Phase 1B build-out, the 'critical' movements at study area intersections are projected to operate at an acceptable LoS 'D' or better during peak hours, with the exception of the 'critical' movements at the Montreal/Aviation and Montreal/Wanaki intersections. Mitigation measures to improve the eastbound left-turn movement at the Montreal/Wanaki intersection include an eastbound protected/permitted left-turn phase and a westbound right-turn lane;

- With regard to cut-through traffic along roadways south of Montreal Road (i.e. Bathgate Drive and Carson's Road), minimal site-generated traffic is projected to use these routes (25 veh/h on Bathgate). Should north-south cut through traffic from the site to Carson's Road or Bathgate Drive prove to be problematic, consideration can be given to prohibiting the north-south through movement via traffic signal design;

- The amount of vehicle parking should be provided in accordance with the City of Ottawa's By-Law requirements with respect to the City's Zoning By-Law requirements for Area X, identified in Schedule 1A of the City's Zoning By-Law;

- As part of Phase 1 development, a multi-use pathway is proposed along the west side of Codd's from Hemlock Road to Blackthorne Avenue and along the south side of Mikinak Road from Codd's Road to Wanaki Road. Uni-directional cycle tracks are planned for both sides of Wanaki Road and Hemlock Road; and

- An interim transit plan serving both Phases 1A and 1B has been developed providing three locations of bus stops within the development.

Based on the foregoing, the proposed development is compatible with the approved CDP, fits well into the context of the surrounding area, and its location and design promotes use of walking, cycling, and transit modes, thus supporting City of Ottawa policies, goals and objectives with respect to redevelopment, intensification and modal share. Therefore, the proposed Phase 1B development of Former CFB Rockcliffe is recommended from a transportation perspective.

Prepared By:

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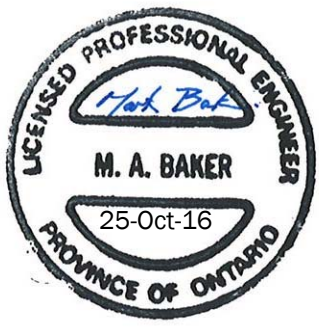
Analyst, Transportation
Ottawa Operations

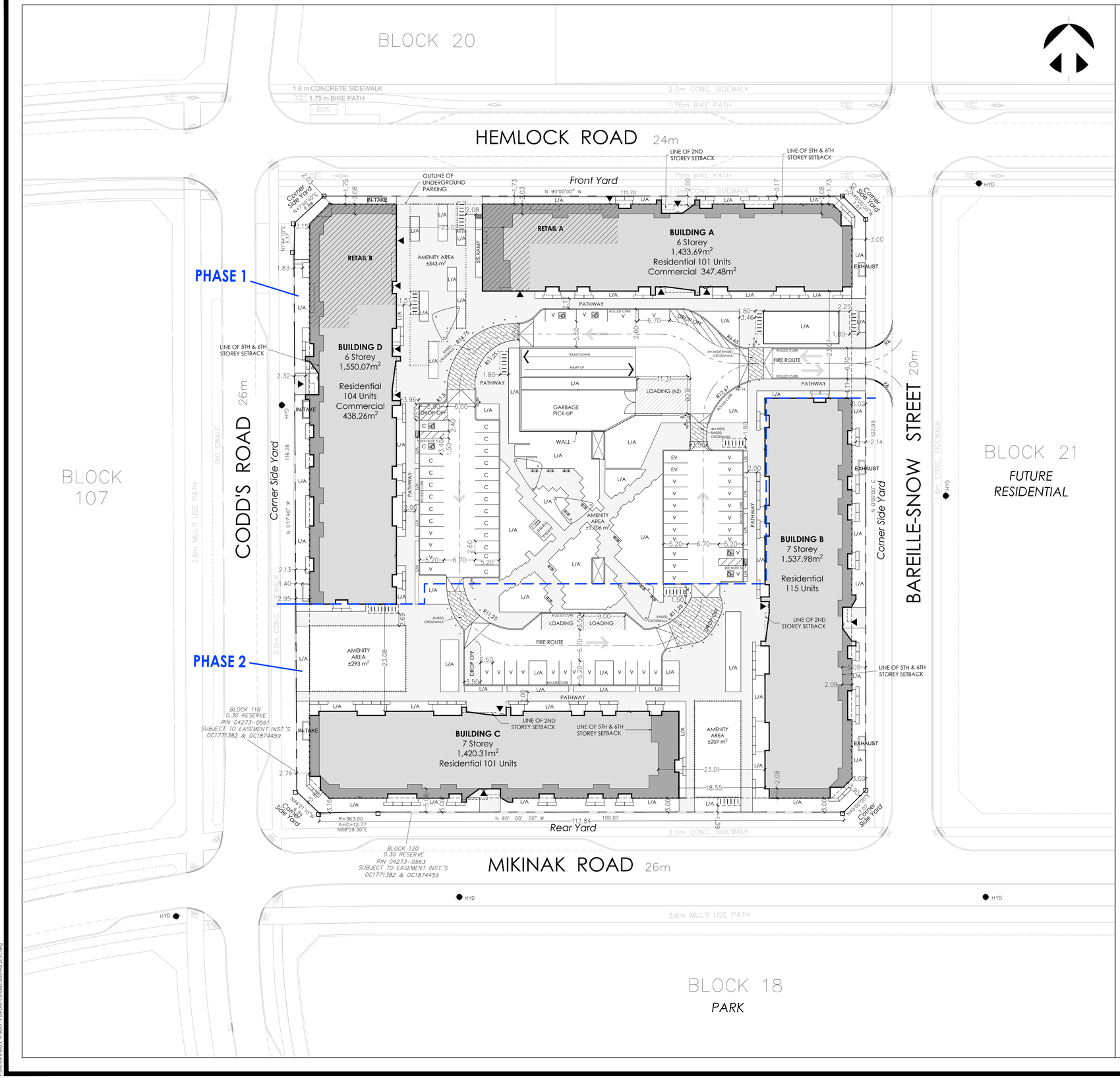
Reviewed By:

Mark Baker, P.Eng.
Transportation Planning Manager
Ottawa Operations



APPENDIX B

Proposed Site Plan



SITE STATISTICS AND DEVELOPMENT DATA

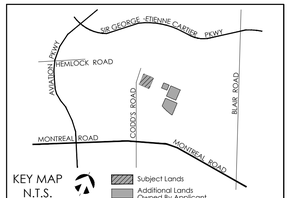
SITE AREA	16,250.85m² (1.62 ha)
PAVED AREA	3,147.79m² (19%)
LANDSCAPED AREA	7,161.01m² (44%)
TOTAL BUILDING COVERAGE	5,942.05m² (37%)
TOTAL GROSS FLOOR AREA	35,103m²
BUILDING A (102 units)	8,015m²
BUILDING B (121 Units)	9,539m²
BUILDING C (107 units)	8,715m²
BUILDING D (115 units)	8,834m²
DENSITY (UPH)	275 UPH
ZONE CATEGORY	GM 31H(30)

BUILDING	BUILDING TYPE	GROUND FLOOR AREA (m²)	UNITS
BUILDING A	RESIDENTIAL/ COMMERCIAL	1,433.69	101
BUILDING B	RESIDENTIAL	1,537.98	115
BUILDING C	RESIDENTIAL	1,420.31	101
BUILDING D	RESIDENTIAL/ COMMERCIAL	1,550.07	104
	TOTAL	5,942.05	421

SECTION	ZONE PROVISION	REQUIRED	PROPOSED
187 (Table)	MIN. LOT WIDTH (m)	No minimum	N/A
187 (Table)	MIN. LOT AREA (m²)	No minimum	N/A
187 (Table)(6)(A)	MAX. BUILDING HEIGHT (m)	30m	20.0m (7 storey)
188H-GM31(Table)	MIN. FRONT YARD AND CORNER SIDE YARD SETBACK (m): 1. FOR A BUILDING WITH RESIDENTIAL LAND USE AT GRADE	5.0m	1.73*(Building A)
	2. ALL OTHER CASES (m)	0.0m	1.73m on Hemlock
188H-GM31(Table)	DESPITE ROW 1, ABOVE MAX. FRONT AND CORNER SIDE YARD SETBACK FOR LOTS EAST OF CODD'S ROAD WHERE THEY ABUT HEMLOCK ROAD (m)	2.0m (Max)	1.73m
188H-GM31(Table)	MIN. INTERIOR SIDE YARD (m)	N/A	N/A
188H-GM31(Table)	MIN. REAR YARD SETBACK ABUTS A STREET (m)	3.0m	3.0m
188H-GM31(Table)	MAX FLOOR SPACE INDEX (0.5/unit)	No max	N/A
101(3)(A),101(Table) AREA X	RESIDENT PARKING: WITH THE FIRST 12 UNITS NOT REQUIRED (0.5/unit)	205	411 (underground)
102(2),102 (Table)	VISITOR PARKING: WITH THE FIRST 12 UNITS NOT REQUIRED (0.1/unit)	41	41
111A (Table)	BICYCLE PARKING (0.5/unit)	211	517 (55 surface, 462 underground)
111A (Table)(E)	COMMERCIAL BICYCLE PARKING (1/250m² of GFA)	3	3
101 (Table)(N79)	COMMERCIAL PARKING (5/100m² over 200m²)	30	21*
107(1), 107 (Table)	MIN. WIDTH OF AISLE (m)	6.7m	3.5m*
137 (Table)	MIN. TOTAL AMENITY AREA (6m²/unit)	2,526m²	2,549m² (communal)
137 (Table)	MIN. COMMUNAL AMENITY AREA (Min. 50% area)	1,263m²	2,549m²

SECTION	ADDITIONAL PROVISIONS	REQUIRED	PROPOSED
65	MAX. PERMITTED PROJECTIONS INTO YARDS: FIRE ESCAPES, OPEN STAIRWAYS, STOOP (m)	>0.6m to lot line	1.83m
65(5)		2m (Max) but	N/A
65(6)	COVERED OR UNCOVERED BALCONY, PORCH, DECK	>1.0m to lot line	
106(1)	MIN. PERPENDICULAR PARKING SPACE SIZE (m)	2.6m x 5.2m	2.6m x 5.2m
106(2)	BARRIER FREE PARKING: TYPE A PARKING SPACE SIZE (m)	3.4m x 5.2m	3.4m x 5.2m
	TYPE B PARKING SPACE SIZE (m)	2.4m x 5.2m	2.4m x 5.2m
	ACCESS AISLE (m)	1.5m	1.5m
111B (Table)	MIN. BICYCLE PARKING SPACE DIMENSIONS, HORIZONTAL	Width: 0.6m Length: 1.8m	0.6m 1.8m
111(9)	MIN. BICYCLE PARKING SPACE ACCESS AISLE WIDTH (m)	1.5m	1.5m
113A (Table)	MIN. LOADING SPACES REQUIRED	N/A	4
113B (Table)	MIN. LOADING SPACE SIZE (m)	3.5m x 9.0m	3.5m x 9.0m
187 (Table)(H)	MIN. WIDTH OF LANDSCAPED AREA ABUTTING A STREET (m)	3.0m	1.73m *
GM31(31)(T)	DESPITE ITEM (H) IN TABLE 187, NO LANDSCAPED AREA IS REQUIRED ABUTTING A STREET FOR BUILDINGS WITH NO REQUIRED FRONT OR CORNER SIDE YARD SETBACK (m)	N/A	N/A
GM31(31)(M)	MIN. DRIVEWAY WIDTH FOR PARKING LOTS OR GARAGES (m)	3.0m	6.0m
GM31(31)(O)	MAX. DRIVEWAY WIDTH TO PARKING LOTS OR GARAGES (m)	6.0m	6.0m
GM31(31)(C)	WHERE THE BUILDING CONTAINS MORE THAN FOUR STOREYS BUT LESS THAN 13 STOREYS, AT AND ABOVE THE FOURTH STOREY A BUILDING MUST BE FURTHER SETBACK (m)	2.0m	2.0m *
GM31(31)(F)	MIN. SEPARATION DISTANCE BETWEEN PORTIONS OF A BUILDING ABOVE FOUR STOREYS (m)	23.0m	23.01m

*** SUBJECT TO MINOR VARIANCE**



SCALE 1:400 (0 4 8 12 16 20 24)

LEGEND

- APARTMENT BUILDING
- CURB (0.2m)
- DEPRESSED CURB (0.2m)
- S.S SNOW STORAGE AREA
- L/A LANDSCAPED AREA
- ENTRANCE
- V VISITOR PARKING
- C COMMERCIAL PARKING
- HYD FIRE HYDRANT
- BLOCK BOUNDARY
- UNDERGROUND PARKING
- PHASE LINE
- PATHWAY (PAVERS)
- DRIVEWAY (PAVERS)
- RB-21 ONE-WAY SIGN
- RB-19 DO NOT ENTER SIGN
- RB-12 NO LEFT TURN SIGN
- NO PARKING
- BENCH
- SHADE STRUCTURE
- BIKE RACKS
- CUSTOM PLANTER (L/A)
- PRIVATE PATIO
- BOLLARD
- STAIRS TO UNDERGROUND
- R RISERS
- TACTILE WALKING SURFACE INDICATOR
- SUB-GRADE EXHAUST

DATE (D.M.Y)	REVISION	BY
19/03/20	Finalizing details for submission	EC
20/02/20	Drop off area adjustments based on Novatech sketch	SP
06/02/20	Road and parking adjustments	SP/CR
18/12/19	Insert new building templates	SP
15/10/19	Draft Site Plan	SP

GENERAL NOTES

1. DO NOT SCALE DRAWINGS FOR PRINT.
2. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF KORSIAK URBAN PLANNING AND MATTAMY HOMES. COPYRIGHT RESERVED.
3. SITE PLAN PREPARED IN ACCORDANCE WITH PLAN 4M-1559, PREPARED BY ANNIS O'SULLIVAN, VOLLEBEKK LTD.
4. WALKWAYS AND CURBS TO BE TIED INTO PUBLIC ROW WHERE APPLICABLE.
5. REFERENCES CITY OF OTTAWA T.W.S.I., DETAIL SC7.3

PROJECT TEAM

SITE PLAN DESIGN:
LANDSCAPE ARCHITECTURE:
MECHANICAL/ ELECTRICAL:
PLANNING/STRUCTURAL:
TRANSPORTATION:
STRIK BALDINELLI MONIZ
ARCHITECTURE:
ENVIRONMENTAL:
NOISE:
CIVIL ENGINEER:
GEOTECHNICAL & STRUCTURAL:

mattamyHOMES

WATERIDGE VILLAGE: PHASE 1B

BLOCK 19, REGISTERED PLAN 4M-1559
PART OF LOTS 21, 22 AND 23
CONCESSION 1 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

TITLE: BLOCK 19 SITE PLAN

DATE: March 23, 2020	DRAWN BY: EC CHECKED BY: CR	DRAWING NO. A1
FILE NO.:		
JOB NO.: Mattamy - Wateridge		

P:\Mattamy\Block 19\Block 19 site plan Concept 2020.dwg 21_Ltr_Dwg

APPENDIX C

TIA Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	**Wateridge Ph1B, Block 19 (681 Mikinak Road)**
Description of Location	**Southeast corner of Codd's Road/Hemlock Road**
Land Use Classification	**Mixed Use – Residential Mid-Rise Condos with Ground Floor Commercial**
Development Size (units)	**445 units**
Development Size (m^2)	**450 m^2 ground floor commercial**
Number of Accesses and Locations	**1 full movement access to Barielle-Snow Street**
Phase of Development	**1**
Buildout Year	

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		X
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		X

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		X
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		X
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	X	
Does the development satisfy the Location Trigger?		X
Does the development satisfy the Safety Trigger?		X

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX D

TDM Checklists

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☐ N/A - no rapid transit within 600m
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☑
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☑
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☐ N/A - no rapid transit within 600m
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☑
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☑
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

TDM measures: *Residential developments*				Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☑
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

APPENDIX E

MMLOS Analysis

1.0 SEGMENT MMLOS

This section provides a review of the boundary streets using complete streets principles. The Multi-Modal Level of Service (MMLOS) guidelines produced by IBI Group in 2015 were used to evaluate the LOS of the boundary roadways for each mode of transportation. The subject site is bounded by the following streets:

a) Codd's Road to the west
b) Hemlock Road to the north
c) Barielle-Snow Street to the east
d) Mikinak Road to the south

Schedule 'B' of the City of Ottawa's Official Plan indicates that all boundary streets are located within the General Urban Area. The boundary streets are approved as part of the Phase 1B subdivision. The boundary street analysis is based on the approved cross-sections.

Targets for the Pedestrian Level of Service (PLOS), Bicycle Level of Service (BLOS), Transit Level of Service (TLOS), Truck Level of Service (TkLOS) and Vehicular Level of Service (Auto LOS) for the study area roadways are based on the targets for roadways within the General Urban Area, as identified in Exhibit 22 of the MMLOS guidelines.

1.1 Pedestrian Level of Service (PLOS)

Exhibit 4 of the MMLOS guidelines has been used to evaluate the segment PLOS of the planned boundary streets. Exhibit 22 of the MMLOS guidelines suggest a target PLOS C for all road classes. The results of the segment PLOS analysis are summarized in **Table 1**.

Table 1: PLOS Segment Analysis

Sidewalk Width	Boulevard Width	Avg. Daily Curb Lane Traffic Volume	Presence of On-Street Parking	Operating Speed [2]	Segment PLOS
Codd's Road (west side) [1]					
3.6m	>2m	> 3000 vpd	No	50 km/h	B
Codd's Road (east side)					
2.0m	>2m	> 3000 vpd	Yes	50 km/h	B
Hemlock Road (north and south side)					
2.0m	>2m	> 3000 vpd	Yes	50 km/h	B
Barielle-Snow Street (west side)					
1.8m	0.5-2m	< 3000 vpd	N/A	50 km/h	B
Mikinak Road (north side)					
2.0m	0	< 3000 vpd	Yes	50 km/h	B
Mikinak Road (south side) [1]					
3.6m	>2m	< 3000 vpd	No	50 km/h	A

1. Multi-use pathway evaluated
2. Operating speed of taken as the assumed posted speed limit (40 km/hr) plus 10 km/h

1.2 Bicycle Level of Service (BLOS)

Exhibit 11 of the MMLOS guidelines has been used to evaluate the segment BLOS of the planned boundary streets. Exhibit 22 of the MMLOS guidelines a target BLOS B for local cycling routes and a target BLOS D for all roads with no cycling designation in the General Urban Area. The results of the segment BLOS analysis are summarized in **Table 2**.

Table 2: BLOS Segment Analysis

Road Class	Bike Route	Type of Bikeway	Travel Lanes (Per Direction)	Operating Speed	Segment BLOS
Codd's Road (west side)					
Collector	Local	MUP	1	50 km/h	A
Codd's Road (east side)					
Collector	Local	Mixed Traffic	1	50 km/h	D
Hemlock Road (north and south side)					
Collector	No Designation	Uni-directional Cycle Track	1	50 km/h	A
Barielle-Snow Street (west side)					
Local (Residential)	No Designation	Mixed Traffic	1	50 km/h	B
Mikinak Road (north side)					
Collector	No Designation	Mixed	1	50 km/h	D
Mikinak Road (south side)					
Collector	No Designation	MUP	1	50 km/h	A

1.3 Transit Level of Service (TLOS)

Exhibit 15 of the MMLOS guidelines has been used to evaluate the segment TLOS of the planned boundary streets. No TLOS target is suggested in Exhibit 22 the MMLOS guidelines for the boundary streets. Codd's Road, Hemlock Road and Mikinak Road will serve transit and have been evaluated for TLOS despite having no target. Barielle-Snow Street has not been evaluated for TLOS. The results of the segment TLOS analysis are summarized in **Table 3**.

Table 3: TLOS Segment Analysis

Facility Type	Level/Exposure to Congestion Delay, Friction and Incidents			Segment TLOS
	Congestion	Friction	Incident Potential	
Codd's Road				
Mixed Traffic – Moderate Parking/Driveway Friction	Yes	Medium	Medium	E
Hemlock Road				
Mixed Traffic –Moderate Parking/Driveway Friction	Yes	Medium	Medium	E
Mikinak Road				
Mixed Traffic – Moderate Parking/Driveway Friction	Yes	Medium	Medium	E

1.4 Truck Level of Service (TkLOS)

No TkLOS target is suggested in Exhibit 22 of the MMLOS guidelines for the boundary streets. The boundary streets (collectors and local) have not been evaluated for TkLOS.

1.5 Vehicular Level of Service (Auto LOS)

Exhibit 22 of the MMLOS guidelines suggest a target Auto LOS D for all roads within the General Urban Area. The typical lane capacity along the study area roadways are based on the City's guidelines for the TRANS Long-Range Transportation Model. The lane capacity along the boundary streets has been estimated based on roadway classification and general characteristics (i.e. suburban with limited access, urban with on-street parking, etc.). Traffic volumes have been based on the total projected peak hour traffic volumes (Figure 14) presented in the 2014 CTS. The results of the Auto LOS analysis are summarized in the following table.

Table 4: Auto LOS Segment Analysis

Direction	Directional Capacity	Traffic Volumes		V/C Ratio and LOS			
		AM Peak	PM Peak	AM Peak		PM Peak	
				V/C	LOS	V/C	LOS
Codd's Road							
NB	400	198	245	0.50	A	0.61	B
SB	400	249	256	0.62	B	0.64	B
Hemlock Road							
EB	400	153	155	0.38	A	0.39	A
WB	400	154	177	0.39	A	0.44	A
Mikinak Road							
EB	400	49	66	0.12	A	0.17	A
WB	400	60	55	0.15	A	0.14	A

Total traffic volumes on Barielle-Snow Street were not projected in the 2014 CTS, however as it is a local class road, volumes are anticipated to be lower than the collector roads that it connects

to (Hemlock Road and Mikinak Road). As such, it is anticipated that Barielle-Snow Street operates with an Auto LOS A (which represents a maximum of 240 vehicles per hour in each direction).

2.0 INTERSECTION MMLOS

This section provides a review of the study area intersections using the complete streets principles.

Intersection analysis has been completed for the two site accesses at Montreal Road.

a) Montreal and Carsons Road/Codd's Road
b) Montreal and Bathgate Drive/Burma Road/Wanaki Road

Schedule 'B' of the City of Ottawa's Official Plan indicates that both intersections are located within the General Urban Area. Montreal Road is also classified as an Arterial Mainstreet within the study area.

The MMLOS guidelines produced by IBI Group in October 2015 were used to evaluate the LOS of all study area intersections for each mode of transportation. This section references the auto LOS analysis provided in the Phase 1B TIS (Section 2.5, Existing Traffic Operations, page 6).

Target PLOS, BLOS, TLOS, TkLOS, and Auto LOS for the study area intersections are based on targets for an Arterial Main Street, as identified in Exhibit 22 of the MMLOS guidelines.

2.1 Pedestrian Level of Service (PLOS)

Exhibit 5 of the Addendum to the MMLOS guidelines has been used to evaluate the existing PLOS at the study area intersections. Exhibit 22 of the MMLOS guidelines suggests a target PLOS C for an Arterial Mainstreet (Montreal Road) and all roadways within the General Urban Area. The results of the intersection PLOS provided in **Table 5** and **Table 6**.

Table 5: PLOS Intersection Analysis – Montreal and Carsons Road/Codd's Road

CRITERIA	North Approach		South Approach		East Approach		West Approach	
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	55	No	55	No	39	No	39
Lanes Crossed (3.5m Lane Width)	6		6		7		7	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Perm + Prot	-8	Permissive	-8	Permissive	-8	Permissive	-8
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	> 5m to 10m	-5
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4
Perpendicular Radius	N/A	0	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT								
Treatment	Standard	-7	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**20**		**20**		**4**		**5**
LOS		**F**		**F**		**F**		**F**
DELAY SCORE								
Cycle Length		120		120		120		120
Pedestrian Walk Time		45		58		9.5		9.5
DELAY SCORE		**23.4**		**16**		**50.9**		**50.9**
LOS		**C**		**B**		**E**		**E**
OVERALL		**F**		**F**		**F**		**F**

Table 6: PLOS Intersection Analysis – Montreal and Bathgate Drive/Wanaki Road

CRITERIA	North Approach		South Approach		East Approach		West Approach	
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	39	No	39	No	39	No	39
Lanes Crossed (3.5m Lane Width)	7		7		7		7	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Permissive	-8
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 10m to 15m	-6	> 5m to 10m	-5	> 10m to 15m	-6	> 10m to 15m	-6
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4
Perpendicular Radius	N/A	0	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT								
Treatment	Standard	-7	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**4**		**5**		**4**		**4**
LOS		**F**		**F**		**F**		**F**
DELAY SCORE								
Cycle Length		80		80		120		120
Pedestrian Walk Time		24		24		8.6		8.6
DELAY SCORE		**20**		**20**		**51.7**		**51.7**
LOS		**B**		**B**		**E**		**E**
OVERALL		**F**		**F**		**F**		**F**

2.2 Bicycle Level of Service (BLOS)

Exhibit 12 of the MMLOS guidelines has been used to evaluate the existing BLOS at the study area intersections. Exhibit 22 of the MMLOS guidelines suggests a target BLOS B for Local Routes in the General Urban Area (Codd's Road and Wanaki Road), and a target BLOS C for Spine Routes along Arterial Mainstreets (Montreal Road). The results of the intersection BLOS analysis are summarized in **Table 7**.

Table 7: BLOS Intersection Analysis

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed	BLOS
Montreal and Carsons Road/Codd's Road				
North Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	1 lane crossed; 50 km/h	D
South Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	1 lane crossed; 50 km/h	D
East Approach	Bike Lane	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	2 lanes crossed; ≥ 60km/h	F
West Approach	Bike Lane	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	2 lanes crossed; ≥ 60km/h	F
Montreal and Bathgate Drive/Wanaki Road				
North Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	1 lane crossed; 50 km/h	D
South Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	1 lane crossed; 50 km/h	D
East Approach	Bike Lane	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	2 lanes crossed; ≥ 60km/h	F
West Approach	Bike Lane	Right Turn Lane Characteristics	No impact on LTS	A
		Left Turn Accommodation	2 lanes crossed; ≥ 60km/h	F

2.3 Transit Level of Service (TLOS)

Exhibit 16 of the MMLOS guidelines has been used to evaluate the existing TLOS the study area intersections. Exhibit 22 of the MMLOS guidelines suggests a target TLOS C for Transit Priority Corridors with continuous lanes along Arterial Mainstreets (Montreal Road). No other roadways within the study area have a transit priority designation. Regardless, Codd's Road at Montreal Road has still been evaluated for TLOS, as Codd's Road provides currently transit service. The results of the intersection TLOS analysis are summarized in **Table 8**.

Table 8: TLOS Intersection Analysis

Approach	Delay[1]	TLOS
Montreal and Carsons Road/Codd's Road		
North	28 sec	D
South	42 sec	F
East	16 sec	C
West	10 sec	C
Montreal and Bathgate Drive/Wanaki Road		
North	-	-
South	-	-
East	4 sec	B
West	7 sec	B

1. Delay based on outputs from Synchro analysis (Parson, TIS)

2.4 Truck Level of Service (TkLOS)

Exhibit 21 of the MMLOS guidelines has been used to evaluate the existing TkLOS at the study area intersections. Exhibit 22 of the MMLOS guidelines suggests a target TkLOS D for Truck Routes along Arterial Mainstreets (Montreal Road). The results of the intersection TkLOS analysis are summarized in **Table 9**.

Table 9: TkLOS Intersection Analysis

Approach	Effective Corner Radius	Number of Receiving Lanes on Departure from Intersection	LOS
Montreal and Carsons Road/Codd's Road			
North	10m to 15m	2	B
South	10m to 15m	2	B
East	10m to 15m	1	E
West	10m to 15m	1	E
Montreal and Bathgate Drive/Wanaki Road			
North	10m to 15m	2	B
South	10m to 15m	2	B
East	> 15m	1	C
West	10m to 15m	1	E

2.5 Vehicular Level of Service (Auto LOS)

Exhibit 22 of the MMLOS guidelines suggests a target Auto LOS D for Arterial Mainstreets and all roadways within the General Urban Area. The existing traffic operations for the study area

intersections were completed as part of Wateridge Phase 1B TIS. Table 1, existing traffic conditions has been included in this appendix for reference and summarized in **Table 10**.

Table 10: Auto LOS Intersection Analysis – Existing

Intersection	AM Peak			PM Peak		
	v/c	LOS	Mvmt	v/c	LOS	Mvmt
Montreal and Carsons Road/Codd's Road	0.62	B	WBT	0.67	B	EBT
Montreal and Bathgate Drive/Wanaki Road	0.55	A	WBT	0.49	A	NBL

APPENDIX F

Synchro Summary Sheets

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	37	37	14	28	10	14
Future Volume (Veh/h)	37	37	14	28	10	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	41	41	16	31	11	16
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	82	19	27			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82	19	27			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	96	99			
cM capacity (veh/h)	911	1059	1587			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	82	47	27
Volume Left	41	16	0
Volume Right	41	0	16
cSH	979	1587	1700
Volume to Capacity	0.08	0.01	0.02
Queue Length 95th (m)	2.1	0.2	0.0
Control Delay (s)	9.0	2.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	2.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	28	41	21	31	41
Future Volume (Veh/h)	28	28	41	21	31	41
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	31	31	46	23	34	46
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	172	57	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	172	57	80			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	97	97			
cM capacity (veh/h)	793	1009	1518			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	62	69	80
Volume Left	31	46	0
Volume Right	31	0	46
cSH	888	1518	1700
Volume to Capacity	0.07	0.03	0.05
Queue Length 95th (m)	1.7	0.7	0.0
Control Delay (s)	9.4	5.0	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	5.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		