

TRAFFIC IMPACT STUDY
SILVER CREEK AT CRAIGLEITH
TERRASAN CORPORATION

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1.0 EXECUTIVE SUMMARY

CF Crozier & Associates Inc. was retained by Terrasan Corporation (Terrasan) to complete a Traffic Impact Study for the proposed Silver Creek at Craigleith development in the Town of The Blue Mountains, County of Grey. The lands are located west of Long Point Road, north of Highway 26. The proposed development will consist of residential, commercial and institutional uses.

The development proposal calls for the realignment of Blue Mountain Drive to the east to form the north leg of the Highway 26 and Hope Street intersection, and the realignment of Brophy's Lane to the east, reconfigured as a right-in/right-out.

Analysis has determined that a signal is warranted at the intersection of Highway 26 and County Road 21/Long Point Road in the 2013 horizon year. It was also determined that an eastbound left-turn lane with a storage length of 25 metres is warranted at the intersection of Highway 26 with the realigned Blue Mountain Drive in 2013 horizon year.

2.0 INTRODUCTION

CF Crozier & Associates Inc. was retained by Terrasan Corporation (Terrasan) to complete a Traffic Impact Study for the proposed Silver Creek at Craigleith development in the Town of The Blue Mountains, County of Grey. The purpose of the study is to assess the impacts of the proposed development on the boundary road system and to recommend any required mitigation measures. The property is bounded by Blue Mountain Drive to the west, Highway 26 to the south, Brophy's Lane and Georgian Bay to the north and Long Point Road to the east. Refer to Figure 1 for site location.

The proposed development will include residential, commercial and institutional uses.

The study analyses the existing operations of the boundary road intersections, as well the future operations with and without the addition of the site generated vehicular trips. A pre-consultation meeting was held on January 21, 2008 with Ontario Ministry of Transportation (MTO) staff to determine the scope of this study.

The study has been completed in accordance with the procedures set out in the MTO "General Guidelines for the Preparation of Traffic Impact Studies" January 2008 guide, with the associated analysis and findings outlined herein.

3.0 EXISTING CONDITIONS

3.1 DEVELOPMENT LANDS

The subject property proposed for development is currently a mix of both developed and undeveloped lands. Along the Highway 26 corridor, a number of commercial establishments exist. The lands along the shores of Georgian Bay are the site of the former Easter Seals Camp. Other lands comprising the subject property are undeveloped. Three commercial entrances onto Highway

26 exist on the development lands.

3.2 STUDY AREA

The study area encompasses the boundary road network surrounding the subject lands, and is described in Section 3.3. Residential areas exist to the south and west of the property. Residences exist to the north and east of the property along Brophy's Lane and Long Point Road.

3.3 BOUNDARY ROAD NETWORK

Highway 26 is a two lane east-west highway. West of County Road 21, Highway 26 is under the jurisdiction of the Ontario Ministry of Transportation. East of County Road 21, Highway 26 is under the jurisdiction of the Town of Collingwood through the "Connecting Links" program. The posted speed limit is 60 km/h, and the design speed is 80 km/h. A Highway Access Management Plan is currently being undertaken for the Town of The Blue Mountains and MTO. The study will include examination of the segment of Highway 26 fronting the subject lands.

County Road 21 (Osler Bluff Road) is a two lane north-south arterial roadway under the jurisdiction of the County of Grey. The posted speed limit is 60 km/h and the design speed is 90 km/h.

Long Point Road is a two lane north-south paved collector roadway under the shared jurisdiction of the Town of The Blue Mountains and the Town of Collingwood. The posted speed limit is 50 km/h, and the design speed is 60 km/h.

Brophy's Lane is a two lane north-south unpaved local roadway under the jurisdiction of the Town of The Blue Mountains. The posted speed limit is 50 km/h and the design speed is 50 km/h.

Hope Street is a two lane north-south paved local roadway under the jurisdiction of the Town of The Blue Mountains. The posted speed limit is 50 km/h and the design speed is 50 km/h.

Blue Mountain Drive is a north-south unpaved local roadway under the jurisdiction of the Town of The Blue Mountains. The speed limit is not posted and is therefore 50 km/h by Town regulations and the design speed is 50 km/h. The roadway is contained within a substandard ten metre right-of-way.

The intersection of Highway 26 and Long Point Road (north approach) and County Road 21 (south approach) is unsignalized. The south approach (Osler Bluff Road) is stop-controlled with no exclusive turn lanes. Insufficient pavement width exists on the south approach to allow simultaneous left and right turns. The north approach (Long Point Road) is stop-controlled with no exclusive turn lanes. Insufficient pavement width exists on the north approach to allow simultaneous left and right turns. The east and west approaches (Highway 26) have no restrictions to free flow. The west approach (Highway 26) consists of a through lane and a right turn lane. The east approach (Highway 26) consists of a through lane and a right turn lane.

The intersection of Highway 26 and Brophy's Lane is unsignalized. The north approach (Brophy's Lane) is stop-controlled with no exclusive turn lanes. Insufficient pavement width exists on the north approach to allow simultaneous left and right turns. The east and west approaches (Highway

26) have no restrictions to free flow. The west approach (Highway 26) has no exclusive left turning lane. The east approach (Highway 26) consists of a through lane and a right turn lane. No south approach exists at the intersection.

The intersection of Highway 26 and Hope Street is unsignalized. The south approach (Hope Street) is stop-controlled with no exclusive turn lanes. Insufficient pavement width exists on the south approach to allow simultaneous left and right turns. The east and west approaches (Highway 26) have no restrictions to free flow. The west approach (Highway 26) consists of a through lane and a right turn lane. The east approach (Highway 26) has no exclusive left turning lane. No north approach exists at the intersection.

The intersection of Highway 26 and Blue Mountain Drive is unsignalized. The north approach (Blue Mountain Drive) is stop-controlled with no exclusive turn lanes. Insufficient pavement width exists on the north approach to allow simultaneous left and right turns. The east approach (Highway 26) consists of a through lane and a right turn lane. The west approach (Highway 26) consists of a shared through/left turn lane. No south approach exists at the intersection.

3.4 DEVELOPMENT PROPOSAL

The subject lands consist of two distinct areas. The west lands will be wholly residential and consist of 19 single family lots and 115 condominium townhouse units. Access to the west lands will be from the realignment of Blue Mountain Drive intersecting Highway 26 and forming the north approach to the Highway 26 and Hope Street intersection.

The east lands will consist of a mix of residential, recreational, institutional and commercial development. The proposed residential uses consist of 14 lots for single detached units, 40 live/work units and a 130 unit senior housing complex. The proposed commercial uses will consist of 1,440 square metres of retail stores, a 1,825 square metre supermarket/grocery store, 695 square metres of restaurants and 1,155 square metres of office space. The proposed institutional use will consist of a 2,085 square metres college building. The proposed recreational use will consist of a 750 square metre community building. Access to the east lands will be through a new public road connection to Long Point Road, and a channelized right-in/right-out on Highway 26. A roundabout is proposed for the internal public roadway system.

Refer to Figure 2 for the Draft Plan.

3.5 TRAFFIC DATA

Turning movement counts were undertaken by CF Crozier & Associates staff from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. on Friday February 15, 2008 at the intersections of Highway 26 and Long Point Road, Highway 26 and Brophy's Lane, Highway 26 and Hope Street and Highway 26 and Blue Mountain Drive. Turning movement counts at these same intersections were undertaken by CF Crozier & Associates staff from 12:00 p.m. to 3:00 p.m. on Saturday February 16, 2008. This traffic data provides the typical roadway a.m. and p.m. peak traffic conditions through the above mentioned intersections, and was selected to capture both commuter and weekend recreational traffic in the Georgian Triangle region.

At the intersections Highway 26 and Long Point Road, Highway 26 and Brophy's Lane, Highway 26 and Hope Street, and Highway 26 and Blue Mountain Drive, the a.m. peak hour was 8:00 to 9:00 a.m., and the p.m. peak hour from 5:00 to 6:00 p.m. The Saturday peak hour at all the above mentioned intersections was 2:00 p.m. to 3:00 p.m. The traffic data contained in **Appendix B** provides a summary of the turning movement counts.

The traffic data recorded on February 15 and 16, 2008 was adjusted to reflect seasonal variations. Traffic data provided by MTO allowed a comparison of annual average daily traffic volumes (AADT) and summer average daily traffic volumes (SADT) on Highway 26 at Long Point Road. It was calculated that SADT volumes were an average of 25 percent greater than AADT volumes for the years 2001 to 2005. Accordingly, the February 15 and 16, 2008 turning movement counts were increased by 25 percent.

Figure 3 illustrates the 2008 adjusted existing traffic volumes.

3.6 INTERSECTION OPERATIONS

The operations of subject intersections were analyzed on the basis of the traffic volumes illustrated in Figure 3. Detailed capacity analyses are included in **Appendix C**.

The assessment of unsignalized intersections is based on the method outlined in the "Highway Capacity Manual, 2000". The Level of Service definitions for unsignalized intersections are included in **Appendix A**.

Table 1 outlines the current levels of service.

TABLE 1
2008 ADJUSTED EXISTING TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Long Point Road	Minor Road Stop-Control	Weekday A.M.	C	24.8 s	1.55	0.35
		Weekday P.M.	F	84.7 s	6.40	0.88
		Saturday P.M.	E	45.2 s	3.53	0.61
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	B	14.7 s	0.09	0.03
		Weekday P.M.	C	24.2 s	0.21	0.06
		Saturday P.M.	C	15.6 s	0.10	0.03
Highway 26 and Hope Street	Minor Road Stop-Control	Weekday A.M.	B	11.6 s	0.05	0.02
		Weekday P.M.	C	19.2 s	0.09	0.03
		Saturday P.M.	C	16.3 s	0.08	0.03
Highway 26 and Blue Mountain Road	Minor Road Stop-Control	Weekday A.M.	C	16.9 s	0.07	0.02
		Weekday P.M.	B	12.6 s	0.03	0.01
		Saturday P.M.	C	17.9	0.06	0.02

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

As indicated in Table 1, the intersection of Highway 26 and Long Point Road operates at a Level of Service "F" in the weekday p.m. peak hour and a Level of Service "E" in the Saturday peak hour and is characterized by excessive delay with significant queue lengths on the minor street (County Road 21). Furthermore, the minor road approach is approaching capacity in the weekday p.m. peak hour. All other intersections operate at a good or very good Level of Service "B" or "C" in the weekday a.m., p.m., and Saturday peak hours. These unsignalized intersections are characterized by low volume-to-capacity ratios and 95% queue lengths of one vehicle.

4.0 FUTURE BACKGROUND CONDITIONS

4.1 HORIZON YEARS

The initial horizon year was chosen to be the anticipated full build out year. It is the intention of the proponent to proceed with development of both east and west lands simultaneously. A five year horizon (2013) was chosen to reflect the full build-out year.

As per MTO guidelines, further horizon years of five and ten years (2018 and 2023) were selected to assess the long term operations of the boundary road system.

4.2 TRAFFIC GROWTH RATES

Traffic growth rates were based on historical traffic data provided by MTO. SADT volumes for Highway 26 at Long Point Road for the years 2001 to 2005 were used to calculate an average annual growth of 1.1 percent in Highway 26 traffic.

Historical traffic volumes were not available for County Road 21. Accordingly, the calculated Highway 26 growth rate was deemed applicable to County Road 21 traffic volumes.

The 1.1 percent growth rate was applied to Highway 26 traffic volumes, County Road 21 traffic volumes, and the turning movements between the two roadways. No background growth rates were applied to volumes on Long Point Road, Brophy's Lane, Hope Street or Blue Mountain Drive. With the exception of the subject development and other developments described in Section 3.3, these roadways serve mature neighbourhoods.

4.3 OTHER LOCAL DEVELOPMENTS

Five other developments that will directly influence future background traffic volumes are currently either under construction or in the planning phase. These are: the Silver Glen Preserve, Tanglewood at Cranberry Trail, the Preserve at Georgian Bay, Brandy Lane and Eden Oak.

The Silver Glen Preserve residential development is under construction for 359 condominium units and 71 single family dwellings. It is located approximately 2.5 kilometres east of the subject property, east of Long Point Road on the south side of Highway 26. This development will have a single access onto Highway 26. 20 percent of the trips generated were assigned to Highway 26 arriving from/departing to west of the Silver Glen Development and were included in the calculation of future background traffic volumes.

The Tanglewood residential development will consist of 645 condominium townhouse units located on the south side of Highway 26. It has two accesses to Highway 26 and is located approximately 3.5 kilometres east of the subject property. Trip generation and distribution characteristics detailed in the Cranberry Trail East Tanglewood Development Traffic Impact Study (Crozier, June 2007) were included in the calculation of future background traffic volumes.

The Preserve at Georgian Bay residential development will consist of 350 medium and high density

residential units and 39 single family detached residential units. The development is located approximately three kilometres east of the subject property on the north side of Highway 26. Access to the site will be from an entrance roadway intersecting Highway 26 and forming the north approach to the Highway 26 and Cranberry Trail West intersection. Trip generation characteristics per the Preserve at Georgian Bay Traffic Impact Study (Crozier, 2007) were applied to the development. 20 percent of the trips generated were assigned to Highway 26 arriving from/departing to west of the Preserve Development and were included in the calculation of future background traffic volumes.

The Brandy Lane residential development will consist of 105 condominium units. The development is located approximately 4.5 kilometres east of the subject property on the south Side of Highway 26. Access to the site will be through the Cranberry Trail East intersection with Highway 26. 20 percent of the trips generated were assigned to Highway 26 arriving from/departing to west of the Brandy Lane Development and were included in the calculation of future background traffic volumes.

The Eden Oak residential development will consist of 85 detached single family units. It is located approximately one kilometre west of the subject property, south of Highway 26. The development will have an access onto Highway 26 via Lakeshore Road. 50 percent of the trips generated were assigned to Highway 26 arriving from/departing to west of the Eden Oak development and were included in the calculation of future background traffic volumes.

The calculated 2013, 2018 and 2022 future background traffic volumes are illustrated in **Figure 4, 5 and 6** and reflect the growth on Highway 26 as well as the traffic generated from the five nearby future developments.

4.4 INTERSECTION OPERATIONS

The operations of the critical intersections were analyzed on the basis of the traffic volumes illustrated in Figures 4, 5 and 6. **Tables 2, 3 and 4** outline the horizon year levels of service. Detailed capacity analyses are included in Appendix C.

TABLE 2
2013 FUTURE BACKGROUND TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Long Point Road	Minor Road Stop-Control	Weekday A.M.	D	33.2 s	2.48	0.49
		Weekday P.M.	F	253.5 s	10.78	1.32
		Saturday P.M.	F	105.1	6.45	0.91
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	C	15.3 s	0.09	0.03
		Weekday P.M.	D	30.3 s	0.27	0.08
		Saturday P.M.	C	17.6 s	0.12	0.04
Highway 26 and Hope Street	Minor Road Stop-Control	Weekday A.M.	B	12.3 s	0.06	0.02
		Weekday P.M.	C	22.9 s	0.12	0.04
		Saturday P.M.	C	18.7 s	0.10	0.03
Highway 26 and Blue Mountain Road	Minor Road Stop-Control	Weekday A.M.	C	19.6 s	0.08	0.03
		Weekday P.M.	B	13.5 s	0.03	0.01
		Saturday P.M.	C	20.9 s	0.08	0.03

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

TABLE 3
2018 FUTURE BACKGROUND TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Long Point Road	Minor Road Stop-Control	Weekday A.M.	F	51.2 s	3.80	0.64
		Weekday P.M.	F	469.2 s	14.48	1.80
		Saturday P.M.	F	235.8 s	9.86	1.26
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	C	16.1 s	0.10	0.03
		Weekday P.M.	E	36.8 s	0.34	0.10
		Saturday P.M.	C	19.6 s	0.13	0.04
Highway 26 and Hope Street	Minor Road Stop-Control	Weekday A.M.	B	12.9 s	0.07	0.02
		Weekday P.M.	D	26.8 s	0.14	0.05
		Saturday P.M.	C	21.1 s	0.12	0.04
Highway 26 and Blue Mountain Road	Minor Road Stop-Control	Weekday A.M.	C	22.2 s	0.10	0.03
		Weekday P.M.	B	14.2 s	0.03	0.01
		Saturday P.M.	C	23.9 s	0.09	0.03

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

TABLE 4
2023 FUTURE BACKGROUND TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Long Point Road	Minor Road Stop-Control	Weekday A.M.	F	68.4 s	4.81	0.75
		Weekday P.M.	F	>600 s	16.90	2.20
		Saturday P.M.	F	338.3 s	11.87	1.50
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	C	16.9 s	0.11	0.04
		Weekday P.M.	E	41.7 s	0.39	0.12
		Saturday P.M.	C	21.0 s	0.15	0.05
Highway 26 and Hope Street	Minor Road Stop-Control	Weekday A.M.	B	13.3 s	0.07	0.02
		Weekday P.M.	D	29.2 s	0.16	0.05
		Saturday P.M.	C	22.6 s	0.13	0.04
Highway 26 and Blue Mountain Road	Minor Road Stop-Control	Weekday A.M.	C	23.7 s	0.11	0.04
		Weekday P.M.	B	14.8 s	0.03	0.01
		Saturday P.M.	D	25.8 s	0.10	0.03

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

As indicated in Tables 2, 3 and 4 the intersection of Highway 26 and County Road 21/Long Point Road will steadily deteriorate to a Level of Service "F" in the a.m., p.m. and Saturday peak hours and is characterized by increasingly excessive delay with unacceptable queue lengths on the minor street. The County Road 21 approach will approach capacity in the weekday a.m. peak hour. In the weekday and Saturday p.m. peak hours, the volume to capacity ratio will exceed 1.00, where more vehicles seek to enter the intersection from the County Road 21 approach than can be physically handled by the intersection.

All other intersections operate at very good, good, fair and poor Levels of Service "B", "C", "D" and "E" in the weekday a.m., p.m., and Saturday peak hours. Delays will increase due to increased

Highway 26 mainline traffic. These unsignalized intersections are characterized by acceptable low volume-to-capacity ratios and 95% queue lengths of one vehicle.

5.0 SITE GENERATED TRAFFIC

The trip generation of the subject development was forecast using the rates provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 7th Edition.

5.1 RESIDENTIAL TRIP GENERATION

It was determined that the use of Category 210, "Single Family Detached" and Category 230, "Condominium/Townhouse" would be accurate representations of the future traffic characteristics of the proposed 25 single family homes (15 on the west lands and 10 on the east lands) and 110 condominium townhouse units (west lands), respectively. Likewise, Category 220, "Apartment" and Category 255, "Continuing Care Retirement Community" would be accurate representations of future traffic characteristics expected for the proposed 40 live/work units (west lands) and 130 unit seniors housing complex (west lands), respectively. The residential trips generated for the west and east lands are tabulated in **Table 5** and **Table 6**, respectively.

5.2 INSTITUTIONAL TRIP GENERATION

It was determined that the use of Category 540, "Junior/Community College" would be an accurate representation of future traffic characteristics expected for the proposed 2,085 square metre (21,500 square feet) college building. The institutional trips generated for the east lands are tabulated in **Table 7**.

5.3 COMMERCIAL TRIP GENERATION

A number of commercial buildings are proposed on the east lands including: 6 specialty retail units (total of 27,100 square feet), a commercial restaurant block (7,750 square feet), a supermarket (20,200 square feet) and a recreational amenity building (8,050 square feet).

It was determined that the use of Category 814 "Specialty Retail" and Category 932 "High-Turnover (Sit down) Restaurant" would be accurate representations of the future traffic characteristics expected for the proposed 6 specialty retail units and the commercial restaurant block respectively. Likewise, category 850 "Supermarket" and Category 495 "Residential Community Centre" would be accurate representations of future traffic characteristics expected for the proposed supermarket and recreational amenity building, respectively.

Information of primary and pass-by trips was unavailable for Category 814. Therefore, the average of the related uses Category 816 "Hardware/Paint Store", Category 843 "Automobile Parts Sales", Category 848 "Tire Store" and Category 890 "Furniture Store" were used to approximate the average pass-by trip percentage for the subject use. Average pass-by trip percentages were available for Category 932 "High-Turnover (Sit-Down) Restaurant and category 850 "Supermarket". It was assumed that there would be no pass by trips for the proposed residential community centre.

As defined by the ITE Trip Generation Handbook, Second Edition, primary trips are trips made for the specific purpose of visiting the generator and pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. The commercial trips generated are tabulated in **Table 8** and further summarized in **Table 9**.

**TABLE 5
WEST LANDS SITE GENERATED TRIPS - RESIDENTIAL**

Area	Use	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
West Lands	Single - Family Detached Housing (category 210)	A.M.	3	8	11
		P.M.	10	6	16
		Sat.	8	6	14
West Lands	Condominium / Townhouse (Category 230)	A.M.	8	41	49
		P.M.	38	18	56
		Sat.	28	24	52
TOTALS		A.M.	11	49	60
		P.M.	48	24	72
		Sat.	36	30	66

**TABLE 6
EAST LANDS SITE GENERATED TRIPS - RESIDENTIAL**

Area	Use	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
East Lands	Single - Family Detached Housing (category 210)	A.M.	3	6	9
		P.M.	6	4	10
		Sat.	5	4	9
East Lands	Apartment (Category 220)	A.M.	4	16	20
		P.M.	16	9	25
		Sat.	14	7	21
East Lands	Continuing Care Retirement (Category 255)	A.M.	15	8	23
		P.M.	18	20	38
		Sat.	18	20	38
TOTALS		A.M.	21	30	51
		P.M.	41	32	73
		Sat.	37	31	68

TABLE 7
SITE GENERATED TRIPS - INSTITUTIONAL

Area	Use	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
East Lands	Junior/Community College (Category 540)	A.M.	48	17	65
		P.M.	32	23	55
		Sat.	17	13	30

TABLE 8
SITE GENERATED TRIPS – COMMERCIAL

Area	Use	Roadway Peak Hour	Type of Trip	Number of Trips		
				Inbound	Outbound	Total
East Lands	Blocks 26-29 33, 34 Specialty Retail Centre (Category 814)	Weekday A.M.	Primary	52	56	108
			Pass-By	32	35	67
			Total	84	91	175
		Weekday P.M.	Primary	47	37	84
			Pass-By	29	23	52
			Total	76	60	136
		Weekend Sat.	Primary	52	56	108
			Pass-By	32	35	67
			Total	84	91	175
East Lands	Block 30 Supermarket (Category 850)	Weekday A.M.	Primary	26	17	43
			Pass-By	14	9	23
			Total	40	26	66
		Weekday P.M.	Primary	69	66	135
			Pass-By	39	37	76
			Total	108	103	211
		Weekend Sat.	Primary	71	68	139
			Pass-By	40	38	78
			Total	111	106	217
East Lands	Block 31 Residential Community Centre (Category 495)	Weekday A.M.	Primary	8	5	13
		Weekday P.M.	Primary	4	9	13
		Weekend Sat.	Primary	5	5	10
East Lands	Block 32 High Turnover (Sit-Down) Restaurant (Category 932)	Weekday A.M.	Primary	26	25	51
			Pass-By	20	18	38
			Total	46	43	89
		Weekday P.M.	Primary	30	19	49
			Pass-By	22	14	36
			Total	52	33	85
		Weekend P.M.	Primary	56	32	88
			Pass-By	42	25	67
			Total	98	57	155

**TABLE 9
SUMMARY OF COMMERCIAL SITE GENERATED TRIPS**

Area	Roadway Peak Hour	Type of Trip	Number of Trips		
			Inbound	Outbound	Total
East Lands	Weekday A.M.	Primary	112	103	215
		Pass-By	66	62	128
		Total	178	165	343
	Weekday P.M.	Primary	150	131	281
		Pass-By	90	74	164
		Total	240	205	445
	Weekend Sat.	Primary	184	161	108
		Pass-By	114	98	212
		Total	298	259	557

5.4 RESIDENTIAL TRIP DISTRIBUTION AND ASSIGNMENT

The trips generated by the residential components development were distributed to the boundary roadways based on the location of retail, commercial and recreational destinations. With the Town of Collingwood and the Village at Blue both located to the east of the subject lands, 80 percent of trips were assumed to arrive from/depart to the east. Specifically, 60 percent would access Highway 26 east of the subject lands and 20 percent would access Osler Bluff Road south of the subject lands. The remaining 20 percent were assigned to Highway 26 west of the subject lands. The trip distributions for the east and west lands of the proposed residential development are illustrated in **Figures 7 and 8** respectively.

The trips generated by the proposed residential development were assigned to the boundary road network as per the distribution. **Figures 9 and 10** illustrate the trip assignment for the east and west areas, respectively.

5.5 INSTITUTIONAL TRIP DISTRIBUTION AND ASSIGNMENT

The trips generated by the proposed east area institutional development were distributed to the boundary roadways based on the location of nearby residential areas. With the Town of Collingwood located to the east of the subject lands, 70 percent of trips were assumed to arrive from/depart to the east. An additional 25 percent of trips were assumed to arrive from/depart to the west. The remaining five percent would access Osler Bluff Road south of the subject lands. The trip distribution for the proposed institutional development is illustrated in **Figure 11**.

The trips generated by the proposed institutional development were assigned to the boundary road

network as per the distribution. **Figure 12** illustrates the trip assignment.

5.6 COMMERCIAL TRIP DISTRIBUTION AND ASSIGNMENT

The primary trips generated by the proposed commercial development were also distributed to the boundary road system based on the location of residential areas and of other commercial operations. With only a limited number of commercial establishments between the subject lands and Thornbury to the west, 40 percent of commercial trips were assumed to arrive from/depart to the west. An additional 30 percent were assumed to arrive from the east. The remaining 30 percent were assumed to arrive from south of the subject property. The primary commercial trip distribution is illustrated in **Figure 13**.

The pass-by trips generated by the proposed commercial development were distributed to the boundary road network based on the existing volume of traffic passing the proposed development site entrance. An overall pass-by distribution was applied proportional to the existing traffic volumes on Highway 26. Accordingly, 50 percent of the pass-by trips were assigned to eastbound Highway 26 and 50 percent to westbound Highway 26. **Figure 14** illustrates the pass-by trip distribution.

The commercial trips generated by the proposed development were applied to the distributions in **Figures 13** and **14**. The resulting primary and pass-by trip assignment is illustrated in **Figure 14** and **16**, respectively.

6.0 TOTAL FUTURE CONDITIONS

6.1 FUTURE ROADWAY IMPROVEMENTS

Local roadway improvements have been proposed as a part of the development. It is proposed to relocate Brophy's Lane to the east, and restrict the full moves intersection to a right-in/right-out. Vehicles that currently access Brophy's Lane using an eastbound left-in or a southbound left-out manoeuvre would be required to access Brophy's Lane through Long Point Road instead.

It is proposed to relocate Blue Mountain Drive to the east and form the north approach to the existing Highway 26 and Hope Street intersection. In keeping with MTO policy to reduce entrances on Highway 26, consideration was given to the closure of Fraser Crescent with access provided via the relocated Highway 26 and Blue Mountain Drive intersection. The closure of Fraser Crescent access directly to Highway 26 would be subject of discussion between residents, the Town of The Blue Mountains and MTO. To be conservative in intersection analysis, it was assumed that all Fraser Crescent traffic would use the re-aligned Blue Mountain Drive intersection with Highway 26.

6.2 BASIS OF ASSESSMENT

The traffic impacts arising from the proposed development were assessed on the basis of the site generated traffic illustrated in Figures 9, 10, 12, 15, and 16 being superimposed on the future background traffic volumes in Figure 4, 5 and 6. Furthermore, traffic volumes have been adjusted to reflect the local roadway improvements described in Section 6.1. The resulting total traffic

volumes for the weekday a.m., p.m. and weekend Saturday peak hours are illustrated in **Figure 17, 18 and 19** for the horizon years 2013, 2018 and 2023, respectively.

6.3 SIGNAL WARRANT ANALYSIS

A signal warrant analysis was undertaken for the intersections of Highway 26 and County Road 21/Long Point Road, as well as the intersection of Highway 26 and the relocated Blue Mountain Drive. The analysis followed the procedures specified in Chapter 4 of the "Ontario Traffic Manual – Book 12", July 2001, including an increase of 20 percent in the warrant threshold for future traffic volumes per subchapter 4.9.

The analysis determined that a signal is warranted at the intersection of Highway 26 and County Road 21/Long Point Road with the introduction of site generated traffic in the 2013 horizon year. Accordingly, intersection capacity analysis of the intersection was completed under a signalized scenario. Refer to **Figure 20** for the preliminary design of the signalized intersection.

The analysis further determined that a signal warrant is not met for the intersection of Highway 26 and Blue Mountain Drive/Hope Street. This is a result of insufficient minor road entering vehicles at this intersection. Signal warrants are included in **Appendix D**.

6.4 LEFT-TURN LANE WARRANT ANALYSIS

A left-turn lane warrant was undertaken for the realigned intersection of Blue Mountain Drive/Hope Street and Highway 26 under 2013 total traffic conditions. It was determined that a deficiency will exist and that an eastbound left-turn lane with the maximum storage length of 25 metres is warranted for this intersection in the critical weekday p.m. peak hour. Refer to **Figure 21** for the preliminary design of the left-turn lane. Left-turn lane warrants are included in **Appendix E**.

6.5 INTERSECTION OPERATIONS

The intersection levels of service were analyzed on the basis of the total traffic volumes illustrated in Figure 17, 18 and 19. **Tables 10, 11 and 12** outline the year 2013, 2018 and 2023 total traffic levels of service, respectively. Detailed capacity analyses are included in Appendix C.

TABLE 10
2013 TOTAL TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Intersection Delay	Critical Approach	Approach Level of Service
Highway 26 and Long Point Road	Signalized	Weekday A.M.	A	9.9 s	NB	C
		Weekday P.M.	B	13.8 s	NB	C
		Saturday P.M.	B	12.9 s	NB	C
Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	B	12.8 s	0.58	0.16
		Weekday P.M.	C	16.3 s	0.98	0.25
		Saturday P.M.	C	15.8 s	1.16	0.28
Highway 26 and Blue Mountain Drive	Minor Road Stop-Control	Weekday A.M.	E	47.0 s	2.13	0.46
		Weekday P.M.	F	78.3 s	1.73	0.43
		Saturday P.M.	F	81.3 s	2.16	0.50

*Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.
Signal timings have been optimized to minimize intersection delay.*

TABLE 11
2018 TOTAL TRAFFIC LEVELS OF SERVICE

Intersection	Control	Peak Hour	Level of Service	Intersection Delay	Critical Approach	Approach Level of Service
Highway 26 and Long Point Road	Signalized	Weekday A.M.	B	10.4 s	NB	C
		Weekday P.M.	B	15.0 s	NB	D
		Saturday P.M.	B	13.6 s	NB	C
Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	B	13.3 s	0.61	0.17
		Weekday P.M.	C	17.6 s	1.09	0.27
		Saturday P.M.	C	17.2 s	1.30	0.31
Highway 26 and Blue Mountain Drive	Minor Road Stop-Control	Weekday A.M.	F	64.4 s	2.73	0.56
		Weekday P.M.	F	118.0 s	2.27	0.56
		Saturday P.M.	F	119.6 s	2.75	0.63

*Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.
Signal timings have been optimized to minimize intersection delay.*

**TABLE 12
2023 TOTAL TRAFFIC LEVELS OF SERVICE**

Intersection	Control	Peak Hour	Level of Service	Intersection Delay	Critical Approach	Approach Level of Service
Highway 26 and Long Point Road	Signalized	Weekday A.M.	B	10.6 s	NB	C
		Weekday P.M.	B	14.6 s	NB	D
		Saturday P.M.	B	14.6 s	NB	C
Intersection	Control	Peak Hour	Level of Service	Control Delay per Vehicle	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Brophy's Lane	Minor Road Stop-Control	Weekday A.M.	B	13.7 s	0.64	0.18
		Weekday P.M.	C	18.6 s	1.17	0.29
		Saturday P.M.	C	14.6 s	1.39	0.33
Highway 26 and Blue Mountain Drive	Minor Road Stop-Control	Weekday A.M.	F	75.9 s	3.06	0.61
		Weekday P.M.	F	148.1 s	2.58	0.64
		Saturday P.M.	F	148.8 s	3.09	0.71

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

Signal timings have been optimized to minimize intersection delay.

The intersection of Highway 26 and County Road 21/Long Point Road will experience an overall Level of Service “B” during all peak hours under total future traffic conditions, excepting the a.m. peak hour in the 2013 year. The Long Point Road leg will experience an approach specific Level of Service “C” during all peak hours in the 2013, 2018 and 2023 horizon years. The County Road 21 leg will experience an approach specific Level of Service “C”, with the exception of a Level of Service “D” during the weekday p.m. peak hour in the 2018 and 2023 horizon years. The introduction of a signal at this intersection will resolve the unacceptably lengthy approach delays and queue lengths associated with the stop-controlled County Road 21 approach under future background traffic conditions.

The realigned intersection of Highway 26 and Brophy’s Lane will experience an improvement in Levels of Service over future background traffic conditions. The design of this intersection as a

right-in/right-out will decrease average delay for vehicles as outbound left-turning vehicles will be required to use the signalized Highway 26 and Long Point Road intersection.

The realigned intersection of Highway 26 and Blue Mountain Drive will experience a Level of Service "F" during all peak hours in all horizon years, excepting the weekday a.m. peak hour in the 2013 year where a Level of Service "E" is expected. This is a result of both the increased outbound traffic volumes from the intersection resultant from the subject development, and the increased mainline Highway 26 traffic volumes that reduces the availability of gaps for the outbound traffic. While significant delays will be experienced by outbound Blue Mountain Drive vehicles, 95th percentile queue lengths will be three vehicles or less, and the maximum volume-to-capacity ratio will be 0.71, indicating that the approach is able to service the outbound demand with significant (0.29) capacity remaining. Since the subject development will fully utilize available developable lands, no further increase in vehicle volumes on Blue Mountain Drive can be expected.

6.6 ROUNDABOUT OPERATIONS

MTO had advised that no policy has been adopted in regards to the operations of roundabouts in Ontario. Therefore, an investigation of "best practices" was undertaken for the analysis and design of the roundabout proposed within the subject lands.

Much literature and research was available from countries that regularly use roundabouts as a form of traffic control, such as England, Australia and others. However, it was considered more appropriate to use information available from the United States where roundabouts are a relatively new feature. It is expected that Canadian driver reaction to roundabouts would most closely match that of United States drivers, and accordingly, United States guidelines for capacity and design of roundabouts would be most applicable. Therefore, "Roundabouts: An Information Guide", U.S. Federal Highway Administration, June 2000 (Publication No. FHWA-RD-00-067) was used to determine 95th percentile queue lengths for the internal roundabout.

Queue length analysis was undertaken for the roundabout in the critical Saturday p.m. peak hour for the south leg (realigned Brophy's Lane) of the intersection. It was calculated that the 95th percentile queue length would be 0.27 vehicles. This queue length will not affect the operations of the right-in/right-out intersection of Highway 26 and Brophy's Lane.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Intersection analyses of existing traffic volumes indicate that the critical intersections are currently operating at acceptable levels of service, with the exception of Highway 26 and County Road 21/Long Point Road, where long delays, queue lengths and volume-to-capacity ratios are being experienced in the weekday p.m. peak hour.

Intersection analyses of the 2013, 2018 and 2023 future background traffic volumes indicate that the critical intersections are expected to operate at lesser levels of service with increases in delay, with the exception of the Highway 26 and County Road 21/Long Point Road intersection. This intersection will experience unacceptable levels of delay, queue lengths and operate with demand exceeding the capacity of the intersection.

The proposed development is expected to add new residential, commercial and institutional trips to the boundary road system. Intersection and warrant analyses of the 2013, 2018 and 2023 total traffic volumes indicate that signals are warranted at the Highway 26 and Country Road 21/Long Point Road intersection, and that an eastbound left turn lane with 25 metres of storage length is warranted at the realigned Blue Mountain Drive intersection with Highway 26. The roadway improvements for the realigned intersection of Highway 26 and Blue Mountain Drive are warranted as a result of the west lands residential development. The roadway improvements for the Highway 26 and County Road 21/Long Point Road intersection are warranted as a result of the east lands mixed use development. All roadway improvements are warranted for the 2013 horizon year.

The introduction of signals at the Highway 26 and County Road 21/Long Point Road intersection will improve the operations of the intersection to a Level of Service "B" or better. The redesign of the realigned Brophy's Lane intersection will improve the operations of the intersection to a Level of Service "B" or better. The realigned Blue Mountain Drive intersection with Highway 26 is expected to operate at Level of Service "E" and "F". However, 95th percentile queue lengths will be three vehicles or less, and volume-to-capacity ratios 0.71 or less.

It is concluded that the traffic generated from the proposed residential development can be mitigated with the implementation of the above noted external roadway improvements.

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