

1597229 Ontario Inc. (Blue Sky Private Equity Inc.)

City of Barrie

Draft Plan of Subdivision

FUNCTIONAL DESIGN REVIEW

17092/200

February 2017



LEA Consulting Ltd.

Consulting Engineers & Planners

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February 17, 2017

Our Ref.: 17092/200

Jaime Shapiro
199 Bay Street, Suite 2900
Toronto, ON
M5L 1G2

Dear Mr. Shapiro:

**Re: Functional Design Review
Draft Plan of Subdivisions, 1597229 Ontario Inc. (Blue Sky Private Equity Inc.)
City of Barrie**

LEA Consulting Ltd. is pleased to present the findings of our Functional Design Review for the proposed draft plan of subdivisions for the 1597229 Ontario Inc. Lands located in the City of Barrie.

Should you have any question regarding this Functional Design Review, please do not hesitate to contact the undersigned.

Yours very truly,

LEA Consulting Ltd.

Kenneth Chan, P.Eng., PTOE
Manager, Transportation Engineering

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:jb/ljs

Encl.: Functional Design Review – 1597229 Ontario Inc.

LEAdership in engineering & planning solutions

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1 INTRODUCTION

LEA Consulting Ltd. (LEA) was retained by 1597229 Ontario Inc. (Blue Sky Private Equity Inc.) to conduct a Functional Design Review for the proposed lands (herein referred to as the “Blue Sky Lands”) located within the Hewitt Secondary Plan Area in the City of Barrie (herein referred to as the “City”). The Blue Sky Lands, which are currently vacant, are located on the south side of Big Bay Point Road and the north side of Mapleview Drive between Yonge Street and 20th Sideroad, as illustrated in **Figure 1-1**. The lands are bounded by Big Bay Point Road to the north, Mapleview Drive to the south, residential development to the west and vacant land to the east. **Figure 1-1** displays the Phase 1 development (as seen on draft plan) of the Blue Sky Development.

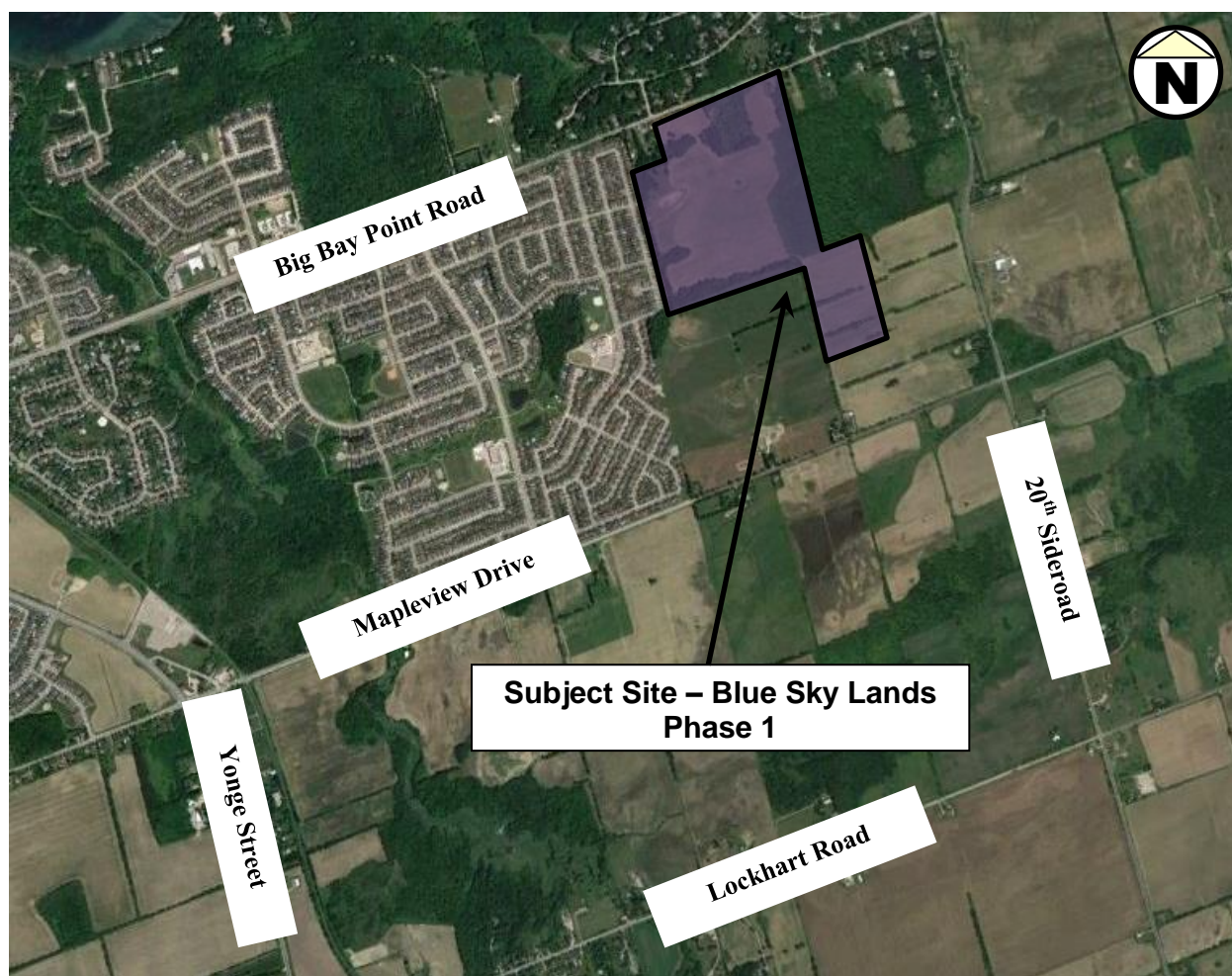
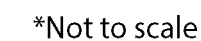
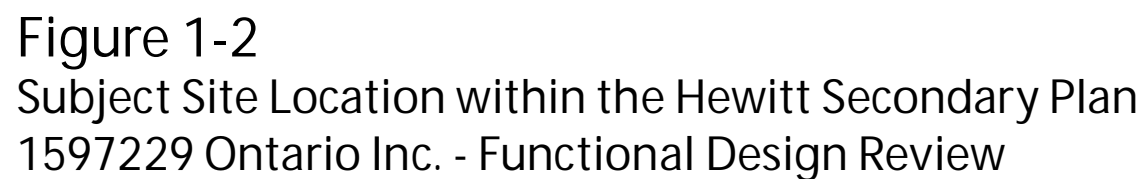


Figure 1-1: Site Context

The proposal for the lands includes a residential development with a mix of single-detached, semi-detached and street townhouse units, with the main accesses provided through Street ‘A’, which is proposed to span between Big Bay Point Road and Mapleview Drive. An additional access will be provided through Street ‘U’, which is proposed to be located between Street ‘A’ and 20th Sideroad on Big Bay Point Road. **Figure 1-2** illustrates the Blue Sky Lands with respect to the Hewitt 2031 Development Plan.



LEA has completed a Master Transportation Study (herein referred to as the “Hewitt Study”) for the entire Hewitt development, which included the Blue Sky Lands. The Hewitt Study included the evaluation of the Hewitt development for the following two horizon years:

- Interim horizon (2020), which analysed the traffic impacts of the partial development of the Hewitt Lands prior to the opening of the Harvie Road / Big Bay Point overpass at Highway 400; and
- Ultimate horizon (2031), which analysed the traffic impacts associated with the full build-out of the Hewitt Lands.

Analysis of the Ultimate horizon within the Hewitt Study accounted for all City-proposed roadway improvement projects and provided the recommended intersection improvements required to accommodate the full build-out of the Hewitt Lands.

This Functional Design Review report is supplemental to the Hewitt Study with a focus on the proposed Phase 1 of the Blue Sky development, which is expected to be developed within Phase 1 of the entire Hewitt development. The completion of Phase 1 of the Hewitt development falls in-between the two analyzed horizons, 2020 and 2031. Therefore, the results and recommendations presented in this report correspond to that proposed for the Ultimate horizon in the Hewitt Study in order to maintain consistency and develop the lands for the full build-out of the Hewitt Lands.

This report will focus on the following objectives:

- Provide a description of the existing conditions within the vicinity of the Blue Sky Lands;
- Determine site traffic generated by the proposed development, which is expected to be developed within Phase 1 of the entire Hewitt development; and
- Provide the results of the traffic assessment, recommended lane configurations, intersection controls, and recommended dimensions of any required turning lanes of the Blue Sky Lands site accesses based on the analysis conducted for the Ultimate horizon in the Hewitt Study.

1.1 PROPOSED DEVELOPMENT

The proposal for the lands is to develop the area into a residential development with single-detached, semi-detached and street townhouse units. The main accesses are provided through Street ‘A’, which is proposed to span between Big Bay Point Road and Mapleview Drive, and Street ‘U’, which is proposed to be located between Street ‘A’ and 20th Sideroad on Big Bay Point Road.

A summary of the site statistics for the Blue Sky Lands, which is to be developed within Phase 1 of the entire Hewitt development, is provided in **Table 1-1**.

Land Use	Phase 1
Single-Detached Units	515
Semi-Detached Units	96
Street Townhouse Units	121
Total Residential Units	732

Table 1-1: Blue Sky Development Phase 1 Site Statistics

The proposed draft plan for the Blue Sky Lands is illustrated in **Figure 1-3**.

2 EXISTING CONDITIONS

The following section describes the existing major roadways and transit services within the vicinity of the Blue Sky Lands.

2.1 ROAD NETWORK

The major roadways within the vicinity of the site are described below, with lane configurations illustrated in **Figure 2-1**.

Mapleview Drive – an east-west major arterial roadway under the jurisdiction of the City between County Road 27 and 20th Sideroad. This road provides direct access to Highway 400 and the Park Place shopping centre. Mapleview Drive currently operates with a seven-lane cross-section between Veteran’s Drive and Huronia Road, and a two-lane cross-section between Huronia Road and 20th Sideroad (within the vicinity of the site). Mapleview Drive has a posted speed limit of 60km/h within the study area.

Big Bay Point Road – an east-west major arterial roadway under the jurisdiction of the City of Barrie between Fairview Road (located slightly east of Highway 400) and 20th Sideroad. Big Bay Point Road begins east of Highway 400; west of Highway 400 it becomes Harvie Road. The two roadways are currently not connected to each other. Big Bay Point Road currently operates with a two-lane cross-section from Fairview Road to Huronia Road, a five-lane cross-section between Huronia Road and Prince William Way, and a two-lane cross-section east of Prince William Way to 20th Sideroad. Big Bay Point Road has a posted speed limit of 50km/h within the study area.

Yonge Street – a north-south major arterial roadway under the jurisdiction of the City between Garden Drive and 10th Line/Victoria Street. Yonge Street currently operates with a five-lane cross-section between Garden Drive and Mapleview Drive, and a two-lane cross-section south of Mapleview Drive. Yonge Street has a posted speed limit of 50 km/h north of Mapleview Drive and 60 km/h south of Mapleview Drive.

20th Sideroad – a north-south arterial roadway under the City’s jurisdiction from Big Bay Point Road to Lockhart Road, where it then falls under the County’s jurisdiction. 20th Sideroad operates with a two-lane cross-section with a posted speed limit of 80km/h.

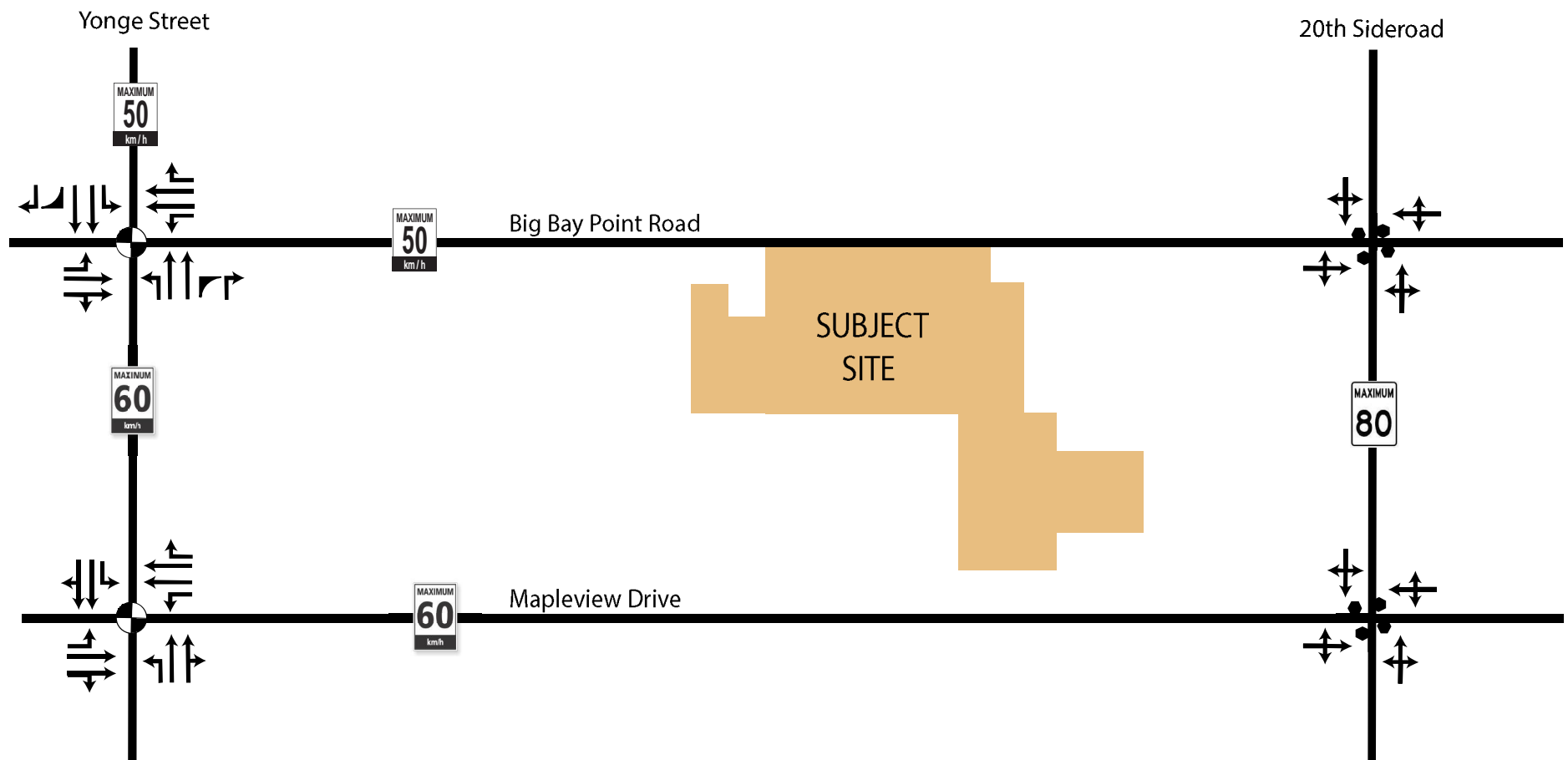


Figure 2-1
Existing Road Network and Lane Configurations
1597229 Ontario Inc.- Functional Design Review

Legend

- Subject Site
- Existing
- Signalized Intersection
- Unsignalized Intersection



2.2 TRANSIT NETWORK

The Blue Sky Lands are serviced by bus routes operated by Barrie Transit and the southern portion of the site is approximately 3,000 meters east of the Barrie South GO Station. The existing transit network nearest to the Blue Sky Lands is outlined below and illustrated in **Figure 1-4**.

Barrie Transit

8A RVH/Yonge (Northbound) / 8B Crosstown/Essa (Southbound) bus routes operate in a circle encompassing the area of Livingstone Street West in the north, Essa Road in the west, Mapleview Drive in the south and Yonge Street in the east. The major stops along this route include Georgian College, Georgian Mall, Barrie Fairgrounds Park Place and the Barrie South GO Station. The 8A and 8B bus routes operate at 30 minute frequencies during weekday morning and afternoon peak travel periods.

3A Georgian (Northbound) / 3B Painswick (Southbound) bus routes operate between Georgian College, the Royal Victoria Hospital and Barrie South GO Station, generally in a north-south direction. The major stops along this route include Park Place, Allendale Recreation Centre, the Downtown Barrie Bus Terminal and Painswick Library. The 3A and 3B bus routes operate at 30 minute frequencies during weekday morning and afternoon peak travel periods.

4A East Bayfield (Northbound) / 4B South GO (Southbound) bus routes operate between the Georgian Mall and Barrie South GO Station, generally in a north-south direction. The major stops along this route include Painswick Library, Allendale Waterfront GO Station, the Downtown Barrie Bus Terminal and Bayfield Mall. The 4A and 4B bus routes operate at 35 minute frequencies during weekday morning and afternoon peak travel periods.

GO Transit

As mentioned above, the southern portion of the Blue Sky Lands is located approximately 3,000 meters east of the Barrie South GO Station. This station is serviced by the following GO buses and trains:

Bus Route 68 operates from Barrie to Newmarket with a connecting service at Newmarket, Route 65, travelling to Union Station. This route operates with 30 minute headways travelling southbound and hourly headways travelling northbound during the morning peak period, and the opposite frequencies during the afternoon peak period. This bus route also operates during the weekends with hourly frequencies.

The **Barrie Train Line** operates between Union Station in Toronto to Barrie South and Allendale Waterfront GO Stations in Barrie. There are currently five train departures in the morning travelling towards Union Station and seven train departures travelling towards Barrie during afternoon peak period. All trains services operate with approximately 30 minute headways. This route operates during the weekends with three southbound trains departing in the morning and three northbound trains arriving in the night on both days.

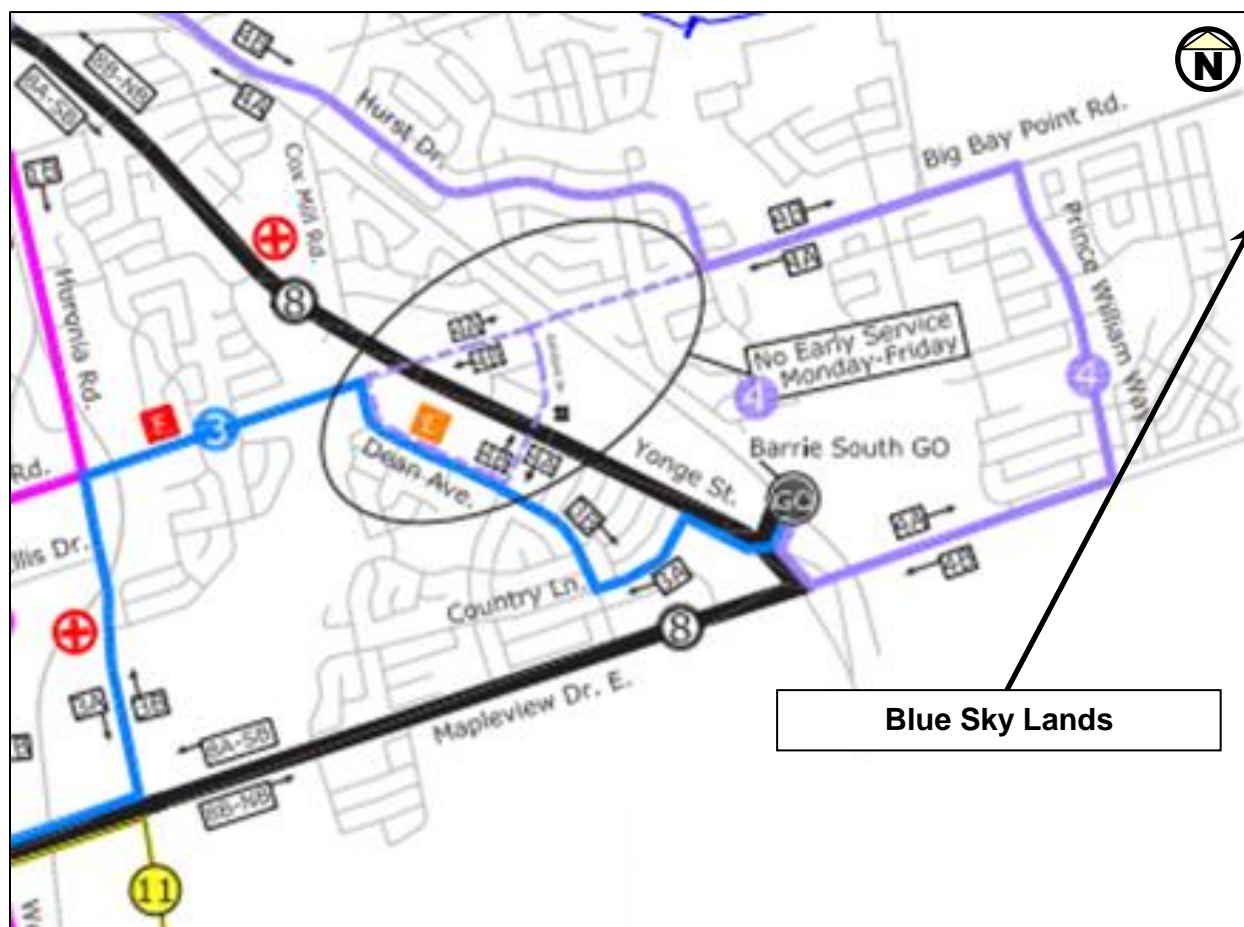


Figure 2-2: Existing Transit Services

3 SITE TRAFFIC GENERATION AND DISTRIBUTION

The proposal for the Blue Sky Lands is to develop the area into a residential development with 515 single-detached, 96 semi-detached and 121 street townhouse units.

Trip generation for the Blue Sky development was based on the trip rates obtained from a proxy site survey of the residential development located along Prince William Way between Mapleview Drive and Big Bay Point Road, which is illustrated in **Figure 3-1**. The trip generation for the development is summarized in **Table 3-1**.

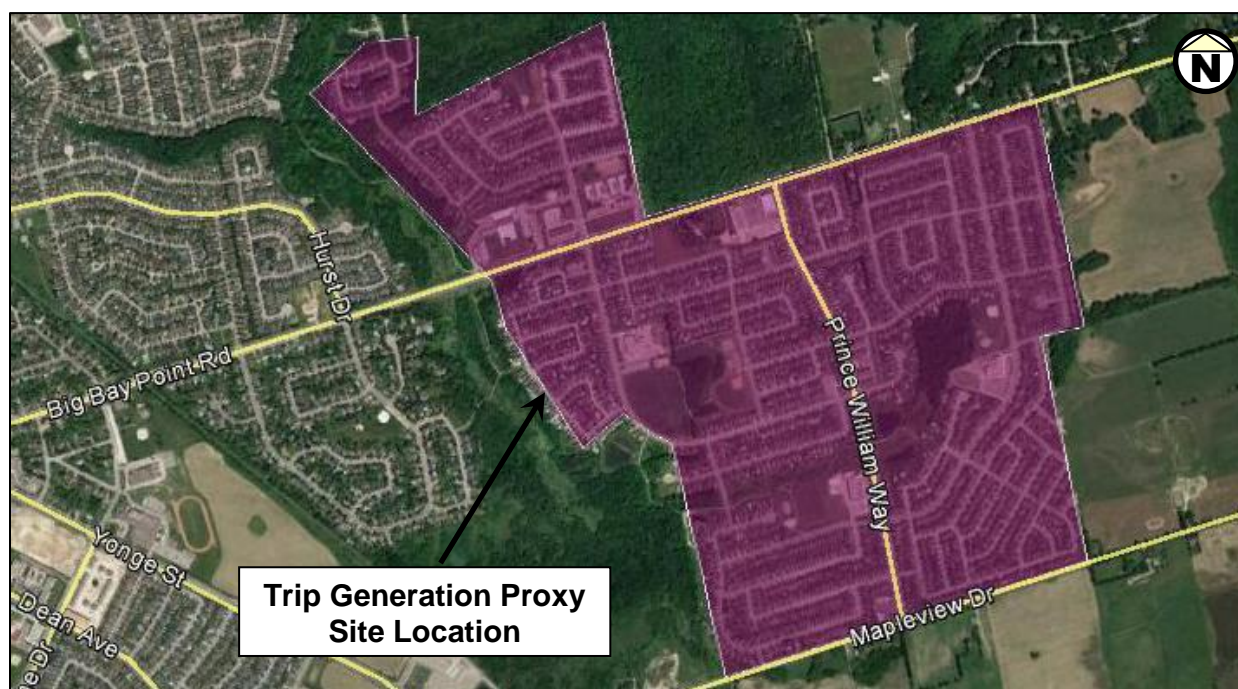


Figure 3-1: Trip Generation Proxy Site Survey Location

Land Use		AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Residential (732 units)	Proxy Site Trip Rate	0.14	0.34	0.48	0.41	0.25	0.66
	Blue Sky Lands Site Trips	102	249	351	300	183	483

Table 3-1: Trip Generation Summary – Blue Sky Lands Site Traffic

The Blue Sky development is expected to generate 351 two-way trips (102 in, 249 out) in the AM peak hour and 483 two-way trips (300 in, 183 out) in the PM peak hour by the end of Phase 1 of the entire Hewitt development.

It should be noted the above-mentioned site traffic is only a component of the trips accounted for in the analysis of the Ultimate horizon within the Hewitt Study.

The City's macroscopic EMME travel demand forecast model was utilized for the distribution of the site generated trips. A detailed discussion of the trip generation and distribution methodologies is included in the Hewitt Master Transportation Study.

4 TRAFFIC ASSESSMENT

The Hewitt Master Transportation Study evaluated the external roadway network for an interim horizon (2020) prior to the opening of the Harvie Road / Big Bay Point Road Highway 400 overpass and an ultimate horizon (2031) corresponding with the full build-out of the Hewitt development. The analysis included the following components for each horizon year:

- The mesoscopic level analysis – Aimsun Modeling Software; and
- The microscopic level analysis – Synchro 8.0 Software.

The Aimsun Model was utilized as a large scale review of the entire Hewitt development with respect to the southern portion of Barrie and the northern portion of Innisfil, and as a screening tool to present the areas of constraint for detailed analyses using the Synchro software.

In addition to the detailed analyses for the identified constraint areas, the proposed Hewitt site accesses were also analyzed at the microscopic level to determine the required lane configuration and dimensions of any required turning lanes.

All analyses were conducted for the 2020 and 2031 horizon years. However, the completion of Phase 1 of the Hewitt development falls in-between 2020 and 2031. Therefore, the results and recommendations presented in this section will correspond to the 2031 horizon year to maintain consistency with the recommendations provided for the full build-out scenario in the Master Transportation Study.

4.1 SITE ACCESS INTERSECTION CAPACITY ANALYSES

As part of the Master Transportation Study, an intersection capacity analysis was completed focusing only on the site accesses of the Hewitt development under the Ultimate Horizon (2031) traffic conditions. While the results presented below are only for the intersections providing direct access to the Blue Sky Lands, the analysis undertaken in the Hewitt Study under Ultimate traffic conditions includes the traffic generated from the entire Hewitt development.

It should be noted that the proposed site accesses were labeled Street ‘18’ and Collector Road 11, whereas they are labeled Street ‘U’ and Street ‘A’, respectively, in the Blue Sky draft plan. While the southern portion of the Blue Sky Lands does not have direct connection to an arterial road, traffic associated with this portion of the development can utilize Street ‘A’ to connect to either Big Bay Point Road to the north or Maplevue Drive to the south.

The results for the intersection capacity analysis at the proposed site accesses during the AM and PM peak hours are summarized in **Table 3-1** and **Table 3-2**, respectively. The tables only include the movements of interest (movements with either a volume-to-capacity (V/C) ratio of 0.85 and higher or a level of service (LOS) of E and higher). The detailed synchro output sheets are provided in **Appendix A**.

Intersection	Movement of Interest	Future Total (2020) Site Accesses AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95 th Queue (m)	V/C	LOS
Big Bay Point Road & Street 'A'	-	-	-	-	-	-	-
Big Bay Point Road & Street 'U'	-	-	-	-	-	-	-
Mapleview Drive & Street 'A'	-	-	-	-	-	-	-

Table 3-1: Ultimate Horizon (2031) Intersection Capacity Analysis –Site Accesses AM Peak Hour

Intersection	Movement of Interest	Future Total (2020) Site Accesses PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95 th Queue (m)	V/C	LOS
Big Bay Point Road & Street 'A'	-	-	-	-	-	-	-
Big Bay Point Road & Street 'U'	-	-	-	-	-	-	-
Mapleview Drive & Street 'A'	-	-	-	-	-	-	-

Table 3-2: Ultimate Horizon (2031) Intersection Capacity Analysis –Site Accesses PM Peak Hour

The intersection capacity analysis results demonstrate that all the site accesses are expected to operate well under future traffic conditions during both the AM and PM peak hours.

4.2 RECOMMENDED LANE CONFIGURATIONS

The analysis presented in the section above and the corresponding results determined the most effective intersection control type and lane configuration at the proposed Blue Sky site accesses (Street 'U' and Street 'A'), which are illustrated in **Figure 4-1**.

As illustrated in **Figure 4-1**, we recommend an exclusive eastbound left-turn lane at Mapleview Drive / Street 'A'. It should be noted that a two-way-left-turn-lane is proposed along Mapleview Drive between Country Lane and the proposed Street 'A' as part of the City's roadway improvements to be implemented by 2031. However, Phase 1 of the Hewitt development, which includes the Blue Sky Lands, is to be constructed prior to 2031. Therefore, the proposed exclusive eastbound left-turn lane is recommended as part of our analysis.

The storage and taper lengths for the proposed exclusive turning lane are based on the results of the intersection capacity analyses and the Transportation Association of Canada (TAC) minimum requirements; the recommended storage and taper lengths are summarized in **Table 4-3**.

Intersection	Movement	95 th Queue (m)		Design Speed (km/h)	Storage (m)	Taper (m)
		AM Peak Hour	PM Peak Hour			
Mapleview Drive & Street 'A'	EBL	2	2	70	15	35

Table 4-3: Recommended Storage and Taper Lengths

Shared eastbound through-right and westbound through-left lanes will provide sufficient capacity for traffic entering the site from the west and east at the Big Bay Point site accesses, respectively. The recommended intersection design along with the storage and taper lengths for all the site accesses are illustrated in **Figure 4-2** and should be implemented during the detailed design of the subdivision. If additional right-of-way is required to accommodate these intersection requirements, modifications to the draft-plan will be required.

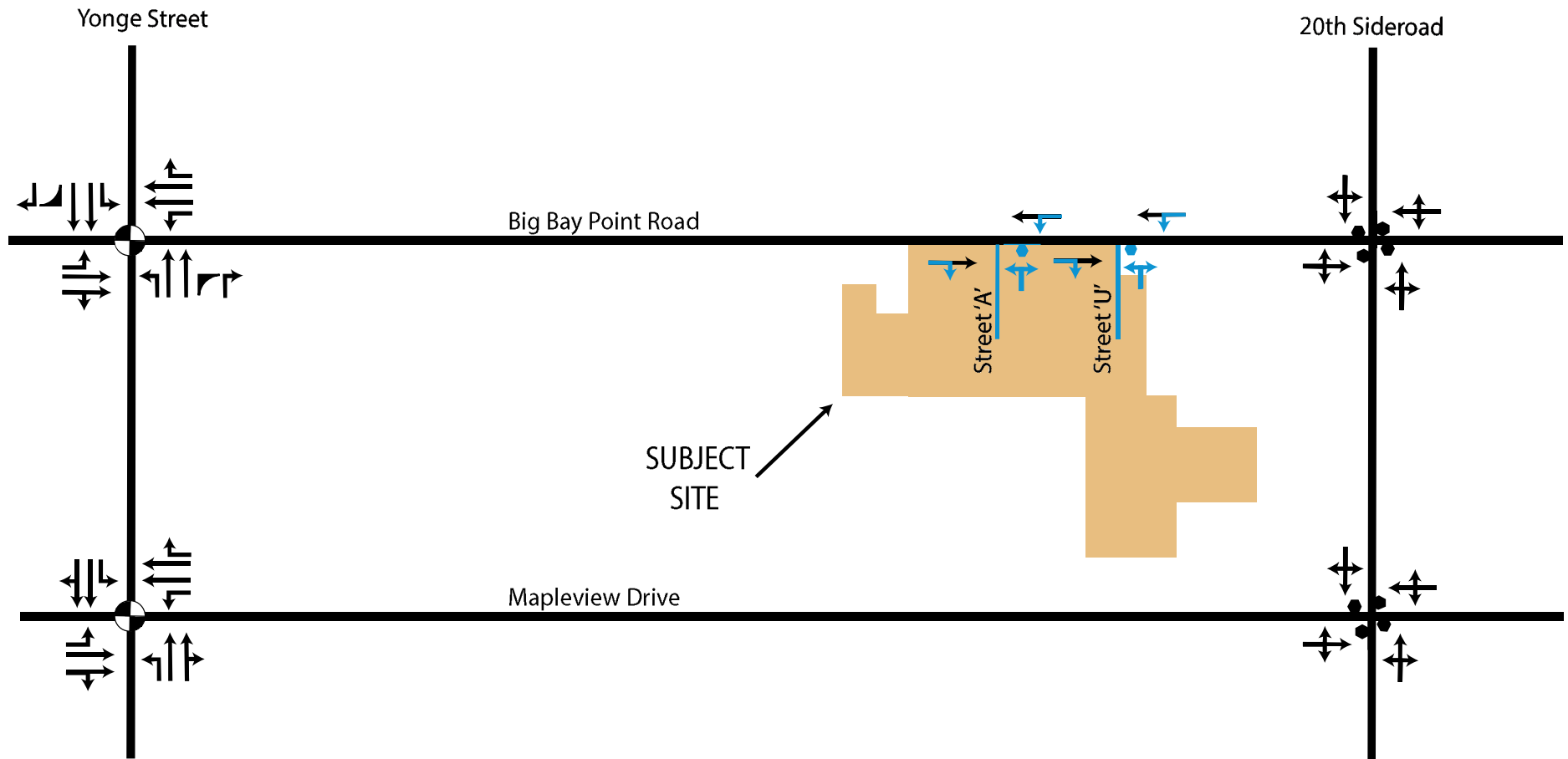








Figure 4-1
 Future Recommended Road Network and Lane Configurations
 1597229 Ontario Inc.- Functional Design Review

Legend	
	Subject Site
	Signalized Intersection
	Unsignalized Intersection
	Existing
	Proposed City Roadway Improvements
	Recommended Hewitt Improvements



*Not to scale



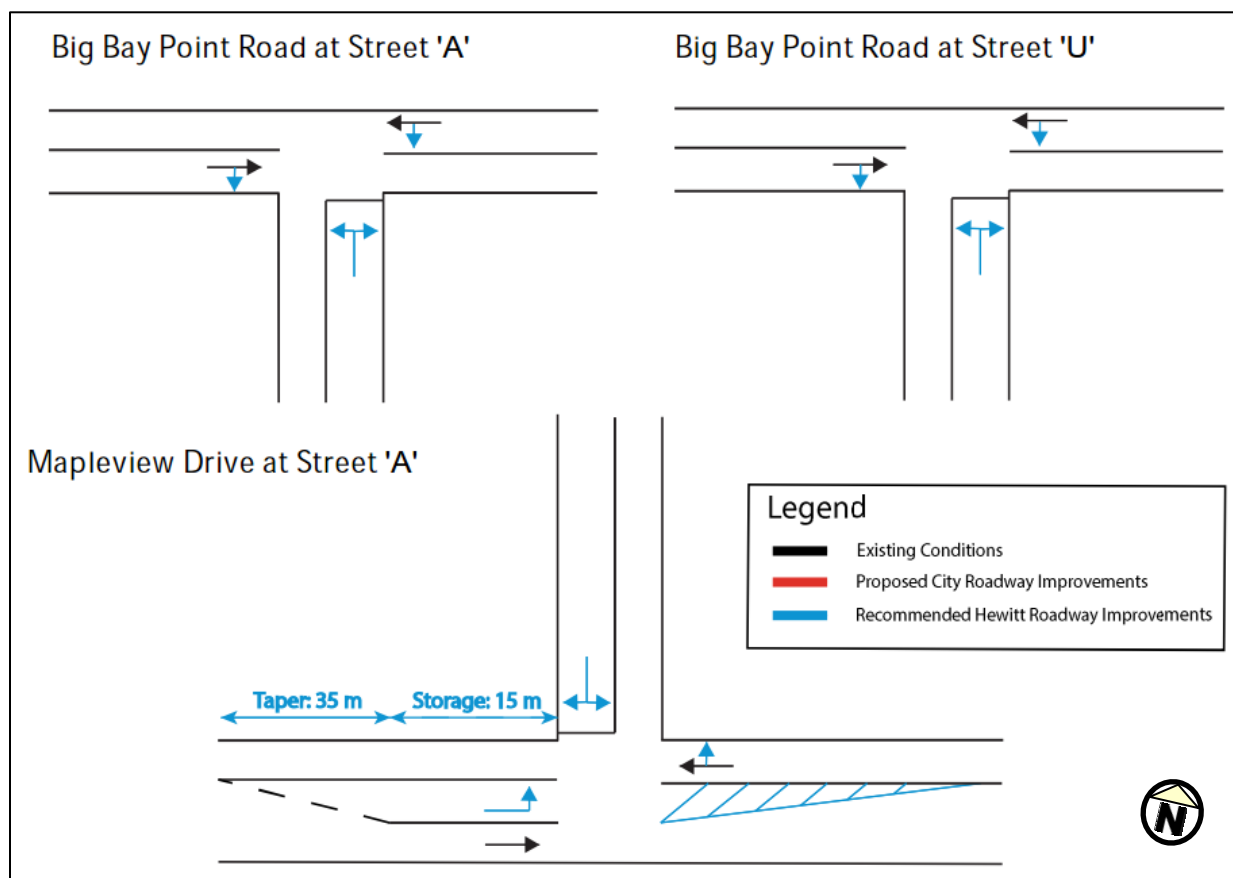


Figure 4-2: Blue Sky Site Accesses – Recommended Intersection Requirements

4.3 COLLECTOR ROAD NETWORK ASSESSMENT

As part of the Traffic Assessment, the proposed collector road network was reviewed to determine its compliance with the right-of-way (ROW) requirements specified in the City's Multi-Modal Active Transportation Master Plan (TMP) and the Hewitt Secondary Plan. Both documents provide recommendations of the locations and classifications of the transportation corridors within the Hewitt development.

The Multi-Modal Active TMP and the Hewitt Secondary Plan recommended transportation networks are illustrated in **Figure 4-3** and **Figure 4-4**, respectively. The three major roadway classifications and recommended ROWs in the Secondary Plan are:

- Arterial – 41 meter maximum ROW;
- Major Collector – 27 meter maximum ROW; and
- Minor Collector – 24 meter maximum ROW.

It should be noted that the recommended ROWs in the Secondary Plan are maximum values and are higher than the recommended ROWs in the Multi-Modal Active TMP.

The transportation network proposed in the Blue Sky Draft Plan was reviewed to determine that the proposed ROWs for the transportation network correspond to the TMP recommendations; the transportation network review is presented in **Figure 4-5**. The recommended and proposed ROWs are summarized in **Table 4-4**.

Roadway	Classification	SP Max. ROW (m)	TMP ROW (m)	Proposed ROW (m)	Is Proposed ROW Sufficient
Big Bay Point Road	Arterial	41	34 W of Street 'A' 27 E of Street 'A'	34 W of Street 'A' 27 E of Street 'A'	Yes Yes
Street 'A'	Major Collector	27	26	27	Yes
Street 'B'	Minor Collector	24	24	24	Yes

Table 4-4: Blue Sky Lands Right-of-Way Summary

The summary table above indicates that the proposed ROWs in the Blue Sky draft plan will be sufficient to satisfy the TMP ROW requirements. However, it should be noted that the City is currently undertaking a Municipal Class Environmental Assessment (EA) for the Hewitt Secondary Plan Area transportation network to determine detailed cross-sections of arterial roads within the secondary plan area. Pending the outcome of the EA, the properties fronting onto Big Bay Point Road in the draft plan may be subject to changes which can be accommodated through the detail design process.

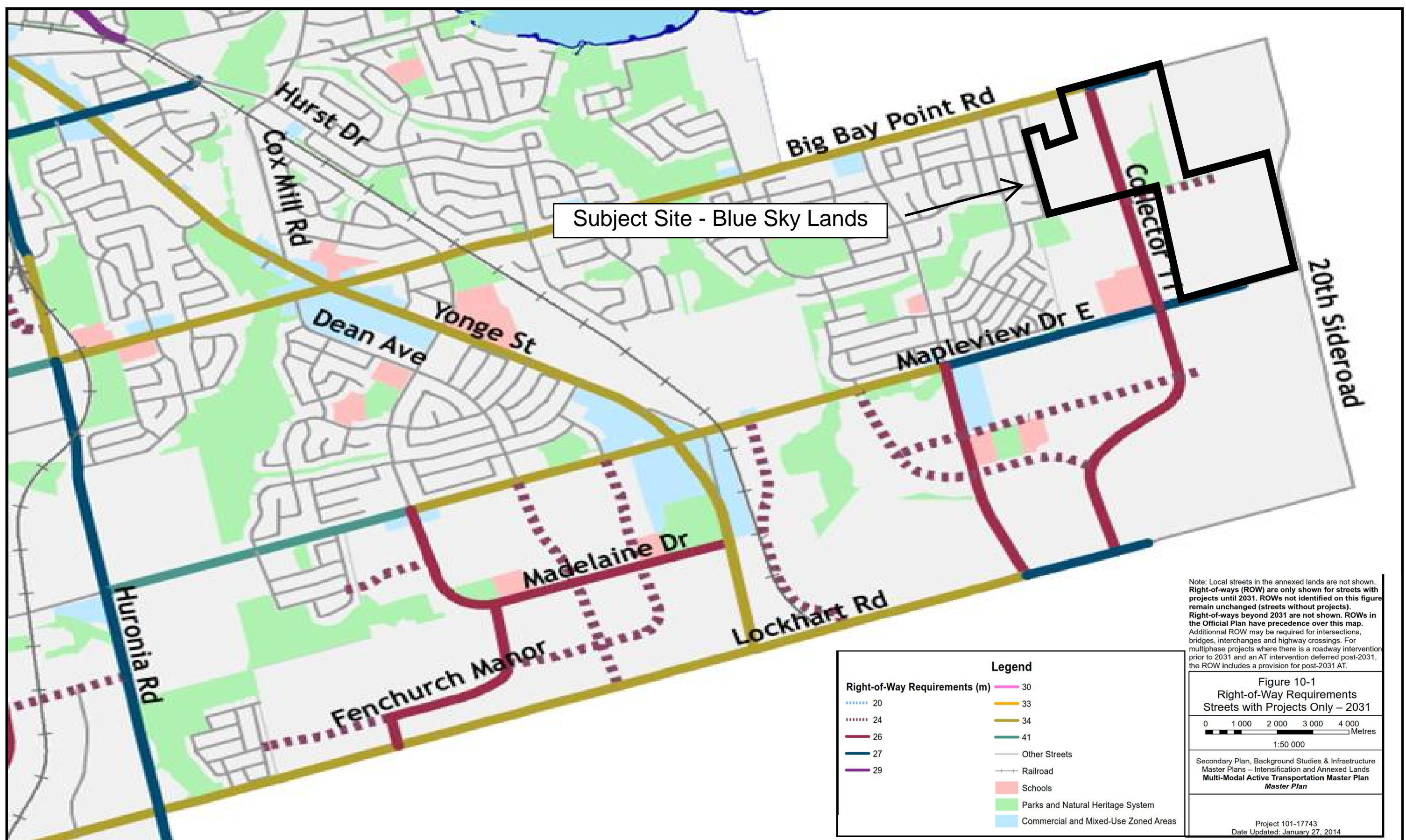


Figure 4-3
Multi-Modal Active Transportation Master Plan Recommended Hewitt Transportation Network
1597229 Ontario Inc. - Functional Design Review



*Not to scale



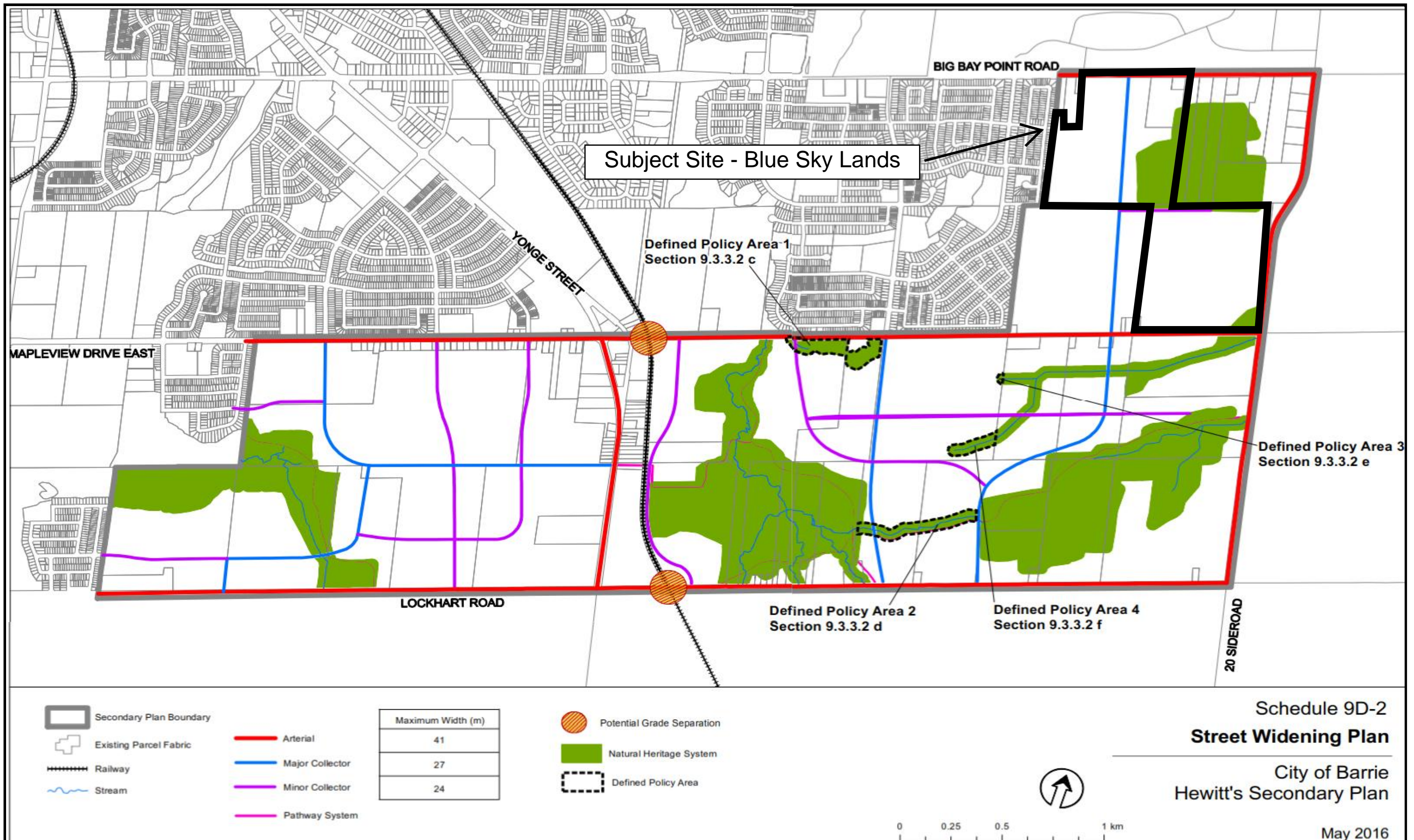


Figure 4-4
Hewitt Secondary Plan Recommended Transportation Network
1597229 Ontario Inc. - Functional Design Review



*Not to scale



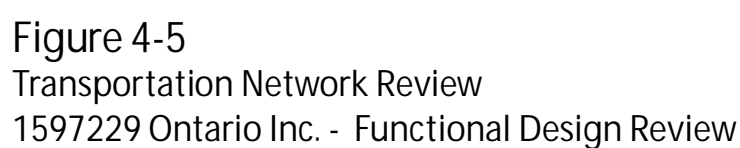


Figure 4-5
Transportation Network Review
1597229 Ontario Inc. - Functional Design Review

Legend

- 41 meters 34 meters
27 meters 24 meters



*Not to scale



4.4 INTERNAL COLLECTOR ROAD NETWORK ASSESSMENT

An internal collector road network assessment was undertaken to determine appropriate intersection controls required at collector-to-collector intersections. This assessment was based on the site traffic volumes generated under Ultimate traffic conditions, which corresponds to the full build-out of the entire Hewitt development.

Based on the projected traffic volumes along the collector roads within the Hewitt development included in the Hewitt Study, signalization of collector-to-collector intersections is not recommended. The following intersection controls are recommended for the various intersection types:

- Major Collector to Major Collector – All-way stop control;
- Major Collector to Minor Collector – Two-way stop control at the minor approaches; and
- Minor Collector to Minor Collector – All-way stop control.

There are no collector-to-collector intersections within the Blue Sky Lands.

5 CONCLUSION

LEA was retained by 1597229 Ontario Inc. (Blue Sky Private Equity Inc.) to conduct a Functional Design Review for the proposed residential development with a mix of single-detached, semi-detached and street townhouse units located within the Hewitt Secondary Plan Area in the City of Barrie. The Blue Sky Lands will have the main accesses provided through Street ‘A’, which is proposed to span between Big Bay Point Road and Mapleview Drive. An additional access will be provided through Street ‘U’, which is proposed to be located between Street ‘A’ and 20th Sideroad on Big Bay Point Road.

The Blue Sky development is expected to consist of 515 single-detached, 96 semi-detached and 121 townhouse units by the end of Phase 1 of the entire Hewitt development. The site traffic estimated to be generated by the end of Phase 1 includes 351 two-way trips (102 in, 249 out) in the AM peak hour and 483 two-way trips (300 in, 183 out) in the PM peak hour.

This Functional Design Review report is supplemental to the Hewitt Study with a focus on the proposed Blue Sky development, which is expected to be developed within Phase 1 of the entire Hewitt development. The completion of Phase 1 of the Hewitt development falls in-between the two analyzed horizons, 2020 and 2031. Therefore, the results and recommendations presented in this report correspond to that proposed for the Ultimate horizon in the Hewitt Study in order to maintain consistency and develop the lands for the full build-out of the Hewitt Lands.

The intersection capacity analysis results demonstrate that all three site accesses are expected to operate well under full build-out traffic conditions during both the AM and PM peak hours.

An exclusive eastbound left-turn lane is recommended at the Mapleview Drive / Street ‘A’ intersection, with a storage length of 15 meters and a taper length of 35 meters. For the traffic entering the site from the west and east, shared eastbound through-right and westbound through-left lanes will provide sufficient capacity at the Big Bay Point Road accesses.


















The proposed road network ROWs in the Blue Sky draft plan corresponds to the recommendations provided in the City’s Multi-Modal Active Transportation Master Plan. However, the City is currently undertaking an EA for the Hewitt Secondary Plan Area transportation network to refine the required cross-sections of the arterial road network. The proposed draft plan can be modified upon the completion of the EA findings. For the Blue Sky Lands, the properties fronting onto Big Bay Point Road may be subject to change along the Big Bay Point Road frontage.

APPENDIX A

Detailed Synchro Output Sheets – Ultimate Horizon Blue Sky Site Accesses










HCM Unsignalized Intersection Capacity Analysis 40: Collector Road 11 & Mapleview Drive E

Future Total - Ultimate (2031)
AM Peak Hour - Site Accesses

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	103	41	6	242	10	62	28	0	41	51	193
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	84	103	41	6	242	10	62	28	0	41	51	193
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage (veh)	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	252			144			764	556	124	544	571	247
vC1, stage 1 conf vol							292	292		259	259	
vC2, stage 2 conf vol							472	264		285	312	
vCu, unblocked vol	252			144			764	556	124	544	571	247
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			80	95	100	93	91	76
cM capacity (veh/h)	1313			1438			304	533	927	575	548	792
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	84	144	6	252	90	285						
Volume Left	84	0	6	0	62	41						
Volume Right	0	41	0	10	0	193						
cSH	1313	1700	1438	1700	351	698						
Volume to Capacity	0.06	0.08	0.00	0.15	0.26	0.41						
Queue Length 95th (m)	1.6	0.0	0.1	0.0	8.0	15.9						
Control Delay (s)	7.9	0.0	7.5	0.0	18.8	13.7						
Lane LOS	A		A		C	B						
Approach Delay (s)	2.9		0.2		18.8	13.7						
Approach LOS					C	B						
Intersection Summary												
Average Delay	7.3											
Intersection Capacity Utilization	44.9%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 59: Collector Road 11 & Big Bay Point Road

Future Total - Ultimate (2031)
AM Peak Hour - Site Accesses

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	223	103	2	394	231	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	223	103	2	394	231	6
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			326		672	274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			326		672	274
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
IF (s)			2.2		3.5	3.3
p0 queue free %			100		45	99
cM capacity (veh/h)			1234		420	764
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	326	396	237			
Volume Left	0	2	231			
Volume Right	103	0	6			
cSH	1700	1234	425			
Volume to Capacity	0.19	0.00	0.56			
Queue Length 95th (m)	0.0	0.0	26.5			
Control Delay (s)	0.0	0.1	23.6			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	23.6			
Approach LOS			C			
Intersection Summary						
Average Delay	5.9					
Intersection Capacity Utilization	42.2%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 60: Street 18 & Big Bay Point Road

Future Total - Ultimate (2031)
AM Peak Hour - Site Accesses

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	↔
Volume (veh/h)	225	2	2	390	6	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	225	2	2	390	6	4
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			227		620	226
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		620	226
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
IF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1341		451	813
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	227	392	10			
Volume Left	0	2	6			
Volume Right	2	0	4			
cSH	1700	1341	549			
Volume to Capacity	0.13	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.1	11.7			
Lane LOS	A	B				
Approach Delay (s)	0.0	0.1	11.7			
Approach LOS		B				
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		32.1%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 40: Collector Road 11 & Mapleview Drive E

Future Total - Ultimate (2031)
PM Peak Hour - Site Accesses

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↔	↘	↖	↔	↘		↔		↖	↔	↘	
Volume (veh/h)	92	106	64	0	106	161	51	36	2	8	16	111	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	92	106	64	0	106	161	51	36	2	8	16	111	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type		TWLTL			TWLTL								
Median storage (veh)		2			2								
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	267			170			547	589	138	496	540	186	
vC1, stage 1 conf vol							322	322		186	186		
vC2, stage 2 conf vol							225	267		310	354		
vCu, unblocked vol	267			170			547	589	138	496	540	186	
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2	
tC, 2 stage (s)							6.1	5.5		6.1	5.5		
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	93			100			90	93	100	99	97	87	
cM capacity (veh/h)	1297			1407			507	518	910	574	547	856	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1							
Volume Total	92	170	0	267	89	135							
Volume Left	92	0	0	0	51	8							
Volume Right	0	64	0	161	2	111							
cSH	1297	1700	1700	1700	517	781							
Volume to Capacity	0.07	0.10	0.00	0.16	0.17	0.17							
Queue Length 95th (m)	1.8	0.0	0.0	0.0	4.9	5.0							
Control Delay (s)	8.0	0.0	0.0	0.0	13.4	10.6							
Lane LOS	A				B	B							
Approach Delay (s)	2.8		0.0		13.4	10.6							
Approach LOS					B	B							
Intersection Summary													
Average Delay		4.5											
Intersection Capacity Utilization		46.8%			ICU Level of Service	A							
Analysis Period (min)		15											

HCM Unsignalized Intersection Capacity Analysis 59: Collector Road 11 & Big Bay Point Road

Future Total - Ultimate (2031)
PM Peak Hour - Site Accesses

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	↔
Volume (veh/h)	338	284	8	271	250	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	338	284	8	271	250	1
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			622		767	480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			622		767	480
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
IF (s)			2.2		3.5	3.3
p0 queue free %			99		32	100
cM capacity (veh/h)			959		367	586
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	622	279	251			
Volume Left	0	8	250			
Volume Right	284	0	1			
cSH	1700	959	368			
Volume to Capacity	0.37	0.01	0.68			
Queue Length 95th (m)	0.0	0.2	38.7			
Control Delay (s)	0.0	0.3	33.4			
Lane LOS		A	D			
Approach Delay (s)	0.0	0.3	33.4			
Approach LOS			D			
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			55.7%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 60: Street 18 & Big Bay Point Road

Future Total - Ultimate (2031)
PM Peak Hour - Site Accesses

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	↔
Volume (veh/h)	334	3	4	273	4	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	334	3	4	273	4	0
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			337		616	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			337		616	336
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
IF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1222		452	706
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	337	277	4			
Volume Left	0	4	4			
Volume Right	3	0	0			
cSH	1700	1222	452			
Volume to Capacity	0.20	0.00	0.01			
Queue Length 95th (m)	0.0	0.1	0.2			
Control Delay (s)	0.0	0.1	13.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.1	13.0			
Approach LOS			B			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			27.8%	ICU Level of Service		A
Analysis Period (min)			15			