FUNCTIONAL SERVICING REPORT

SNELL'S HOLLOW EAST SECONDARY PLAN AREA

TOWN OF CALEDON

PROJECT 2019-4851 FEBRUARY 2021

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.0	Original Report	Y. Gollamudi	February 2021	K. Shahbikian	February 2021

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1.0 INTRODUCTION

1.1 Study Objectives and Location

The objective of this report is to provide a servicing plan for the proposed development within the Snell's Hollow Secondary Plan Area that will guide future detailed engineering designs.

The subject site is located south of Highway 410, northwest of Mayfield Road, and northeast of Kennedy Road, in the Town of Caledon, Region of Peel, as shown in **Figure 1.1**.

The Snell's Hollow Secondary Plan area is approximately 62.4ha that includes lands on both sides of Heart Lake Road, with the majority of the site area on the west side of Heart Lake Road. Out of the 62.4ha, development is proposed in approximately 36.97ha, as discussed in **Section 1.2** below.

The following sections of this report provide strategic information regarding stormwater management (SWM), sanitary servicing and water supply for the subject lands. The information will be provided while ensuring compatibility with the existing storm, sanitary and water supply services.

1.2 Proposed Development Plan and Population

The secondary plan area is approximately 62.4ha, including 36.97 ha of developable area, 0.7ha of existing SWM pond and 24.68ha of Natural Heritage System area, including buffer area. The proposed development consists of detached houses, semi-detached houses, townhouses, Medium-High density residential areas, commercial areas, roads, park blocks, open space and SWM blocks.

The proposed commercial block and Medium High-density residential blocks will be developed as part of a separate site plan.

Table 1-1 below summarizes the proposed development and estimated population based on the Peel Region design criteria. For ease of identification, areas have been divided into A, B and C, as shown in **Figure 1.2**.

Table 1-1: Development Proposal and Estimated Population

	ID As per Figure 1.2	Block Land Use	Area (ha)	Units	Population Density (Peel Region Design Criteria) (persons/unit)	Population Estimate (persons)
Developable Area	A	Low Density (Detached, Semi-Detached & ST. Townhouses)	10.02	351	3.43	1204
		Medium Density (Townhouses)	2.73	210	2.92	613
		SWM blocks	3.33	-		
		Right of Way	8.8	-		
		Park blocks	1.31	-		
		Open Space (MTO Setback)	2.01	-		
	B	Low Density (Detached, Semi-Detached & ST. Townhouses)	0.37	13	3.43	45
		Medium Density (Townhouses)	1.70	135	2.92	394
		Medium-High Density	1.27	190	2.23	424
		Right of Way	2.3	-		
		Park blocks	0.38	-		
		Open Space (MTO Setback)	0.02	-		
		Servicing Block	0.01	-		
	C	Medium-High Density	1.25	188	2.23	419
		Commercial	1.47	-	-	93*
		Sub-Total	**36.97**	**1087**		**3192**
		Natural Heritage System	21.95	-	-	
		Open Space (Buffer)	2.73	-	-	
		Existing SWM Pond	0.7	-	-	
		Total Area	**62.4**	**1087**		**3192**

**Based on 63 Jobs/ha for Commercial Area as per the Concept Plan*

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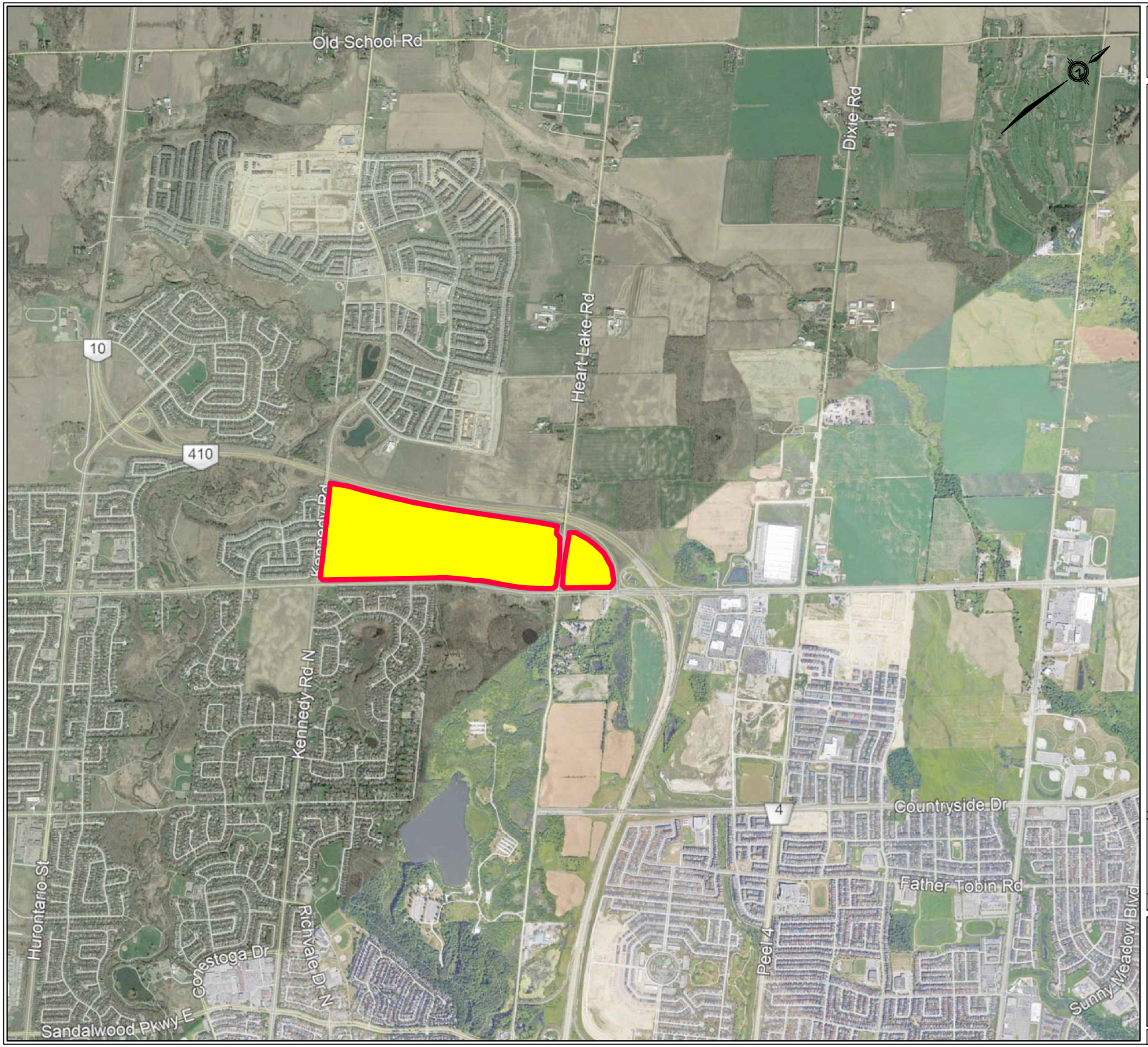

SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

SNELL'S HOLLOW
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FIGURE 1.1
LOCATION PLAN

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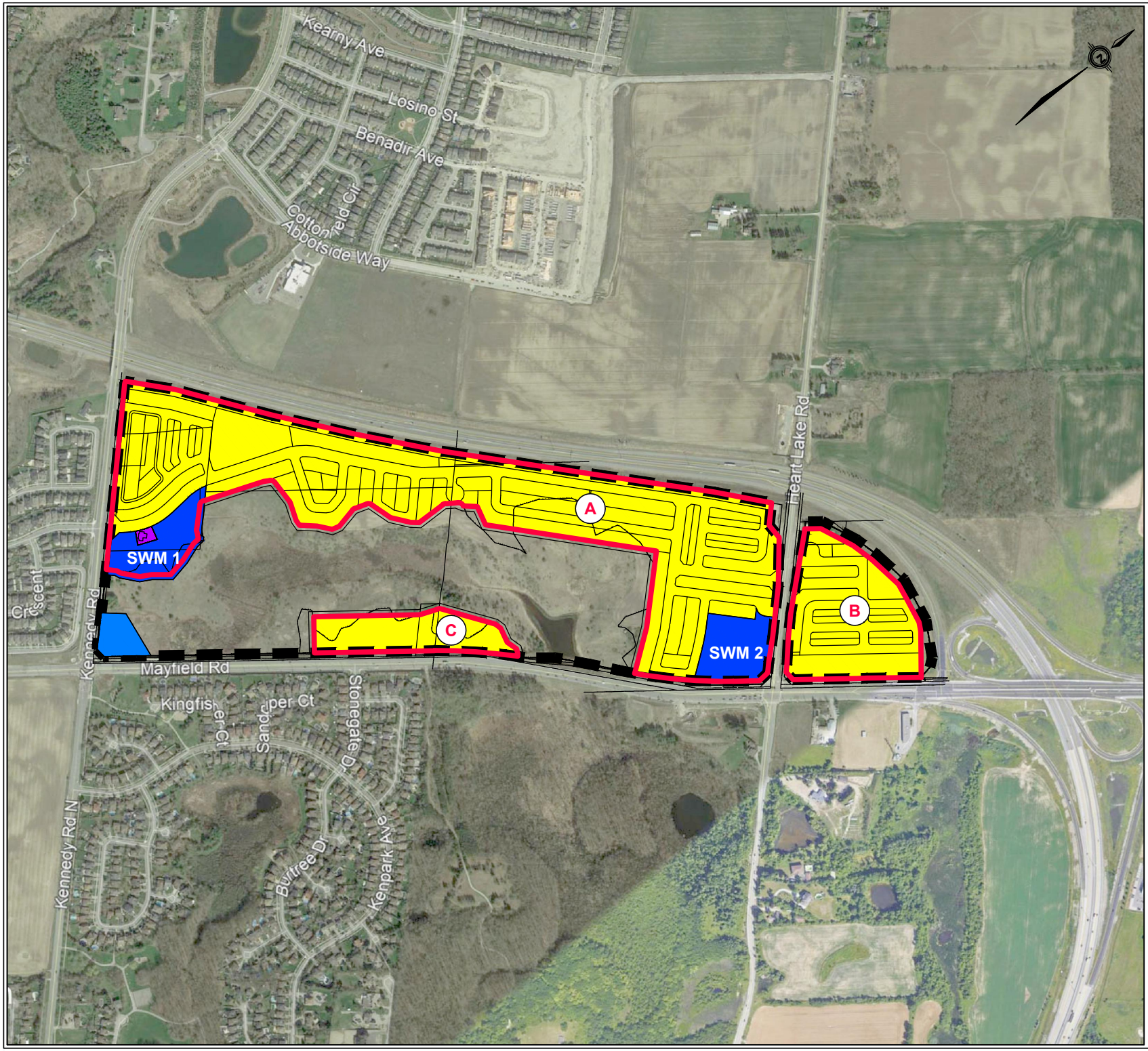

SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- SNELL'S HOLLOW SECONDARY PLAN AREA
- DEVELOPMENT BOUNDARY
- PROPOSED SWM POND
- EXISTING SWM POND
- EXISTING HERITAGE DWELLING

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FIGURE 1.2
DEVELOPMENT PLAN

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2.0 STORMWATER MANAGEMENT

2.1 Existing Land Use and Soil Conditions

Based on google satellite imagery, the subject site is currently primarily agricultural land. The Draft Final Report-Etobicoke Creek Hydrology Update (April 2013) defines existing land use in Figure A-1 (provided in **Appendix A.1**). The subject site land use is identified as agricultural, meadow, successional, estate residential, and open water. A portion of the Heart Lake Provincially Significant Wetland (PSW) is located within site, as discussed in the R.J. Burnside & Associates Limited Baseline Conditions Report (August 2020).

As per Draft Final Report-Etobicoke Creek Hydrology Update (April 2013) Figure A-31 (provided in **Appendix A.1**), the subject site soils are ONEIDA throughout the site's developable area. Similarly, the York Region Soil map identifies the soils as the Oneida series with soil type defined as clay loam. Subject site soils are therefore identified as type D.

Borehole logs from the preliminary Geotechnical Investigations completed by Golder Associates Ltd. (Refer to **Appendix A.1**) for the subject site confirm the soil type to be Silty clay.

2.2 Existing Storm Drainage and Infrastructure

The subject site is located within the Etobicoke Creek watershed. The majority of the subject site west of Heart Lake road generally drains southeast towards the tributary of the Etobicoke located within site, draining to an existing culvert under Mayfield Road. There is a drainage divide located within the site, which diverts the flows from the site to the east towards another tributary of the Etobicoke Creek. Please refer to **Figure 2.1** for more details.

Based on the TRCA design criteria (August 2012), the site is located within TRCA defined catchment 224.

MMM Group Limited completed a Draft Final Report-Etobicoke Creek Hydrology Update (April 2013), further breaking down the catchment drainage boundaries located within the Etobicoke Creek "Spring Creek" subwatershed. The subject site was identified as part of three (3) pre-development catchment area IDs. The west portion of the site drains southerly and is within catchment ID area 41. The easterly portion of the subject site is split between catchment ID 447 and 24.

The catchment areas defined in the Draft Final Report-Etobicoke Creek Hydrology Update (April 2013) can be seen in **Figure J-1** (provided in **Appendix A.1**).

The pre-development drainage areas located within the site boundary were determined based on the available topography data and shown in **Figure 2.1** and summarized in **Table 2-1**.

Table 2-1: Summary of Pre-development Drainage Areas

TRCA Design Criteria (August 2012)	*Draft Final Report-Etobicoke Creek Hydrology Update* (April 2013)		SCE Pre-development Drainage Areas (Based on **Figure 2.1)**		
Catchment ID	Subwatershed	Catchment ID	Catchment ID	Runoff Direction	Area (ha)
224	Spring Creek	41	1	SW	46.2
224	Spring Creek	24	2	SE	12.6
224	Spring Creek	447	3	NE	2.9

The existing storm infrastructure within the vicinity of the site includes existing SWM ponds, culverts and a storm sewer system on Mayfield Road, collecting the road drainage. Please refer to **Figure 2.1**, which identifies the existing SWM ponds and existing culverts.

There are two existing SWM ponds located near the sites. One of the existing stormwater management ponds is located southwest of the subject site in the northeast corner of the Kennedy Road and Mayfield Road intersection. The pond, designed initially by Stantec (2007), was sized to accommodate Mayfield Road's runoff and external area. GHD (May 2017) completed a facility retrofit report to ensure that the pond was providing adequate quality and quantity control. Based on the tributary drawing, the estate lots along Mayfield Road, which are within the subject boundary, were accommodated in the Pond as an external area; however, the Stantec (2007) report identifies that any future development of the external lands should provide their own quantity and quality control. The pond was sized to accommodate the Mayfield Road Widening. The pond discharges to the Spring Creek tributary that runs through the subject site.

The other SWM pond is located south of Mayfield Road and west of Heart Lake Road, as identified in **Figure 2.1**. The background data collected for the existing two SWM ponds is presented in **Appendix A.1** for additional information.

2.3 Existing Hydrology Model

2.3.1 TRCA Existing Hydrology Model

The latest Etobicoke Creek Hydrology Model was completed by MMM Group Limited (April 2013). The model was created for TRCA to determine quantity control criteria for development located within the watershed. Etobicoke Creek watershed runs through Caledon, Brampton, Mississauga and Toronto. The Etobicoke Creek model delineated sub-basins, in which the Snell's Hollow East Secondary Plan Area is located within the Spring Creek subwatershed in sub-basin number 6.

2.3.2 Existing Catchment Parameters

The Draft Final Report-Etobicoke Creek Hydrology Update (April 2013) by MMM Group Limited determined watershed parameters through the DTM, aerial photographs, and soil maps. SCS Curve Number method was used in the model, which is a function of land use, soil type, and AMC conditions; the weighted average was calculated using GIS software. Initial abstraction was calculated based on the Visual OTTHYMO Model Hydraulic Reference manual. As discussed in **Section 2.1**, the subject site falls within three (3) catchment areas of the Spring Creek subcatchment. **Table 2-2** summarizes the existing catchment parameters defined in the MMM Group Limited TRCA hydrology model (April 2013).

Table 2-2: Summary of TRCA Existing Model Catchment Parameters

TRCA Model		TRCA Catchment ID	TRCA Catchment Area (ha)	CN	IA	TP (hr)
Existing-2 to 100yr	AMCII	41	263.00	74	8.9	0.516
Existing-Regional_12hr_AMCIII	AMCIII	41	263.00	88	8.9	0.516
Existing-2 to 100yr	AMCII	24	140.14	76	8.1	0.557
Existing-Regional_12hr_AMCIII	AMCIII	24	140.14	89	8.1	0.557
Existing-2 to 100yr	AMCII	447	106.74	79	6.8	0.585
Existing-Regional_12hr_AMCIII	AMCIII	447	106.74	91	6.8	0.585

2.3.3 Corresponding Flows (TRCA)

The Flows from the TRCA Hydrology modelling corresponding to the catchments 41, 24 and 447 are summarized below in **Table 2-3.**

Table 2-3: Existing TRCA Flows for catchments 41, 24 and 447

Storm Event	TRCA Catchment ID 41	TRCA Catchment ID 24	TRCA Catchment ID 447
2-Year	2.66 cms	1.55 cms	1.41 cms
5-Year	4.69 cms	2.69 cms	2.36 cms
10-Year	6.25 cms	3.55 cms	3.06 cms
25-Year	8.36 cms	4.71 cms	4.00 cms
50-Year	10.01 cms	5.62 cms	4.73 cms
100-Year	11.74 cms	6.57 cms	5.48 cms
Regional Event	32.36 cms	17.05 cms	12.96 cms

2.3.4 Subject Site Hydrology

A separate hydrology model was not prepared for the subject site to analyze the peak flows from the subject site. Instead, the flows from the existing TRCA model was used to establish the flows from the subject site using the MTO Prorating Methodology. This approach was used to establish the flows to ensure that the subject site flows correspond to the calibrated TRCA Existing model.

The existing flows for the subject site are summarized in **Table 2-4** below. Detailed calculations are provided in **Appendix A.2**.

Table 2-4: Existing Peak Flows for catchments 1, 2 and 3

Storm Event	SCE Catchment ID 1	SCE Catchment ID 2	SCE Catchment ID 3
2-Year	0.72 cms	0.26 cms	0.09 cms
5-Year	1.27 cms	0.44 cms	0.16 cms
10-Year	1.70 cms	0.58 cms	0.20 cms
25-Year	2.27 cms	0.77 cms	0.27 cms
50-Year	2.72 cms	0.92 cms	0.32 cms
100-Year	3.19 cms	1.08 cms	0.37 cms
Regional Event	8.78 cms	2.80 cms	0.87 cms

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SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- AREA 1 DRAINAGE AREA = 46.2ha
- AREA 2 DRAINAGE AREA = 12.6ha
- AREA 3 DRAINAGE AREA = 2.9ha
- DIRECTION OF DRAINAGE FLOW
- EXISTING WATERCOURSE
- EXISTING CULVERT
- EXISTING SWM POND

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FIGURE 2.1
PRE-DEVELOPMENT DRAINAGE PLAN

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2.4 Stormwater Design Criteria

As per TRCA design criteria (August 2012), the following design criteria will need to be considered in the development of the Snell's Hollow East Secondary Plan Area;

- **Quantity control:** Peak flows are to be controlled to the unit flow rates described in the TRCA Appendix A for Etobicoke Creek Catchment 224. The unit flow rates are summarized in the table below:

Table 2-5: TRCA Unit Flow Rate Equations for Etobicoke Creek, Catchment 224.

Return Period (years)	Unit flow Equation (l/s/ha)
2	7.5
5	13.3
10	18.7
25	27
50	35.2
100	42.1

- **Design Storms:** Peak flows are to be modelled using the 6-hour AES storm as defined in the TRCA criteria.

- **Erosion control:** Erosion control will be provided either through the 5mm retention (for site plans < 2.0ha) or the 25mm 48hour detention in SWM ponds.

- **Quality control:** Enhanced level of quality protection (80% TSS removal) is required as per the latest MOE SWMP Manual.

- **Water Balance:** The subject site is within a significant groundwater recharge area (SGRA); therefore pre-development recharge conditions are to be maintained in post-development conditions;

- **Feature-Based Water Balance (FBWB)**: PSW's have been identified on the subject site, runoff to these features should be maintained in post-development conditions.

The following design criteria were established in the *Draft Final Report-Etobicoke Creek Hydrology Update*, by MMM Group Limited, dated April 2013:

- **Design Storms:** The report recommends utilizing the 12hr AES rainfall distribution for a 2-100 year rainfall event to establish the peak flows. The Regional event should be modelled with the final 12-hours of the Hazel event under AMC III conditions.

- **Quantity Control:** New unit flow rates were established for infill developments for both the 2-100 storm events and regional storm events (please see the table below); however, any development on the subject site cannot be considered infill. It was confirmed with TRCA that regional control is required for this site based on the release rate of 127.44l/s/ha.

As per the report, the pre-development Regional flows are to be maintained in post-development conditions and unit flow rates have been developed. Regional storage will require an additional 214m^3/ha, which is to be added after the Regional Storm storage has been sized using the unit flow rates.

Table 2-6: Unit Flow Rate as per the *Draft Final Report-Etobicoke Creek Hydrology Update*

Return Period (years)	Unit flow Equation Catchment 41 (l/s/ha)	Unit flow Equation Catchment 24 (l/s/ha)	Unit flow Equation Catchment 447 (l/s/ha)
2	10.11	11.09	13.21
5	17.85	19.20	22.06
10	23.75	25.34	28.65
25	31.77	33.63	37.45
50	38.08	40.12	44.28
100	44.65	46.85	51.32
Regional	127.44 (Basin 6)		

The subject site is bounded by the Mayfield Region of Peel Right of Way (ROW). The applicable design criteria stated in the Region of Peel Public Works Stormwater Design Criteria and Procedural Manual, June 2019, will apply for works within the Regional ROW.

2.5 Proposed Stormwater Management Scheme

To provide the required stormwater management control and meet the design criteria presented in **Section 2.4**, two (2) stormwater management facilities are proposed, as shown in **Figure 2.2**. The two SWM facilities service for the majority of the site. SWM Facility 1 discharges to the Etobicoke tributary located within the subject site and SWM Facility 2 discharges to the existing 525mm diameter storm sewer on Heart Lake Road. The remaining catchment (South Site Plan – Catchment 203) is proposed to follow the existing drainage conditions and drain towards the Etobicoke's tributary located within the site, providing on-site controls.

The proposed SWM 1 and SWM 2 facilities are proposed to provide water quality, quantity treatment and erosion control during the post-development conditions. SWM Facility 1 services the western half of the subject site lands west of Heart Lake Road, and SWM Facility 2 services the eastern half and the subject lands east of Heart Lake Road. The water balance criterion is proposed to be met site-wide as discussed in **Section 2.9.1** below.

The tributary to each SWM facility and the corresponding imperviousness is presented in **Figure 2.2** and **Table 2-7** below. Detailed calculations are presented in **Appendix A.3**.

Table 2-7: Post Development Drainage Areas

Facility	Post Development Catchment ID	Area (ha)	Total area (ha)	Imperviousness	Runoff Coefficient
SWM Facility 1	201	14.51	14.51	54%	0.58
SWM Facility 2	202	13.68	19.73	63%	0.64
	204	6.05			
On-site Controls	203	2.72	2.72	90%	0.83

Please refer to **Figure 2.2** for an illustration of the post-development drainage plan. The proposed Stormwater infrastructure is presented in **Figure 2.3**.

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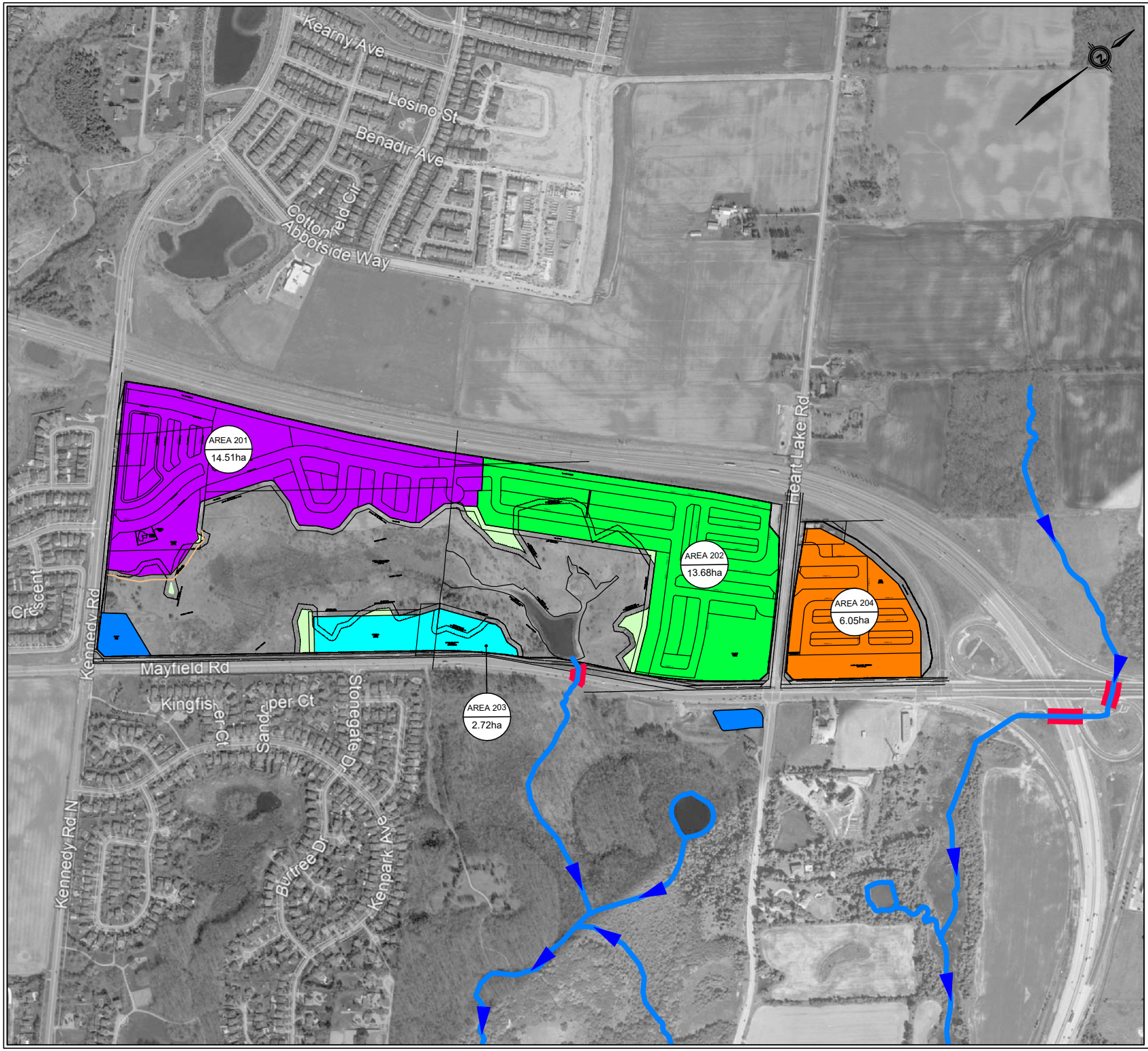

SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- AREA 201 DRAINAGE
  AREA = 14.51ha
  RUNOFF COEFFICIENT = 0.58
- AREA 202 DRAINAGE
  AREA = 13.68ha
  RUNOFF COEFFICIENT = 0.62
- AREA 203 DRAINAGE
  AREA = 2.72ha
  RUNOFF COEFFICIENT = 0.83
- AREA 204 DRAINAGE
  AREA = 6.05ha
  RUNOFF COEFFICIENT = 0.67
- EXISTING WATERCOURSE
- EXISTING CULVERT
- EXISTING SWM POND

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FIGURE 2.2
POST-DEVELOPMENT DRAINAGE PLAN

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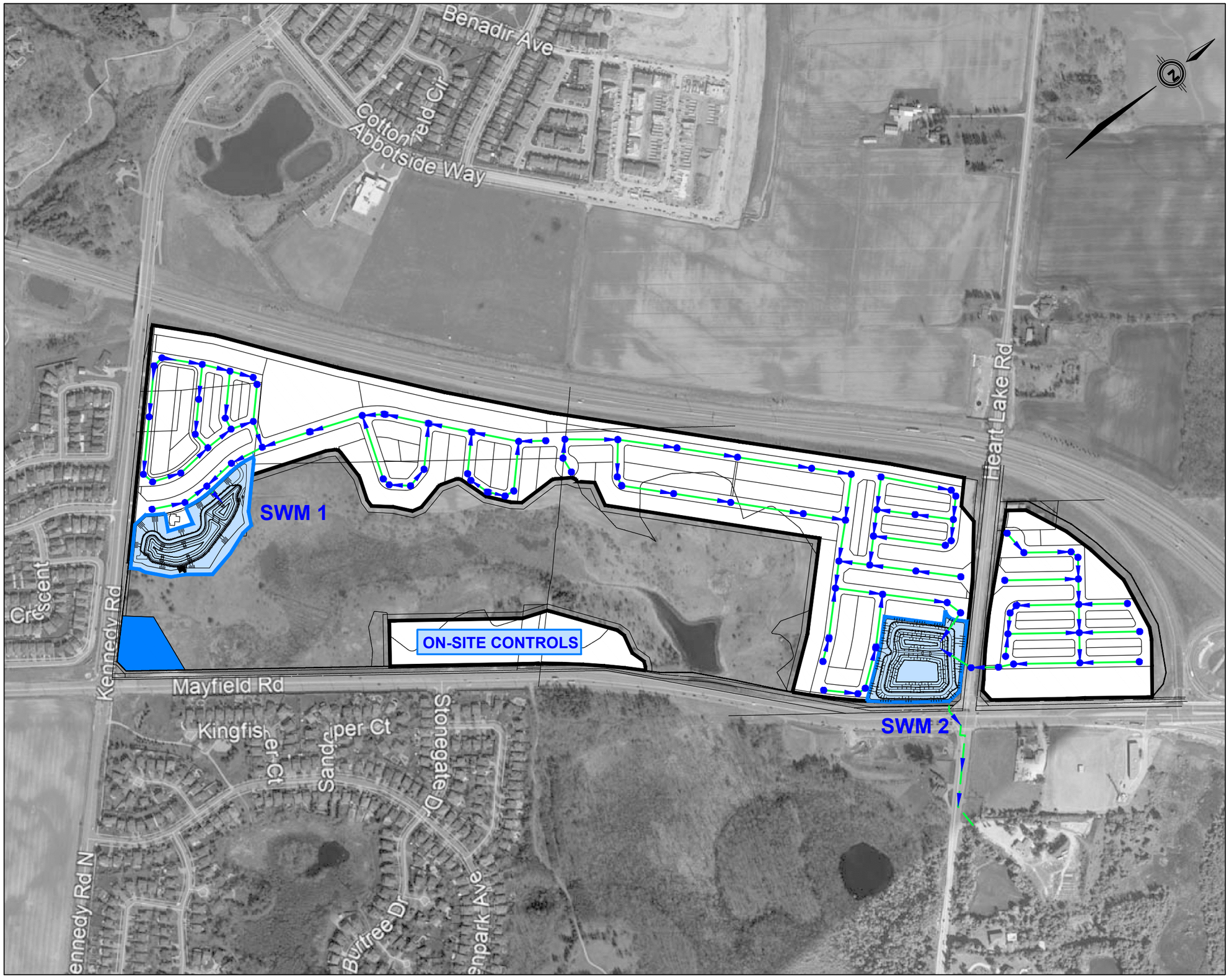

LEGEND

- DEVELOPMENT BOUNDARY
- PROPOSED SWM PONDS
- PROPOSED STORM SEWERS
- EXISTING SWM POND
- EXISTING STORM SEWER
  (PLEASE REFER TO BACKGROUND INFORMATION PRESENTED IN APPENDIX A.1)

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FIGURE 2.3
STORM SERVICING PLAN

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2.6 SWM Strategy – Area Draining to SWM Pond 1 (Catchment 201)

A detailed evaluation of the SWM and Low Impact development measures that apply to the proposed development were reviewed and presented in the CEISMP Section 8.3.1. As presented in the report, a SWM Pond is proposed to achieve the quality, quantity and erosion control requirements for Catchment 201, as per the design criteria discussed in **Section 2.4**. SWM Pond 1 discharges to the creek located within the subject site.

2.6.1 Allowable Release Rates

As discussed in the previous sections, approximately 14.51 ha is proposed to drain to the SWM facility 1. The maximum allowable release rates from SWM Pond 1 are based on the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The pond release rates are based on a pre-development drainage area of 19.44ha. A summary of the allowable flows from SWM Pond 1 are outlined in **Table 2-8** below.

Table 2-8: Summary of the Allowable Design Flows for SWM Pond 1

Return Period (years)	Target Flow Rate ($m^3/s/ha$)	Target Rate (m^3/s)
2	0.0075	0.146
5	0.0133	0.259
10	0.0187	0.364
25	0.0270	0.525
50	0.0352	0.684
100	0.0421	0.819
Regional Event	0.123*	1.785

**The regional unit flow rate is based on TRCA's existing peak flow of 32.36cms for catchment 41 with an area of 263 ha.*

2.6.2 Quantity Control

According to the latest stormwater management plan, it is proposed to drain approximately 14.51 ha of the subject site to SWM Pond 1.

Based on the calculations presented in **Appendix A.3,** the required 100-year storage volume is 2863 $m^{3,}$ and the required regional event volume is 5968 m^3. Please note that since the post-development regional peak flow

of 1.47m^3/s was less than the allowable release rate of 1.785cms, the regional storage volume was estimated by adding the 214m3/ha to the 100-year storage volume.

Currently, SWM Pond 1 is adequately sized to provide 100-year storage of 4200 m^3 and a regional volume of 7180 m^3. The full VO results are provided in **Appendix A.3**.

Table 2-9: Storage Volume for SWM Pond 1

Return Period (years)	Target Flow Rate (m^3/s/ha)	Target Rate (m^3/s)	Required volume (m^3) (Governing Storm)
2	0.0075	0.146	2350
5	0.0133	0.259	2500
10	0.0187	0.364	2594
25	0.0270	0.525	2723
50	0.0352	0.684	2789
100	0.0421	0.819	2863
Regional Event	0.123	1.785	5968

2.6.3 Quality Control

Quality Control for the tributary area to SWM Pond 1 (14.51 ha) will be provided at the pond. The permanent pool is sized to provide 80% of TSS removal based on Table 3.2 in the MOE. *SWM Planning and Design Manual*. The required permanent pool volume is summarized in **Table 2-10** below, and calculations are provided in **Appendix A.4** for reference.

Table 2-10: Permanent Pool Volume for SWM Pond 1

Contributing Area	Overall Imperviousness (%)	Required Permanent Pool Volume (m^3)	Provided Permanent Pool Volume (m^3)
14.51	54	2137	2250

2.6.4 Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25mm event over 48 hours. Additionally, the Fluvial Geomorphological Assessment completed by GeoMorphix (April 15, 2020) recommended a 24 hour or 48-hour detention of the 25mm to prevent erosion in the subject site area and downstream.

Therefore, SWM Pond 1 was sized to ensure that the 25mm event is released over 48 hours. Please refer to **Appendix A.3** for erosion control calculations. **Table 2-11** below provides a summary of the required erosion control volume.

Table 2-11: Erosion control required volume for SWM Pond 1

Contributing Area	RV (mm) (Value from VO model)	Required Storage Volume (m^3)	Peak Outflow (m^3/s)
14.51	14.8	2147	0.019

2.7 SWM Strategy – Area Draining to SWM Pond 2 (Catchments 202 & 204)

A detailed evaluation of the SWM and Low Impact development measures that apply to the proposed development were reviewed and presented in the CEISMP Section 8.3.1. As presented in the report, a SWM Pond is proposed to achieve the quantity, quality and erosion control requirements for Catchments 202 and 204, as per the design criteria discussed in **Section 2.4.** SWM Pond 2 discharges to the existing 525mm diameter storm sewer on Heart Lake Road.

2.7.1 Allowable Release Rates

As discussed in the previous sections, approximately 19.73ha is proposed to drain to the SWM facility 2. The maximum allowable release rates from SWM Pond 2 are based on the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The pond release rates are based on a pre-development drainage area of 12.65ha. A summary of the allowable flows from SWM Pond 2 are outlined in **Table 2-12** below.

Table 2-12: Summary of the Allowable Design Flows for SWM Pond 2

Return Period (years)	Target Flow Rate ($m^3/s/ha$)	Target Rate (m^3/s)
2	0.0075	0.095
5	0.0133	0.168
10	0.0187	0.236
25	0.0270	0.341
50	0.0352	0.445
100	0.0421	0.532
Regional Event	0.122*	1.538

**The regional unit flow rate is based on TRCA's existing peak flow of 17.05cms for catchment 24 with an area of 140.14 ha.*

2.7.2 Quantity Control

According to the latest stormwater management plan, it is proposed to drain approximately 19.73 ha of the subject site to SWM Pond 2.

Based on the calculations presented in **Appendix A.3,** the required 100-year storage volume is 7925 $m^{3,}$ and the required regional event volume is 19037 m^3. The regional storage volume was estimated by adding the 214m3/ha to the regional storm storage sized using the unit flow rates.

Currently, SWM Pond 2 is adequately sized to provide 100-year storage of 7980 m^3 and a regional volume of 19510 m^3. The full VO results are provided in **Appendix A.3**.

Table 2-13: Storage Volume for SWM Pond 2

Return Period (years)	Target Flow Rate ($m^3/s/ha$)	Target Rate (m^3/s)	Required volume (m^3) (Governing Storm)
2	0.0075	0.095	4594
5	0.0133	0.168	5719
10	0.0187	0.236	6392
25	0.0270	0.341	7099
50	0.0352	0.445	7484
100	0.0421	0.532	7925
Regional Event	0.122	1.538	19037

2.7.3 Quality Control

Quality Control for the tributary area to SWM Pond 2 (19.73 ha) will be provided at the pond. The permanent pool is sized to provide 80% of TSS removal based on Table 3.2 in the MOE. *SWM Planning and Design Manual*. The required permanent pool volume is summarized in **Table 2-14** below and calculations are provided in **Appendix A.4** for reference.

Table 2-14: Permanent Pool Volume for SWM Pond 2

Contributing Area	Overall Imperviousness (%)	Required Permanent Pool Volume (m^3)	Provided Permanent Pool Volume (m^3)
19.73	63	3317	4400

2.7.4 Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25mm event over 48 hours. Additionally, the Fluvial Geomorphological Assessment completed by GeoMorphix (April 15, 2020) recommended a 24 hour or 48-hour detention of the 25mm to prevent erosion in the subject site area and downstream.

Therefore, SWM Pond 2 was sized to ensure that the 25mm event is released over 48 hours. Please refer to **Appendix A.3** for erosion control calculations. **Table 2-11** below provides a summary of the required erosion

control volume.

Table 2-15: Erosion control required volume for SWM Pond 2

Contributing Area	RV (mm) (Value from VO model)	Required Storage Volume (m^3)	Peak Outflow (m^3/s)
19.73	16.776	3310	0.029

2.8 SWM Strategy – South Site Plan Area (Catchment 203)

2.8.1 Allowable Release Rates

As previously discussed, the site plan area (Catchment 203) located at the south side of the subject lands is proposed to have on-site controls. The on-site storage will control peak flows to the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The release rates are based on a pre-development drainage area of 2.72ha. A summary of the south site plan's allowable flows is outlined in **Table 2-16** below.

Table 2-16: Summary of the Allowable Design Flows for the South Site Plan (Catchment 203)

Return Period (years)	Target Flow Rate ($m^3/s/ha$)	Target Rate (m^3/s)
2	0.0075	0.020
5	0.0133	0.036
10	0.0187	0.051
25	0.0270	0.073
50	0.0352	0.096
100	0.0421	0.115
Regional Event	0.123*	0.335

**The regional unit flow rate is based on TRCA's existing peak flow of 32.356cms for catchment 41 with an area of 263 ha.*

2.8.2 Quantity Control

On-site controls are proposed for the South Site Plan in order to maintain the allowable release rates presented

in **Section 2.8.1** above.

Based on the calculations presented in **Appendix A.3,** the required 100-year storage volume is 1486 $m^{3,}$ and the required regional event volume is 2550 m^3. The full VO results are provided in **Appendix A.3**.

The on-site retention methods (Underground storage, parking storage or roof storage) will be determined at the site plan stage when additional information is available.

Table 2-17: Storage Volume for the South Site Plan (Catchment 203)

Return Period (years)	Target Flow Rate ($m^3/s/ha$)	Target Rate (m^3/s)	Required volume (m^3) (Governing Storm)
2	0.0075	0.020	819
5	0.0133	0.036	1002
10	0.0187	0.051	1117
25	0.0270	0.073	1265
50	0.0352	0.096	1376
100	0.0421	0.115	1486
Regional Event	0.123	0.335	2550

2.8.3 Quality Control

On-site measures should be designed to provide 80% TSS removal to achieve the quality control requirements.

The on-site measures can be stand-alone units like Jellyfish Filter units or a combination of Lot-level techniques, including but not limited to infiltration galleries, bioswales, tree pits, permeable pavers or underground infiltration/ retention tanks.

2.8.4 Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25mm event over 48 hours. Please refer to **Appendix A.3** for erosion control calculations. **Table 2-18** below provides a summary of the required erosion control volume.

Table 2-18: Erosion control required volume for the South Site Plan

Contributing Area	RV (mm) (Value from VO model)	Required Storage Volume (m^3)	Peak Outflow (m^3/s)
2.72	22.692	617	0.005

Since achieving an outflow of 5 L/s is not feasible, the erosion control requirements can be met via 5mm on-site retention given the small area of the site (2.72 ha).

2.9 Water Balance and Feature-Based Water Balance

2.9.1 Water Balance

The subject site is not located within a WHPA-Q1/Q2 area; however, some areas are located within a significant groundwater recharge area (SGRA). Therefore, as per TRCA design criteria (August 2012), the subject site requires that post-development infiltration matches existing conditions. A post to pre-development conditions detailed water balance was undertaken for the proposed development. The total precipitation value was based on the TRCA water budget tool.

As the TRCA water budget tool inputs do not equal outputs, the evaporation value was determined based on prorating the precipitation value. The infiltration factor for pervious areas was determined based on the M.O.E. factors. M.O.E. factors were determined to assume the site has tight clay soils, the terrain has rolling hills, and land cover varies between agricultural, meadow, and natural feature areas. The existing rooftops were considered impervious areas.

It is determined that the site annual infiltration capacity for pre-development conditions is approximately 112,905 $m^{3,}$ and it will drop to 75,621 m^3 per year under the post-development conditions. Thus, the approximate annual infiltration deficit is calculated to be 37,284 m^3.

In order to achieve the post to pre infiltration for the subject lands, the following options were explored in detail. Please note the below options are explored only for the lands west of Heart Lake Road. There are limited options for lands east of Heart Lake Road due to limited space. For example, the Clean water collector system (proposed in Option 3) below will be challenging as it introduces a new sewer system that requires crossing the Regional ROW. Additionally, grading constraints and limited spacing constrict the ability to propose infiltration facilities.

Option 1: Infiltration Trenches for Catchments 201 and 202 & On-site measures for Catchment 203

The following option proposes infiltration trenches where feasible to meet the water balance requirements and assumes the Catchment 203 will provide its own site plan measures.

The proposed measures in this option are detailed below.

- Catchment 203 to provide own site plan control to achieve 5mm infiltration
    - Various LID measures that can help achieve the required SWM criteria were discussed in the CEISMP report. Please refer to Section 8.4 of the CEISMP for more details.
- Infiltration Trenches are proposed at Low-Density Development area(Detached/Semi-Detached/St. Townhouses).
    - Based on the preliminary calculation presented in **Appendix A.5**, approximately 2000m of Infiltration trench (Width = 1.5m and Depth = 0.72m) is required to meet the water balance. A design infiltration rate of 15mm/hr with a safety factor of 2.5 was utilized to complete these calculations. Based on the development plan, approximately 2339m is available for infiltration trenches, as shown in the figure in **Appendix A.5.**
- Infiltration trenches in the Park area
    - Based on the preliminary calculation presented in **Appendix A.5**, approximately 201m of Infiltration trench (Width = 1.5m and Depth = 0.72m) is required to meet the water balance. A design infiltration rate of 15mm/hr with a safety factor of 2.5 was utilized to complete these calculations.

The above measures help achieve the 34820m^3/y of the above mentioned 37284m^3/y deficit. This option is currently recommended for the proposed development. It helps achieve the required post to pre-water balance, and the operation and maintenance costs are estimated to be low compared to the other options discussed below.

Table 2-19 summarizes the pre to post-development conditions water balance with mitigation measures presented in Option 1.

Table 2-19: Water Balance Summary

Characteristics	Site				
	Total Pre-development	Post-development	Percent Change (Pre to Post)	Post-development with mitigation (OPTION 1)	Change (pre to post with mitigation) (OPTION1)
Inputs (Volumes)					
Precipitation (m^3/year)	535,556	535,556	0%	535556	0%
Total Inputs (m^3/year)	535,556	535,556	0%	535556	0%
Outputs (Volumes)					
Precipitation surplus (m^3/year)	258,625	340,197	24%	340197	24%
Net Surplus (m^3/year	258,625	340,197	24%	340197	24%
Total Evapotranspiration (m^3/year)	276,931	195,359	-42%	195359	-42%
Total Infiltration (m^3/year)	112,905	75,621	-49%	110441	-2%
Total Runoff (m^3/year)	145,720	264,576	45%	229756	37%
Total Outputs (m^3/year)	535,556	535,556	0%	535556	0%

Option 2: Infiltration Trenches (Catchments 201 and 202), Infiltration Gallery (Catchment 201) & On-site measures for Catchment 203

The following option proposes infiltration trenches where feasible to meet the water balance requirements and assumes the Catchment 203 will provide its own site plan measures. Additionally, an infiltration gallery is proposed to provide a post to pre-water balance for the area draining to the facility.

The proposed measures in this option are detailed below.

- Catchment 203 to provide own site plan control to achieve 5mm infiltration
    - Various LID measures that can help achieve the required SWM criteria were discussed in the CEISMP report. Please refer to Section 8.4 of the CEISMP for more details.
- Infiltration Gallery in Park Area (Catchment 201)
    - A separate CWC is proposed to convey the flows to an infiltration galley (approximately 0.3ha) to provide infiltration for the roof areas within Catchment 201.
- Infiltration Trenches are proposed at Low-Density Development area(Detached/Semi-Detached/St.

Townhouses) within Catchment 202 and Catchment 201

- Based on the preliminary calculation presented in **Appendix A.5**, approximately 935m of Infiltration trench (Width = 1.5m and Depth = 0.72m) is required to meet the water balance. A design infiltration rate of 15mm/hr with a safety factor of 2.5 was utilized to complete these calculations. Based on the development plan, approximately 1111m is available for infiltration trenches, as shown in the figure in **Appendix A.5.**

The above measures help achieve the 39940m^3/year, which is greater than the 37284m^3/year deficit. This option is currently not recommended as it involves a third pipe system and a separate infiltration gallery. However, this option can be explored in the detail design stage to achieve the requirements, if the agency requires.

Option 3: Perforated Clean Water Collector System & On-site measures for Catchment 203

The following option proposes a perforated clean water pipe system that collects clean water from the roofs and promotes infiltration. Similar to the other two options, catchment 203 is proposed to provide its infiltration measures.

The proposed measures in this option are detailed below.

- Catchment 203 to provide own site plan control to achieve 5mm infiltration
  - Various LID measures that can help achieve the required SWM criteria were discussed in the CEISMP report. Please refer to Section 8.4 of the CEISMP for more details.
- Perforated CWC's
  - A perforated CWC system is proposed and the storm sewers to enable infiltration from the clean roof areas. As shown in the calculations in **Appendix A.5**, approximately 1950m of 300mm diameter perforated pipe is required to satisfy the infiltration requirements.

The above measures help achieve the 37284m^3/year deficit. This option is currently not recommended as it involves a third pipe system. However, this option can be explored in the detail design stage to achieve the requirements.

2.9.2 Feature Base Water Balance

The *Snell's Hollow East Secondary Plan Baselines Condition* Report by R.J. Burnside (August 2020) identifies that the subject site drains to the Heart Lake Provincial Significant Wetlands (PSW) defined by the

Ministry of Natural Resources (MNRF). A portion of the PSW is within the site boundary.

R.J Burnside and Schaeffers Consulting Engineers completed a Wetland Water Balance Risk Evaluation that classified the wetlands within the subject side as "High Risk." As required by TRCA, a continuous water balance model was prepared by Schaeffers Consulting Engineers. The details are presented in the report titled "Feature-Based Water Balance – Snells Hollow Secondary Plan Area," dated February 2021.

2.10 Floodplain Analysis

A floodplain analysis has been conducted for the subject site to determine the conveyance capacity of the tributary. The method of establishing the existing floodplain has been discussed with the TRCA due to the backwater conditions caused by the 1050 mm diameter culvert under the Mayfield Road crossing. Schaeffer's previously conducted the analysis using conventional 1-D HEC-RAS Modelling. It was found that the water spills over the Mayfield Road at various locations, including the culvert's location. Due to the very limited capacity of the culvert, the system acts in backwater; 1-D modelling ignores the impacts of storage available within the valley. This information was conveyed to the TRCA during a meeting held on August 7th, 2020 between the TRCA and Schaeffers. It was concluded to establish the floodplain assuming the culvert being plugged and assuming the valley as a complete storage unit.

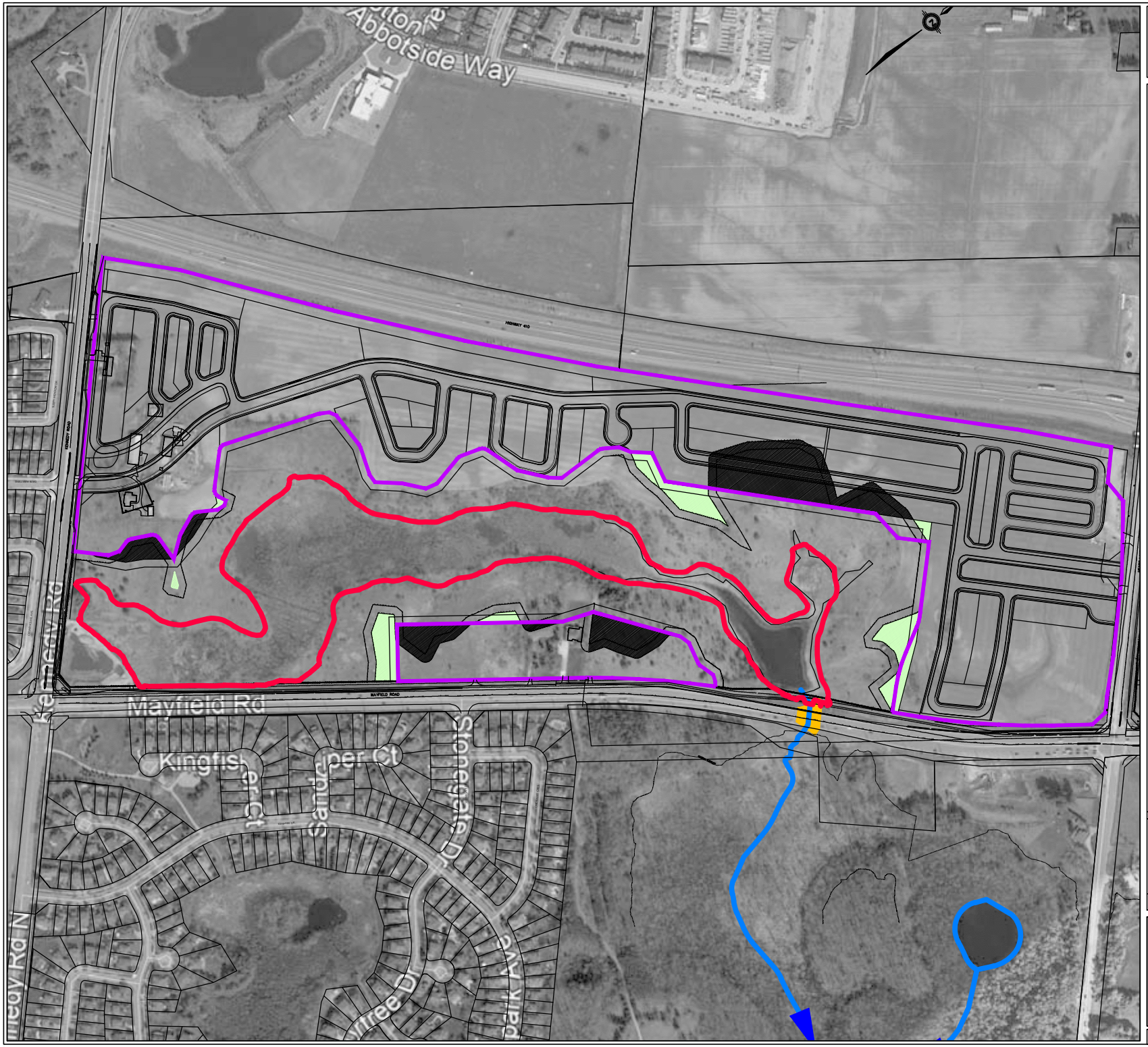
In following this methodology, Schaeffer's established the floodline for the subdivision based on the total runoff volume generated from the Future drainage conditions at the request of the TRCA. It is to note that the spill elevation to Mayfield Road has been established based on the field survey as 257.50 masl. The total available storage within the valley is calculated to be 183,870 m^3 at the elevation of 257.50 masl. Please refer to the floodplain shown in **Figure 2.4**.The overall drainage area towards the watercourse in Future conditions is calculated to be 51.75ha. This area includes the 9.76ha drainage area to the Kennedy SWM Pond as per the SWM report by GHD (SWM Facility Retrofit Report), the 17.23 ha from the proposed subdivision, and the 24.76 ha of drainage from the valley. Please refer to the future conditions drainage area in **Figure 2.5.**

2.10.1 Runoff Generated

The runoff volume calculation has been carried out using Visual OTTHYMO. Overall drainage parameters have been updated to reflect the future drainage conditions and the land uses. Based on the VO hydrograph output for the Hurrican HAZEL regional storm case, a total runoff volume of 184.452mm is expected. This

amounts to 95,454 m^3 of volume. VO modelling results are presented in **Appendix D**. With the assumption that the culvert is plugged, it has been estimated that the water surface elevation will be 256.65 masl within the valley when retaining 95,454 m^3 of water, lower than the spill elevation. As such, the proposed grading and servicing has been carried out to safely maintain a freeboard from this elevation. The proposed floodline is depicted in **Figure 2.4.** Furthermore, this floodline has been delineated on the existing floodplain drawing.

Phil Gotfried



SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- EXISTING WATERCOURSE
- FUTURE REGIONAL FLOODLINE ELEVATION 256.65m
- EXISTING CULVERT
- DEVELOPMENT BOUNDARY

PLEASE NOTE THE DRAFT PLAN SHOWN HERE IS CONCEPTUAL

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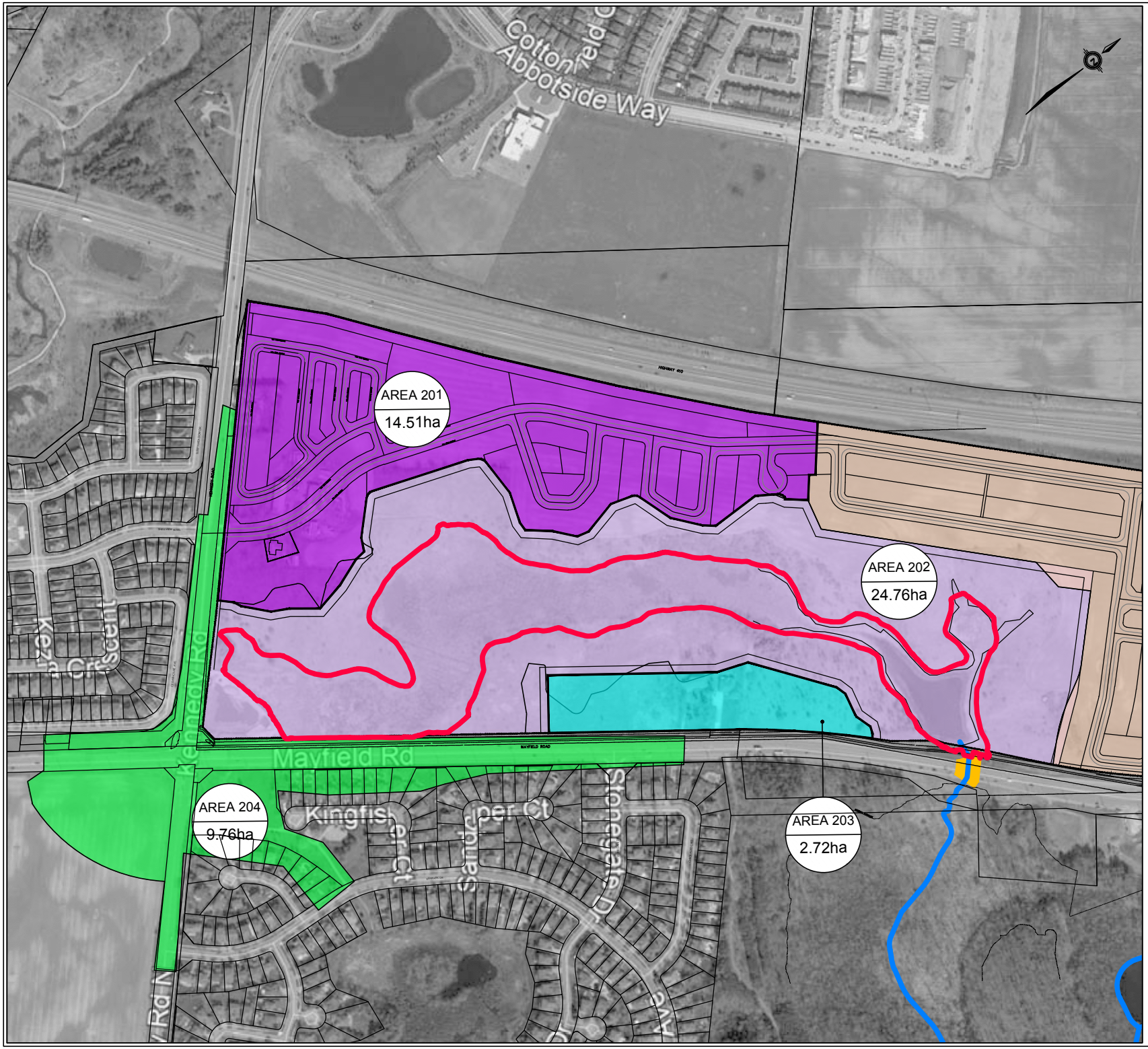
FIGURE 2.4
FUTURE REGIONAL FLOODLINE

2019-4851	FEBRUARY 2021	SCALE: N.T.S.

Yashaswy Gollamudi



SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- AREA 201 DRAINAGE
  AREA = 14.51ha
  RUNOFF COEFFICIENT = 0.58
- AREA 202 DRAINAGE
  AREA = 24.76ha
  RUNOFF COEFFICIENT = 0.25
- AREA 203 DRAINAGE
  AREA = 2.72ha
  RUNOFF COEFFICIENT = 0.83
- AREA DRAINING TO EAST AWAY FROM THE VALLEY CORRIDOR
- AREA 204 DRAINAGE
  AREA = 9.76ha
  RUNOFF COEFFICIENT = 0.52
  AREA OBTAINED FROM GHD SWM POND REPORT
- EXISTING WATERCOURSE
- EXISTING CULVERT
- FUTURE REGIONAL FLOODLINE ELEVATION 256.65m

PLEASE NOTE THE DRAFT PLAN SHOWN HERE IS CONCEPTUAL

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FIGURE 2.5
FUTURE DRAINAGE AREA

2019-4851	FEBRUARY 2021	SCALE: N.T.S.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Servicing

Currently, the subject site is predominantly surrounded by vacant lands with no existing sanitary services in the subject site's vicinity.

3.2 Background Studies and Future Infrastructure

Additional studies and projects are currently in progress/completed by the Region of Peel and other surrounding developments that provide sanitary servicing for the proposed development.

The studies and projects have been summarized in the sections below.

3.2.1 Region of Peel – Kennedy Road Sanitary Sewer

The Region of Peel has retained EXP to provide engineering services for sanitary sewer construction on Kennedy Road North and Conservation Drive in the City of Brampton. The sanitary sewers' construction was deemed necessary by the Peel Region to service the future residential development, Mayfield West Phase 1. As per the drawings shown in **Appendix B.1**, a 1200mm diameter CPP sanitary sewer, approximately 2055m long, is proposed on Kennedy Road from 100m north of Mayfield Road to Conservation Drive Drive and along Conservation Drive from Kennedy Road to 150m West of Dawnridge Trail in the City of Brampton. The proposed sewers connect to the existing sewer network at Conservation Drive and Dawnridge Trail.
Based on the correspondence dated February 09, 2021, the completion of the construction is currently unknown. A construction tender is expected to be issued for late spring of 2021.

The relevant excerpts are presented in **Appendix B.1**.

3.2.2 Heart Lake Road Employment Lands, Master Environmental Servicing Plan (MESP) by TIMG (dated March 2015)

As part of the Heart Lake Road Employment lands development located east of Heartlake Road and North of Countryside Drive, TMIG proposed a sanitary sewer network to service the lands. The sanitary sewer network proposed along the Ecopark Close Road from the Heartlake road considered an external area of approximately 54.38ha and a population of 6663 in the infrastructure design.

As per the Sanitary Drainage plan, EXSAN03 prepared by TMIG, a portion of the proposed development west of Heartlake Road(approximately 24.03 ha and equivalent population of 4002), and the subject site east of Heartlake Road (approximately 7.0ha and equivalent population of 1645) was considered in the design of the downstream sewer.

Region of Peel has confirmed that the works for the project have been completed in an email correspondence dated February 09, 2021.

The relevant excerpts are presented in **Appendix B.1**.

3.3 Sanitary Design Criteria

The sanitary flow calculations are based on the following Region of Peel's Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Sanitary Sewer Design Criteria (Revised July 2009):

- a sanitary demand of 308.8 L/cap/day;
- Harmon Peaking Factor, K is $[1+14/(4+P^{0.5})]$, Where P is the population in thousands;
- an infiltration rate of 0.2L/s/ha;
- a maximum velocity of 3.5 m/s; and
- a minimum velocity of 0.75 m/s.

3.4 Proposed Sanitary Servicing Plan

As shown in **Figure 3.1**, two (2) separate sewer networks are proposed to service the west and east development area.

The western area (approximately 13.54 ha) will connect to the 1200mm sewer on Kennedy Road, proposed by Region of Peel (referred to in **Section 3.2.1** above).

The eastern area (20.7ha) and the South Site Plan (2.72 ha) will be serviced by the proposed sewers on Heart Lake Road. The proposed sewers will connect to the sanitary sewer stub at Heat Lake Road and Ecopark Close installed as part of Heart Lake Road Employment Lands.

As mentioned in **Section 3.2.2** above, the downstream sewer network is designed to accommodate an external

area, including the subject site. Out of the total population of 3192, approximately 2417 is proposed to drain to the Hearlake Road. The downstream sewers at the Heat Lake Road and Ecopark Close have considered a population of 4647 for the subject site.

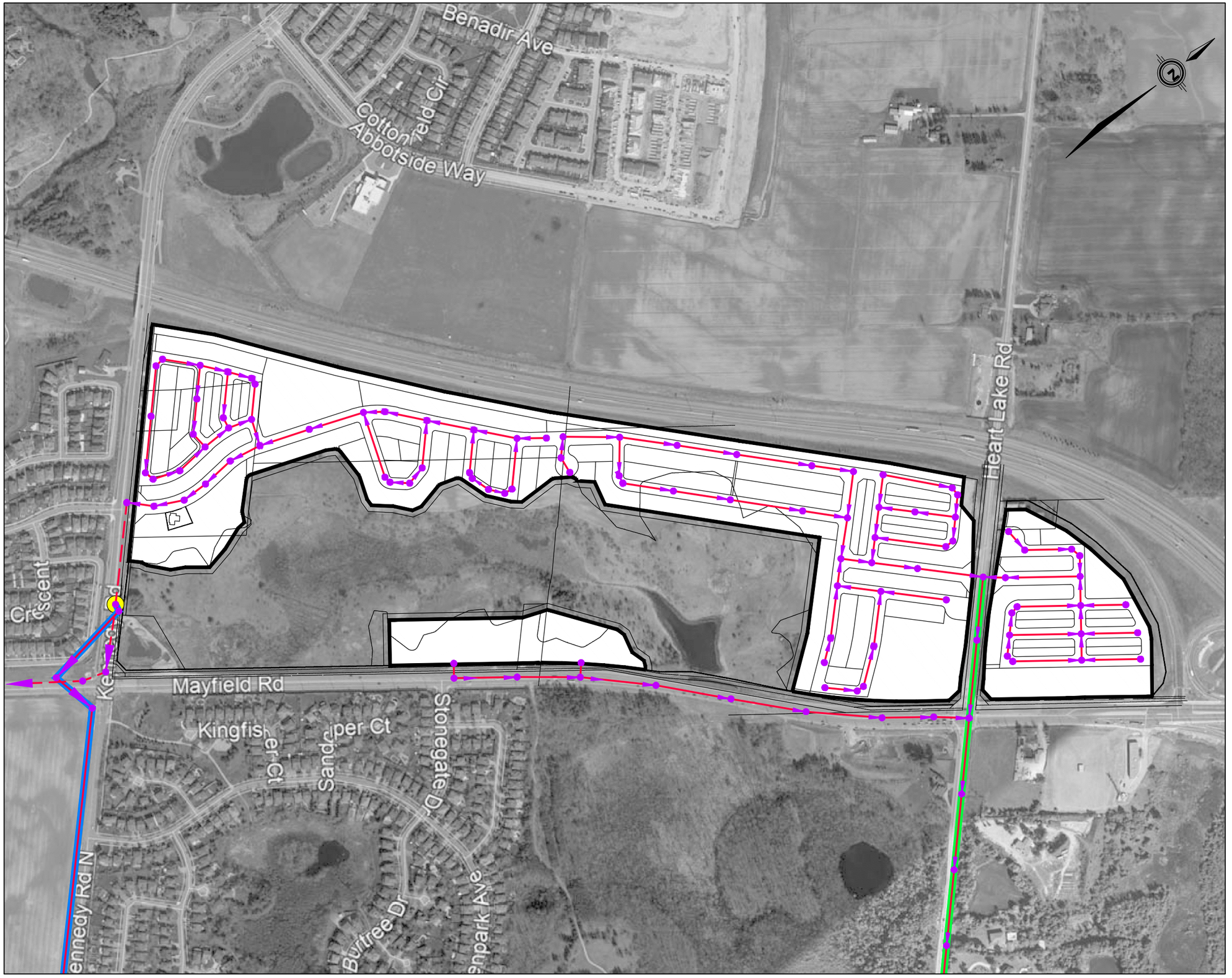
The sanitary flows were estimated for the proposed developments based on the generation rate of 302.8L/c/day and the estimated population. The summarized results are presented below in **Table 3-1**.

Please refer to **Figure 3.1** for the proposed sanitary servicing scheme. The detailed sanitary demand calculations are presented in **Appendix B.2**.

Table 3-1: Sanitary Servicing Requirements

Discharge Location	Area ID	Population	Average Demand [L/s]	K (Harmon Peaking Factor)	Peak Flow [L/s]	Infiltration [L/s]	Total Peak Flow [L/s]
Site Discharge to East (Heart Lake Road)	**A1**	1042	3.65	3.79	13.84	2.93	16.77
	B	863	3.02	3.84	11.61	1.21	12.82
	C	512	1.79	3.97	7.12	0.54	7.66
	Total	**2417**	**8**	**-**	**32.57**	**4.68**	**37.26**
Site Discharge to West (Kennedy Road)	**A2**	**775**	**2.72**	**3.87**	**10.51**	**2.71**	**13.21**

Phil Gotfried



SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- DEVELOPMENT BOUNDARY
- PROPOSED SANITARY SEWERS
- EXISTING SANITARY SEWERS
- PROPOSED SANITARY SEWERS BY REGION
- PROPOSED SANITARY SEWER CONNECTION BY REGION FROM EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWERS TO CONNECT TO EX. STUB AT HEARTLAKE AND ECOPARK RD.

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FIGURE 3.1
SANITARY SERVICING PLAN

2019-4851	FEBRUARY 2021	SCALE: N.T.S.

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4.0 WATER SUPPLY SERVICING

4.1 Existing Water Supply Servicing

The subject site is located within the Region of Peel Pressure Zone 7 Central (7C) within the Central Transmission System. Pressure Zone 7 services the areas with an elevation of 243.4m – 289.6m.

The existing water supply network adjacent to the subject site consists of watermains and feedermains along Mayfield Road, Heart Lake Road and Kennedy Road. There are 400mm diameter, 750mm diameter and 600mm diameter watermains along Mayfield Road, and 400mm diameter watermain, as well as 900mm diameter and 1200mm diameter feedermains running along Heart Lake Road. There is a 300mm watermain and a 600mm feedermain on Kennedy Road.

4.2 Water Supply Servicing Design Criteria

Watermains for the development shall be designed in accordance with the Region of Peel's Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Watermain Design Criteria (Revised June 2010).

Typical criteria for Residential land uses are summarized as follows:

- Average Consumption Rate of 280 L/cap/day;
- Maximum Day Factor of 2.0;
- Peak Hour Factor of 3.0;

Typical criteria for Industrial, Commercial and Institutional (ICI) land uses are summarized as follows:

- Average Consumption Rate of 300 L/employee/day;
- Maximum Day Factor of 1.4;
- Peak Hour Factor of 3.0;

Pressure:

- Minimum operation pressure during the peak hour demand: 40 psi;
- Maximum operation pressure under static load or during minimum hourly demand: 100 psi

Watermain diameter:

- Minimum diameter for residential area: 150mmØ;

Fire Protection Demand:

- Fire Underwriters Survey fire flow calculation cannot be performed since residential unit details are not available; therefore, fire flow requirements from the neighbouring municipalities will be used until the detailed water supply analysis:
    - a minimum fire flow demand of 7,000 l/min for single-family & semi-detached units;
    - a minimum fire flow demand of 9,000 l/min for townhouses;
    - a minimum fire flow demand of 19,000 l/min for multi-unit apartment buildings;
    - a minimum fire flow demand of 25,000 l/min for commercial areas.

4.3 Proposed Water Supply Servicing Plan

It is proposed to service most of the subject development (Area A as per **Figure 1.2**) internally by a network of 200mm diameter watermains that will connect to the 300mm diameter watermain on Kennedy Road and the 400mm diameter watermain on Heart Lake Road. Area B (shown in **Figure 1.2**) will be serviced by connections to the 400mm watermain on Mayfield Road east of Heart Lake Road and the 400mm diameter on Heartlake Road. The South Site Plan (Area C as per **Figure 1.2**) will connect to the 400mm diameter watermain on Mayfield Road.

Please refer to **Figure 4.1** for the water supply servicing plan

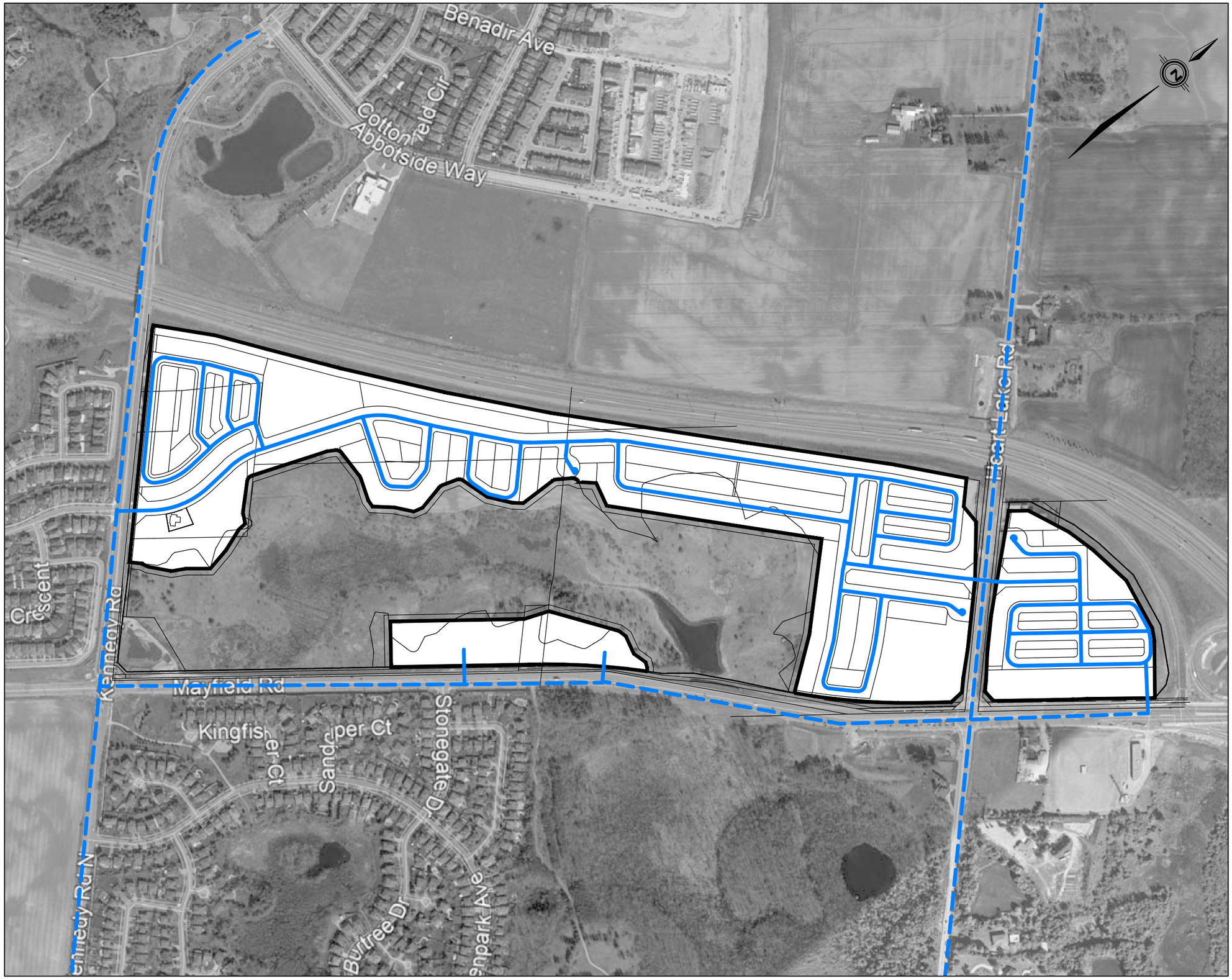
Two hydrant tests were performed in October 2020, one on Kennedy Road north of Mayfield Road and one on Heart Lake Road north of Mayfield Road. Hydrant tests reported static pressure of 78 psi and 80 psi, respectively, resulting in the hydraulic grade of 317.85 m and 317.26m. These values were used as the boundary conditions in the water supply model. The detailed WaterCAD modelling results are presented in the report titled "Water Supply Analysis Report, Snell's Hollow Secondary Plan Area, Town of Caledon," dated February 2021. Based on the modelling results, all the water supply demands and fire flow requirements are satisfied.

The expected domestic supply and fire flow demands are summarized in **Table 4-1**, with detailed calculations provided in **Appendix C.1**.

Table 4-1: Water Supply Demand

Land Use	Average Day Demand [L/s]	Peak Hourly Demand [L/s]	Maximum Day Demand [L/s]	Maximum Day Demand + Fire Flow [L/s]
Residential (Low Density)	4.05	12.14	8.10	124.76
Residential (Townhouses)	3.26	9.79	6.53	156.53
Residential (Medium-High Density)	2.73	8.20	5.46	322.13
Commercial	0.32	0.96	0.45	417.12
Total	**10.36**	**31.09**	**20.54**	**1020.54**

Phil Gotfried



SNELL'S HOLLOW SECONDARY PLAN
TOWN OF CALEDON

LEGEND

- DEVELOPMENT BOUNDARY
- PROPOSED WATERMAIN
- EXISTING WATERMAIN

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FIGURE 4.1
WATER SUPPLY SERVICING PLAN

2019-4851	FEBRUARY 2021	SCALE: N.T.S.

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5.0 CONCLUSIONS

This Functional Servicing Report presents a municipal servicing scheme for the proposed Snell's Hollow Secondary Plan Area located in the Town of Caledon.

The FSR presents the servicing scheme and demonstrates that adequate stormwater, sanitary, and water supply servicing will be available for the proposed development.

Stormwater Management:

- Two stormwater management facilities are proposed to meet the required quantity, quality and erosion requirements for Catchments 201, 202 and 204.
- The South Site Plan (Catchment 203) is proposed to have on-site controls.
- A floodplain assessment was completed to determine the conveyance capacity of the tributary.
- Post to pre-water balance is proposed via infiltration trenches and infiltration galleries in Catchments 201 and 202. Catchment 203 will provide its own measures to achieve 5mm infiltration.

Sanitary Servicing:

- The 1200mm diameter sanitary sewer proposed by Peel Region on Kennedy Road will service a portion of the proposed development. The remaining development is proposed to be serviced by the proposed sanitary sewer on Heart Lake Road. The proposed sewer on Heart Lake Road will connect to the existing sanitary sewer at Heat Lake Road and Ecopark Close Road.
- The expected total peak sanitary flow for the area discharging to the west is 13.21 L/s and for the area discharging to the east is 37.26 L/s.

Water Servicing:

- It is proposed to service most of the subject development (lands west of Heartlake road) internally by a network of 200mm diameter watermains that will connect to the 300mm diameter watermain on Kennedy Road and the 400mm diameter watermain on Heart Lake Road.
- Lands east of Heartlake Road will be serviced by connections to the 400mm watermain on Mayfield Road east of Heart Lake Road and the 400mm diameter on Heartlake Road.
- The South Site Plan (Area C as per **Figure 1.2**) will connect to the 400mm diameter watermain on Mayfield Road.

- A WaterCAD water supply model was prepared in order to analyze the proposed system under various demand scenarios. Based on the modelling results, all the water supply demands and fire flow requirements are satisfied.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

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