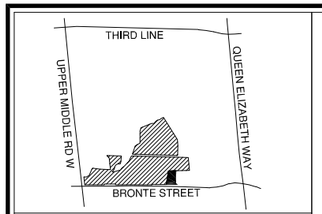
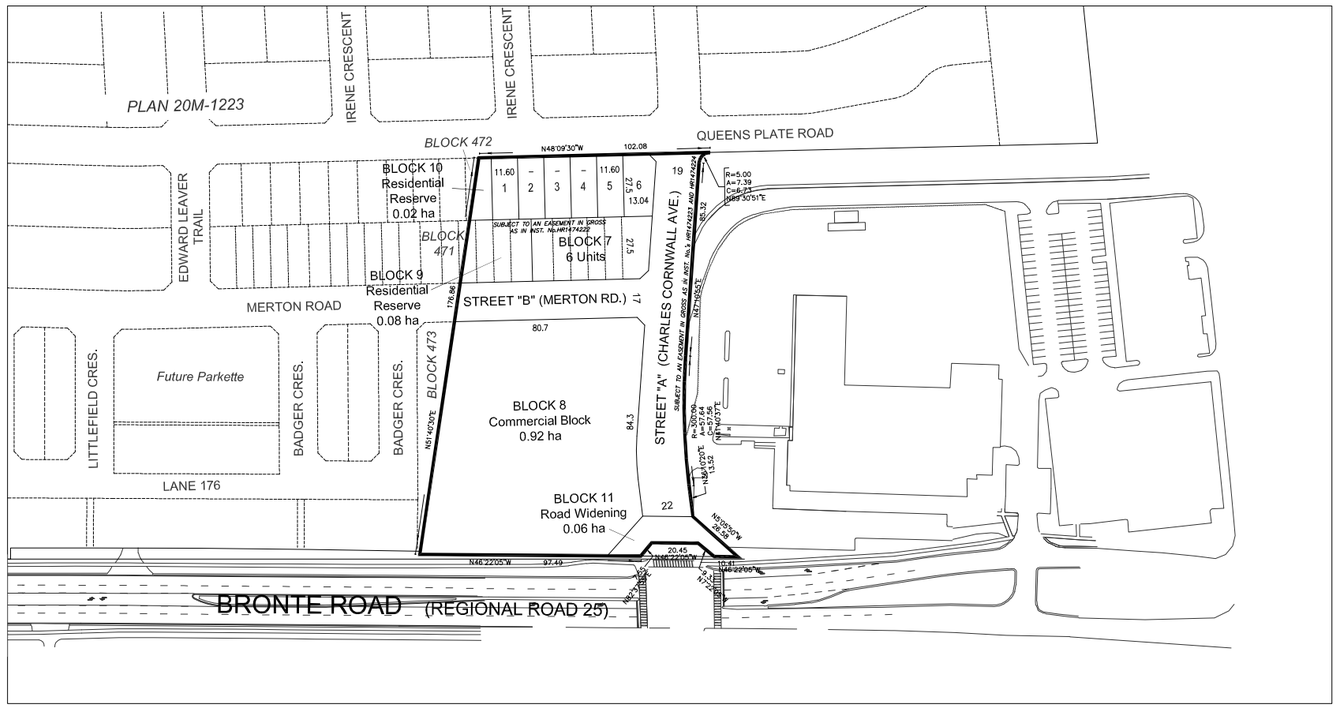
Figures & Drawings



KEY MAP N.T.S. — SUBJECT PROPERTY — ADDITIONAL LANDS OWNED BY APPLICANT



M:\12601\Figures\FSR\Former Region Lands\Subm1\Figures\02F_601DraftPlan.dwg

DRAFT PLAN OF SUBDIVISION

PART OF LOT 30
CONCESSION 2, SOUTH OF DUNDAS STREET

GEOGRAPHIC TOWNSHIP OF TRAFALGAR
NOW IN THE
TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

ARGO - BRONTE GREEN REGION LANDS

OWNER'S AUTHORIZATION

I HEREBY AUTHORIZE KORSIAK URBAN PLANNING TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF OAKVILLE FOR APPROVAL.

SIGNED _____ DATE _____
Gord Buck
Bronte Green Corporation
4900 Palladium Way, Suite 105
Burlington, Ontario L7M 0W7

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE CORRECTLY AND ACCURATELY SHOWN.

SIGNED _____ DATE _____
Ron Querubin, OLS, OLIP
J.D.BARNES SURVEYING MAPPING GIS
411 RUTHERFORD ROAD SOUTH, BRAMPTON, ONTARIO L6W 3J1
T: (905) 670-8499 F: (905) 670-2806 www.jdbarnes.com

ADDITIONAL INFORMATION (UNDER SECTION 51 (17) OF THE PLANNING ACT)

A) SHOWN ON PLAN
B) SHOWN ON PLAN
C) SHOWN ON PLAN
D) SHOWN ON PLAN
E) SHOWN ON PLAN
F) SHOWN ON PLAN
G) SHOWN ON PLAN
H) MUNICIPAL AND PIPED WATER TO BE PROVIDED
I) CLAY LOAM
J) SHOWN ON PLAN
K) SANITARY AND STORM SEWERS TO BE PROVIDED
L) SHOWN ON PLAN

LAND USE SCHEDULE

Land Use	Lots/Blocks	Lot / Block Total	Area (ha)	Units
Single Detached (11.6 m)	1-6	6	0.20	6
Street Townhouses (7.62 m)	7	1	0.14	6
Commercial Block	8	1	0.92	
Residential Reserve	9, 10	2	0.10	
Road Widening	11	1	0.06	
17 m ROW (86 m)			0.14	
19-22 m ROW (161 m)			0.32	
Totals	11	11	1.88	12

24T- SDE CALCULATIONS

Unit Type	Blocks	Units	SDE*
Single Detached	1-6	6	6
Townhouse	7	6	4.6
Total	1-7	12	10.6

* SDE Factors:
Detached - 1.00
Townhouse - 0.76

DATE [D,M,Y]	REVISION	DWG	BY
31/03/2021	Original Submission	A	KC

NOTES:
- Pavement illustration is diagrammatic
- Collector to Arterial daylight triangle = 15 m
- Local to Collector daylight triangle = 3.5 m

SCALE 1:1500 March 31, 2021 A
DRAWN BY: KC CHECKED BY: CM

206-277 Lakeshore Road East
Oakville, Ontario L6J 1H9
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DSEL david schaeffer engineering ltd
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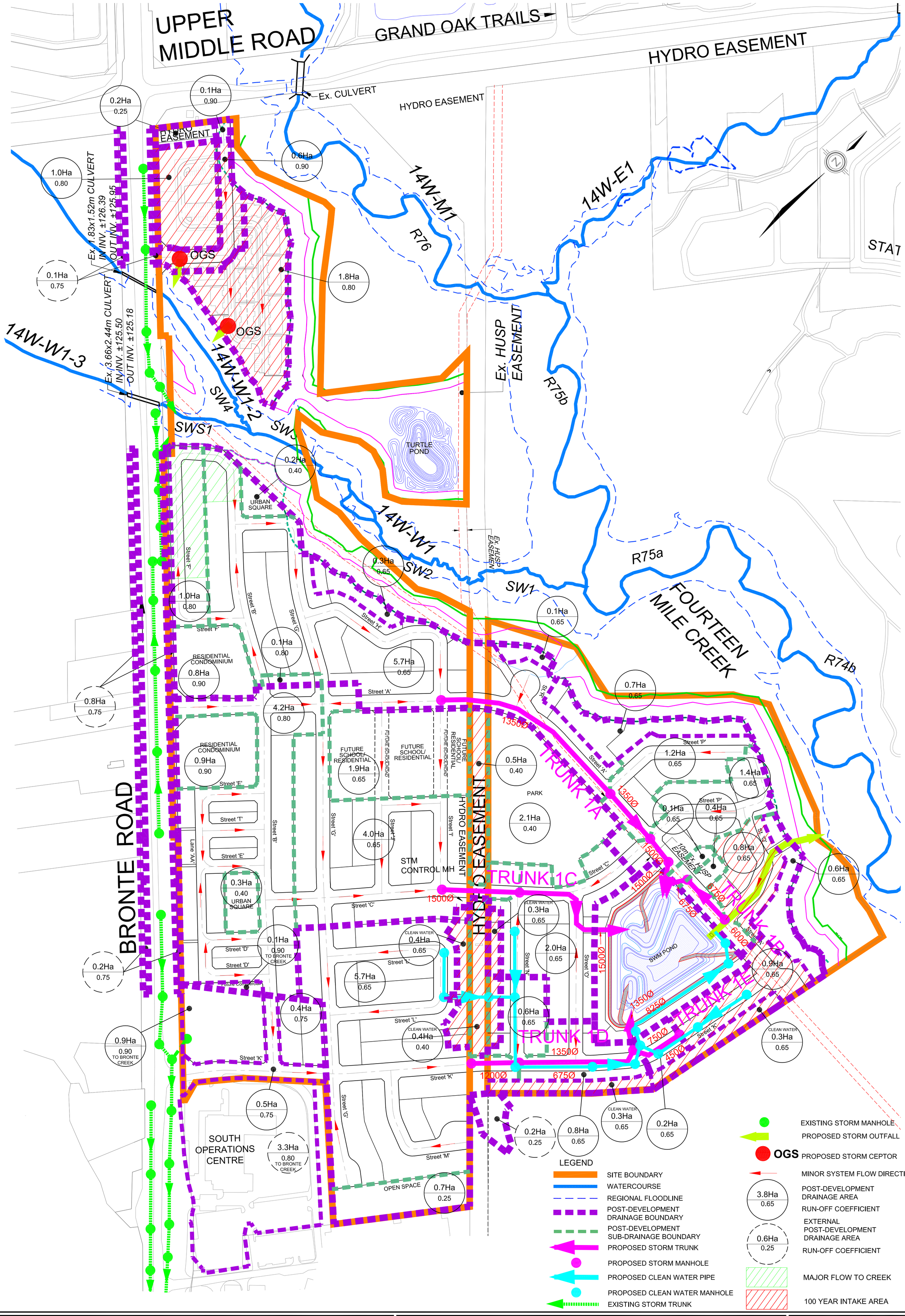
www.DSEL.ca

ARGO BRONTE GREEN REGION LANDS

DRAFT PLAN

DATE:	MAY 2021
SCALE:	N.T.S.
PROJECT No.:	12-601
FIGURE	2



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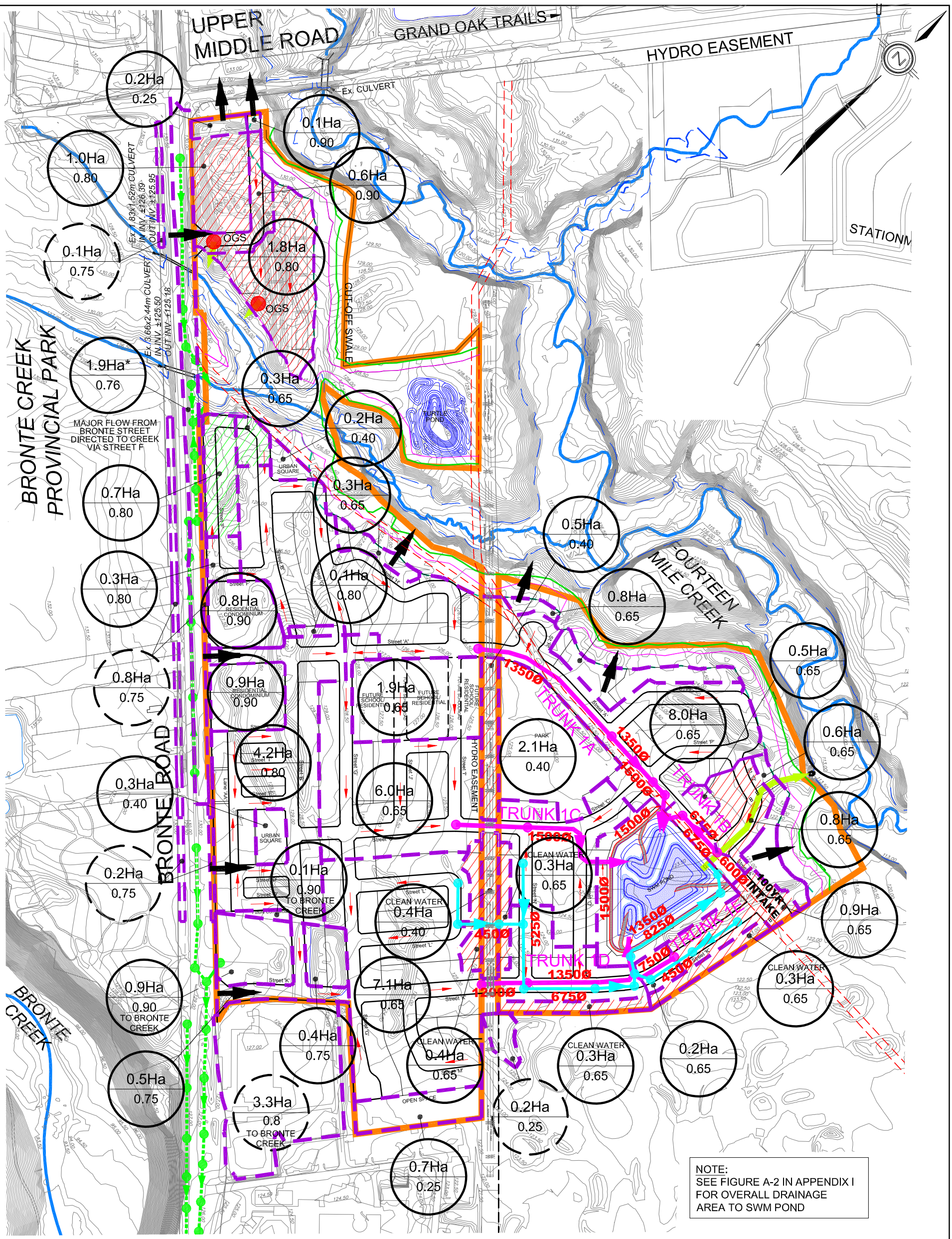
ARGO BRONTE GREEN REGION LANDS

CONCEPTUAL STORM TRUNK SIZING

DATE:	MAY 2021
SCALE:	1:2000
PROJECT No.:	12-601
DRAWING:	5



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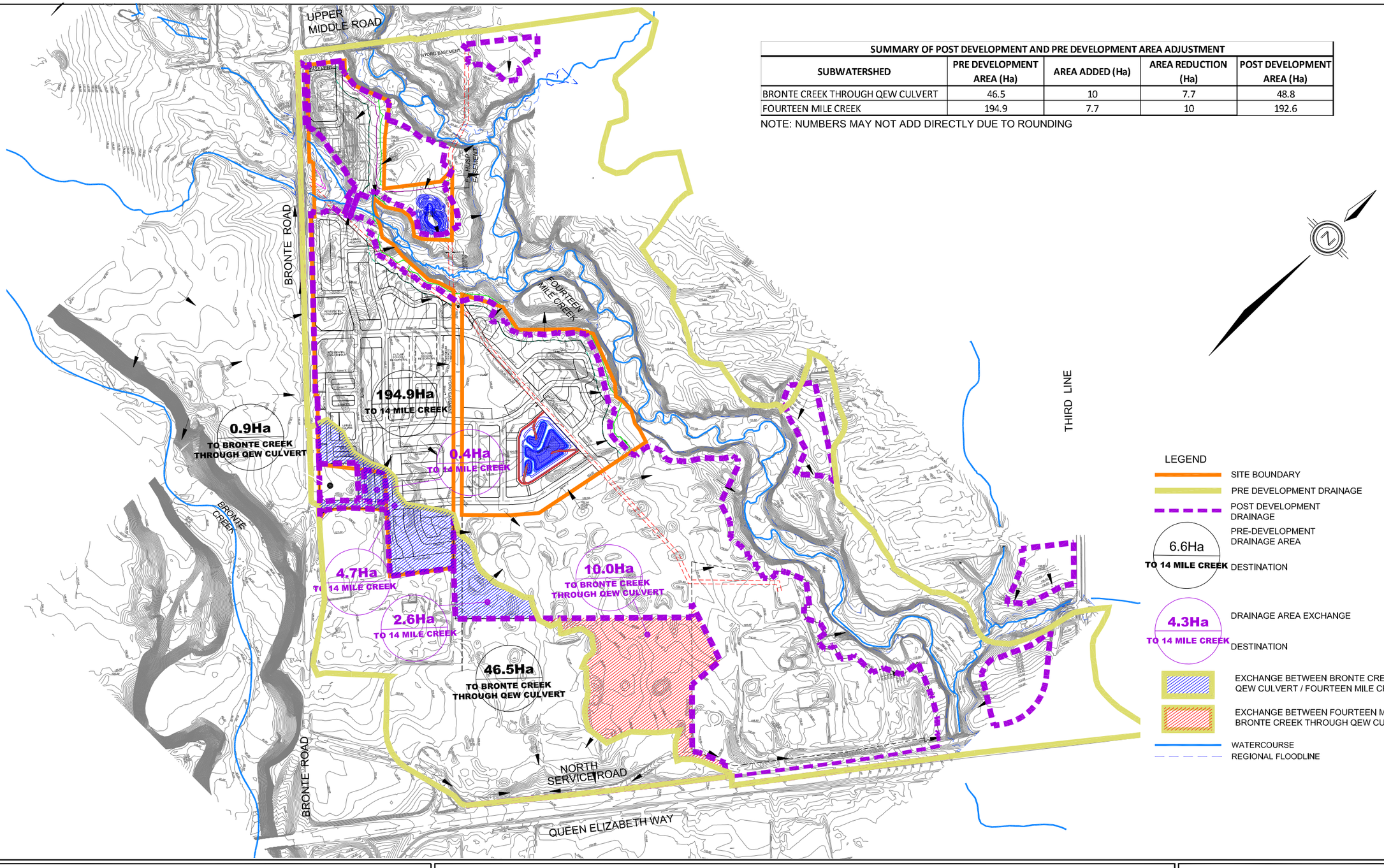
ARGO BRONTE GREEN REGION LANDS

CONCEPTUAL STORM SERVICING

DATE:	MAY 2021
SCALE:	1:5000
PROJECT No.:	12-601
FIGURE:	9

SUMMARY OF POST DEVELOPMENT AND PRE DEVELOPMENT AREA ADJUSTMENT				
SUBWATERSHED	PRE DEVELOPMENT AREA (Ha)	AREA ADDED (Ha)	AREA REDUCTION (Ha)	POST DEVELOPMENT AREA (Ha)
BRONTE CREEK THROUGH QEW CULVERT	46.5	10	7.7	48.8
FOURTEEN MILE CREEK	194.9	7.7	10	192.6

NOTE: NUMBERS MAY NOT ADD DIRECTLY DUE TO ROUNDING



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ARGO BRONTE GREEN REGION LANDS

BRONTE CREEK & FOURTEEN MILE CREEK DRAINAGE EXCHANGE

DATE:	MAY 2021
SCALE:	1:10000
PROJECT No.:	12-601
FIGURE	13

Appendices

Appendix B - Hydraulic Analysis

Appendix R - Region Headquarters Lands

Appendix U - SWM Report

Appendix V - Pond Design Brief

Appendix W - Bronte Green Subdivision Detailed Design Drawings

Appendix B

Hydraulic Capacity and Modeling Analysis
Bronte Green Development
GeoAdvice Engineering
April 2019

Hydraulic Capacity and Modeling Analysis
Bronte Green Development

FINAL

Technical Memorandum

Prepared for:
David Schaeffer Engineering Ltd.
600 Alden Road, Suite 500
Markham, ON L3R 0E7

Prepared by:
GeoAdvice Engineering Inc.
Unit 203, 2502 St. John's Street
Port Moody, BC V3H 2B4

Submission: April 26, 2019

Contact: Mr. Werner de Schaetzen, Ph.D., P.Eng.
Re: Project 2017-004-DSE

Document History and Version Control

Revision No.	Date	Document Description	Revised By	Reviewed By
R0	January 26, 2017	Draft Submission	Adrien d'Andrade	Werner de Schaetzen
R1	January 30, 2017	Final Submission	Adrien d'Andrade	Werner de Schaetzen
R2	February 9, 2017	Final Submission	Adrien d'Andrade	Werner de Schaetzen
R3	February 21, 2017	Final Submission	Adrien d'Andrade	Werner de Schaetzen
R4	March 10, 2017	Final Submission	Adrien d'Andrade	Werner de Schaetzen
R5	August 30, 2018	Draft Submission	Adrien d'Andrade	Werner de Schaetzen
R6	October 1, 2018	Draft Submission	Adrien d'Andrade	Werner de Schaetzen
R7	October 3, 2018	Draft Submission	Adrien d'Andrade	Werner de Schaetzen
R8	October 5, 2018	Final Submission	Adrien d'Andrade	Werner de Schaetzen
R9	April 18, 2019	Draft Submission	Adrien d'Andrade	Werner de Schaetzen
R10	April 26, 2019	Final Submission	Adrien d'Andrade	Werner de Schaetzen

Statement of Qualifications and Limitations

This document represents GeoAdvice Engineering Inc. best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by a member of the engineering profession currently practicing under similar conditions. No warranty, express or implied is made.

Contents

1 Introduction

GeoAdvice Engineering Inc. (GeoAdvice) was retained by David Schaeffer Engineering Ltd. to assess the hydraulic impact of the Bronte Green (Development) on the Region of Halton (Region) water distribution system.

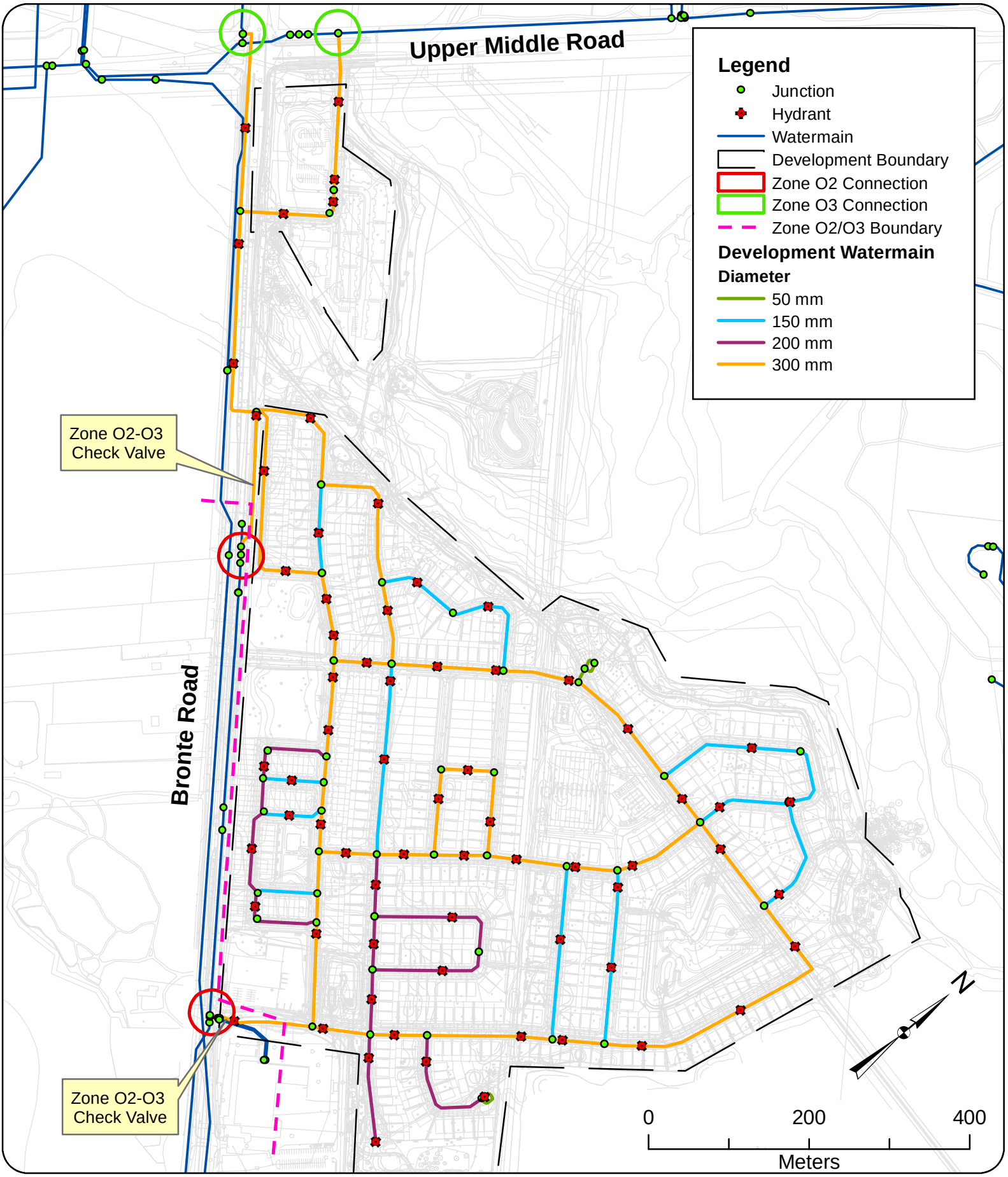
The Bronte Green development is located between Queen Elizabeth Way, Bronte Road, and Upper Middle Road.

Figure 1.1 illustrates the proposed network layout, as well as the connection points and proposed pipe diameters. There are four (4) proposed connections to the Region's existing water main network:

- Two (2) connections from the O3 pressure zone. These are the main feeds to the development.
- Two (2) connections from the O2 pressure zone. These are connected through check valves that allow Zone O2 to provide flow to the development in an emergency or fire flow situation.

This memo describes the assumptions and results of the hydraulic modeling using the Region InfoWater water model (received on August 1, 2018). InfoWater (Innovyze Software) is a GIS water distribution system modeling and management software application.

The results presented in this memo are based on the analysis of steady state simulations. The predicted available fire flows, as calculated by the hydraulic model, represent the flow available in the water main while maintaining a residual pressure of 20 psi at the hydrant. No extended period simulations were completed in this analysis to assess the water quality or to assess the hydraulic impact on storage and pumping.



GeoAdvice Engineering Inc.

Project: **Hydraulic Capacity and Modeling Analysis**
Bronte Green Development
Client: **David Schaeffer Engineering Ltd.**
Date: **April 2019**
Created by: **Ad'A**
Reviewed by: **WdS**

Site Layout and Proposed Pipe Diameters

Figure 1.1

2 Demands

2.1 Consumer Demands

Population densities were assigned according to the Region of Halton Design Guidelines. A summary of these tables highlighting relevant data for this development is shown in **Table 2.1** below.

Table 2.1: Region of Halton Demand Factors

Demand Type	Amount	Units
Average Day Demand		
Residential	275	L/c/d
Institutional/School	11,000	L/Ha/d
Commercial	24,750	L/Ha/d
Parks/Urban Square/Open Space	11,000	L/Ha/d
Maximum Daily Demand		
Residential	2.25 x avg. day	L/c/d
Institutional/School	2.25 x avg. day	L/Ha/d
Commercial	2.25 x avg. day	L/Ha/d
Parks/Urban Square/Open Space	2.25 x avg. day	L/Ha/d
Peak Hour Demand		
Residential	4.00 x avg. day	L/c/d
Institutional/School	2.25 x avg. day	L/Ha/d
Commercial	2.25 x avg. day	L/Ha/d
Parks/Urban Square/Open Space	2.25 x avg. day	L/Ha/d

Water demand calculations are shown in **Table 2.2** and **Table 2.3** below. Detailed calculations of demands are shown in **Appendix A**. Demands were grouped and evenly applied to the all model nodes within each group. The locations of nodes do not necessarily represent hydrant locations.

Table 2.2: Residential Water Demand Calculations

Land Use	Population	Average Day Demand	Maximum Day Demand	Peak Hour Demand
Type	**(Cap)**	**(L/s)**	**(L/s)**	**(L/s)**
Residential	4,083.5	13.00	29.24	51.99

Table 2.3: Non-Residential Water Demand Calculations

Land Use	Area	Average Day Demand	Maximum Day Demand	Peak Hour Demand
Type	**(Ha)**	**(L/s)**	**(L/s)**	**(L/s)**
Institutional/School	1.86	0.24	0.53	0.53
Commercial	0.99	0.28	0.64	0.64
Parks/Urban Square/Open Space	3.35	0.43	0.96	0.96
Total	**6.20**	**0.95**	**2.13**	**2.13**

There is currently not enough information about the non-residential users to calculate specific water demands. As such, the demand was calculated based on the area of the proposed development land for the non-residential blocks. Rates of 11,000 L/ha/d for community services and 24,750 L/ha/d for commercial blocks were used as per the Region of Halton Water and Wastewater Linear Design Manual.

2.2 Fire Flows

Fire flow demands were determined in accordance with the Fire Underwriters Survey's Water Supply for Public fire Protection guideline (1999). FUS calculations are based on the types of building, floor area, number of storeys, construction class, occupancy class and exposure facture. **Table 2.4** shows the calculated FUS fire flows for each building type in the development.

Table 2.4: FUS Fire Flow Requirements at 140 kPa (20 psi)

Development Type	Fire Flow (L/s)	Bronte Green
Residential Low-Density	150 or 167	Detached Residential
Residential Medium-Density	317	Townhouse
Residential High-Density	267 or 283	Back to Back Townhouse and Condominium
Institutional/Commercial	273	School and Commercial

Hydrant nodes were modeled at proposed locations, as provided by David Schaeffer Engineering on April 5, 2019. Fire flow requirements were only assessed at hydrant nodes.

3 Modeling Considerations

3.1 Water Main Configuration

The water main network was laid out based on a pipe network layout prepared by David Schaeffer Engineering and provided to GeoAdvice on April 5, 2019, as shown in **Figure 1.1**.

3.2 Pressure Requirements

As outlined in the Region of Halton Design Guidelines, the generally accepted best practice is to design new water distribution systems to operate between 40 psi and 80 psi. The target pressure at any point in the distribution system is 45 psi. Pressure requirements are outlined in **Table 3.1**.

Table 3.1: Region of Halton Pressure Requirements

Demand Condition	Minimum Pressure		Maximum Pressure	
	(kPa)	(psi)	(kPa)	(psi)
Normal Operating Pressure (maximum daily flow)	275	40		
Peak Hour Demand (minimum allowable pressure)	275	40	-	-
Maximum Fixture Pressure (Ontario Building Code)	-	-	550	80
Maximum Distribution Pressure (Halton)	-	-	690	100
Maximum Day Plus Fire	140	20	-	-

3.3 Elevations

Elevations of the modeled junctions were assigned according to a site grading plan prepared by DSEL and provided to GeoAdvice on January 16, 2017. Modeled node elevations were assigned according to center line of road or the closest proposed grade.

3.4 Pipe Characteristics

Pipe diameter and Hazen-Williams C factors were assigned in the model according to the Region of Halton Design Guidelines. Pipe characteristics used for the development are outlined in **Table 3.2** below.

Table 3.2: Model Pipe Characteristics

Nominal Diameter (mm)	Hazen Williams C-Factor (/)
50	100
150	100
200	110
300	120

4 Modeling Results

The proposed water mains within the development were sized to the minimum diameter which would satisfy the greater of maximum day plus fire and peak hour demand. Modeling was carried out for peak hour and maximum day plus fire flow using InfoWater. The proposed water main layout, as well as detailed pipe and junction tables can be found in **Appendix B**.

4.1 System Pressures

The modeling results indicate that the development can be adequately serviced by the proposed water main layout. Modeled service pressures for the development are summarized in **Table 4.1** below. Detailed modeling results can be found in **Appendix C**.

Table 4.1: Summary of Available Service Pressures (PHD)

Scenario	Maximum Pressure (psi)	Average Pressure (psi)	Minimum Pressure (psi)
Interim 2016	98	94	90
Future 2031	95	92	88

As outlined in the Region of Halton Design Guidelines, the generally accepted best practice is to design new water distribution systems to operate between 40 psi and 80 psi. Based on the anticipated service pressures, pressure reducing valves may be required for all blocks within the development.

4.2 Available Fire Flows

The minimum allowable pressure under fire flow conditions is 140 kPa (20 psi) at the location of the fire. Fire flows were only assessed at the proposed locations of the hydrants. Hydrant locations were prepared by David Schaeffer Engineering and provided to GeoAdvice on April 5, 2019. A summary of available fire flows is shown below in **Table 4.2**. Detailed fire flow reports can be found in **Appendix D**.

Table 4.2: Summary of Available Fire Flows (MDD + FF)

Scenario	Maximum Available Fire Flow (L/s)	Average Available Fire Flow (L/s)	Minimum Available Fire Flow (L/s)
Interim 2016	1,227	466	185
Future 2031	1,229	481	189

*The predicted available fire flows, as calculated by the hydraulic model, represent the flow available in the water main while maintaining a residual pressure of 20 psi at the hydrant. High available fire flows (>500 L/s) are theoretical values. Actual available fire flow is limited by the hydraulic losses through the hydrant lateral and hydrant port sizes.

4.3 Residual Pressures

A summary of the residual pressures is shown below in **Table 4.3**.

Table 4.3: Summary of Residual Pressures (MDD + FF)

Scenario	Maximum Residual Pressure (psi)	Average Residual Pressure (psi)	Minimum Residual Pressure (psi)
Interim 2016	87	67	22
Future 2031	90	70	23

As shown in **Table 4.3**, the model predicts that all fire flow requirements can be met throughout the development with the proposed watermain layout shown in **Figure 1.1.**

5 Conclusions

The proposed water main network for the Bronte Green development can deliver all domestic and fire flows as per the Ministry of Environment, Region of Halton, and Fire Underwriters Criteria as follows:

- The service pressures are expected to range between 88 psi and 98 psi, which are within the Region of Halton guidelines for water distribution systems.
- All FUS fire flow requirements are achievable with the proposed water main layout
- Based on the anticipated service pressures exceeding 80 psi, pressure reducing valves will be required for all blocks within the development.

Submission

Prepared by:

Adrien d'Andrade, E.I.T.
Hydraulic Modeler / Project Engineer

Approved by:

LICENSED PROFESSIONAL ENGINEER
W. B. F. de Schaetzen
100116349
PROVINCE OF ONTARIO

April 26, 2019

Werner de Schaetzen, Ph.D., P.Eng.
Senior Modeling Review / Project Manager