ALTONA GROUP

UPDATED TRANPORTATION IMPACT ASSESSMENT

PROPOSED MIXED-USE DEVELOPMENT

1294 KINGSTON ROAD, 1848 & 1852 LIVERPOOL ROAD CITY OF PICKERING

July 2020

19225

Disclaimer

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1 INTRODUCTION

LEA Consulting Ltd. (LEA) was retained by the Altona Group to prepare a Transportation Impact Assessment (TIA) to support a Zoning By-law Amendment application for the proposed mixed-use development at 1294 Kingston Road, 1848 Liverpool Road, and 1852 Liverpool Road (herein referred to as the "subject site") located on the northwest corner of Liverpool Road and Kingston Road in the City of Pickering. Altona Group, owner of the subject site, is proposing the redevelopment and intensification of the subject site with a mixed-use development that incorporates a 25-storey tower and a 13-storey midrise building. The proposal also commits to the restoration and adaptive reuse of the Old Liverpool House as well as new publicly accessible open space and improvements to the public realm. A previous submission was submitted in May 2019 and this report is an updated version.

The proposed development includes 495 units to the 0.91-hectare site (0.89 after accounting for conveyances as requested by Region) with a total residential gross floor area of 39,622 m^2. Restaurant or other active commercial/retail uses make up of 1,332 m^2 along the Liverpool and Kingston Road frontages of the new buildings and the retained Old Liverpool House. A total gross floor area of 40,953 m^2 is proposed at a density of 4.59 FSI over the subject site. A total of 557 parking spaces will be provided, mostly within 3 levels of underground parking with 31 spaces provided at-grade to support the retail. **Figure 1.1** shows the subject site and study area while **Figure 1.2** illustrates the proposed site plan.

Figure 1.1: Site Location and Study Area

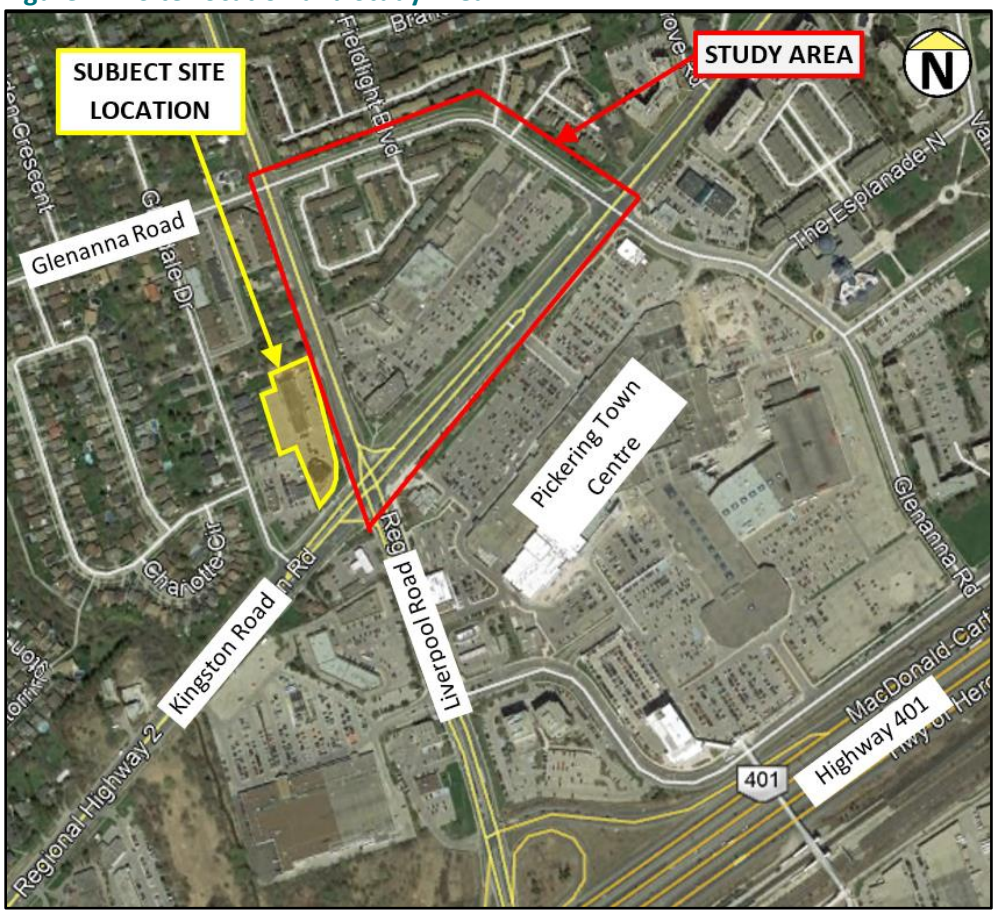
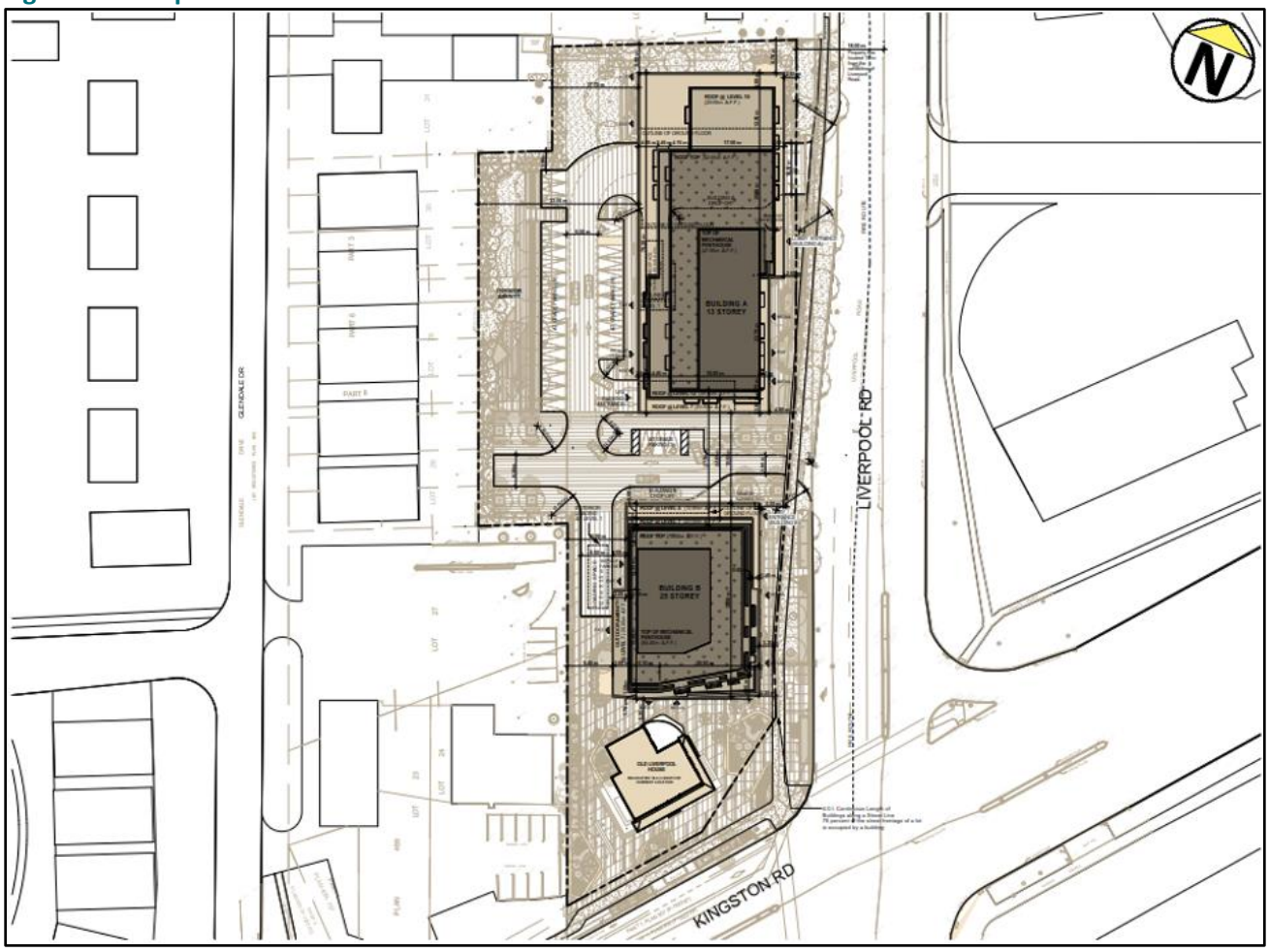


Figure 1.2: Proposed Site Plan



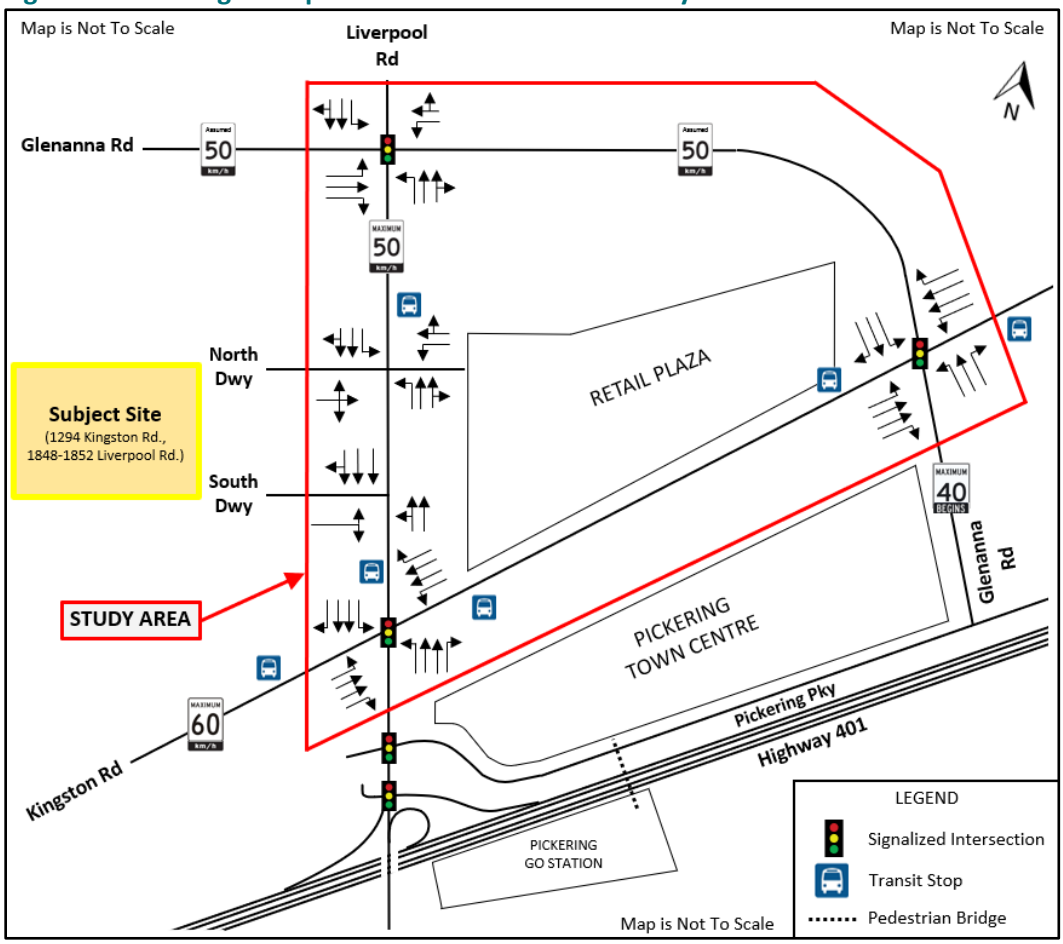
Source: Kirkor Architects and Planners (July 22nd, 2020)

2 EXISTING TRANSPORTATION CONDITIONS

2.1 ROAD NETWORK AND SITE ACCESSES

Figure 2.1 illustrates the lane configurations, type of traffic control, and transit stops in the study area.

Figure 2.1: Existing Transportation Elements in the Study Area



The following provides an overview of the existing road network surrounding the subject site.

Kingston Road (Highway 2) is a Type B Arterial Regional Road under the jurisdiction of Durham Region. This road runs generally in the east-west direction between Woodbine Avenue in the City of Toronto and the Ajax-Whitby municipalities, turning into Dundas Street West at Lake Ridge Road. Near the subject site, Kingston Road has a general seven-lane cross-section including bus-only lanes and bicycle lanes within the study area. The posted speed limit is 60 km/hr. At approximately 300 metres west of the Liverpool Road intersection, there are no bus or bicycle lanes available.

Liverpool Road (Regional Road 29) is a Type B Regional Road from Bayly Street to Finch Avenue under the jurisdiction of Region of Durham. Liverpool Road is a local road south of Bayly Street to Lake Ontario. It has a general five-lane cross-section within the study area. The posted speed limit near the subject site is 50 km/hr.

Glenanna Road is a Type C Arterial Road that has a two-lane cross section. This road runs east west from its westerly end to east of Liverpool Road and runs north-south to its south limits at Pickering Parkway. This road has a posted speed limit of 40 km/hr. from Pickering Parkway to Kingston Road. From Kingston Road to Listowel Crescent (located west of Liverpool Road), the posted speed limit is 50 km/hr. West of Listowel Crescent, the speed limit is 40 km/hr. to its westerly terminus point at Fairport Road.

The subject site currently has two stop-controlled driveways. The south driveway is located approximately 63 metres north from the Liverpool/Kingston intersection. The north driveway is located approximately 142 metres north of the Liverpool/Kingston intersection; this driveway is directly aligned with a main plaza access to the east and formed a four-legged unsignalized intersection.

2.2 TRAFFIC DATA COLLECTION

Existing traffic volumes in the study area combined counts from Durham Region's Traffic Engineering and Operations interactive map and LEA Consulting Ltd. **Table 2.1** summarizes the traffic data details.

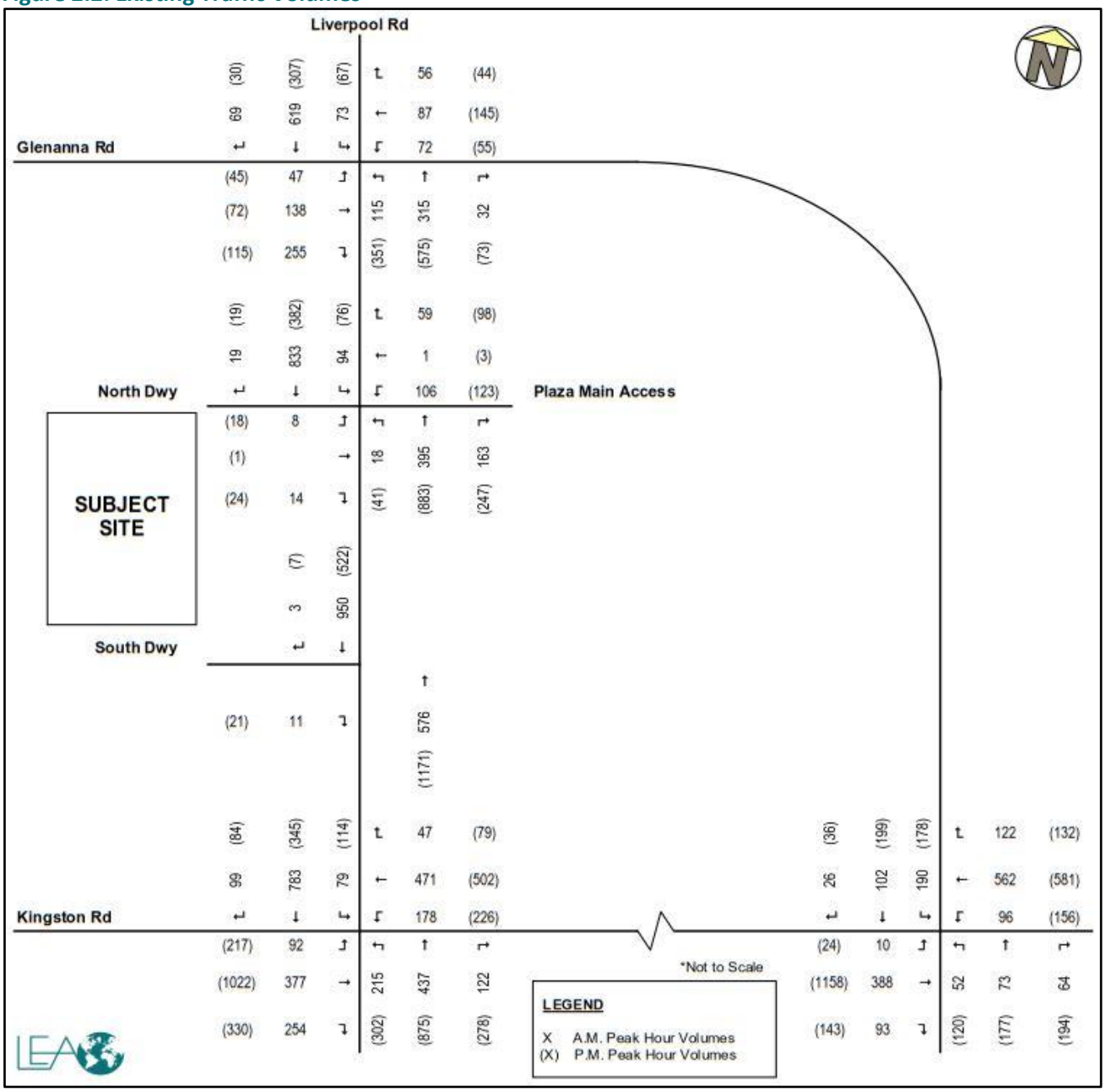
Table 2.1: Traffic Data Dates and Sources

Intersection	Date of Survey	Source
Liverpool Road (RR29) and Glenanna Road	Wednesday, June 14th, 2017	Durham Region
Liverpool Road (RR29) and North Driveway / Plaza Access	Thursday, November 8th, 2018	LEA Consulting Ltd.
Liverpool Road (RR29) and South Driveway	Thursday, November 8th, 2018	LEA Consulting Ltd.
Liverpool Road (RR29) and Kingston Road (Highway 2)	Thursday, June 15th, 2017	Durham Region
Glenanna Road and Kingston Road (Highway 2)	Wednesday, June 14th, 2017	Durham Region

The subject site currently has two access points. In and out movements at each access were counted to determine the existing site trip generation. Since the Durham Region counts were conducted in 2017, these volumes were adjusted to reflect 2019 volumes, which is consistent to the initial submission. In discussion with Region staff, growth in the general area was stagnant and a 0.5% growth rate was recommended.

Figure 2.2 shows the existing traffic volumes. Detailed traffic count data and signal timing plans can be found in **Appendix A**.

Figure 2.2: Existing Traffic Volumes



Traffic conditions were observed during the data collection phase. It was found that the westbound left movement at the Liverpool / Main Plaza and Liverpool/Kingston intersections experience some congested conditions. No issues were identified at either Liverpool/Glenanna and Glenanna/Kingston intersections. Much of the traffic generally heads southwest during the AM peak hour which indicates a general travel pattern southwest using westbound Highway 401 and westbound Kingston Road. During the PM peak hour, the general travel pattern is the opposing directions.

Pedestrian volumes in the study are considered light with any one leg of any location with a maximum volume of less than 100 during a given peak hour. Most pedestrian crossings occur at both Kingston Road intersections.

2.3 COLLISION DATA ANALYSIS

Vehicle and pedestrian collision data were reviewed in the study area. Data was collected for two road sections within the study area, Liverpool Road (50 m north of Glenanna Road to 50 m south of Kingston Road) and Kingston Road (50 m east and west of Liverpool Road) for the past five years. Collison data received from Durham Region Police and the information provided includes data to the next road intersection beyond the 50-metre benchmark requested initially.

Over the five-year period from October 28, 2014 to October 29, 2019. A total of 132 incidents were reported. **Table 2.2** summarizes the number of incidents by location. More detailed information can be found in **Appendix A**.

Table 2.2: Five-Year Collision Data by Location

Road Corridor	Road Segment	Number of Incidents	Pedestrian Related
Liverpool Rd.	Anton Sq. to Glenanna Rd	0	0
	At Glenanna Rd Intersection	15	5
	Between Glenanna Rd & Kingston Rd	11	1
	At Kingston Rd Intersection	86	28
	Between Kingston Rd & Pickering Pkwy	10	1
Kingston Rd.	Between Glendale Dr. & Liverpool Rd	7	0
	Between Liverpool Rd & Pickering Town Centre Entrance	3	2
	Total	**132**	**37**

The following list highlights some collision data statistics.

- Most collisions occurred at Kingston/Liverpool intersection (86). The predominant incidents were vehicles conducting a turning movement (33%) and rear end collisions (45%).
- Most turning movement collision involve a left turning vehicle. Two southbound right turn collisions were recorded.
- A low number of collisions on Liverpool Road between Glenanna Road and Kingston Road but most incidents involve left turns onto Liverpool Road.
- No discernable pattern of collisions was identified on Kingston Road.
- Approximately 33% of the incidents include a pedestrian component with zero fatalities.

Table 2.3 compares the observed collision rate to the Ontario wide collision rates (Ontario Road Safety Report for 2016 and summary for 2018). The total collision rate is smaller than the Ontario wide rate, and the personal injury rate is also smaller.

Table 2.3: Comparison of Collision Rates – Liverpool /Kingston Intersection and Ontario

Collision Type	Number of Collisions	Estimated rate per 100 million km	Ontario wide rate per 100 million km
All	11	122	147.75
Personal Injury	1	11	24.3

2.4 EXISTING INTERSECTION CAPACITY ANALYSIS

Intersection capacity analysis was conducted for the existing traffic conditions using Synchro Version 9.0 software, following the methodology outlined in the Highway Capacity Manual (2000) and the Region of Durham's Synchro software parameters as outlined in the Design Specifications for Traffic Control Devices, Pavement Markings, Signage and Roadside Protection (April 2007).

Signal timing plans were obtained from the Region of Durham for the three signalized intersections located in the study area (See **Appendix A**). The current posted speed limits and the default peak hour factor value of 0.92 were applied in capacity analyses. The existing capacity analysis is summarized in **Table 2.4** with detailed outputs found in **Appendix B.**

Table 2.4: Existing Conditions – Signalized Intersection Capacity Analysis

Intersection	Weekday AM Peak Hour									Weekday PM Peak Hour (Road Peak)								
	Overall			Movement of Interest				Queue (m)		Overall			Movement of Interest				Queue (m)	
	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th
Glenanna Road at Kingston Road	0.43	24	C	EBL	0.08	21	C	1	m2.4	0.75	21	C	EBL	0.08	7	A	1	m2.4
				EBT	0.67	34	C	23	24				EBT	0.81	13	B	69	m#162.8
				EBR	0.08	7	A	0	0				EBR	0.17	3	A	0	m4.8
				WBL	0.39	27	C	15	24				WBL	0.60	22	C	15	39
				WBT	0.58	30	C	55	63				WBT	0.30	10	A	30	48
				WBR	0.14	25	C	5	16				WBR	0.12	9	A	3	13
				NBL	0.10	15	B	5	12				NBL	0.46	33	C	17	28
				NBT	0.10	18	B	10	24				NBT	0.59	46	D	37	55
				NBR	0.05	18	B	0	5				NBR	0.17	37	D	1	19
				SBL	0.30	9	A	11	30				SBL	0.74	46	D	35	44
				SBT	0.13	13	B	17	33				SBT	0.69	52	D	44	63
				SBR	0.02	14	B	0	2				SBR	0.03	35	C	0	0
Liverpool Rd at Kingston Rd	0.76	37	D	EBL	0.35	26	C	12	21	0.98	44	D	EBL	0.63	25	C	27	44
				EBT	0.52	36	D	38	50				EBT	0.97	54	D	117	#163.0
				EBR	0.81	55	D	52	79				EBR	0.78	43	D	66	#111.1
				WBL	0.55	56	E	39	60				WBL	1.00	99	F	~46.2	#88.4
				WBT	0.58	63	E	58	75				WBT	0.44	38	D	57	75
				WBR	0.13	56	E	11	23				WBR	0.17	34	C	16	29
				NBL	0.75	27	C	26	#69.0				NBL	0.87	46	D	44	#78.5
				NBT	0.34	22	C	37	56				NBT	0.87	41	D	94	120
				NBR	0.10	19	B	0	13				NBR	0.38	28	C	14	40
				SBL	0.21	16	B	8	15				SBL	0.73	41	D	14	#33.5
				SBT	0.71	29	C	85	94				SBT	0.35	27	C	29	42
				SBR	0.08	18	B	1	8				SBR	0.07	36	D	0	9
Liverpool Rd at Glenanna Rd	0.35	18	B	EBL	0.38	41	D	10	20	0.58	12	B	EBL	0.39	40	D	9	20
				EBT	0.60	45	D	29	47				EBT	0.27	37	D	14	26
				EBR	0.35	40	D	8	32				EBR	0.08	36	D	0	15
				WBL	0.56	47	D	16	31				WBL	0.29	26	C	6	22
				WBT	0.54	44	D	25	47				WBT	0.67	36	D	16	63
				NBL	0.27	5	A	5	11				NBL	0.56	7	A	20	m85.2
				NBTR	0.15	3	A	6	12				NBTR	0.28	3	A	17	m8.8
				SBL	0.12	4	A	4	11				SBL	0.15	5	A	4	11
				SBTR	0.30	5	A	22	38				SBTR	0.14	5	A	10	19

Analysis of existing conditions indicates generally acceptable levels of service (LOS) for most movements at the signalized intersections for both the AM and PM peak hours. However, some movements are experiencing capacity constraints during the PM peak hour. This includes the eastbound through movement at both Liverpool Road at Kingston Road intersection. The volume-to-capacity (v/c) ratio is around 0.95; however, the delay time is acceptable with a value of about 55 seconds. The westbound left movement at Liverpool Road at Kingston Road is right on capacity (v/c ratio) during the PM peak hour; the overall intersection v/c ratio is below capacity.

The existing capacity analysis for unsignalized intersections for the AM and PM peak hours is summarized in **Table 2.5.**

Table 2.5: Existing Conditions – Unsignalized Intersection Capacity Analysis

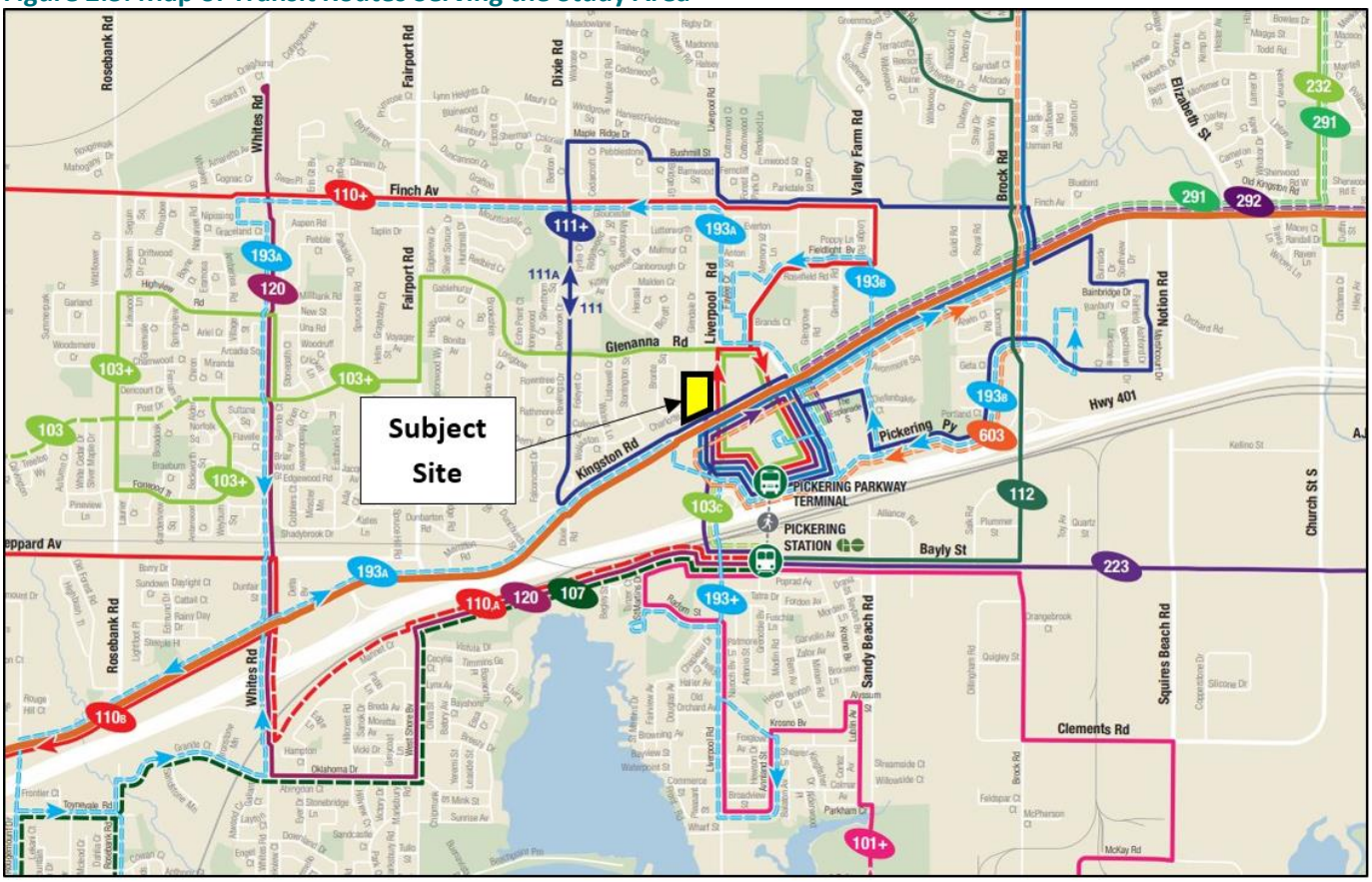
Intersection	Move-ment	Weekday AM Peak Hour						Weekday PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS	Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS
Liverpool Rd at South Dwy	EBLR	12	625	11	1	0.02	B	23	815	9.5	1	0.03	A
Liverpool Rd at North Dwy / Main Plaza Dwy	EBLTR	24	332	17	2	0.07	C	47	496	13.0	3	0.09	B
	WBL	115	327	22	12	0.35	C	134	279	29.3	20	0.48	D
	WBTR	65	855	10	2	0.08	A	110	761	10.5	4	0.14	B
	NBL	20	756	10	1	0.03	A	45	1123	8.3	1	0.04	A
	SBL	102	1047	9	3	0.10	A	83	700	10.8	3	0.12	B

The analysis shows that both unsignalized accesses are operating at acceptable LOS during both peak hours. The westbound left movement at the north driveway experiences the highest delay at 29 seconds; these delays result from the continuous volume of cross traffic on Liverpool Road.

2.5 EXISTING TRANSIT SERVICE

The subject site is serviced by Durham Region Transit which includes a bus rapid transit (BRT) system along Kingston Road (a high order transit corridor) and two community bus routes. The Durham Region transit terminal is located on the south side of the nearby Pickering Town Centre with a walking distance of approximately 750 metres from the subject site. The Pickering GO Station, which is a Metrolinx Anchor Mobility Hub, is located south of Highway 401 at the northeast corner of Liverpool Road and Bayly Street. The subject site is within an 800-metre radius of the GO Station with a walking distance of approximately one kilometre. **Figure 2.3** shows the local transit routes serving the general area.

Figure 2.3: Map of Transit Routes Serving the Study Area



The bus routes servicing the subject site are as follows:

- **103 Glenanna Bus** operates predominately east-west along Glenanna Road from Pickering Parkway Terminal (i.e. Pickering Town Centre) to Rouge Hill GO Station (Toronto). This route operates 7 days a week, exclusively during rush hour on weekdays with a peak headway of 30 minutes. During the weekday midday, the routes **103B** and **103C** operate once an hour. On weekends, service interval times is 60 minutes between Pickering Parkway Terminal and Rossbank Road.
- **110 Finch West Bus** is a circle route between Pickering Town Centre and Pickering GO Station travelling via Finch Avenue, Altona Road, Sheppard Avenue, Whites Road and Bayly Street. On weekends, the bus route travels between Pickering Parkway Terminal to Whites Road at Kingston Road intersection. Service frequency ranges between 16-30 minutes during the AM peak period and 27-40 during the PM peak period. Outside of weekday peak periods and on weekends, the route operates every 30 minutes but only to the Whites Road/Kingston Road intersection.
- **111 East Pickering Bus** is a circle route around the Pickering City Centre area. It travels in a clockwise manner to as far west as Dixie Road at Kingston Road, before returning towards Pickering Parkway Terminal via Finch Avenue, Brock Road, and Pickering Parkway to the bus terminal. The route **111A** operates in the opposing direction (counter-clockwise) as route **111**. The Monday-Friday AM peak period operates with a 12-18-minute headway whereas the PM peak period operates at a 17-30-minute headway. Hourly service is available on weekends.

- **193 Community Bus Route** operates as a circuitous route to several communities in the area bounded by Finch Avenue to the north, Brock Road to the east, Liverpool Road at Annland Street to the southeast and Kingston Road at Roughmount Drive and Rossbank Road to the southwest. The route operates midday from Monday-Saturday between 10:30AM to about 4:30PM, with a headway of 2 hours offering 3 runs.
- **223 Bayly Bus** operates generally in an east-west route, travelling between Pickering Parkway Bus Terminal and Ashbury Avenue and Audley Road. This route operates along Liverpool Road, Bayly Road and Audley Road. A 30-minute headway is scheduled for much of Monday to Saturday between 5:00 AM and 8:30 PM. Outside of these times, the headway is generally 60 minutes, including all-day Sunday.
- **291 & 292 Ajax Community Bus** travels east-west between from Pickering Parkway Bus Terminal and Harwood Avenue and Lake Driveway, travelling in general along Kingston Road and Harwood Avenue. Like the **193** Community Bus Route, a circuitous route serves local communities to as far east as Salem Road. The route operates Monday-Saturday from 8:40AM to about 6:30PM with a headway of 60 minutes. On Sunday, only midday service is available between 11:30AM to 5:30PM with a headway of 2 hours.
- **603 Pickering-Uxbridge Bus** operates north-south from Pickering Parkway Bus Terminal to Main Street North and Brock Street E. in the Township of Uxbridge. Service is provided Monday to Friday as a one-directional commuter service. Two trips from Uxbridge occur during the AM Peak and midday period. Northbound bus service begins during the midday with a 2-hour headway. During the PM peak period, service departs for Uxbridge between 3:30 and 6:00 PM.
- **900 Pulse Bus** operates east-west along Kingston Road from the University of Toronto (Scarborough) to Mary Street at Dundas Street (City of Oshawa). This route is designed as a Rapid Transit Corridor with dedicated bus lanes on sections near Liverpool Road, Brock Road, and between Westney and Salem Roads. Service operates 7 days a week, with peak headways of 10-15 minutes on weekdays, 15-30 minutes on Saturday, and 30 minutes on Sundays**.**
- **916 Rossland Bus** operates primarily east-west along Rossland Road from Pickering Parkway Terminal to Harmony Bus Terminal within the SmartCentres Oshawa North shopping complex. The route operates 7 days a week, with peak headways of 15 minutes on weekdays, 10-20 minutes on Saturdays, and 30 minutes on Sunday.
- **51 Highway 407 East (GO Transit)** operates primarily along Highway 407 between the Highway 407 Bus Terminal at Yonge Street and the Oshawa Bus Terminal. This route passes by the subject site on Kingston Road to the Pickering GO Station. Branch routes A, C and D divert from Highway 407, Highway 404, Highway 401 with stops at the Scarborough Centre Bus Terminal, Centennial College, and the University of Toronto-Scarborough. The route then travels via Highway 401, Whites Road, Kingston Road, Liverpool Road to the Pickering GO Station. The route then travels west to Oshawa GO Bus terminal via Bayly Street, Brock Road, Highway 407/Highway 7, and Simcoe Street. Branch route 51B by-passes these stops and travels directly to the Pickering GO Station via Highway 407 and Brock Road. Afterwards, the bus follows the branch routes A, C and D path to the Oshawa Bus Terminal. Service frequency is 25-35 minutes during the weekday AM peak and PM peak period. There is no service during the weekend.

A summary of the transit service is provided in **Table 2.6**.

Table 2.6: Existing Transit Service Summary

Route Name	Direction	From	To	Weekday Hours of Operation	Peak Weekday Headway (Minutes)
103 Glenanna	E-W	Pickering Parkway Terminal (Liverpool Rd. at Kingston Rd.)	Rouge GO Hill Station	6:00AM-7:30PM	30
110, 110A Finch West	N-S		Pickering GO Station	6:15AM-11:00PM	16-30
111, 111A East Pickering	N-S		Finch Av., Brock Rd., Dixie Rd.	9:00AM-8:00PM	12-30
193A, 193B Community Route	N-S		Whites Rd. at Finch Av., Rougemount Dr. at Kingston Rd., Brock Rd. at Kingston Rd., and Liverpool Rd. at Annland St.	10:30AM-4:30PM	60
223 Bayly	E-W		Audley Rd./Ashburn Blvd.	5:15AM-Midnight	30
291 & 292 Ajax Community	N-S		Salem Rd. at Kingston Rd., Harwood Av. at Lake Driveway	8:40AM-6:30PM	120
603 Pickering-Uxbridge	N-S		Main St. N. at Brock St. East.	6:30AM-6:30PM	90-120
916, 916C Rossland	E-W		Harmony Bus Terminal Oshawa)	6:00AM-11:30PM	15-20
900 Pulse	E-W	University of Toronto Scarborough (Morningside Av. at Ellesmere Rd.)	Mary St at Dundas Street (Oshawa)	4:30AM-2:00AM	10-15
GO Transit 51 407 East Bus	E-W	Highway 407 Bus Terminal (Richmond Hill)	Oshawa Bus Terminal	5:00AM-MIdnight	25-30

3 FUTURE BACKGROUND TRAFFIC CONDITIONS

3.1 BACKGROUND DEVELOPMENT SITE TRIPS

In consultation with Durham Region staff, it was determined that the only potential background development in the study area is located immediately north of the subject site at 1854-1858 Liverpool Road. As of August 2019, the development proposes 461 m^2 of ground floor commercial spaces and 98 residential units. Region of Durham staff has expressed their desire for a signalized intersection shared among both developments. Therefore, the background site trips were allocated to use the north driveway.

Background development site trips for 1854-1858 Liverpool Road were taken from the August 2019 Traffic Impact Study, Site Plan Review, & Transportation Demand Management Plan prepared by TRANS-PLAN. The two-way site trips generated are projected at 45 and 61 for the AM and PM peak hours, respectively. These site trips are shown in the study area with **Figure C1** in **Appendix C**.

3.2 CORRIDOR GROWTH RATE AND OTHER ROAD IMPROVEMENTS

In discussion with Region staff, it was determined that growth in the general area has remained stagnant. A growth rate of 0.5% for a 5 and 10-year analysis period was recommended by Region staff for this study after full build-out. It is assumed that this proposed development will be completed by 2023 and a similar assumption was made for the 1854-1585 Liverpool Road development proposal. Consequently, the future horizon years of 2028 and 2033 will be reviewed.

The land uses north and west of the subject site contain low density residential uses. Growth in the general area was deemed stagnant according to the Region. After consultation with the review agencies, no other developments were specified to be included in the initial study. Future long terms plans include land use intensification to the Pickering City Centre area but the timeline for completion is uncertain at this time. As such, the background traffic associated with these development proposals was not explicitly included with this study other than the general growth rates discussed above.

An environmental assessment is scheduled to address a proposed widening of Liverpool Road from 5 to 7 lanes from Kingston Road to Highway 401. This study was to commence in 2019 with construction starting in 2022. Regional staff indicated that the EA study has not begun yet. To be conservative, our analysis assumes this widening will be operational by 2028. When completed, a shared through/right turn lane is expected to replace the current exclusive right-turn lane in the southbound direction at the Liverpool/Kingston Road intersection. No change to the northbound lane is expected.

DRT currently runs Pulse bus service on Kingston Road. This service began in 2013 is a precursor for a future Bus Rapid Transit (BRT) system as part of Metrolinx 2018's 2041 Regional Transportation Plan. Limited BRT lanes and associated street signage exist in the study area from west of Liverpool Road to Glenanna Road. Other existing portions include a small section west of Whites Road and between Westney and Salem Roads to the east. Metrolinx is continuing design work for future expansion plans with an expected completion date in 2020. An environmental assessment follows then procurement for funding and construction. A timeline for full project implementation is unknown at the time of preparation of this report. Therefore, Kingston Road remain unchanged under future conditions.

Figures C2 and **C3** in **Appendix C** show the background growth in corridor traffic on Liverpool and Kingston Roads for 2028 and 2033; respectively. Future total traffic for 2028 is the sum of existing traffic, plus corridor growth and future site traffic. **Figures 3.1 and 3.2** show the 2028 and 2033 background traffic volumes, respectively.

Figure 3.1: 2028 Background Traffic Volumes

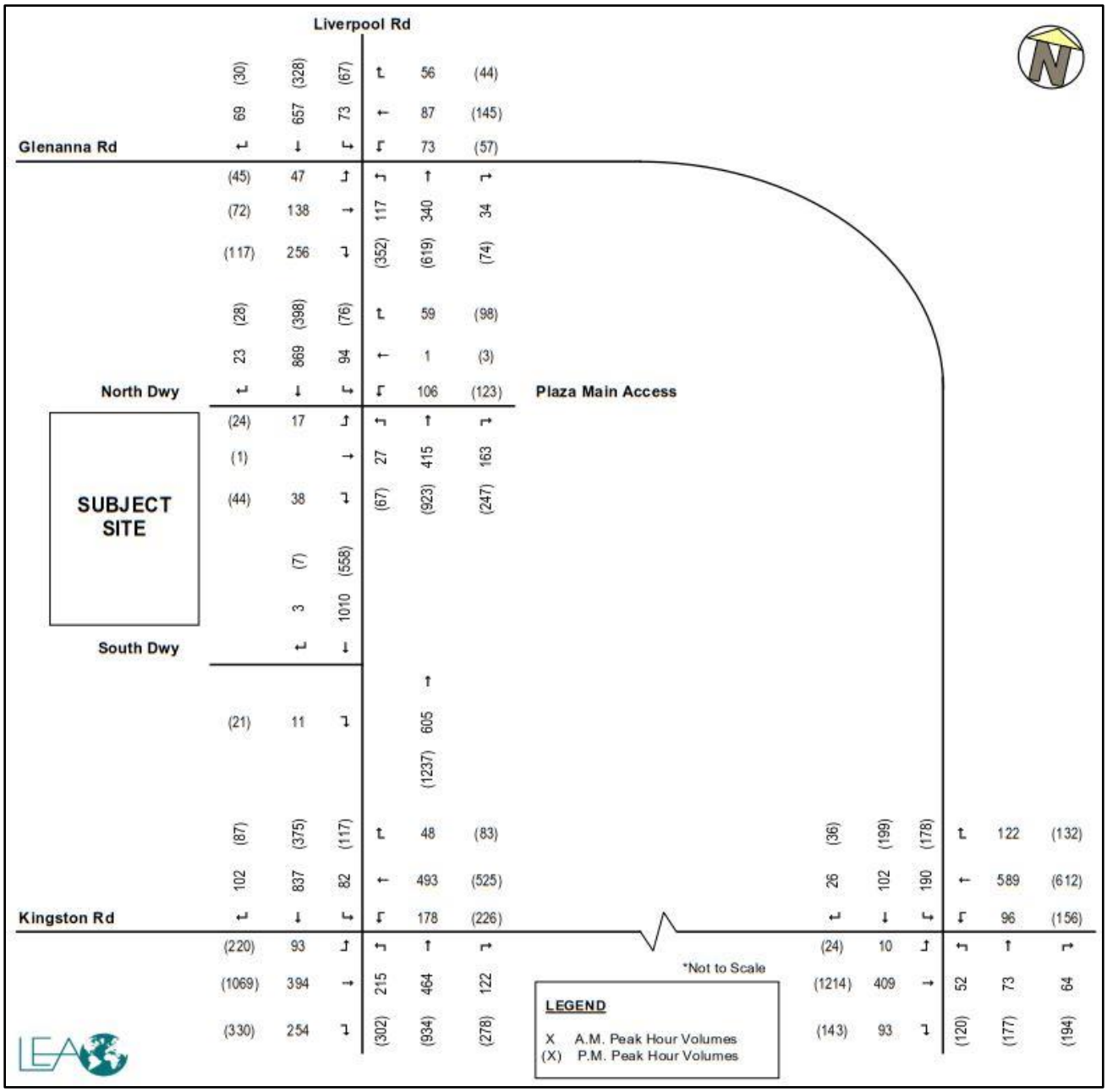
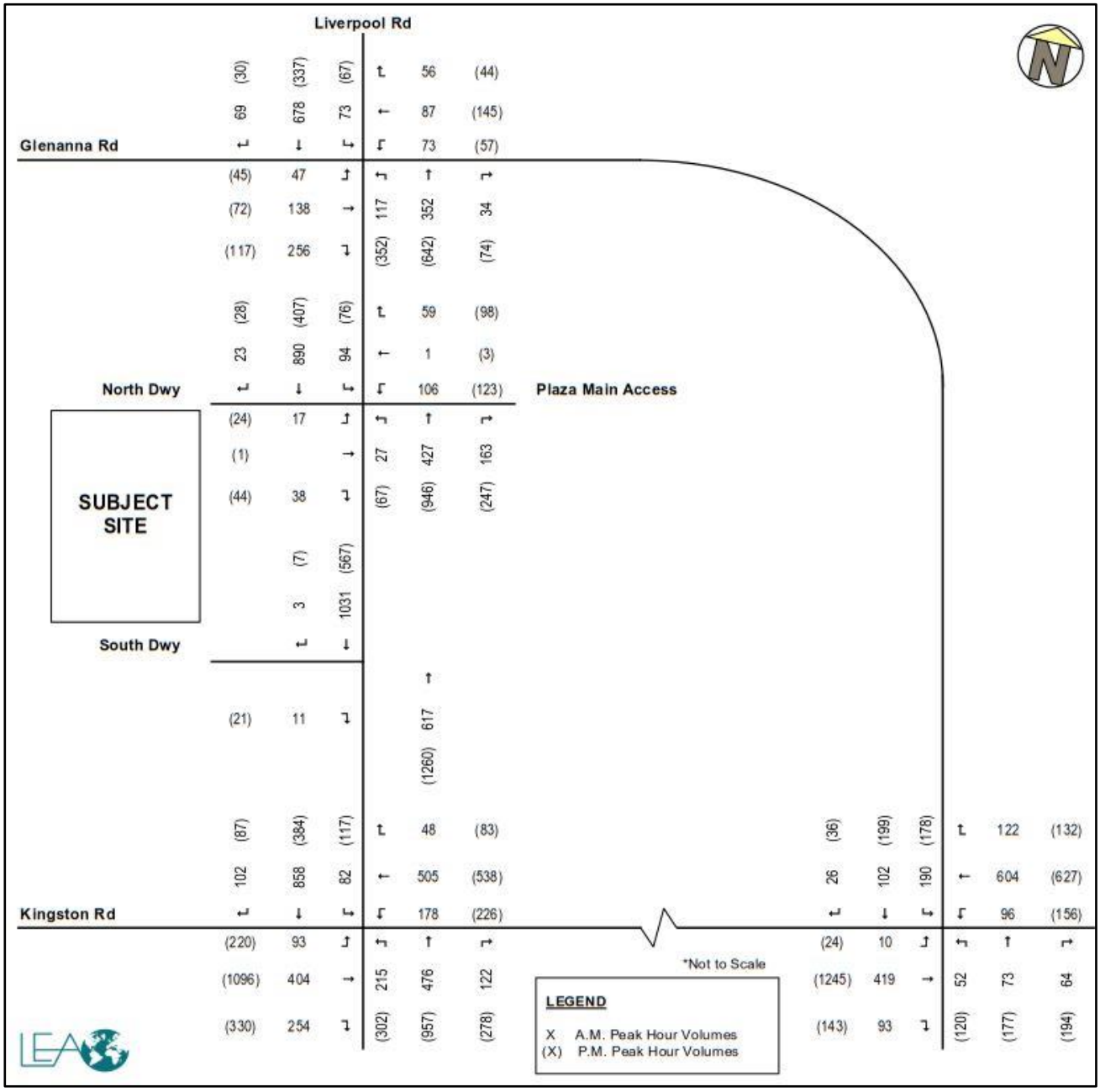


Figure 3.2: 2033 Background Traffic Volumes



3.3 FUTURE BACKGROUND TRAFFIC ANALYSES

In conducting the intersection capacity analysis, it was observed that the existing signal timing will not be ideal under future conditions at the Liverpool/Kingston intersection during the PM peak. Therefore, the signal timings were optimized for 2033 and applied to 2028 while maintaining the existing cycle length. The results of the signalized intersection capacity analysis for 2028 and 2033 future background analysis are provided in **Tables 3.1** and **3.2**, respectively, with detailed outputs found in **Appendix D**.

Table 3.1: 2028 Background Traffic Conditions – Signalized Intersection Capacity Analysis

Intersection	Weekday AM Peak Hour									Weekday PM Peak Hour (Road Peak)								
	Overall			Movement of Interest						Overall			Movement of Interest					
	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	Queue (m)		V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th								50th	95th
Glenanna Road at Kingston Road	0.44	24	C	EBL	0.08	20	C	1	m2.3	0.78	22	C	EBL	0.08	8	A	1	m2.8
				EBT	0.67	33	C	23	24				EBT	0.85	16	B	143	m#180.1
				EBR	0.08	7	A	0	0				EBR	0.17	3	A	0	m6.6
				WBL	0.39	26	C	15	23				WBL	0.60	23	C	16	40
				WBT	0.60	30	C	57	66				WBT	0.32	10	A	32	51
				WBR	0.29	26	C	20	31				WBR	0.13	9	A	4	14
				NBL	0.10	15	B	5	13				NBL	0.54	35	C	20	32
				NBT	0.11	19	B	10	25				NBT	0.59	46	D	37	55
				NBR	0.05	18	B	0	5				NBR	0.17	37	D	1	19
				SBL	0.30	9	A	11	21				SBL	0.74	48	D	34	41
				SBT	0.14	13	B	17	33				SBT	0.69	54	D	44	67
				SBR	0.02	15	B	0	2				SBR	0.03	35	C	0	2
Liverpool Rd at Kingston Rd	0.81	36	D	EBL	0.44	28	C	13	23	0.99	46	D	EBL	0.58	19	B	26	42
				EBT	0.54	36	D	40	52				EBT	0.97	52	D	122	#168.4
				EBR	0.81	54	D	52	79				EBR	0.74	39	D	64	#102.0
				WBL	0.56	59	E	39	60				WBL	0.99	87	F	41	#83.8
				WBT	0.65	66	E	61	79				WBT	0.50	41	D	63	78
				WBR	0.14	58	E	0	24				WBR	0.19	36	D	16	31
				NBL	0.76	28	C	26	#73.6				NBL	0.85	40	D	47	#84.2
				NBT	0.37	22	C	40	59				NBT	0.95	52	D	106	#149.2
				NBR	0.10	20	B	0	10				NBR	0.36	28	C	13	39
				SBL	0.22	16	B	8	18				SBL	0.83	66	E	15	#38.4
				SBTR	0.56	24	C	54	75				SBTR	0.45	36	D	27	44
Liverpool Rd at Glenanna Rd	0.36	18	B	EBL	0.38	41	D	10	20	0.59	12	B	EBL	0.39	40	D	9	20
				EBT	0.60	44	D	29	46				EBT	0.27	37	D	14	26
				EBR	0.44	41	D	12	37				EBR	0.08	36	D	0	15
				WBL	0.56	54	D	17	28				WBL	0.30	27	C	6	24
				WBT	0.53	55	E	27	41				WBT	0.67	36	D	21	61
				NBL	0.29	5	A	4	10				NBL	0.57	7	A	14	m75.7
				NBTR	0.16	3	A	6	12				NBTR	0.30	3	A	13	m14.4
				SBL	0.12	4	A	4	11				SBL	0.16	5	A	4	12
				SBTR	0.31	5	A	24	42				SBTR	0.15	5	A	11	20

Table 3.2: 2033 Background Traffic Conditions – Signalized Intersection Capacity Analysis

Intersection	Weekday AM Peak Hour									Weekday PM Peak Hour (Road Peak)								
	Overall			Movement of Interest				Queue (m)		Overall			Movement of Interest				Queue (m)	
	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th
Glenanna Road at Kingston Road	0.45	24	C	EBL	0.08	20	C	1	m2.1	0.79	22	C	EBL	0.08	8	A	1	m2.7
				EBT	0.68	33	C	24	24				EBT	0.87	16	B	148	m#182.2
				EBR	0.08	7	A	0	0				EBR	0.17	3	A	0	m6.6
				WBL	0.39	26	C	14	23				WBL	0.60	24	C	16	40
				WBT	0.61	30	C	59	67				WBT	0.32	10	A	33	52
				WBR	0.28	26	C	20	31				WBR	0.13	9	A	4	14
				NBL	0.10	15	B	5	13				NBL	0.54	35	C	20	32
				NBT	0.11	19	B	10	25				NBT	0.59	46	D	37	55
				NBR	0.05	19	B	0	6				NBR	0.17	37	D	1	19
				SBL	0.30	9	A	11	21				SBL	0.74	48	D	34	41
				SBT	0.14	13	B	18	33				SBT	0.69	53	D	44	67
				SBR	0.02	15	B	0	2				SBR	0.03	35	C	0	2
Liverpool Road at Kingston Road	0.82	37	D	EBL	0.45	28	C	13	23	1.00	49	D	EBL	0.59	20	B	26	42
				EBT	0.56	37	D	41	53				EBT	0.99	58	E	126	#175.3
				EBR	0.81	54	D	52	79				EBR	0.74	39	D	64	#102.0
				WBL	0.57	59	E	39	60				WBL	0.99	88	F	41	#82.9
				WBT	0.66	67	E	63	80				WBT	0.51	41	D	65	80
				WBR	0.14	58	E	0	24				WBR	0.19	36	D	17	31
				NBL	0.77	29	C	26	#75.8				NBL	0.85	41	D	47	#84.8
				NBT	0.37	22	C	41	61				NBT	0.98	57	E	110	#155.0
				NBR	0.10	20	B	0	10				NBR	0.37	28	C	14	40
				SBL	0.22	17	B	8	19				SBL	0.83	66	E	15	#38.1
				SBTR	0.58	26	C	55	81				SBTR	0.46	36	D	28	45
Liverpool Road at Glenanna Road	0.37	18	B	EBL	0.37	40	D	10	20	0.59	12	B	EBL	0.39	40	D	9	20
				EBT	0.59	44	D	29	46				EBT	0.27	37	D	14	26
				EBR	0.48	41	D	14	39				EBR	0.08	36	D	0	15
				WBL	0.55	52	D	17	25				WBL	0.30	27	C	6	24
				WBT	0.52	53	D	27	36				WBT	0.67	37	D	33	61
				NBL	0.30	5	A	4	9				NBL	0.58	7	A	12	m74.8
				NBTR	0.17	3	A	6	11				NBTR	0.31	3	A	12	m15.0
				SBL	0.12	4	A	4	11				SBL	0.16	5	A	4	12
				SBTR	0.32	5	A	25	44				SBTR	0.16	5	A	11	21

The traffic conditions under 2028 background for both peak periods are comparable to the existing operations, even the two most problematic movements (westbound left and eastbound through) during the PM peak are expected to operate with similar or improved LOS and/or v/c ratios.

Similarly in 2033, most of the movements and intersections are expected to operate with a slightly higher delay and v/c ratios compared to 2028. However, the two problematic movements, as per above, are still be expected to operate within capacity as well as acceptable delay and LOS.

The unsignalized intersection operations under future background conditions in 2028 and 2033 are summarized in **Tables 3.3** and **3.4**, respectively, below. Detailed outputs can be found in **Appendix D**.

Table 3.3: 2028 Background Traffic Conditions – Unsignalized Intersection Capacity Analysis

Intersection	Move-ment	Weekday AM Peak Hour						Weekday PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS	Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS
Liverpool Rd at South Dwy	EBLR	12	457	13	1	0.03	B	23	688	10	1	0.03	B
Liverpool Rd at North Dwy / Main Plaza Dwy	EBLTR	59	348	17	5	0.17	C	75	511	13	4	0.15	B
	WBL	115	290	25	15	0.40	D	134	238	38	25	0.56	E
	WBTR	65	855	10	2	0.08	A	110	732	11	4	0.15	B
	NBL	29	733	10	1	0.04	B	73	1098	9	2	0.07	A
	SBL	102	1035	9	3	0.10	A	83	687	11	3	0.12	B

Table 3.4: 2033 Background Traffic Conditions – Unsignalized Intersection Capacity Analysis

Intersection	Move-ment	Weekday AM Peak Hour						Weekday PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS	Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS
Liverpool Rd at South Dwy	EBLR	12	458	13	1	0.03	B	23	684	10	1	0.03	B
Liverpool Rd at North Dwy / Main Plaza Dwy	EBLTR	59	344	18	5	0.17	C	75	504	13	4	0.15	B
	WBL	115	289	25	15	0.40	D	134	232	40	26	0.58	E
	WBTR	65	855	10	2	0.08	A	110	724	11	4	0.15	B
	NBL	29	722	10	1	0.04	B	73	1089	9	2	0.07	A
	SBL	102	1027	9	3	0.10	A	83	673	11	3	0.12	B

Good LOS are expected at both intersections. The westbound left movement delay time experiences a minor increase of 2 seconds from the 2033 results, which is not significant.

4 SITE-GENERATED TRAFFIC

4.1 TRIP GENERATION

The subject site is proposed to be redeveloped with a mixed-use development with ground floor commercial space and two residential towers with a 25-storey tower, and a 13-storey midrise building. Restaurant or other active commercial/retail use make up 1,332 m^2 along the Liverpool and Kingston Road frontages of the new buildings and the retained Old Liverpool House. A total gross floor area of 40,953 m^2 is proposed at a density of 4.59 FSI over the subject site. The detailed building statistics are summarized in **Table 4.1.**

Table 4.1: Subject Site Building Statistics

Buildings	Retail GFA (m^2)	Number of Residential Units
Building A - Apartment Units	-	217
Building A – At-grade Retail	370	-
Building B - Apartment Units	-	278
Building B - At-grade Retail	519	-
Retained Old Liverpool House (Retail)	442	-
TOTAL	**1,332 m^2**	**495 units**

Trip generation for the apartment units was calculated based on the 10th Edition ITE Multifamily Housing (High Rise) Land use Code 222. To be conservative, we analysed the traffic conditions with 500 units.

Section 2.3.5 of the 2017 Durham Region Transportation Master Plan specifies a targeted increase in transit mode share from 10.7% in 2011 to 12.2% by 2031. The study area is located within a higher order transit corridor with service provided by Durham Region Transit (DRT) and GO Transit. A Bus Rapid Transit lane is located on Kingston Road with a transit stop located on the southern edge of the property and across Kingston Road on the southeast corner of Liverpool Road. There is a DRT bus terminal at the south end of Pickering Town Centre with access to nine bus routes. Pickering GO Station is located on the south side of Highway 401, which also includes several bus bays dedicated for some Durham Region transit routes. This railway station is within 800 metres of the subject site (1-kilometre walk). The GO Station contributes to transit mode share where the Lakeshore East GO train line provides access to downtown Toronto via train or bus.

A review of the other modal share was undertaken to determine if further reduction to site trips is possible. We reviewed the modal share In the Transportation Tomorrow Survey (TTS) for the zone to which the subject site lies in. It was determined that auto drivers accounted for 73% of site trips and other modes at 27% as outlined in **Exhibit E1** in **Appendix E** and summarized in **Table 4.2**. As noted above, the Durham Region Transportation Master Plan aims to decrease auto use and promote other modes of travel. The report acknowledges other modes including carshare but there is lack of additional information regarding the promotion of this program.

Table 4.2: Modal Split from TTS

Travel Modes	Percentage
Auto driver	73%
Transit Excluding GO	5%
GO Rail Only	1%
Joint Go Rail and Local Transit	1%
Auto Passenger	19%
Walk	1%
TOTAL	**100%**

There are bicycle lanes on Kingston Road near the subject site as part of a larger plan as stated in the Regional Cycling Plan (November 2012). The goal is to complete connectivity of bicycle lanes on Kingston Road and on Liverpool Road from Highway 401 to Finch Avenue. The cycling plan is to be developed in phases by 2031. There is no specific timeline for expansion of the bicycle network within the study area. As such, a site trip reduction by bicycle mode is difficult to establish.

From the above conditions, we can only conservatively decrease the background generated trips related to the proposed development to the north by 10% to account for transit trips.

Trip generation for the retail/commercial uses was generated by applying the ITE 10th Edition Shopping Center (Land Use Code 820). ITE defines a shopping centre as:

> "*An integrated group of commercial establishments that is planned, development, owned and managed as a unit. A shopping center's composition is related to its market area in terms of size, location and type of store. A shopping center also provides on-site parking facilities sufficient to service its own parking demands*."

The definition further adds:

> "*Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the centre adjacent to the streets and major access points). These building are typically drive-in banks, retails stores, restaurants or small offices*".

The proposed development includes new at-grade retail in both residential buildings while retaining the existing Liverpool House. The second definition regarding the variety of outparcels uses that considers this land use code as an acceptable means to calculated new site generated trips. To be conservative, we analysed the net impact of the proposed development with a total retail/commercial space at 1,350 m^2.

The site layout features 31 at-grade parking stalls west and south of Building A, including 2 accessible stalls. It is expected that the future at-grade retail/commercial use would operational after the AM peak period Therefore, pass-by site traffic will be included with the PM peak period analysis.

The mix of residential and retail/commercial use is subject to site interaction trips. We applied the interaction rates specified in **Tables 7.1** and **7.2** in the 2nd Edition of the ITE Trip Generation Handbook (see **Appendix E)**. Total proposed development generates about 150-210 peak hour two-way trips. **Table 4.3** summarizes the site trip generation values.

Table 4.3: Site Trip Generation

Land Use	Number of Units	Size (m^2)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Apartment	500		37	116	153	109	70	179
Retail		1,350 m^2	9	5	14	26	29	55
Site Interaction	-		-2	-2	-4	-5	-5	-10
Transit Reduction (10%)	-		-4	-12	-16	-11	-7	-18
TOTAL	***500***	***1,350***	***40***	***107***	***147***	***119***	***87***	***206***

4.2 TRIP ASSIGNMENT

Existing site trips were removed from the analysis and the site distribution of residential site trips was estimated using the 2016 Transportation Tomorrow Survey (TTS) data and a review of the local road network.

The distribution of new residential site trips was estimated from reviewing Transportation Tomorrow Survey (TTS) data for 2016 and existing proportion of traffic at the Liverpool / Kingston Road intersection. For the background development, it is expected that most vehicular trips will occur between home and work. The distribution of vehicular trips for AM and PM peak hour inbound and outbound trips is shown in **Exhibit E2** in **Appendix E.** We reviewed the existing proportion of southbound traffic at Liverpool / Kingston intersection to adjust the general percentage of site traffic exiting south of the subject site.

There are no eastbound ramps to/from Highway 401 at Liverpool Road. All inbound site traffic from the west are likely to exit at the Whites Road off-ramp and can travel to the subject site via Kingston Road or Bayly Street. The general tendency is to use the most direct path, or Kingston Road. Given the TTS data suggest 56% of traffic would travel north-south on Liverpool Road, we reassigned a proportion of northbound through to the eastbound left movement at Liverpool / Kingston intersection.

A similar review was undertaken for outbound distribution. The most logical on-ramp of use is at Brock Road. Access to this ramp can be made from traveling east via Kingston Road or on Pickering Parkway. Similarly, a direct path was generally applied, and we assigned 75% of outbound east traffic via a southbound left at Kingston Road and the remaining 25% travel through then left onto Pickering Parkway.

Glenanna Road is a link to the local neighbourhood, it was deemed that all future site traffic is unlikely to use this road. Hence all future site traffic was assigned to travel on Liverpool Road. **Table 4.4** summarizes the directional distribution of new residential trips.

Table 4.4: Background Trip Distribution

Direction	AM Peak Hour		PM Peak Hour	
	Into Site	Out from Site	Into Site	Out from Site
North	38%	38%	38%	38%
South	27%	50%	26%	40%
East	5%	5%	4%	13%
West	30%	7%	32%	9%

For the future retail/commercial site traffic, we applied the existing peak hour site traffic distribution. More information will be provided in the following section. For details of the site traffic and distribution for the

different uses, please refer to **Figures E1** to **E9** in **Appendix E.** The overall net site traffic volume is illustrated in **Figure 4.1**.

Figure 4.1: Net Site Traffic Volumes

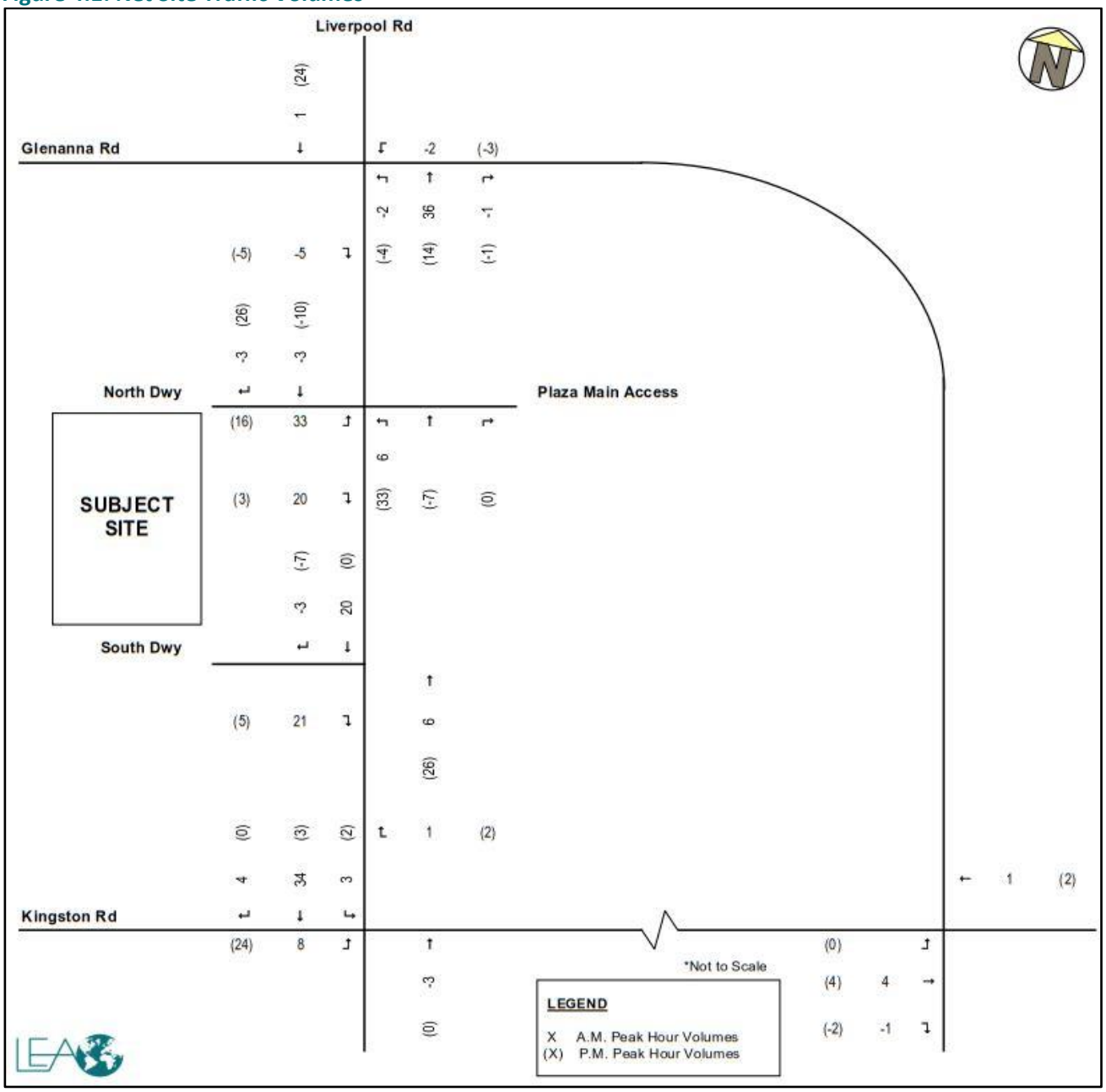


Figure E10 in **Appendix E** show the background development site traffic for 1854-1858 Liverpool Road using the North Driveway.

5 FUTURE TOTAL TRANSPORTATION CONDITIONS

5.1 FUTURE SITE ACCESS CONSIDERATIONS

A memorandum report was prepared by LEA to review seven potential future access scenarios for this development proposal. This review was conducted after a discussion with the Region on January 15, 2020 following the first development application submission. Seven access options were reviewed in greater detail to assess which access option preserved the best traffic operations for the Liverpool Road corridor. The access options are summarized in **Table 5.1**.

Table 5.1: Site Access Options at Liverpool Road

<table>
<tr><th rowspan="2">Option</th><th colspan="2">1294 Kingston Road, 1848 & 1852 Liverpool Road</th><th rowspan="2">Main Plaza Driveway</th></tr>
<tr><th>North Driveway</th><th>South Driveway</th></tr>
<tr><td>0</td><td>Unsignalized</td><td>Existing Configuration</td><td rowspan="6">Existing location</td></tr>
<tr><td>1</td><td rowspan="4">Signalized</td><td>Right-In/Right-Out w porkchop</td></tr>
<tr><td>1A</td><td>Right-In/Right-Out with extended Liverpool Road median</td></tr>
<tr><td>2</td><td>Right-out only</td></tr>
<tr><td>3</td><td>No south access</td></tr>
<tr><td>4</td><td rowspan="2">Relocated 25 metre north and signalized</td><td rowspan="2">Right-out only</td></tr>
<tr><td>4A</td><td>Aligned with North Driveway</td></tr>
</table>

For all future access options, the south driveway is relocated approximately 20 metres north to allow for more spacing from the Liverpool/Kingston intersection.

The review was conducted using Synchro and SimTraffic softwares. Intersection capacity results, queueing conditions and corridor travel time and delay conditions were reviewed with each access option. It was determined that Option 2 was preferred. This option retains the north driveway current location and the south driveway allows only outbound right movements. Retaining left turn movements at the north driveway does not create any capacity issues. The 30-metre storage length for the northbound left at the North Driveway and southbound left at Kingston Road were deemed acceptable. Only a minor use of taper section between left turns was revealed and does not impact the opposing left movements. The technical memorandum is contained in **Appendix F**.

Site access options review was undertaken and find no difference to traffic operations for the Liverpool corridor between south driveway as right-out only versus overall site access from a single access. Therefore, the need for westerly connection to Glendale Drive is deemed unnecessary. Glendale Drive is a local road and the locals residents indicate traffic and parking issues exist because of the Tim Hortons located at the northeast corner of the Glendale/Kingston intersection, which is just west of the Old Liverpool House.

The second access is deemed as a net benefit as oppose to a single site access. Further justification for the retaining a second access point in discussed in the next section.

5.2 JUSTIFICATION FOR TWO SITE ACCESSES

Retaining two access points to the subject site provides a number of benefits for internal site circulation and queuing for the proposed development as well as to the neighbouring site immediately to the north, whose potential redevelopment may share a coordinated signalized access point at the North Driveway.

In the Pickering City entre Urban Design guidelines, Section 2.3.5.2 Surface Parking, item e) state: "Access to parking and automobile drop-off area will be designed to minimize pedestrian/vehicle conflict. The number of vehicular access points will be kept to a minimum to reduce the potential conflict between pedestrian, cyclists and motor vehicles." The preference from the Region is one access point on the subject site; however, It would be more beneficial for the proposed development to retain the South Driveway. **Table 5.2** provides a summary of pros and cons of the number of access points.

Table 5.2: Pros and Cons by the Number of Site Accesses

	One Access	Two Accesses
Pros	• Limits the number of accesses and curb cut on Liverpool Road. • Limits the potential for pedestrian and bicycle and motor vehicle conflicts at Liverpool Road. • Meets Regional guidelines regarding site accessibility.	• The second access provides a second exit point in the event main access point is restricted/blocked. • Prevent the potential for on-site outbound queues if only one access is available. • The second access allows for quicker site exit in the event of need for site evacuation. • The second access can be used by emergency vehicles (especially ambulance) for quicker site exit and potentially save travel time.
Cons	• All outbound left traffic exit at one access. • Site exit may be slowed with only one access. In the event the single access is restricted, no other means for egress is available. This is especially critical if an emergency vehicle (i.e. ambulance) requires a quick departure to a medical institution. • There is a potential for outbound queuing that could extend internally which may create circulation congestion.	• Traffic exiting from the South Driveway may experience queued traffic on Liverpool Road, potentially preventing quick exit. Such conditions are more likely to occur during weekday AM peak hour and not other periods.

As shown above, there are many advantages to retain the South Driveway as the second point of access. The benefits of having the secondary access overrides the dis-benefits and improves the overall site accessibility. Therefore, it is deemed that the second access at the South Driveway serves as a net benefit to the site operation. The following analysis reviews the future traffic conditions based on **Site Access Option 2**, as discussed above.

5.3 FUTURE TOTAL INTERSECTION CAPACITY ANALYSIS

Future total traffic volumes are the sum of total future background traffic plus future site traffic minus existing site traffic. Future total traffic volumes for 2028 and 2033 are shown in **Figures 5.1** and **5.2**, respectively.

Figure 5.1: 2028 Future Total Traffic

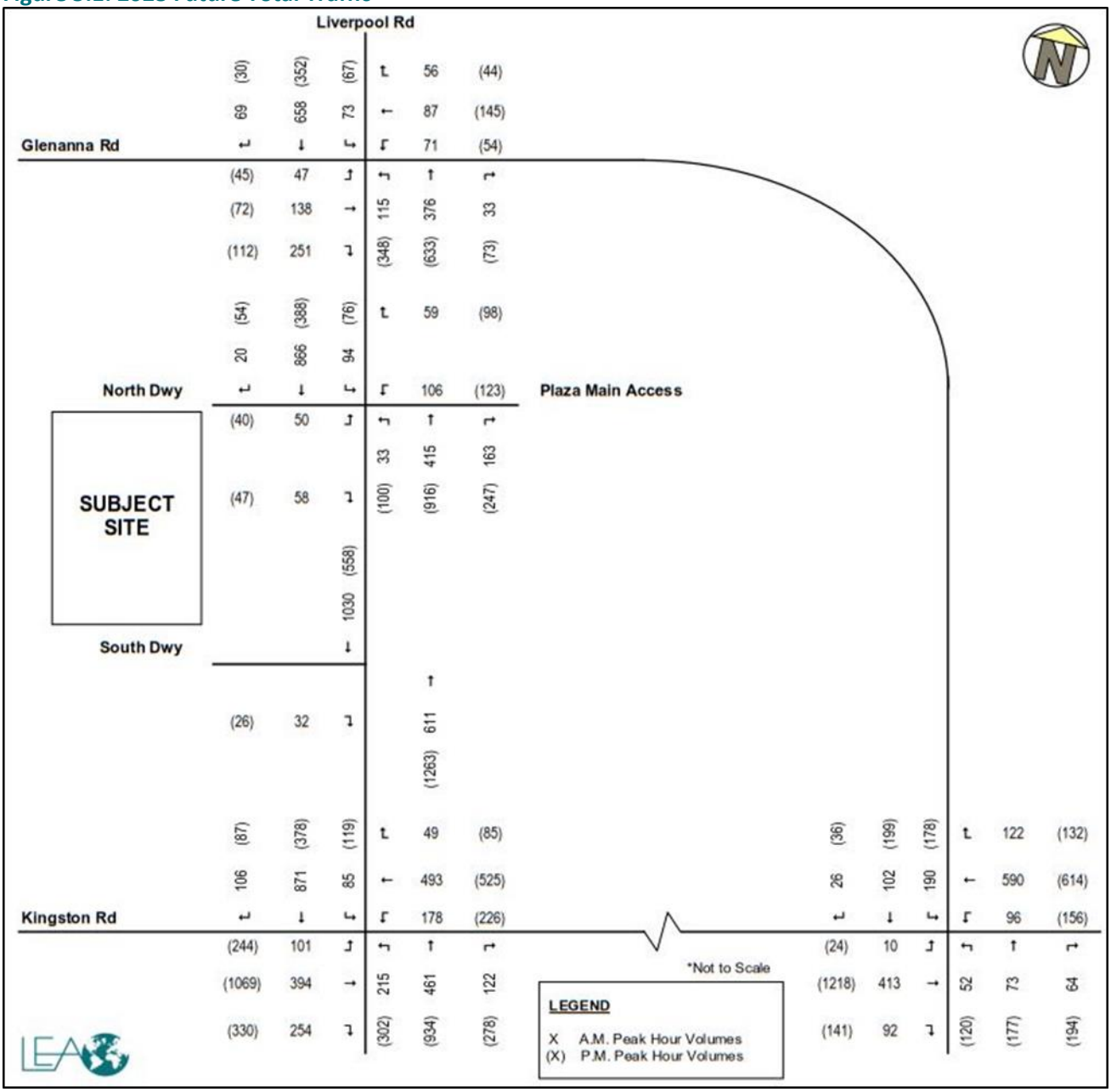
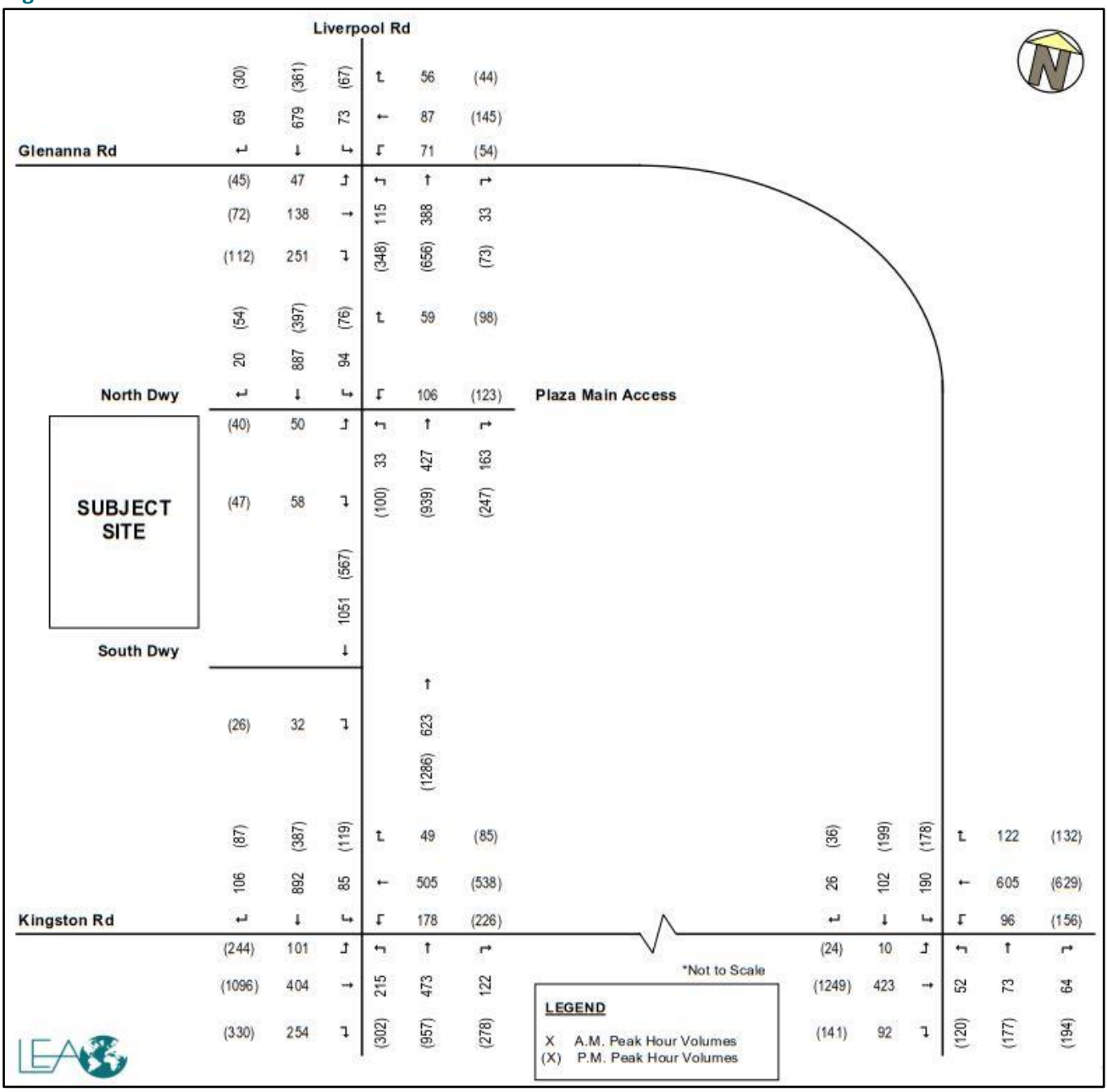


Figure 5.2: 2033 Future Total Traffic



The results of the signalized intersection capacity analysis for 2028 and 2033 future total analysis are summarized in **Tables 5.2** and **5.3**, respectively with more detailed outputs found in **Appendix G**.

Table 5.3: 2028 Future Total Conditions – Signalized Intersection Capacity Analysis

Intersection	Weekday AM Peak Hour									Weekday PM Peak Hour								
	Overall			Movement of Interest				Queue (m)		Overall			Movement of Interest				Queue (m)	
	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th
Glenanna Road at Kingston Road	0.44	24	C	EBL	0.08	20	C	1	m2.4	0.78	22	C	EBL	0.08	8	A	1	m2.8
				EBT	0.68	33	C	23	25				EBT	0.85	16	B	143	m#180.1
				EBR	0.08	5	A	0	0				EBR	0.17	3	A	0	m6.5
				WBL	0.39	26	C	15	23				WBL	0.60	23	C	16	40
				WBT	0.60	30	C	57	66				WBT	0.31	10	A	32	51
				WBR	0.15	25	C	5	17				WBR	0.13	9	A	3	13
				NBL	0.10	15	B	5	13				NBL	0.54	35	C	20	32
				NBT	0.11	19	B	10	25				NBT	0.59	46	D	37	55
				NBR	0.05	18	B	0	5				NBR	0.17	37	D	1	19
				SBL	0.30	9	A	11	26				SBL	0.74	47	D	34	41
				SBT	0.14	13	B	17	33				SBT	0.69	53	D	44	67
				SBR	0.02	15	B	0	2				SBR	0.03	35	C	0	1
Liverpool Rd at Kingston Rd	0.77	36	D	EBL	0.38	25	C	14	23	0.98	45	D	EBL	0.65	21	C	30	47
				EBT	0.54	36	D	40	52				EBT	0.97	52	D	122	#168.4
				EBR	0.81	54	D	52	79				EBR	0.74	39	D	64	#102.0
				WBL	0.56	59	E	39	60				WBL	0.98	83	F	41	#83.5
				WBT	0.64	65	E	61	79				WBT	0.50	41	D	63	78
				WBR	0.14	58	E	0	24				WBR	0.19	36	D	16	31
				NBL	0.76	28	C	26	#73.0				NBL	0.84	40	D	47	#83.1
				NBT	0.36	22	C	39	58				NBT	0.95	51	D	104	#145.5
				NBR	0.10	20	B	0	13				NBR	0.36	28	C	12	38
				SBL	0.23	15	B	7	14				SBL	0.82	62	E	13	#38.8
				SBTR	0.62	23	C	66	55				SBTR	0.44	34	C	28	44
Liverpool Rd at North Dwy / Plaza Main Dwy	0.42	9	A	EBL	0.30	39	D	10	21	0.54	9	A	EBL	0.19	38	D	7	15
				EBTR	0.04	37	D	0	0				EBTR	0.02	36	D	0	0
				WBL	0.63	47	D	22	39				WBL	0.66	48	D	26	43
				WBTR	0.04	37	D	0	0				WBTR	0.07	36	D	0	10
				NBL	0.08	2	A	1	1				NBL	0.15	2	A	1	m4.0
				NBTR	0.25	2	A	6	3				NBTR	0.52	4	A	9	m121.1
				SBL	0.20	5	A	6	13				SBL	0.35	9	A	5	15
				SBTR	0.38	5	A	29	45				SBTR	0.19	4	A	11	17
Liverpool Rd at Glenanna Rd	0.36	17	B	EBL	0.38	41	D	10	20	0.60	12	B	EBL	0.39	40	D	9	20
				EBT	0.60	45	D	29	46				EBT	0.27	37	D	14	26
				EBR	0.41	41	D	11	35				EBR	0.08	36	D	0	14
				WBL	0.54	45	D	15	29				WBL	0.28	27	C	6	22
				WBT	0.54	42	D	25	43				WBT	0.67	37	D	32	60
				NBL	0.28	4	A	4	12				NBL	0.58	7	A	12	101
				NBTR	0.18	3	A	7	16				NBTR	0.31	3	A	12	10
				SBL	0.13	4	A	4	11				SBL	0.16	5	A	4	12
				SBTR	0.31	5	A	24	41				SBTR	0.16	5	A	12	22

Table 5.4: 2033 Future Total Conditions – Signalized Intersection Capacity Analysis

Intersection	Weekday AM Peak Hour									Weekday PM Peak Hour								
	Overall			Movement of Interest				Queue (m)		Overall			Movement of Interest				Queue (m)	
	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th	V/C	Delay (s)	LOS	Move-ment	V/C	Delay (s)	LOS	50th	95th
Glenanna Road at Kingston Road	0.45	24	C	EBL	0.08	20	B	1	m2.3	0.79	22	C	EBL	0.08	8	A	1	m2.7
				EBT	0.68	32	C	24	25				EBT	0.87	16	B	149	m#183.2
				EBR	0.08	5	A	0	0				EBR	0.17	3	A	0	m6.3
				WBL	0.40	26	C	14	23				WBL	0.60	24	C	16	40
				WBT	0.60	30	C	59	67				WBT	0.32	10	A	34	52
				WBR	0.15	24	C	6	17				WBR	0.13	9	A	4	14
				NBL	0.10	15	B	5	13				NBL	0.54	35	C	20	32
				NBT	0.11	19	B	10	25				NBT	0.59	46	D	37	55
				NBR	0.05	19	B	0	6				NBR	0.17	37	D	1	19
				SBL	0.31	9	A	11	20				SBL	0.74	47	D	34	42
				SBT	0.14	13	B	17	32				SBT	0.69	53	D	44	67
				SBR	0.02	15	B	0	2				SBR	0.03	35	C	0	0
Liverpool Road at Kingston Road	0.78	36	D	EBL	0.38	25	C	13	23	1.01	48	D	EBL	0.65	21	C	29	46
				EBT	0.56	37	D	41	53				EBT	0.99	58	E	126	#175.3
				EBR	0.81	54	D	52	79				EBR	0.74	39	D	64	#102.0
				WBL	0.57	59	E	39	60				WBL	0.99	88	F	41	#82.8
				WBT	0.65	66	E	63	80				WBT	0.52	41	D	65	80
				WBR	0.14	58	E	0	24				WBR	0.20	37	D	17	32
				NBL	0.77	29	C	26	#76.0				NBL	0.86	41	D	47	#85.4
				NBT	0.37	22	C	41	60				NBT	0.98	57	E	110	#155.0
				NBR	0.10	20	B	0	13				NBR	0.37	28	C	14	40
				SBL	0.24	16	B	7	15				SBL	0.84	68	E	13	#40.3
				SBTR	0.64	25	C	70	61				SBTR	0.46	34	C	30	46
Liverpool Rd at North Dwy / Plaza Main Dwy	0.43	9	A	EBL	0.29	39	D	10	20	0.55	10	A	EBL	0.22	38	D	8	17
				EBTR	0.05	37	D	0	1				EBTR	0.03	36	D	0	0
				WBL	0.63	47	D	22	38				WBL	0.66	48	D	26	43
				WBTR	0.04	37	D	0	0				WBTR	0.07	36	D	0	11
				NBL	0.10	2	A	1	1				NBL	0.18	3	A	2	m8.9
				NBTR	0.26	2	A	6	3				NBTR	0.53	4	A	9	m119.6
				SBL	0.20	5	A	6	13				SBL	0.36	9	A	5	13
				SBTR	0.39	5	A	31	46				SBTR	0.20	4	A	11	19
Liverpool Road at Glenanna Road	0.37	16	B	EBL	0.37	41	D	10	20	0.60	12	B	EBL	0.39	40	D	9	20
				EBT	0.60	44	D	29	46				EBT	0.27	37	D	14	26
				EBR	0.46	41	D	13	38				EBR	0.08	36	D	0	15
				WBL	0.54	42	D	16	25				WBL	0.29	27	C	7	23
				WBT	0.53	39	D	25	37				WBT	0.67	37	D	37	60
				NBL	0.29	4	A	4	12				NBL	0.59	6	A	12	12
				NBTR	0.18	3	A	7	16				NBTR	0.32	3	A	12	11
				SBL	0.13	4	A	4	11				SBL	0.17	6	A	4	12
				SBTR	0.32	5	A	25	44				SBTR	0.17	5	A	12	22

The traffic conditions under 2028 are comparable to the future background conditions, even the two most problematic movements (westbound left and eastbound through) during the PM peak are expected to operate with similar LOS and/or v/c ratios.

The traffic conditions for 2033 are expected to operate in a similar manner with a slightly higher delay time compared to 2028. All problematic movements, as noted above, are still expected to operate within capacity and with an acceptable delay and LOS.

Table 5.4 summarizes the unsignalized intersection capacity analysis for 2028 and 2033. Good LOS are maintained under future total traffic conditions.

Table 5.5: 2028 and 2033 Future Total Conditions – Unsignalized Intersection Capacity Analysis

Intersection	Move-ment	Weekday AM Peak Hour						Weekday PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS	Flow Rate (vph)	Capacity (vph)	Control Delay (s)	Queue Length 95th (m)	Vol/Cap Ratio (v/c)	LOS
2028													
Liverpool Rd at South Dwy	EBR	34	887	9	1	0.04	A	24	809	10	1	0.03	A
2033													
Liverpool Rd at South Dwy	EBR	35	895	9	1	0.04	A	28	800	10	1	0.03	A

6 SIGNAL WARRANT ANALYSIS

6.1 EXISTING TRAFFIC CONDITIONS

To evaluate whether a signal is warranted at the Liverpool Road and North Driveway-Plaza Main Driveway intersection, 12 hours of traffic movement counts were collected on Tuesday, March 19th, 2019, as shown in **Exhibit H1** of **Appendix H**. The highest 8 hours of traffic volumes were identified. A signal warrant analysis was conducted under existing traffic conditions, utilizing the warrant analysis outlined in the Ontario Traffic Manual (OTM) Book 12- Traffic Signals. The detailed warrant analysis is attached in **Appendix H** and summarized in **Table 6.1.**

Table 6.1: Existing Traffic Signal Warrant

Justification		Compliance	Signal Justified?	
			Yes	No
1. Minimum Vehicle Volume	A: Total Volume	100%		X
	B: Crossing Volume	98%		
2. Delay to Cross Traffic	A: Main Road	100%	X	
	B: Crossing Road	100%		
3. Combination	A: Justification 1	98%	X	
	B: Justification 2	100%		
4. 4-Hour Volume		100%	X	
5. Collison Experience		0%		X
6. Pedestrians	A: Volume	-		X
	B: Delay	-		

Analysis results indicate that a signal is warranted at this intersection as per Justifications 2 to 4 (Delay to Cross Traffic, Combination Warrant, and 4-Hour Volume in the OTM Book 12. Therefore, there is some support for a traffic signal at this location.

6.2 FUTURE TOTAL TRAFFIC CONDITIONS

A signal warrant analysis was conducted with the site development. A temporal profile of peak hour residential site traffic was derived from a proxy site survey of a development in the nearby neighbourhood. The development at 1000-1200-1400 The Esplanade North was selected as a suitable proxy, which consists of two condominium towers and several townhouses. Trip generation data was collected on Tuesday, March 19th, 2019 (See **Exhibit H2** in **Appendix H**). This proxy site data was used to generate a temporal profile of residential site traffic during a weekday.

The resulting profile was applied to the future background development and subject site traffic. The peak hour site traffic of both sites was used as well as the proxy residential site peak hour of 3:00 PM to 4:00 PM. For the remaining hours of the day, we applied the temporal profile values obtained from the proxy site survey.

These volumes were combined with existing traffic volumes, minus the existing subject site traffic, corridor growth volumes and new subject site traffic, to formulate the future traffic volumes for the signal warrant analyses.

The individual and combined traffic volumes are summarized in **Exhibit H3** of **Appendix H** for 2028. The results are summarized in **Table 6.2**.

Table 6.2: Future Total Traffic Signal Warrant 2028

Justification		Compliance	Signal Justified?	
			Yes	No
1. Minimum Vehicle Volume	A: Total Volume	100%	X	
	B: Crossing Volume	100%		
2. Delay to Cross Traffic	A: Main Road	100%	X	
	B: Crossing Road	100%		
3. Combination	A: Justification 1	100%	X	
	B: Justification 2	100%		
4. 4-Hour Volume		100%	X	
5. Collison Experience		0%		X
6. Pedestrians	A: Volume	-		X
	B: Delay	-		

Results indicate the signal is warranted as per Justifications 1 to 4. Justification 3 provides strong support for the need of a traffic signal installation.

7 PARKING REVIEW

The subject site is situated in the City Centre Zone 1 of Pickering. The minimum vehicle parking space requirement is based on the City of Pickering Zoning By-Law 7553/17. Section 3.1 (Parking Space Requirements) specifying the base requirement by land use. The development proposes 495 apartment units and approximately 1,332 m^2 of retail/commercial space as per By-law definition. The required and proposed parking spaces are shown in **Table 7.1**.

Table 7.1: Required and Proposed Parking Spaces

Use	Standard (per unit)	Rate per 100 m^2	# of Units / Size (m^2)	Number of Parking Spaces	
				Required	Proposed
Apartment Dwelling	0.80	-	495	396	
Visitor - Apartment Dwelling	0.15	-	474	75	
Retail Store (per 100 m^2)	-	3.5	1,332	47	
Total				**518**	**557**

The minimum number of parking spaces required is 518 spaces. The proposal includes 3 underground parking levels totaling 526 spaces and 31 surface parking spaces for a total supply of 557 spaces. This supply exceeds the minimum requirement by 39 spaces or 7.5% above the requirement.

The oversupply rate is considered acceptable when compared to two other nearby development proposals which has a rate just above 25%. **Table 7.2** show the development statistics.

Table 7.2: Nearby Development Vehicle Parking Requirements and Proposed Supply

Address	Development Proposal	Parking		Percent Above Requirement
		Required	Proposed	
1854-1858 Liverpool Rd.	98 Apartment units 436 m^2 Retail	99	126	27%
1505-1535 Kingston Rd.	96 Townhouses	111	140	26%

The proposed site plan includes 121 visitor parking spaces which consist of 31 surface and 90 underground on level P1. The underground spaces are located on level P1 and include the two parking rows along the west wall and southern portion or underneath Building B.

For access between the underground parking and the Old Liverpool House, access will be internally connected to the Commercial Lobby of Building B or the southwest corner of this building. The commercial lobby is located directly adjacent to the proposed at-grade retail and directly across from a pedestrian area surrounding Old Liverpool House, providing convenient access to the heritage asset.

Accessible Parking Requirements

The minimum number of accessible parking spaces required was based on the general City By-law 6604/05, Part 24. Each owner/operator of a parking lot shall provide a minimum number of accessible parking spaces of Type “A” and Type “B”. The minimum requirements are identified in Table (5a) of the by-law. With an overall requirement of 513 parking spaces, the accessible parking space requirement is 6 for Type “A” and 7 for Type “B” spaces. The development plan includes 8 Type “A” spaces and 7 Type “B” spaces. Therefore, the proposed parking supply exceeds the requirement.

Bicycle Parking Requirements

The bicycle parking supply requirement is specified in the City of Pickering Zoning By-Law 7553/17, Section 3.9. The base requirement is for 0.50 spaces for apartment units and 1.0 for each townhouse. **Table 7.3** shows the base requirements versus supply.

Table 7.3: Comparison of Bicycle Parking Requirement and Proposed Supply

Land Use	Number of Units / Size (m^2)	By-law Standard	Requirement
Apartment	495	0.50 per unit	248
Retail	1,332	Greater of 2 or 1.0 per 1,000 m^2	2
		Total	***250***
		Proposed Supply	***256***
		Net Difference	***+6***

The by-law requirement is 250 bicycle parking spaces. The proposed supply is 256 spaces which exceeds the requirement by 6 spaces. Additional external bicycle parking spaces are proposed to support short term bicycle parking needs.

8 LOADING AND SITE CIRCULATION REVIEW

The loading space requirements is based on City of Pickering Zoning By-Law 7553/17. Section 3.11 (Loading Standards). The minimum dimension of a loading space is 3.5 metres in width, 12.0 metres in length with a minimum vertical clearance of 4.2 metres. The By-law does not state the type of loading space required. Each of the proposed residential buildings has a dedicated loading space with dimensions that exceed the minimum requirement.

A functional review was conducted to identify site traffic access, internal loading vehicle circulation, and loading vehicle maneuvering in/out of the dedicated loading spaces. The entry and exit paths to/from Liverpool Road, loading spaces and underground parking garage are provided in **Appendix I** as drawings 001-009.

9 TRAVEL DEMAND MANAGEMENT

Travel Demand Management (TDM) is the application of strategies and policies to reduce travel demand, or to redistribute this demand in space or in time. The goal is to improve connectivity to the transportation network and offer improved options for transit, walking, and cycling. The following section reviews the existing bicycle and pedestrian network surrounding the subject site. In addition, active transportation trip generators and planned active transportation network improvements are identified and discussed.

9.1 POTENTIAL STRATEGIES TO SUPPORT TRANSIT & SMART COMMUTE CHOICE

As explained in Section 2.4 of this report, the general area is well served by public transit service mode share. Section 2.3.5 of the 2017 Durham Region Master Transportation Plan 2017 specifies a targeted growth in transit mode share from 10.7% in 2011 to 12.2% by 2031. The Smart Commute program offered by Metrolinx aims to reduce the number of single-occupancy vehicles commuting trips in the Greater Toronto and Hamilton Area. Smart Commute works with partnering organizations and provides services specific to each location. These organizations can be residential condominium corporations and their residents. Services offered by Smart Commute to member companies include:

- Smart Commute Tool
  - Helps to find alternative transportation options when an origin and destination are chosen.
- Carpooling Assistance
  - The Smart Commute carpool tool helps to match commuters travelling to and from similar locations. Members can indicate their origin and destination as well as time of departure to find a carpool to participate in.
- Emergency Ride Home
  - A program which subsidizes taxi or transit rides home for commuters who use active transportation or a carpool to get to work, but for unforeseen situations are required to travel by taxi or transit.

In addition to receiving information packages from Smart Commute, any information would be made easily accessible and available to tenants. A bulletin board in the residential lobby and elevators are good places to present information regarding carpools, cycling routes, transit pass discounts, or any other TDM measures being implemented. Alternatively, the information can be relayed via email.

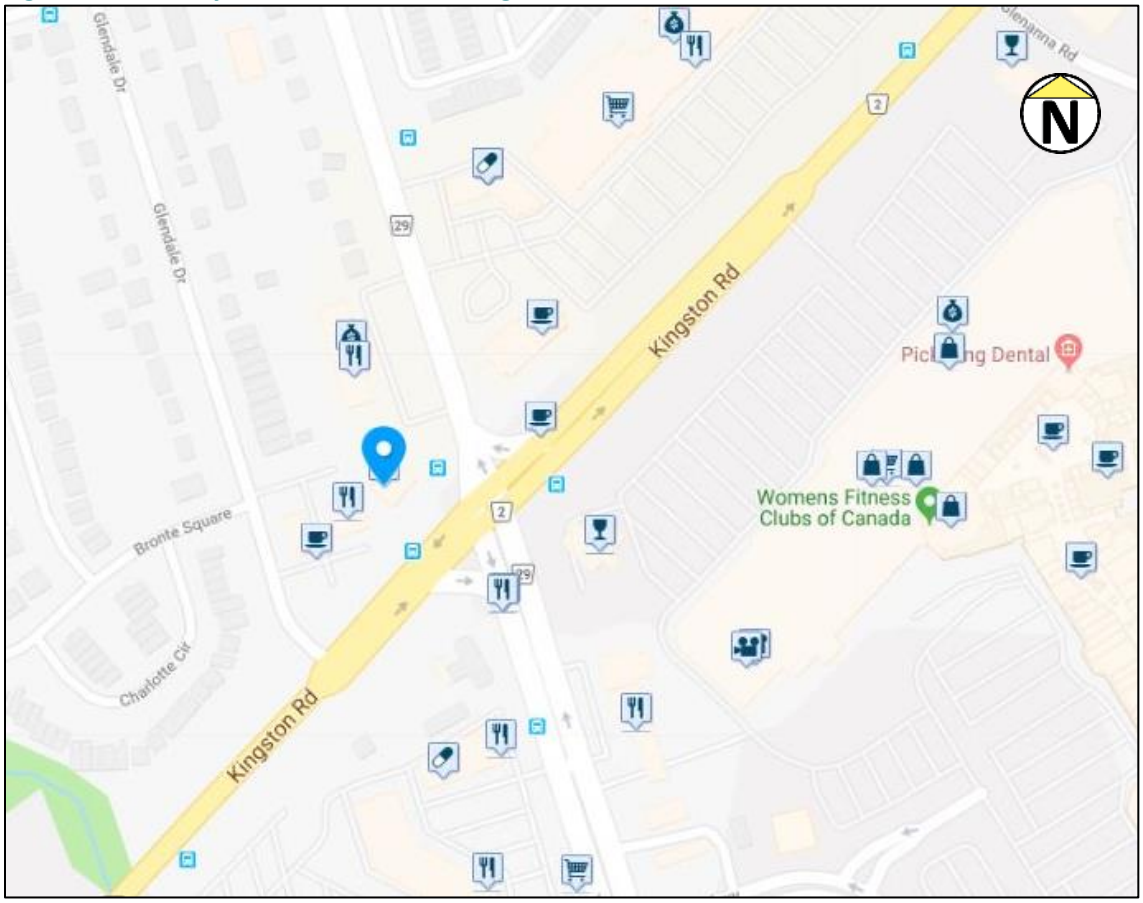
Property owners may choose to provide tenants with discounted or free transit passes to reduce the number commuting trips by car. Tenants who already own a car may find daily or monthly passes too expensive in addition to the cost of owning and insuring a vehicle. Transit payment can be made with a variety of methods include monthly pass, exact cash fare or using a refillable Presto card. The proposed strategies can be further detailed at the site plan stage and would consider future trends and travel behavior.

9.2 WALKABILITY AND PEDESTRIAN CONNECTIVITY

The subject site is part of the City Centre Neighbourhood which provides a range of shopping and personal service amenities. Walkscore.com rates the subject site high with a value for walking at 8 out of 10. This score reflects the wide variety of nearby amenities within a 15-minute walking distance. Such amenities and

the proposed addition of mixed uses on the site include shopping, bars, restaurants, parks, schools and entertainment. Given the large variety, the proposed development is well supported to facilitate reduced vehicular travel. The proposed public realm design introduces new high-quality pedestrian connections through the subject site and to the surrounding transit amenities and street network. These pedestrian connections are proposed to be enhanced with landscaping, adjacent active at-grade frontages, and publicly accessible gathering spaces. **Figure 9.1** illustrates the subject site and nearby amenities.

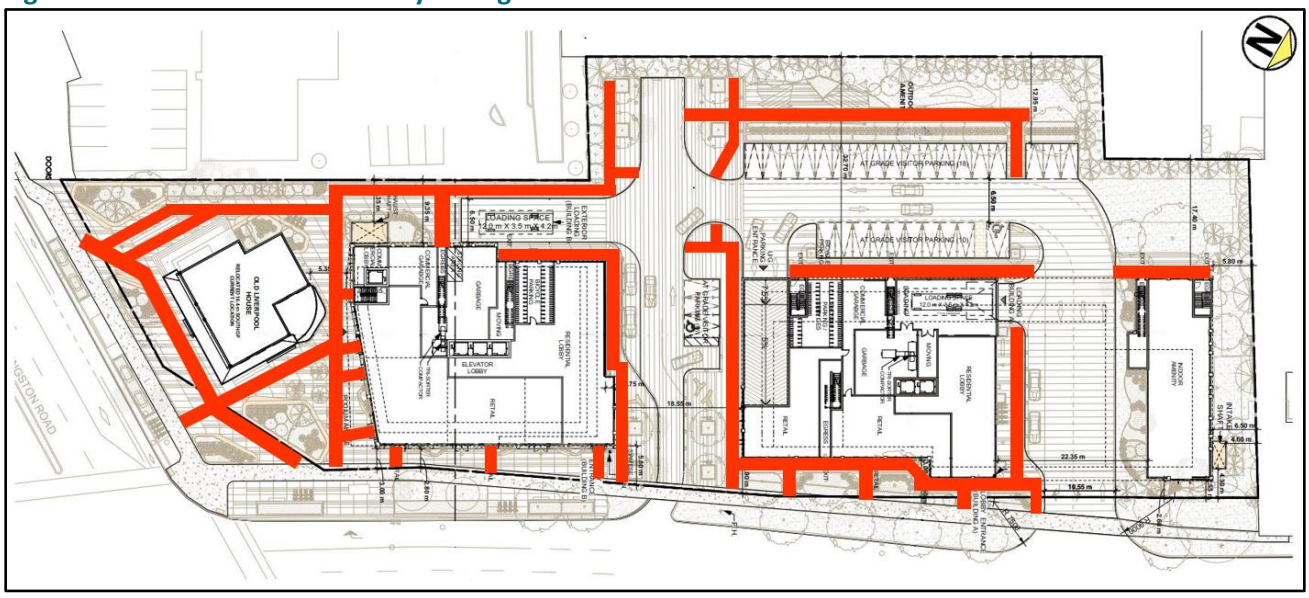
Figure 9.1: Nearby Amenities to 1294 Kingston Road



Source: *Walkscore.com (March 12, 2019)*

The proposed site plan includes design elements that encourage pedestrian movement along and through the site, in particular to access retail frontages and the transit stop. Multiple walking paths are featured throughout the site, thus allowing quick access to Liverpool Road. **Figure 9.2** shows the pedestrian connections in red. In addition, the open space around Liverpool House aims to present a healthy atmosphere for social interaction and relaxation.

Figure 9.2: Pedestrian Connectivity Linkages

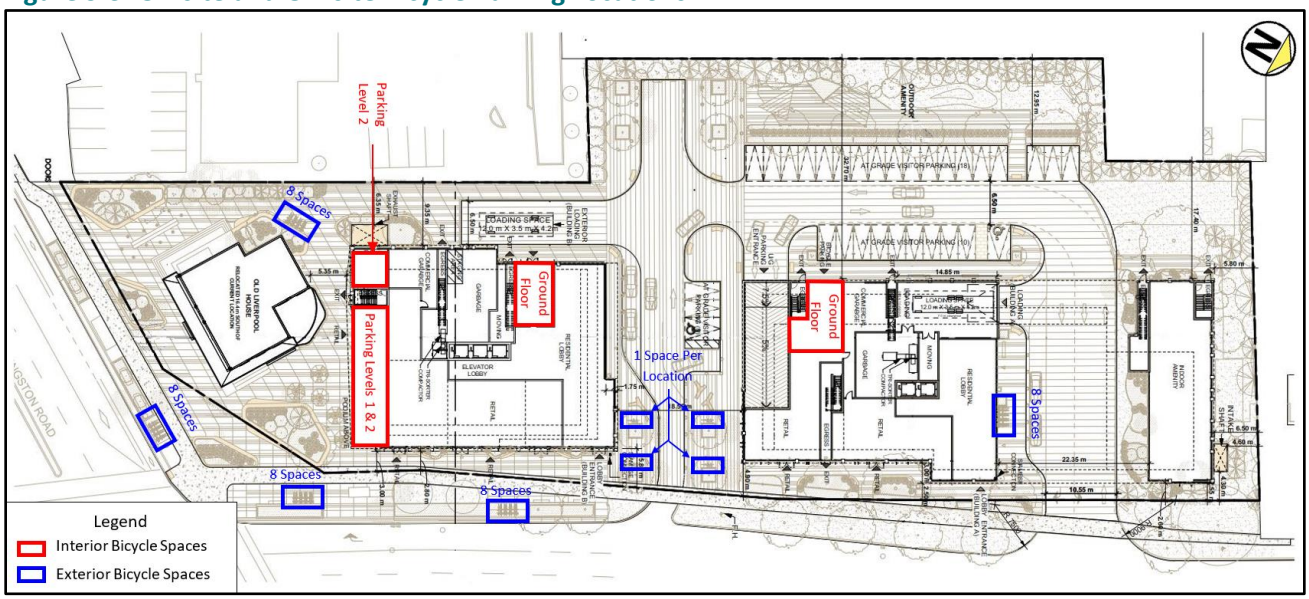


Source: Kirkor Architects and Planners (July 22nd, 2020)

9.3 BICYCLE FACILITIES AND PARKING

Bike parking is a requirement for new developments. As shown in **Table 7.5**, a minimum of 250 spaces are required of which 2 are for retail use. The development includes 256 bicycle parking spaces available at-grade and on level P1 within the development. Exterior at-grade bicycle parking is accommodated in the proposed plans, with opportunities to locate spaces in convenient locations adjacent to the proposed buildings and transit station waiting area. **Figure 9.3** shows the interior and potential exterior bicycle parking locations. Overall, the development may be able to accommodate nearly 300 bicycle spaces.

Figure 9.3: On-site and Off-site Bicycle Parking Locations



Source: Kirkor Architects and Planners (July 22nd, 2020)

The surrounding area includes Durham Region Transit Bus Terminal located just south of the Pickering Town Centre, Pickering GO Station (less than 1 kilometre south of the subject site and within a cycling distance), and a good assortment of retail and commercial amenities to the immediate east and southeast of the subject site. Dedicated bicycle lanes are on Kingston Road in the immediate vicinity of the subject site.

The City has a vision for a connected cycling network as part of the City Centre area. A Multi-Use Path (MUP) is proposed on the east side of Liverpool Road on the east side. This additional feature aims to encourage residents to use more active transportation modes while reducing vehicle use. The MUP has a minimum recommended width of 3.0 metres and the landscape buffer between the MUP and roadway must have a minimum width of 1.5 metres. A review of the future access option drawing has a landscape buffer of 2.4 metres north of the proposed signalized driveway. There is sufficient landscape buffer that will not impact the Liverpool Road land widths.

9.4 POTENTIAL CAR SHARING STRATEGIES

Car sharing services help to reduce individual car ownership by providing temporary and affordable, on-demand access to a fleet of shared vehicles. Reduced car ownership is associated with higher use of alternative modes of transportation and in turn, contributes to fewer vehicles kilometres travelled, more efficient land use, and the development of human scaled urban environments. Dedicated car-share parking spaces are available at various locations and provide access to a vehicle for people to rent for short-term use; by the hour, the day, or overnight. Zipcars, Enterprise CarShare, and Maven are three (3) commercial car-share operations in the Toronto area. Unfortunately, such services are not available in Pickering now.

Turo is a service that operates differently than these other car-share services and may be applicable to the multi-residential context in Pickering. This concept involves a prospective user being able to find a vehicle owner nearby that is offering a vehicle for rent. The concept is similar to a conventional car rental agency except the rental vehicle is an individual's personal vehicle.

Another option is ridesharing. This concept allows for people to arrange a ride with a driver who is heading to a destination in the same general direction. The goal is to increase occupancy in vehicles and facilitate people travelling together. Poparide is a ridesharing program available in the City of Pickering which matches passengers and drivers heading in the same general direction. The passenger specifies a departure time with a general origin and destination. A driver shares their vehicle for use to anyone for a fee.

10 CONCLUSIONS

LEA Consulting Ltd. (LEA) was retained by Altona Group to prepare a Transportation Impact Assessment for the proposed mixed-use development at 1294 Kingston Road, 1848 Liverpool Road, and 1852 Liverpool Road (subject site) located in City of Pickering. The subject site is located on the northwest corner of Liverpool Road and Kingston Road and the proposed development will replace the existing retail plaza with two (2) residential buildings with **495 residential units** and an estimated **1,332 m^2 of retail space**.

Existing intersection capacity analyses were conducted. Some capacity and delay issues were identified for the eastbound through on Kingston Road. The Westbound left at Liverpool Road at Kingston Road was found to operate at above capacity. No issues were identified at the Liverpool Road and Glenanna Road intersection.

The Region is intended to widen Liverpool Road from 4 to 6 lanes between Kingston Road and the Highway 401 interchange. To date, the Environmental Assessment has not begun. This report assumes the road widening will be operational upon full development build-out by 2023. A suggested by the Region, a growth rate of 0.5% per annum was applied for analysis years 2028 and 2033 to the through movements on Liverpool and Kingston Roads as no other developments and growth north of the subject site is known.

Future background capacity analysis was conducted with an optimized timing plan applied for the PM peak hour at the Liverpool/Kingston intersection. The eastbound through movements on Kingston Road operate at LOS graded E or better but with a v/c just under 1.00. The westbound left at Liverpool Road at Kingston Road operates at close to capacity.

The expected site traffic generated by the subject site is about 150 and 210 two-way site trips for the AM and PM peak hours, respectively. The net impact of the new site traffic on the surrounding road network was determined to be negligible. The analyses reviewed the site access arrangement with two and one-access scenarios and it was determined that there is no significant difference in traffic operations with either access scenario to the surrounding road network, while the two-access scenario provides important functional benefits to the proposed development itself.

A **traffic signal warrant analysis** was conducted at the North Driveway at Liverpool Road intersection. The analysis found that a traffic signal is warranted under Justification 3 (combined warrant of minimum vehicle and delay to cross traffic).

The vehicle parking requirements total 518 spaces whereas 557 spaces are proposed with this development plan. A total of 13 accessible parking spaces (6 Type “A” and 7 Type “B”) are required and the development provides 8 type “A” spaces and 7 type “B” spaces and exceeds the minimum requirement.

The by-law requires a minimum of 250 bicycle parking spaces. The development plan includes 256 interior bicycle spaces which exceeds the requirement. Additional bicycle parking spaces can be accommodated on the site exterior.

A functional review of the site parking, loading, and accesses was conducted for the proposed development assuming two site accesses. Two (2) type “G” loading spaces are provided; one for each residential building All vehicles have been provided with adequate space for turning movements.

Travel Demand Management (TDM) is the application of strategies and policies to reduce travel demand, by improving connectivity to the transportation network with options other than personal automobiles including transit, walking, and cycling. The subject site is located adjacent to higher order transit routes which include a regional transit terminal which provides transportation access to other parts of the Region

and Toronto. The Pickering Go Train Station is located nearby which provides access to the entire Greater Toronto and Hamilton Area.

Other TDM measures can potentially be pursued. The Smart Commute programme could be promoted to the future tenants presenting alternative travel options, such as travelling at a different time of day, choosing a different mode (e.g., carpooling, transit, walking or cycling), or reducing trips through teleworking. The area has a high walkability score with a wide variety of amenities nearby within a short walking distance. On-site bicycle locker storage and at-grade bicycle parking is available. Car sharing is an alternative TDM measure, that is, unfortunately, unavailable in Pickering now. Other forms of transport include automobile ridesharing and Poparide.

A high level of pedestrian connectivity to the surrounding area is proposed with multiple walking paths and publicly accessible open spaces for social interaction and a healthy atmosphere.