Functional Servicing and Stormwater Management Report

Proposed Mixed-Use Condominium Development
1012 Yonge Street
City of Barrie

Prepared for Crown (Barrie) Developments Inc.

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1. Introduction

1.1 Background

GHD Limited was retained by Crown (Barrie) Developments Inc. (the “Owner”) to provide professional engineering services related to the preparation of a site specific Functional Servicing and Stormwater Management Report (FSR-SWM) for a proposed mixed-use development located at 1012 Yonge Street (the “Site”), in the City of Barrie (the “City”).

This report has been prepared to support the requirements of the Official Plan Amendment and Zoning By-Law Amendment Application Process within the Hewitt’s Secondary Plan. This report discusses the existing infrastructure in the vicinity of the subject lads and recommendations for the conceptual provision of sanitary drainage, storm drainage, and water distribution / fire protection in accordance with the City of Barrie standards and criteria. Additionally, the report provides details about the stormwater management in accordance with City of Barrie, Ministry of Environment, Conservation and Parks (MECP), and Lake Simcoe Region Conservation Authority’s (LSRCA) Stormwater Management guidelines.

The report concludes that the proposed services to be constructed as part of the overall subdivision development will adequately service the new development at 1012 Yonge Street.

The report has also been prepared and will continue to be coordinated with the Hewitt’s Secondary Plan Area Subwatershed Impact Study, completed by Burnside & Associates.

Additionally, the following documents were used / referenced in preparation of this report:

- Stormwater Management Planning and Design Manual by the Ministry of Environment, Conservation and Parks (MECP) 2003 [MECP SWMPD];
- Technical Guidelines for Stormwater Management Submissions by the Lake Simcoe Region Conservation Authority (LSRCA) 2016 [LSRCA SWM Guidelines];
- City of Barrie’s Storm Drainage and Stormwater Management Policies and Design Guidelines 2017 [City SWM Guidelines];
- Barrie Creek, Lovers Creek, and Hewitt Creek Subwatershed Plan by the LSRCA 2012 [LSRCA Subwatershed Plan];
- Phosphorus Offsetting Policy by the LSRCA 2017 [LSRCA Phosphorus Offsetting Policy];
- Lake Simcoe Protection Plan 2009 [LSPP];
- Highlights of Draft Changes to LSRCA SWM Technical Guidelines by the LSRCA June 24, 2016 [LSRCA Draft SWM Technical Guidelines];
- Drainage & Stormwater Master for the City of Barrie, prepared by Amec, Drawing No. SA-283-R22, dated October 2013;
- Site Plan (Dwg. No. A100) prepared by SRN Architects, dated January 27, 2022;
- Hewitt’s Secondary Plan Area Subwatershed Impact Study prepared by R.J. Burnside & Associates Limited, dated September 2016; and,
- Official Plan for the City of Barrie, Amendment No.39, dated 2014.

- Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed, Hutchinson Environmental Ltd., March 30, 2012

- Wet Weather Flow Management Guidelines, City of Toronto, November 2006

1.2 Site Description

The is located on the west side of Yonge Street and north of Lockheart Road with a municipal address of 1012 Yonge Street. The Site is approximately 4.90 ha in size in size is currently bounded by agricultural land to the north, west and south, and Yonge Street to the east. Refer to Figure 1 on Appendix A for the site location.

Currently, the site is used as agricultural land and is occupied by one 2-storey residential building, two stone and farm barns, a metal garage and a plastic green house. Vehicle access to the Site is provided by an existing gravel driveway connected to Yonge Street.

Based on the topographic survey, under existing conditions, the northwest corner of the site drains towards the existing agricultural lands to the north and west, while the reminder of the site drains from northwest to southeast, and into the existing ditch running along the west side of Yonge Street. Please refer to the topographic survey by GUIDO PAA SURVEYING, dated January 4th, 2019 in Appendix A for the existing condition of the site.

1.3 Existing Soils Condition

A geotechnical investigation was completed by Soil Engineers Ltd. by extending boreholes across the site to examine subsurface soil conditions. The boreholes were completed in March 2020 and found the site contains a layer of Topsoil (approximately 0.30m thick), underlain by Sandy Silt Till of approximately 2m – 3m depth, on average, underlain by a thicker layer of Sand, found within all boreholes down to the limit of borehole investigation, down to 9m depth. For further details related to existing soils data, refer to the Soil Engineers Ltd. Geotechnical Investigation Report.

1.4 Existing Groundwater Condition

A hydrogeological investigation was completed by GHD in 2021 and previous investigations were completed by Cole Engineering Group Ltd. Based on the results from the GHD investigations, the site is underlain by Ice contact deposits consisting of silt, sandy silt and sand from 0.76 to 15.85 metres below ground surface (mBGS). Based on the results from the SWRTSs, the horizontal hydraulic conductivity (K_h) ranges from 1.1 x 10^{-5} to 1.1 x 10^{-2} cm/s, due to the variability of the deposit. The horizontal hydraulic conductivity (geomean) of the ice contact deposits is 4.4 x 10^{-4} cm/s, and accounting for the variability of the deposit the hydraulic conductivity (geomean) plus one standard deviation is 4.3 x 10^{-3} cm/s, which is representative of the aquifer. Based on groundwater levels collected at the site in September 2021, the levels ranged from 3.75 mBGS at MW2-21 to 7.47 mBGS at BH1, and on average are about 5.7 mBGS or 263.53 mAMSL to 264.82 mAMSL. Groundwater flow is east to west across the site towards the tributary of Lover's Creek.

1.5 Site Development Proposal

The proposed development is based on the site plan by SRN Architects, dated January 27th, 2022, which proposes one 3-storey townhome, two 3-storey condo buildings, two 4 to 6-storey condo buildings, two 6 to 9-storey condo buildings, with commercial units fronting Yonge Street. The entire development will also consist of a shared level of below grade parking.

Vehicle access to the proposed development will be provided via a private driveway connected to the future municipal R.O.W. along the north, a new 24m to 25m R.O.W. along the south, and Yonge Street to

the east. The new 24 to 25 meter municipal R.O.W. (Street A) is proposed along the entire southern boundary of the proposed development, connected to the future municipal R.O.W. to the west and Yonge Street to the east. Lastly, a small potion of northwest corner of the site will also be part of the future municipal R.O.W. connecting to the future residential development to the north and the future municipal R.O.W. to the west.

A copy of the site plan by SRN Architects, dated January 27th, 2022 is provided within Appendix A.

2. Terms of Reference

The Terms of Reference used for this report were based on the City of Barrie's Development Manual (2017), Storm Drainage and Stormwater Management Policies and Design Guidelines (2017), and the Sanitary Sewage Collection System Policies and Design Guideline (2017). Other documents that were used to establish the design criteria are noted in their appropriate section.

2.1 LSRCA Design Charrette

In accordance with the City of Barrie's requirements for the development within the Hewitt's Secondary Plan Area, a virtual design charrette meeting was held with City and LSRCA staff on August 13, 2020 on the Microsoft Teams platform.

Technical design parameters for stormwater, sanitary sewers and water distribution were presented and confirmed by the City and LSRCA staffs. These design parameters are presented in the beginning of each of these sections respectively.

3. Stormwater Management and Drainage

This section provides an analysis, valuate on a preliminary basis, of the site Stormwater Management (SWM) opportunities and constraints, including:

- Calculation of the proposed storm flows;
- Evaluation of the capacity of the existing stormwater service connections or ultimate outlets; and,
- Demonstration that adequate capacity is or will be available within the receiving municipal sewers and downstream infrastructure to accommodate the additional stormwater flows from the proposed development.

3.1 Existing Conditions

As mentioned in section 1.2, the site is currently used as agricultural land and consists of one 2-storey residential building, two stone and farm barns, a metal garage and a plastic green house, with a total site area of 4.90 ha. Based on the topographic survey, there aren't any existing catchbasins on site. Runoff from the northwest corner of the site flows overland to the north and west (approximately 0.77ha) and the reminder of the site (4.13ha) flows into an existing ditch running along the west side of Yonge Street. See Figure DAP-1, for the existing storm drainage conditions.

3.2 Proposed Conditions

The proposed development consists of one 3-storey townhome, two 3-storey condo buildings, two 4 to 6-storey condo buildings, and two 6 to 9-storey condo buildings with commercial units fronting Yonge Street. A small portion of the frontage along the western limit and the new 18.0m R.O.W (Street B) at the northwest corner of the site will drain onto the future municipal R.O.W. to the west, and eventually into SWM Pond #3.

The following design criteria will be applied:

- SWM Quantity control: Post-development peak flows for all storms, up to and including 100-year, from the subject site are to be controlled to meet the pre-development levels;
- SWM Quality Control: Stormwater is to be treated to Enhanced Protection levels, i.e., 80% TSS removal, as defined in the MECP 2003 SWMPD Manual;
- Phosphorus loadings will meet or be below existing conditions;
- Water Balance: Maintain the pre-development infiltration target to the extent feasible; and,
- The City's Intensity-Duration-Frequency (IDF) data to be used for analysis.

Based on the latest Site Plan by SRN Architects Inc., revision dated January 27, 2022, the site is proposed to be developed into a high-density residential site with commercial space off Yonge Street.

The majority of the entire private development (Area 100), and the new municipal R.O.W. along the southern limit (Area 103) will be draining towards Yonge Street and eventually into SWM Pond#5. However, a small area fronting the future R.O.W. to the west (Area 101), and a small area on the northwest corner that will become part of the future municipal R.O.W. (Area 102) will drain to SWM POND #3 instead. The total area draining towards SWM Pond #5 and SWM Pond#3 is approximately 4.797ha (Area 100 + Area 103) and 0.113 ha (Area 101 + Area 102) respectively. Refer to Figure DAP-2 attached to the end of this report for the proposed conditions drainage area.

3.3 Proposed Interim Condition

An interim conditions is proposed to maintain the existing drainage pattern prior to the completion of the future R.O.W to the west and north. A temporary swale will be proposed to run along the western limits of the site to capture storm runoff from Area 101, into a temporary ditch inlet catchbasin and eventually discharging into the storm sewer on Street A flowing towards SWM Pond #5. The northwest corner (Area 102) that will become part of the future municipal R.O.W. will have temporary 3:1 sloping to match existing grading to the north, in order to maintain the existing drainage patterns.

Based on the above, the proposed development can proceed and be developed without the need of the future R.O.W. to the west and north, nor SWM Pond #3. The temporary ditch, catchbasin and 3:1 slope will be removed in the ultimate condition.

Refer to Figure DAP-2 attached to the end of this report.

3.4 External Stormwater Management Scheme

As per the R. J. Burnside & Associates Limited issued Addendum No. 2, the 2019 SIS study (December 9, 2021), the required SWM controls for this site were intended to be provided using two end-of-pipe SWM facilities. The SIS originally proposed drainage divide cuts through the center of the site, whereby the western part of the subject site would drain westerly towards SWM Pond #3 (located within Lockhart Innisfill Investments Ltd. property) and the eastern part of the site would drain easterly towards SWM Pond #5 (located within Ballymore's property). Refer to Figure DD showing the originally proposed drainage divide in Appendix B, extracted from the R.J. Burnside & Associates Ltd. SIS report.

The drainage divide has since then been further revised based on Addendum No. 2 (December 9, 2021) from R.J. Burnside & Associates. The new storm drainage divide for SWM Pond #5 now encloses the entire proposed development and the new municipal R.O.W. along the southern boundary, with a total area of approximately 4.79ha. The remainder area of 0.11ha will drain onto the future R.O.W. to the west and eventually into SWM Pond #3. Burnside has confirmed that SWM Pond#5 is able to accommodate the additional storm flow from the proposed development.

As per Figure 9 & 10-Proposed Storm Sewer Plan within Addendum No.2, new storm sewers will be constructed within the future R.O.W. to the west, the proposed 24m R.O.W. to the south and Yonge Street to the east. The storm sewers will be extended from the downstream SWM Ponds #3 and #5, through adjacent landowners as part of their respective development applications, up to the property limit of the subject site at both the east and west site boundaries to provide municipal storm connections.

A copy of the Figures 9 & 10 Proposed Storm Sewer Plan has been provided in Appendix B.

3.5 Internal Stormwater Management Scheme

The development will incorporate a "dual" drainage system consisting of storm sewers and catch-basins (minor system) to capture runoff up to the 100-year event and using the roadway to convey overland flow (major system for storm event beyond the 100-year storm). The site can be divided into two components when discussing stormwater management: 1) the private site plan area and 2) the municipal collector road ROW.

All storm runoff generated within the private site (Area 100), up to and including the 100-year storm event, will be captured via area drains and catchbasins, directed into the underground parking garage and routed via underground storm piping in an easterly direction towards Yonge Street. Clean water from the roof and grassed areas will also be conveyed to wards the proposed infiltration gallery located along the northern limit of the site, prior to discharged towards Yonge Street, in order to achieve the infiltration and water balance target (see section 3.7 and 3.8 on page 8). Storm flows will then exit the underground garage at a

designated storm outlet location and connected to the future municipal storm sewer at Street 'A' and Yonge Street intersection which eventually drains into SWM Pond #5.

Additionally, runoff up to the 100-year storm event from new municipal ROW (Street 'A') will be captured just prior to Yonge Street using sufficiently sized catch basins and draining into the future storm sewer within Yonge Street, and eventually discharging into SWM Pond #5.

Refer to Drawing DAP-2 Preliminary Functional Grading & Storm Drainage Plan, for a depiction of the intended post-development stormwater routing.

3.6 SWM Quantity Control and Storm Sewer Design

As mentioned in Section 3.4, the future storm sewer system flowing easterly will be sized for the total capture of the 100-year storm and convey the flow to SWMF #5 to achieve required SWM controls. The target flow to be conveyed to the pond block was calculated using the Rational Method with City's Intensity-Duration-Frequency (IDF) data. The runoff coefficient was calculated as per the City standard. The 100 year storm flow for Area 100 and Area 103 is determined to be 1.61 m^3/s and 0.31 m^3/s respectively, totaling 1.92 m^3/s. Detailed flow calculations are included in Appendix B.

3.7 SWM Quality Control

SWM Pond #5 is proposed to provide the quality controls for the proposed development and the new municipal R.O.W to the south for the interim and ultimate condition. However, once the future R.O.W. to the west is developed, a small piece of uncontrolled drainage (Area 101) and the future R.O.W. to the north (Area 102) will drain via surface onto the future R.O.W. and eventually into SWM Pond#3 instead.

Since the SWM Ponds are both located on external landowners' properties, the design of the SWM Ponds will be prepared by the external landowners' consultants and the details about the quality control calculations can be found within such external consultants engineering reports. In accordance with the SIS Addendum No. 2, it can be expected that downstream SWM Ponds #3 and #5 shall be designed to achieve Enhanced Level of treatment, or a minimum of 80% TSS removal. The SWM ponds will treat the runoff for pollutants such as oil, grease, gas and heavy metals.

3.8 Infiltration and Water Balance

As per the LSRCA guidelines, every attempt should be made to match post-development infiltration volumes to pre-development levels on an annual basis. An annual water budget analysis was completed to determine the infiltration deficit between pre-development conditions and uncontrolled post-development conditions (i.e., without infiltration). The water balance calculations are provided in Appendix B. As per the water balance calculations, the pre- and post-development annual infiltration volumes are 5,331 m^3 and 1,866 m^3, respectively, resulting in an annual infiltration deficit of 3,465 m^3.

In order to mitigate this infiltration deficit, Low Impact Development measures in the form of Roof Water/Clean Surface Water Collector system piping and Underground Infiltration Chambers, are proposed to provide required infiltration to compensate the deficit resulting from the proposed development.

In Spring of 2022, in-situ infiltration rates will be measured at the proposed LID locations and at the underside of chamber elevation using the Guelph permeameter methodology in support of final infiltration chamber sizing and design. As per the Hydrogeological study completed by GHD, dated February 2022, a conservative vertical hydraulic conductivity of 1.0×10^{-7} m/s is used. According to the equation in Figure C1 in Appendix C of the LIDSWMPD Guide, (CVC/TRCA, 2010), the infiltration rate is 10 mm/hr with a 2.5 factor of safety. For the drawdown time of 24 hrs, the required area of infiltration system to mitigate infiltration deficit is 903 m^2. The estimate of infiltration area is provided in Appendix B.

All rooftop areas are captured and piped through the underground garage to the Underground Infiltration Chambers to achieve the target mitigation infiltration to meet the annual pre-development infiltration rate. The detailed calculations are provided in Appendix B.

An infiltration area of 1,243 m^2 is proposed. The proposed infiltration area is much larger than the estimate above because the infiltration chambers provide for both water balance infiltration requirements and volume control, which is discussed in the following section. Infiltration chambers are proposed using StormTech SC-740 storm chambers with 150 mm clear stones under the chamber units. Given that only rooftop areas where the runoff generated can be considered as "clean" are conveyed into the chambers, no water quality pre-treatment is proposed.

Due to the sandy soils and generally deep groundwater table found on site, the underground infiltration chambers are proposed to be located under the private roadway along the northern limit of the Site, in an area of deepest groundwater relative to finished grade (groundwater table approximately 7 m deep) and outside the influence of the underground garage footprint. Refer to Figure DAP-2 for the chamber locations.

3.9 Volume Control

Based on LSRCA's definition of major development, the proposed site creates in excess of 0.5 hectares of new impervious surfaces and should attempt to meet the LSRCA criteria for Volume Control, which indicates that for sites without restrictions "stormwater runoff volumes will be controlled, and the post-construction runoff volume shall be captured and retained / treated on site from a 25 mm rainfall event from the total impervious area."

Various methods for stormwater volume reduction may be considered such as infiltration, reuse and rainwater harvesting, canopy interception or evapotranspiration. The site development area is largely encumbered by either a proposed underground garage or municipal ROW, both of which prohibit the use of infiltration galleries. Additionally, the proposed infiltration gallery needs to be a minimum of 5 meters away from any build foundations and therefore the only area available for infiltration opportunity is under the private road aligned adjacent to the north property limit.

The 25 mm storm event runoff from the rooftop and the landscaped area is conveyed to the StormTech Chamber system and a total storage volume of 757 m^3 is provided. A total of 357 StormTech SC-740 chambers are proposed for volume control. Refer to Appendix B for the detailed calculations.

3.10 Phosphorus Removal

In order to meet the required net zero phosphorus loading objective, a wet detention pond (off-site) and underground infiltration (on-site) are proposed to provide phosphorus removal for the proposed development. As per Table 3 of Hutchinson's Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed, March 30, 2012 the removal efficiency for wet ponds is 63% and underground storage is 25%. The underground storage removal efficiency is based on the assumption that only 150 mm of stone depth is provided on the storage chamber bottom. For this project 25 mm of rainfall from the roof top and landscaped area is conveyed to the chamber and retained, this is equivalent to 15 mm of rainfall for the whole site. According to Figure 1a in the Wet Weather Flow Management Guidelines (City of Toronto, November 2006) 15 mm of daily rainfall corresponds to 80% of annual rainfall. Therefore, the chamber system will provide 80% phosphorus removal. To calculate the total phosphorus removal rate of BMPs in a treatment train (underground infiltration and SWM pond), Equation 4-1 in the New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environment Protection, 2004 is used. The total phosphorus removal rate is calculated to be 93%.

An analysis of annual phosphorus loading was completed for both the pre-development and post-development conditions. The phosphorus export coefficient values used in the calculations are specific to Hewitts Creek as per Table 3 of Hutchinson's Phosphorus Budget Tool. Pre-development conditions were

analyzed using 'Cropland' as per the current land use – a tree farm, resulting in an annual phosphorus loading of 0.93 kg/year. Post-development conditions were modelled using 'High Intensity Residential' land use type, resulting in an annual phosphorus loading of 6.47 kg/year. The implementation of the above treatment BMPs result in an annual post-development loading of 0.45 kg/year. The proposed Best Management Practices (BMPs) significantly reduces the annual phosphorous loading in post-development and a net zero phosphorous release from the site is achieved. Outputs from the phosphorous loading calculations have been provided in Appendix B.

3.11 Other Pollutants

As per Sections 2.3.3 to 2.3.5 of the LSRCA SWM Technical Guidelines, winter salt, temperature and other contaminants such as oil, grease and gas, and heavy metals should be addressed. For winter salt, only clean water is discharged to the infiltration chamber. In the detailed design stage, design practices including location of snow storage, use of deciduous plants, minimal road grades and rougher pavement will be considered. For temperature, the runoff from the site is discharged to storm sewer system and there is no fish or fish habitat at the outlet. For oil, grease and gas, and heavy metals, SWM Pond #3 and #5 has been designed to meet the water quality control criteria and regular pond maintenance shall be implemented to achieve the appropriate removal rate for the pollutants.

4. Water Supply System

4.1 Existing System

According to our available records, the existing site is supplied via a local water well. Existing water infrastructure is currently not available in the area.

4.2 Water Supply

The proposed water servicing of the site will comprise of a new municipal watermain that will be aligned along the proposed 24.0m wide municipal ROW (Street A) to connect with future development to the west and east. Private water connection shall be made to provide fire protection and domestic water supply for the residential and commercial component of the subject site. Service connections, Water meter, backflow preventer, and detector assembly will be provided within the building, all to be designed in accordance with City's Design standards. The mechanical consultant shall confirm the final watermain size to meet the demands for the proposed buildings.

Refer to Fig DAP-3 for the preliminary proposed water connections.

4.3 Domestic Demand

The domestic water usage will be calculated based on the MECP's Design Guidelines for Drinking Water Systems and City of Barrie's design guideline as outlined in Table 1 below.

Table 1 – Water Usage Design Parameters

	Criteria	Criteria Source
Domestic Average Flow	225 L/Day/Person	Barrie Standard
Population Count (High Density)	1.67 Persons/Unit	Barrie Standard

Population Count (Medium Density)	2.57 Persons/Unit	Barrie Standard
Maximum Day Factor	2.50	MECP Standard
Peak Hour Factor	3.75	MECP Standard
Minimum Hour Factor	0.45	MECP Standard

Table 2 below shows the breakdown of units used to estimate the equivalent population.

The domestic demand for the new development is based on an equivalent population of approximately 1,846 persons (1,090 High Density Condo Units x 1.67 persons + 10 Medium Density Townhouse Units x 2.57 persons) with a consumption rate of 225 litres/capita/day and 1,179.5 sq.m of commercial retail with a consumption rate of 28 m^3/Day/Ha. Therefore, the domestic demand for the proposed development is as follows:

- Average Day = (225 x 1,846) + (28 x 1,179.5) = 418,653 L/day (4.85 L/s)
- Maximum Day = 2.5 x Average Day = 1,046,633 L/day (726.6 L/min or 12.11 L/s)
- Peak Hour = 3.75 x Average Day = 1,569,949 L/day (1090.2 L/min or 18.17 L/s)

Table 2 – Equivalent Population

Building	Units	Density	Pop.
A	543	1.67 persons	907
B	218	1.67 persons	364
C	221	1.67 persons	369
D	54	1.67 persons	90
E	54	1.67 persons	90
F	10	2.57 persons	26
Total	**1100**		**1846**

The population per unit of 1.67 was utilized for the proposed the condo apartment units of the development in our calculations, which is considered to be a high density development land use. Please refer to Appendix C for the email confirmation between IBI (formerly Cole Engineering Group Ltd.) and City staff (Oct. 28/19). The population per unit of 2.57 was utilized for the proposed townhouse, which is considered to be medium density development land use.

4.4 Fire Demand

The proposed buildings will have protected openings (as defined by the Fire Underwriters Survey) and a sprinkler system. The buildings will also be constructed using fire resistive construction methods. Given the above, the estimated fire flow required is given by the following formula (as based on the Fire Underwriters Survey):

F = 220 * C * A^0.5

For a building with fire resistive construction, C=0.6, however we have conservatively used C=0.8 for the purpose of the calculations,

C = 0.8

For fire resistive buildings, 'A' is taken as the area of the largest floor plus 25% of each of the two adjoining floors (excluding the basement). As such,

A = 8,940 m^2 (5,960.2 m^2 + 2 x (0.25 x 5,960.2 m^2)

Therefore, the required fire flow is:

F = 17,000 litres/min.

As the proposed development (Building A) will be assumed to have combustible occupancy due to the retail/commercial unit located on ground level, the fire flow will be reduced by 0% due to occupancy hazard reduction/surcharge, and thus,

F = 17,000 litres/min.

As the development will be equipped with an automatic sprinkler system, the fire flow may be further reduced by 30%, or by 5,100 L/min.

Finally, the fire flow will be increased by 20%, or by 3,400 L/min due to exposure to structures within 45 meters of the building. Thus,

F = 15,000 litres/min

Our calculations are included in Appendix D for all buildings in the development site.

Based on the FUS, the governing building has an effective floor area taken to be 8,940 sq.m. According to the calculations, a minimum fire suppression flow of approximately 15,000 L/min (3,963 USGPM) will be required from the nearest hydrant with at least 140 kPA (20 Psi) of pressure.

4.5 Total Demand

The total demand is the greater of the Maximum Day Domestic Demand plus the Fire Demand or the Peak Hour Demand. Based on the FUS, the governing building for the development site will be Building A with an effective floor area taken to be 8,940 sq.m. Thus, the total demand for the proposed development is approximately 15,726.6 litres per minute (approximately 262.11 litres per second, or 4,154.54 U.S. gallons per minutes).

According to the calculations, a minimum fire suppression flow of approximately 15,726.6 L/min (4,154.54 USGPM) will be required from the nearest hydrant with at least 140 kPA (20 Psi) of pressure.

Watermain sizing within the site to provide adequate flows and fire protection is to be determined and confirmed with the City during the detail design process, following the City's confirmation of their Water Pressure Model. Flows from the proposed development will be incorporated within the Water Pressure Model to ensure there is sufficient pressure within the future watermains to support the proposed development.

5. Sanitary Drainage System

5.1 Existing Sanitary Drainage System and Flows

Currently, the site is used as agricultural land and is occupied by one 2-storey residential building, two stone and farm barns, a metal garage and a plastic green house. Vehicle access to the Site is provided by an existing gravel driveway connected to Yonge Street.

According to available records, there is no existing sanitary sewer system in the area. The current apple orchard within the property operates through a septic system. Therefore, the existing site does not currently contribute any flows to the municipal sanitary sewer system.

5.2 Proposed Sanitary Servicing

The peak sanitary sewage discharge from the site will be determined using sanitary sewer design sheets that consider the land use and site statistics as shown on the Site Plan.

The estimated sanitary discharge rate from the proposed site will be calculated based on the criteria set out by the City's Sanitary Sewage Collection System Policies and Design Guidelines, as outlined in Table 3 below.

Table 3 – Sanitary Design Parameters

	Criteria	Criteria Source
Domestic Average Flow	225 L/Day/Person	Barrie Standard
Extraneous Flow	0.1 L/s/Ha (Infiltration)	Barrie Standard
Peaking Factor	Harmon: $M = 1 + (14/(4 + P^{0.5}))$ (Where P is Population in Thousands) OR Babbit: $M = 5 / P^{0.2}$ (Where P is Population in Thousands)	Barrie Standard
Commercial/Institutiona	28 m^3/Day/Ha	Barrie Standard

A total peak sanitary discharge flow of 21.69 L/s for the entire proposed development area was calculated based on the equivalent population calculated in Section 4.3 and Table 3 above. For conservative purposes, the greater peaking factor was used to calculate the peak sanitary discharge (Babbit). Refer to Appendix C for detailed sanitary flow calculations.

Currently, the SIS proposes a sanitary drainage divide approximately three-quarters through the site, where the western quarter of the subject site would discharge sanitary flow westerly towards a new sub-trunk sanitary sewer (outleting to Patrick Drive at the western limit of the Secondary Plan Area) and the eastern three-quarters of the site would discharge sanitary flow easterly towards a new sub-trunk sanitary sewer along future Kneeshaw Drive (outfall to Mapleview Drive).

Based on the latest site plan, the entire underground parking garage spans the majority of the site, therefore sanitary discharge for the entire site will be directed to a single outlet. The entire site proposes to

direct all sanitary sewage towards the future sanitary sewer on Street A which will then flow easterly towards Yonge Street. The sanitary sewer connection shall be directed easterly under Yonge Street and connect to a new sanitary sewer on Kneeshaw Drive, located within Ballymore's property, which directs drainage northerly towards Mapleview Drive. A depiction of the proposed sanitary diversion area is shown on the SIS Figure 14-Proposed Sanitary Sewer Plan, provided in Appendix C. Please see Fig DAP-3 for the preliminary sanitary service connection location in Appendix A.

To ensure there will be sufficient sanitary sewer capacity downstream within the Secondary Plan Area to accept sanitary flows from the entire proposed development, please refer to the email exchange in Appendix C between the Group Engineer (R.J. Burnside) and City staff on October 18 and 29, 2019. The email exchange references an increase to the capacity allowance to d/D ratio to 0.70 for the proposed downstream 375mm diameter sanitary sewer, which would support potential increases in density from the contributing lands, including the subject site.

6. Site Grading

The proposed grades will match the intended drainage patterns as per the Subwatershed Impact Study, to the extent possible, recognizing the need to direct all storm and sanitary drainage easterly and recognizing the need to meet future perimeter grades along all boundaries.

Current preliminary grading design has been prepared for the proposed site development that ties to current existing grades along Yonge Street. The preliminary grading design is generally showing the proposed drainage patterns of the development site all draining east towards Yonge Street, meeting the overall stormwater management approach.

A detailed perimeter and internal grading will be prepared at the site plan application stage of planning approvals and will be based on the adjacent subdivision development design including: Rainsong (by Great Gulf), Rainsong's future Recreation Center and the Yonge Street centreline profile and cross-sections proposed in the Phase 2 Public Information Centre drawings, prepared by the City of Barrie, dated January 16, 2018, in recognition of future boulevards and urbanization along the Yonge Street corridor. Emergency stormwater overland flow will be directed to approved outlet(s), such as existing municipal roads (Yonge Street) to the east. The proposed Yonge Street transportation improvement drawings can be found in Appendix A.

For preliminary grading design, refer to Drawing DAP-2, Preliminary Functional Grading & Storm Drainage Plan', located after the report.

7. Erosion and Sediment Control

Prior to any disturbance on site, an Erosion and Sediment Control (ESC) Plan will be submitted to the municipality and LSRCA in support of a Site Alteration Permit. The ESC design will be completed to include:

- ESC is a dynamic process and plan designs must be flexible and adapted to the conditions and stages of work
- ESC's are to address:
  - Stage 1: Topsoil stripping, grading and re-stabilization
  - Stage 2: Site servicing and roads
  - Stage 3: Building construction
- Select the types and locations of best management practices based on the outcome of the erosion risk assessment.
- Preserve existing vegetation and maintain vegetation buffer whenever possible
- Stabilize stockpiles and any other exposed soils on areas inactive for 30 days.
- Protect exposed soils, particularly on steep slopes
- Slow flow velocity and settle sediments
- Protect existing storm inlets and storm sewer system
- Conduct pre-construction meeting with the developer, contractor, and regulatory authorities to confirm understanding of the design and monitoring
- Continuous inspection and reporting of the measures

The ESC design will include all calculations demonstrating appropriate sizing of stormwater control features such as Cut-Off Swales, Temporary Sediment Traps and/or Temporary Sediment Control Ponds. Construction access for the site will be depicted on the ESC Plan and its location will be subject to City of Barrie approval.

8. Utilities

Utilities such as gas, cable, telephone and hydro are proposed to be available within the future right of way fronting the development site (Street A). As stated in Amendment No. 39 to the City's Official Plan, Section 9.6.6 "Prior to approval of development within the Hewitt's Secondary Plan Area, all interested telecommunications providers and required utilities providers shall work with the landowner(s) and the City to confirm their plans for services to support the proposed development. The City shall work with the providers to determine appropriate locations for large equipment or cluster sites."

9. Conclusions and Recommendations

Based on our investigations, we conclude the following:

Storm Water

The storm drainage divide for SWM Pond #5 has been revised based on coordination with Burnside. The majority of the stormwater runoff from the site will be directed to SWM Pond #5, located to the east of Yonge Street, and a small portion of the site will be directed to SWM Pond #3 located to the west of Yonge Street. However, an interim condition of a temporary swale along the west and 3:1 sloping along the north, are proposed to ensure the proposed development can proceed prior to the completion of SWM Pond #3. Both ponds are currently under design by others and new storm sewers will be extended to the site property line, by neighboring developments. The required quantity and quality control will be provided in SWM Ponds #3 and #5 pond blocks to achieve the minimum 80% TSS removal as well as treat

additional pollutants such as oil, grease, and heavy metals. Burnside has also confirmed that SWM Pond #5 is able to accommodate the increase in storm flow based on the new storm drainage divide.

Post-development water balance will meet pre-development rates through the use of Roof Water Collector pipes and underground infiltration chambers. Storm runoff from the majority of rooftops across the site will be captured and directed to underground chambers along the northern portion of the property. Sandy soil and relatively deep groundwater table conditions are suitable for on-site infiltration measures. Phosphorus removal calculations show that up to 93% of phosphorus can be removed in the post-development condition using downstream SWM Ponds and the proposed underground infiltration facilities.

Sanitary Flows

The expected net increase in peak sanitary discharge flow from the site is approximately 21.69 L/s based on the proposed site plan. The entire site will be serviced by a sanitary connection at Yonge Street and all sewage directed east to the proposed sanitary sewer on Kneeshaw Drive, east of the proposed development. The principle of diverting sanitary drainage area and utilizing a single outlet has been reviewed by the Group Engineer.

Water Supply

A new municipal watermain will extend along the proposed collector road, Street 'A', extending from Yonge Street to the western property boundary where municipal water supply for the site will be provided. The site requires a minimum flow rate of 15,726.6 L/min (4,154.54 USGPM) at a pressure of 140 kPa (20 PSI) to account for both fire and domestic flows. The final watermain sizing is to be determined at the detail design stage, following the City's update of the Water Pressure Model.

Sincerely,

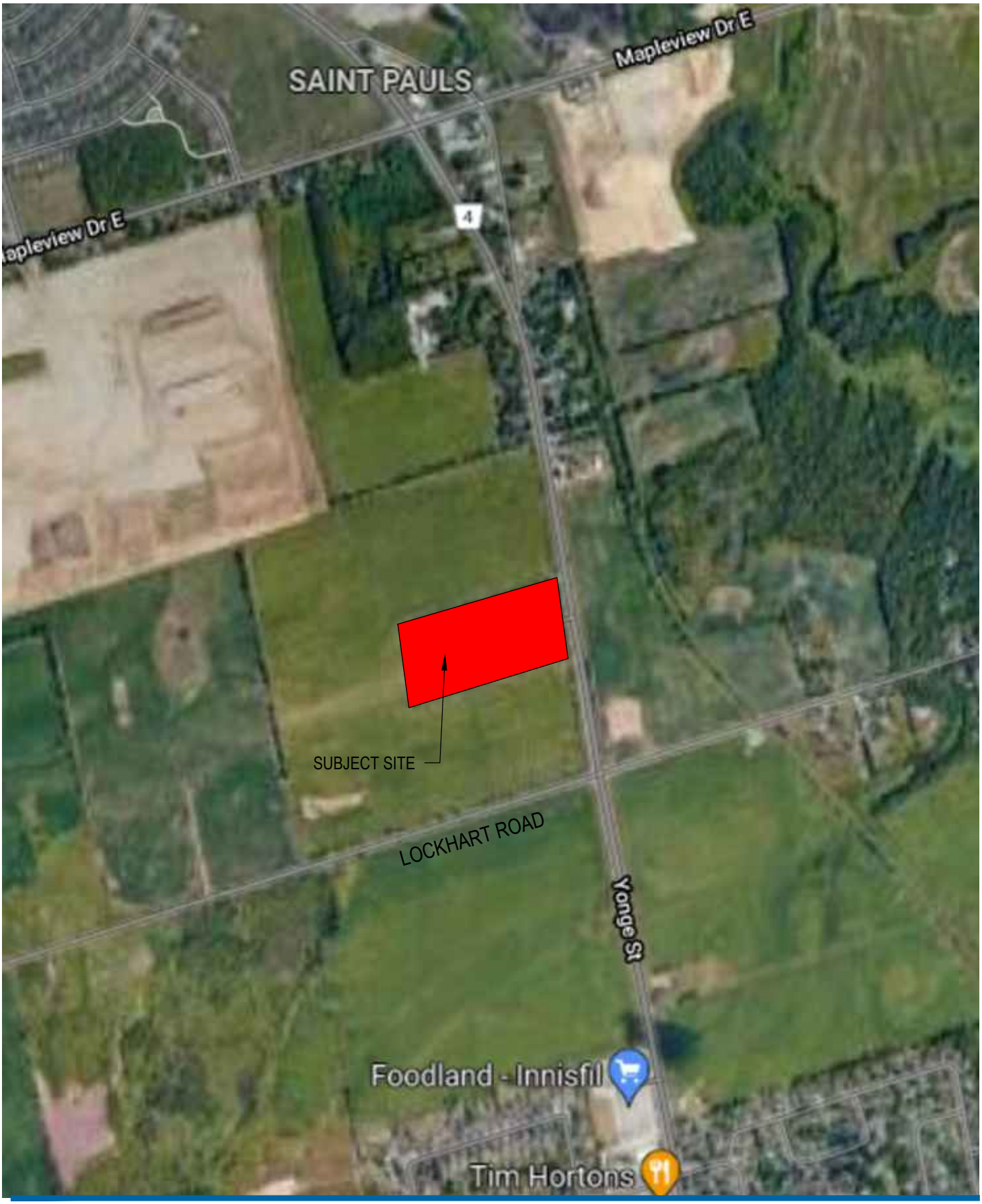
GHD

Winston Thai, P.Eng.
Project Manager, Community Development

Dave Liu, E.I.T
Designer, Community Development

WT/en

Appendix A
Background Information and Drawings



N

GHD

CROWN COMMUNITIES DEVELOPMENT
1012 YONGE STREET

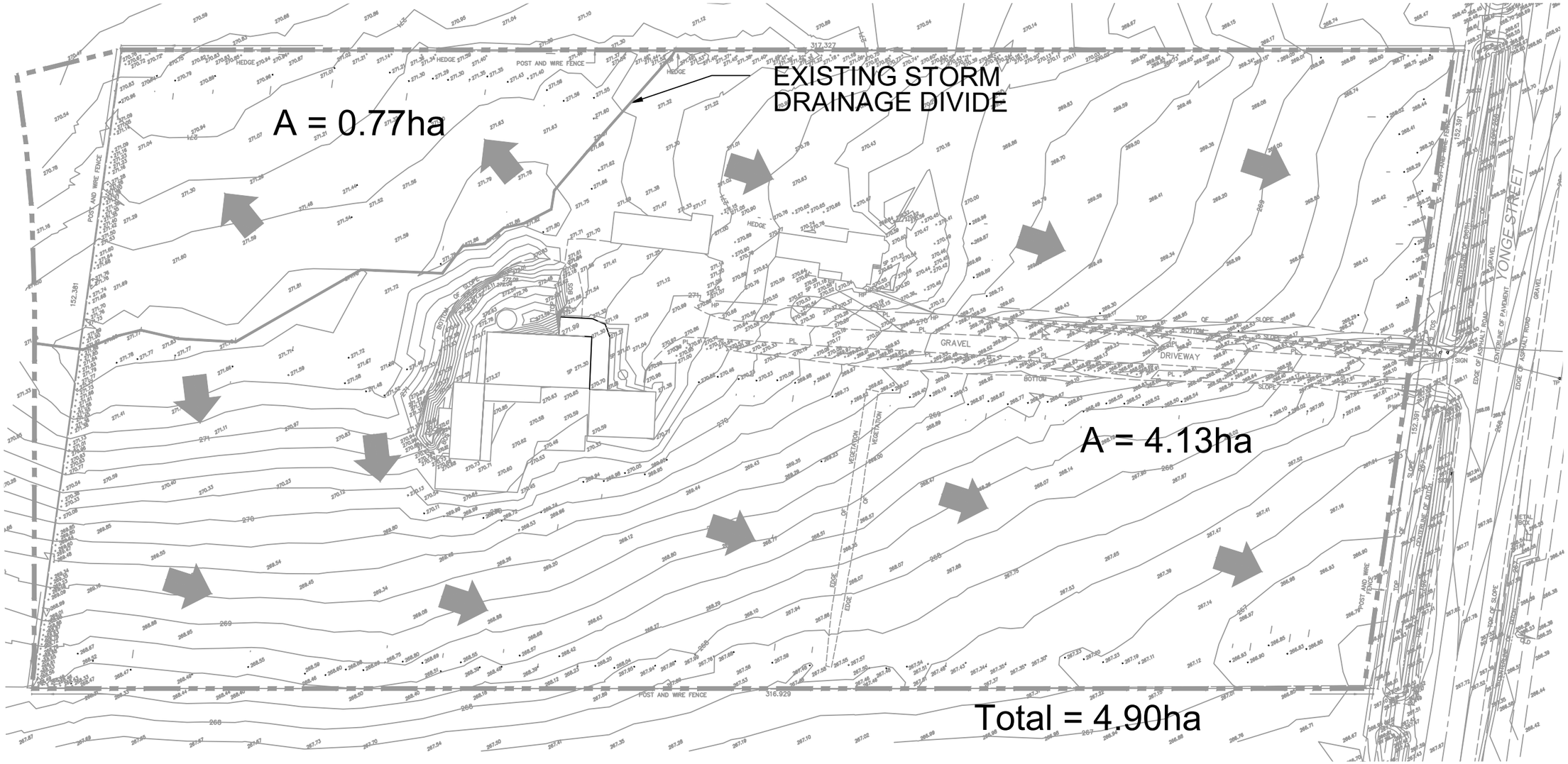
KEY PLAN

Job Number	11226647
Revision	A
Date	JAN 2022

Figure 01

140 Allstate Parkway, Suite 210, Markham Ontario L3R 5Y8 **T** 1 905 752 4300 **F** 1 905 752 4301 **E** ytomail@ghd.com **W** www.ghd.com

Plot Date: 21 January 2022 - 7:50 PM Plotted by: Winston Thai Cad File No: N:\CA\Mississauga\Projects\662\11226647\Tech\Submission\2nd Submission\11226647 - FIGURE 01 - KEY PLAN.dwg



LEGEND

DEVELOPMENT BLOCK AREA BOUNDARY

270.01 EXISTING ELEVATION

EXISTING OVERLAND FLOW ARROW

N

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

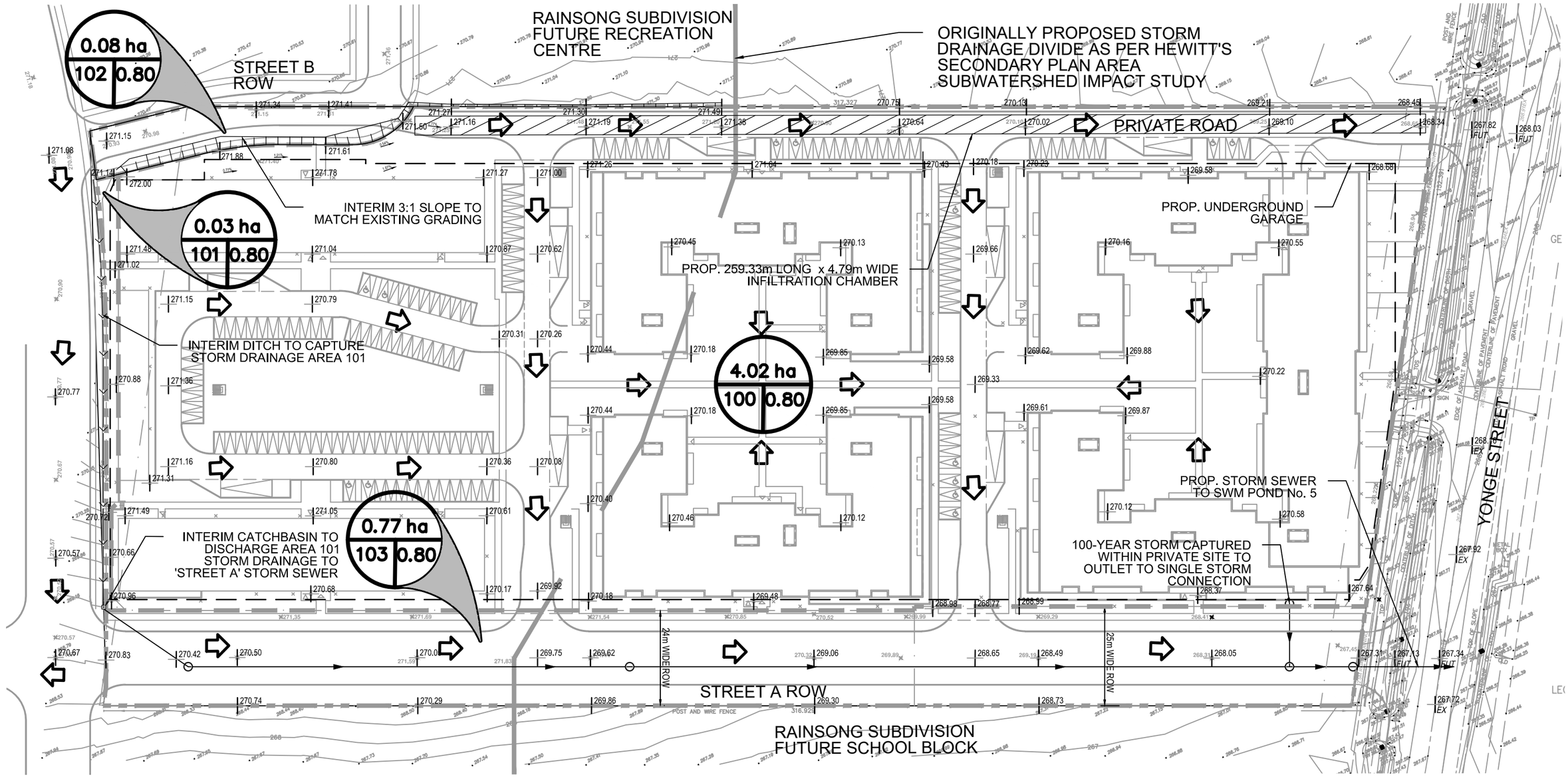
GHD

PRE - DEVELOPMENT STORM DRAINAGE PLAN

Project No. 11226647
Report No.
Date Jan. 21, 2022

FIG: DAP-1

Filename: N:\CA\Mississauga\Projects\662\11226647\Digital_Design\ACAD\Civil 3D\11226647-PRE-DRAINAGE.dwg
Plot Date: 21 January 2022 - 7:51 PM



LEGEND

- PROPOSED STORM
- DEVELOPMENT BLOCK AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- STORM MANHOLE
- PROPOSED ELEVATION
- OVERLAND FLOW ARROW
- AREA IN HECTARES
- AREA ID / RUNOFF COEFFICIENT

N

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

GHD

PRELIMINARY - FUNCTIONAL GRADING & STORM DRAINAGE PLAN

Project No. 11226647
Report No.
Date Jan. 21, 2022

FIG: DAP-2

Filename: N:\CA\Mississauga\Projects\662\11226647\DigitaL_Design\ACAD\Civil 3D\11226647-POST-DRAINAGE-revised.dwg
Plot Date: 4 February 2022 - 1:24 PM

RAINSONG SUBDIVISION
FUTURE RECREATION CENTRE

PRIVATE ROAD

PROP. UNDERGROUND
GARAGE

PROP. 259.33m LONG x 4.79m WIDE
INFILTRATION CHAMBER

100-YEAR STORM CAPTURED
WITHIN PRIVATE SITE TO
OUTLET TO SINGLE STORM
CONNECTION

OUTLET TO SINGLE
SANITARY CONNECTION

PROP. SANITARY
SEWER

PROP. WATERMAIN

PROP. STORM
SEWER

24m WIDE ROW

STREET A ROW

25m WIDE ROW

RAINSONG SUBDIVISION
FUTURE SCHOOL BLOCK

PROP. STORM SEWER
TO SWM POND No. 5

YONGE STREET

LEGEND

PROPOSED ELEVATION

DEVELOPMENT BLOCK
AREA BOUNDARY

OVERLAND FLOW ARROW

N

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

GHD

PRELIMINARY SITE
SERVICING

Project No. 11226647
Report No.
Date Jan. 21, 2022

FIG: DAP-3

Filename: N:\CA\Mississauga\Projects\66211226647\Digital_Design\ACAD\Civil 3D\11226647-PRELIMINARY SERVICING PLAN.dwg
Plot Date: 4 February 2022 - 3:11 PM

SKETCH SHOWING TOPOGRAPHY
FOR SITE DEVELOPMENT PURPOSES OF

PART OF LOT 15
CONCESSION 11

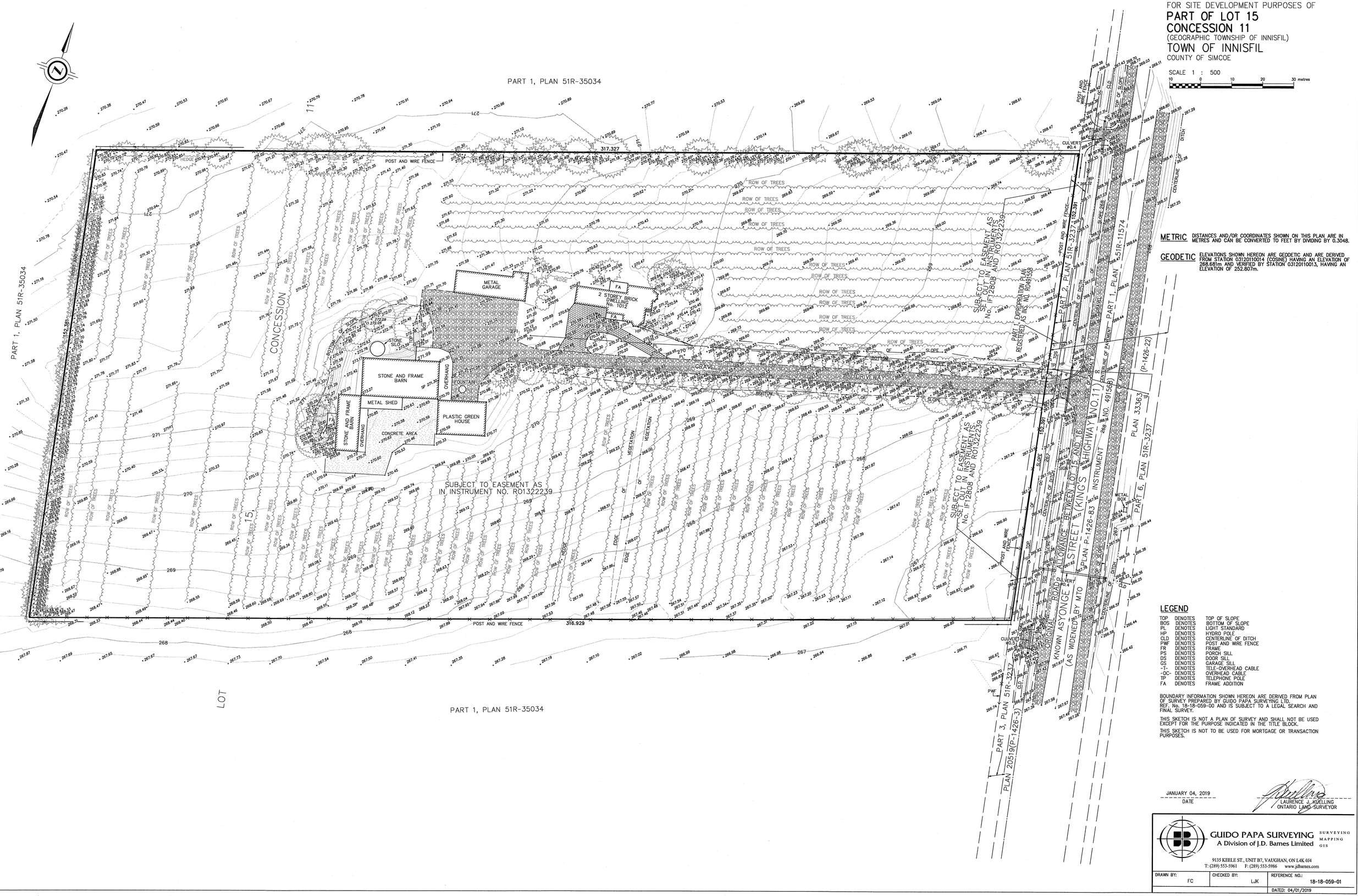
(GEOGRAPHIC TOWNSHIP OF INNISFIL)

TOWN OF INNISFIL

COUNTY OF SIMCOE

SCALE 1 : 500

10 0 10 20 30 metres



METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

GEODETIC ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE DERIVED FROM STATION 03120110014 (COSINE) HAVING AN ELEVATION OF 268.681m AND VERIFIED BY STATION 03120110013, HAVING AN ELEVATION OF 252.807m.

LEGEND

TOP	DENOTES	TOP OF SLOPE
BOS	DENOTES	BOTTOM OF SLOPE
PL	DENOTES	LIGHT STANDARD
HP	DENOTES	HYDRO POLE
CLD	DENOTES	CENTERLINE OF DITCH
PWF	DENOTES	POST AND WIRE FENCE
FR	DENOTES	FRAME
PS	DENOTES	PORCH SILL
DS	DENOTES	DOOR SILL
GS	DENOTES	GARAGE SILL
-T-	DENOTES	TELE-OVERHEAD CABLE
-OC-	DENOTES	OVERHEAD CABLE
TP	DENOTES	TELEPHONE POLE
FA	DENOTES	FRAME ADDITION

BOUNDARY INFORMATION SHOWN HEREON ARE DERIVED FROM PLAN OF SURVEY PREPARED BY GUIDO PAPA SURVEYING LTD. REF. No. 18-18-059-00 AND IS SUBJECT TO A LEGAL SEARCH AND FINAL SURVEY.

THIS SKETCH IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

THIS SKETCH IS NOT TO BE USED FOR MORTGAGE OR TRANSACTION PURPOSES.

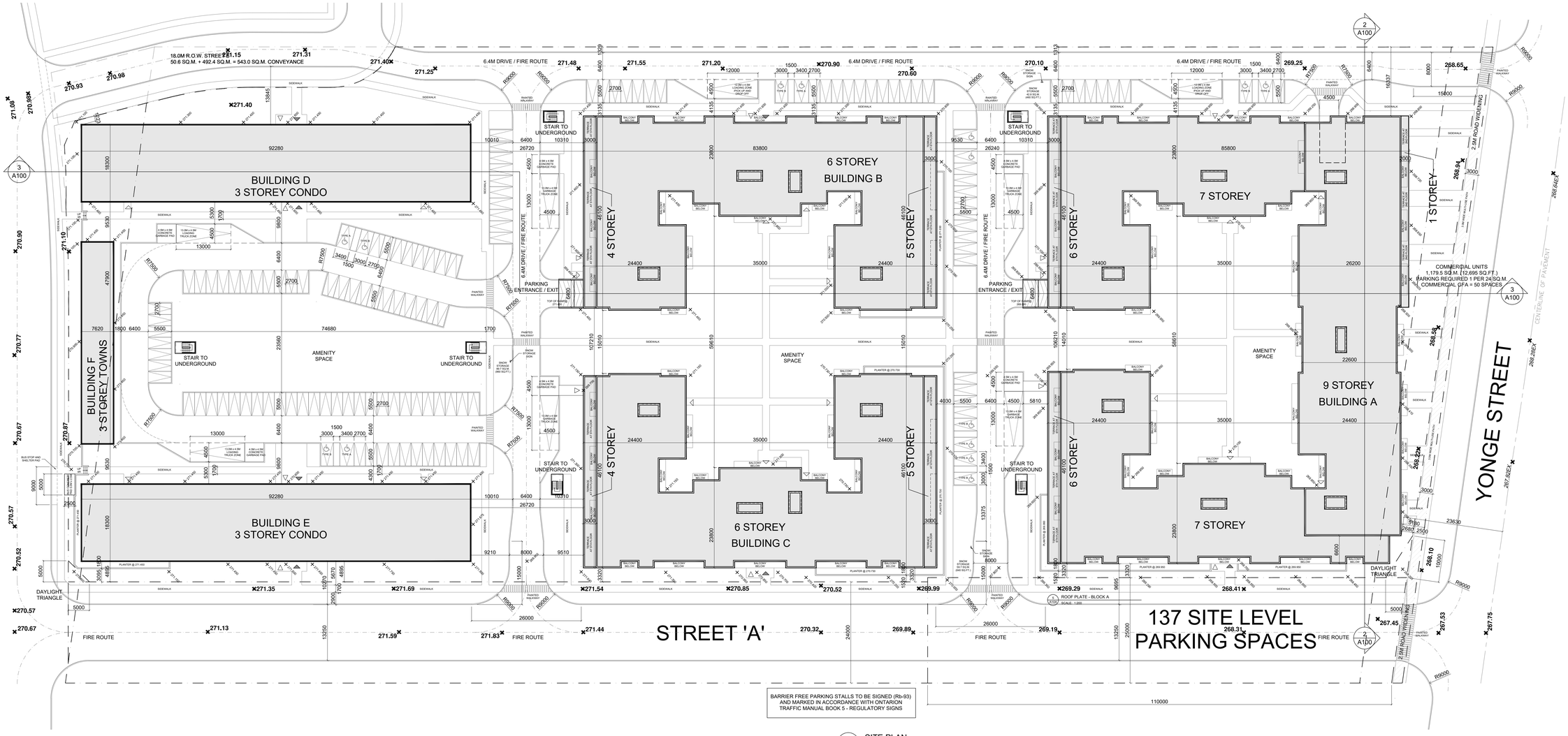
JANUARY 04, 2019
DATE

LAURENCE J. KUELLING
ONTARIO LAND SURVEYOR

GUIDO PAPA SURVEYING
A Division of J.D. Barnes Limited
SURVEYING MAPPING GIS
9135 KEELE ST., UNIT B7, VAUGHAN, ON L4K 0J4
T: (289) 553-5961 F: (289) 553-5986 www.jdbarnes.com

DRAWN BY:	CHECKED BY:	REFERENCE NO.:
FC	LJK	18-18-059-01
		DATED: 04/01/2019

FILE: G:\Jobs\2018\18-18-059-01 - 1012 Yonge Street, Innisfil, - Crown Communities\Drawing\18-18-059-01.dgn



1 A100 SITE PLAN
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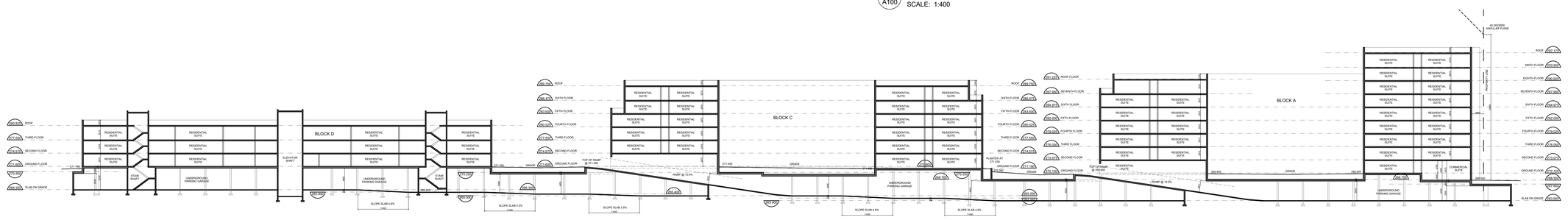
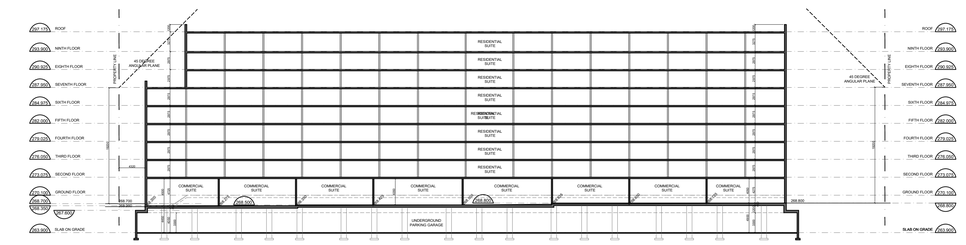


2 A100 BUILDING SECTION (EAST / WEST)
SCALE: 1:400



3 A100 BUILDING SECTION (NORTH / SOUTH)
SCALE: 1:400

SITE STATISTICS FOR PROJECT:

	TYPE	AREA	UNITS
PARKING	UNDERGROUND GARAGE	35,283.5 SQ.M. (379,790 SQ.FT.)	1,033 SPACES
	SURFACE PARKING		104 SPACES
	TOTAL PARKING (NO COMMERCIAL SPACES REQUIRED)		1,179 SPACES
	PARKING RATIO OF 1.0/ SPACES PER UNIT		
	COMMERCIAL SPACE (OFF YONGE) (REQUIRED 50 PARKING SPACES)	1,179.5 SQ.M. (12,695 SQ.FT.)	N/A
BLOCK A (MIXED-USE) / 9 STOREY CONDO	GROUND (RESIDENTIAL)	4,624.5 SQ.M. (49,835 SQ.FT.)	45 UNITS
	GROUND (COMMERCIAL)	1,179.5 SQ.M. (12,695 SQ.FT.)	
	TYPICAL (2ND TO 5TH)	5,960.3 SQ.M. (64,155 SQ.FT.)	95 UNITS PER FLOOR
	6TH FLOOR	5,960.3 SQ.M. (64,155 SQ.FT.)	95 UNITS PER FLOOR
	6TH TO 9TH FLOORS	2,243.4 SQ.M. (24,150 SQ.FT.)	21 UNITS PER FLOOR
	TOTAL (GROUND TO 6TH)	45,589.7 SQ.M. (490,835 SQ.FT.)	323 UNITS
BLOCK B / 6 STOREY CONDO	GROUND	2,631.1 SQ.M. (28,320 SQ.FT.)	39 UNITS
	TYPICAL (2ND TO 4TH)	2,631.1 SQ.M. (28,320 SQ.FT.)	39 UNITS PER FLOOR
	5TH FLOOR	2,689.2 SQ.M. (28,945 SQ.FT.)	38 UNITS
	6TH FLOOR	2,573.9 SQ.M. (27,705 SQ.FT.)	36 UNITS
	TOTAL	15,288.0 SQ.M. (164,575 SQ.FT.)	215 UNITS
BLOCK C / 6 STOREY CONDO	GROUND	2,799.7 SQ.M. (30,130 SQ.FT.)	31 UNITS
	TYPICAL (2ND TO 4TH)	2,799.7 SQ.M. (30,130 SQ.FT.)	39 UNITS PER FLOOR
	5TH FLOOR	2,689.2 SQ.M. (28,945 SQ.FT.)	38 UNITS
	6TH FLOOR	2,573.9 SQ.M. (27,705 SQ.FT.)	36 UNITS
	TOTAL	16,467.4 SQ.M. (177,230 SQ.FT.)	221 UNITS
BLOCK D / 3 STOREY CONDO	GROUND	1,886.1 SQ.M. (20,175 SQ.FT.)	18 UNITS
	TYPICAL (2ND TO 3RD)	1,886.7 SQ.M. (20,175 SQ.FT.)	18 UNITS
	TOTAL	5,586.3 SQ.M. (64,530 SQ.FT.)	54 UNITS
BLOCK E / 3 STOREY CONDO	GROUND	1,888.2 SQ.M. (18,175 SQ.FT.)	18 UNITS
	TYPICAL (2ND TO 3RD)	1,888.7 SQ.M. (18,175 SQ.FT.)	18 UNITS
	TOTAL	5,586.1 SQ.M. (54,530 SQ.FT.)	54 UNITS
BLOCK F / 3 STOREY TOWNS	GROUND	365.0 SQ.M. (3,930 SQ.FT.)	
	TYPICAL (2ND TO 3RD)	803.0 SQ.M. (3,930 SQ.FT.)	
	TOTAL	1,083.9 SQ.M. (11,780 SQ.FT.)	12 UNITS
TOTAL	RESIDENTIAL GFA	88,410.0 SQ.M. (951,690 SQ.FT.)	1,100 UNITS
	COMMERCIAL GFA	1,179.5 SQ.M. (12,695 SQ.FT.)	
	TOTAL GFA	89,593.5 SQ.M. (964,385 SQ.FT.)	

SITE STATISTICS:

SITE AREA	40,398.5 SQ.M. (434,850 SQ.FT.)
BUILDING COVERAGE	15,302.0 SQ.M. (164,710 SQ.FT.) OR 37.88%
LANDSCAPED AREA	17,301.8 SQ.M. (186,235 SQ.FT.) OR 42.83%
PAVED AREA	7,794.7 SQ.M. (83,900 SQ.FT.) OR 19.29%
FSI	2.22 (INCLUDING COMMERCIAL)
	2.19 (EXCLUDING COMMERCIAL)
TOTAL UNIT COUNT	1,100 UNITS
TOTAL PROJECT GFA	89,593.5 SQ.M. (964,385 SQ.FT.)
UNDERGROUND GARAGE	35,283.5 SQ.M. (379,790 SQ.FT.)

THESE DRAWINGS ARE NOT TO BE SCALED:
ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES MUST BE REPORTED DIRECTLY TO SRN ARCHITECTS INC.

NO:	DATE:	ISSUED FOR:
3	09/05/20	CLIENT REVIEW
4	23/05/20	CLIENT REVIEW
5	22/11/20	CLIENT REVIEW
6	14/12/20	CLIENT REVIEW
7	19/01/21	CLIENT REVIEW
8	26/02/21	CLIENT REVIEW
9	21/08/21	CLIENT REVIEW
10	06/01/22	CLIENT REVIEW
11	27/01/22	CLIENT REVIEW

ADDITIONAL NOTES:

PRELIMINARY, NOT FOR CONSTRUCTION
ALL AREAS CALCULATIONS ARE PRELIMINARY

NO:	DATE:	REVISION COMMENT:

SRN ARCHITECTS
8395 JANE STREET, SUITE 203
VAUGHAN, ONTARIO. L4K 5Y2
PHONE: 905.417.5515 FAX: 905.417.5517

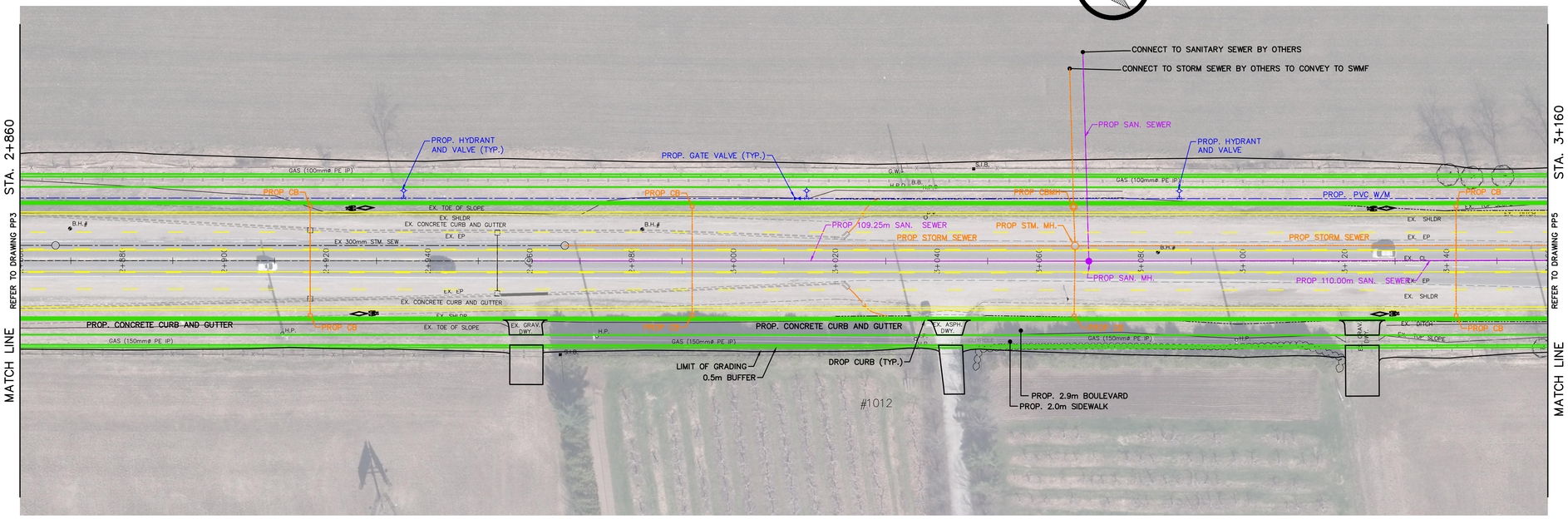
CLIENT:

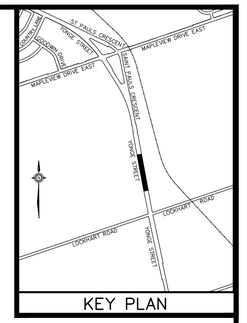
PROJECT:
BARRIE MIXED-USE
1012 YONGE STREET
BARRIE, ONTARIO.

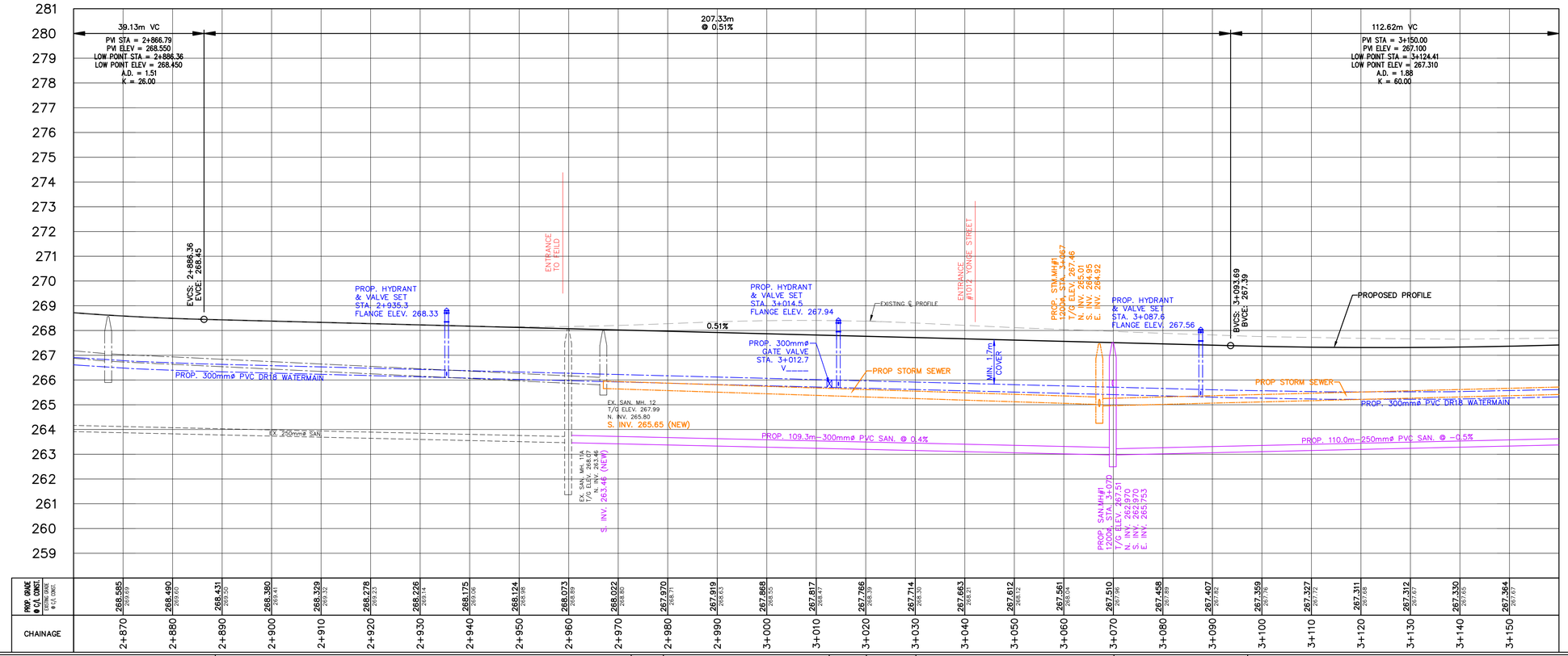
DRAWING TITTLE:
SITE PLAN

DATE: 27/01/22	SCALE: 1:400
DRAWN BY: G.P.R.	CHECKED BY: G.P.R.
PROJECT NUMBER: S19013	DRAWING NUMBER: A100

YONGE STREET







GENERAL NOTES

REFER TO CURRENT CITY OF BARRIE STANDARDS FOR APPLICABLE GENERAL NOTES.

BENCH MARKS

NO.	REVISIONS	DATE	APPROVED
1.	30% DRAFT SUBMISSION	02/2018	RRW
2.	30% SUBMISSION	02/2018	RRW
3.	PUBLIC INFORMATION CENTRE	11/2018	TMK

CITY OF BARRIE
ACCEPTED
DATE. . . . . .
. . . . . DIRECTOR OF ENGINEERING

YONGE STREET IMPROVEMENTS

PLAN & PROFILE – YONGE STREET
STA. 2+860 TO 3+160

Barrie
ENGINEERING DEPARTMENT

SCALE HOR.	1:500	VERT.	1:100
DESIGN	C.J.	DRAWN	J.M.M.
REVIEWED	T.F.H.	DATE	2018.01.16

CONTRACT NO. 20__-__
SHEET NO. PP2

Plotted by: DSMITH on November 9, 2018 at 9:25am
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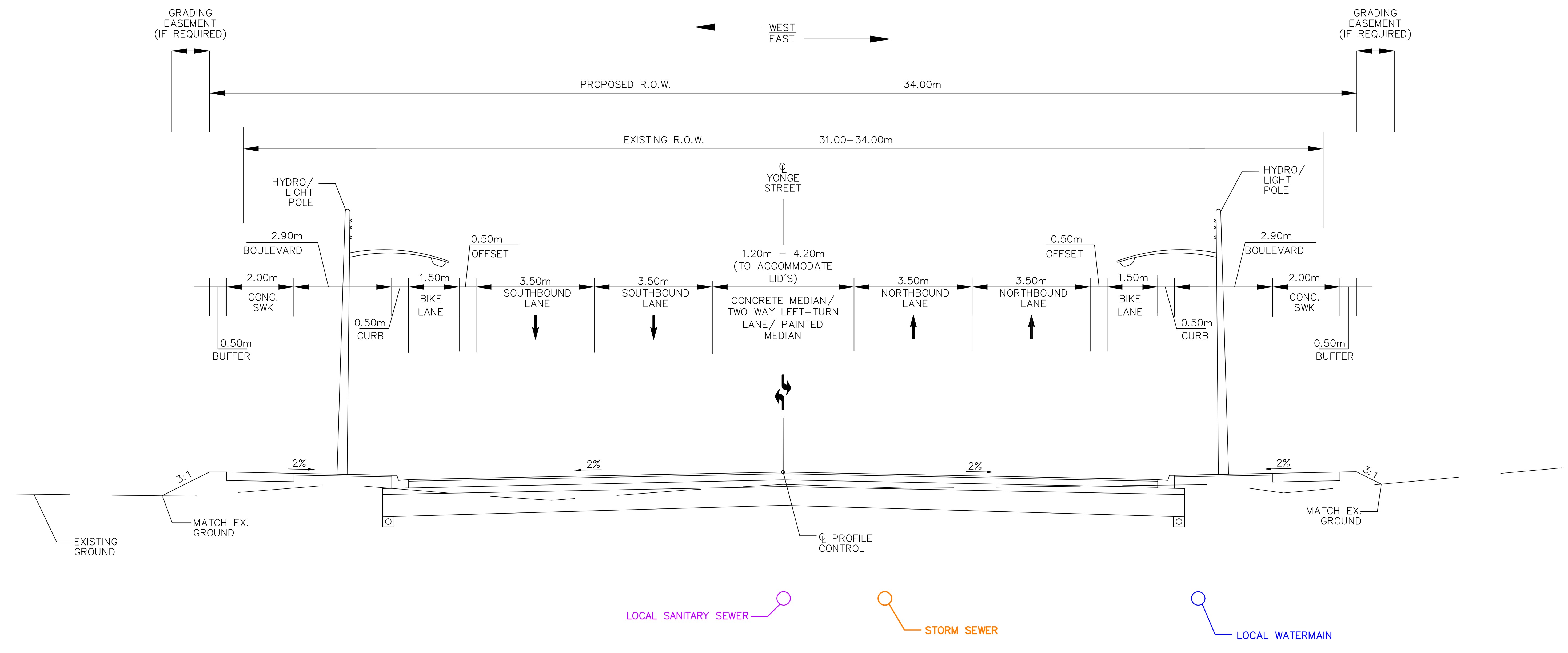
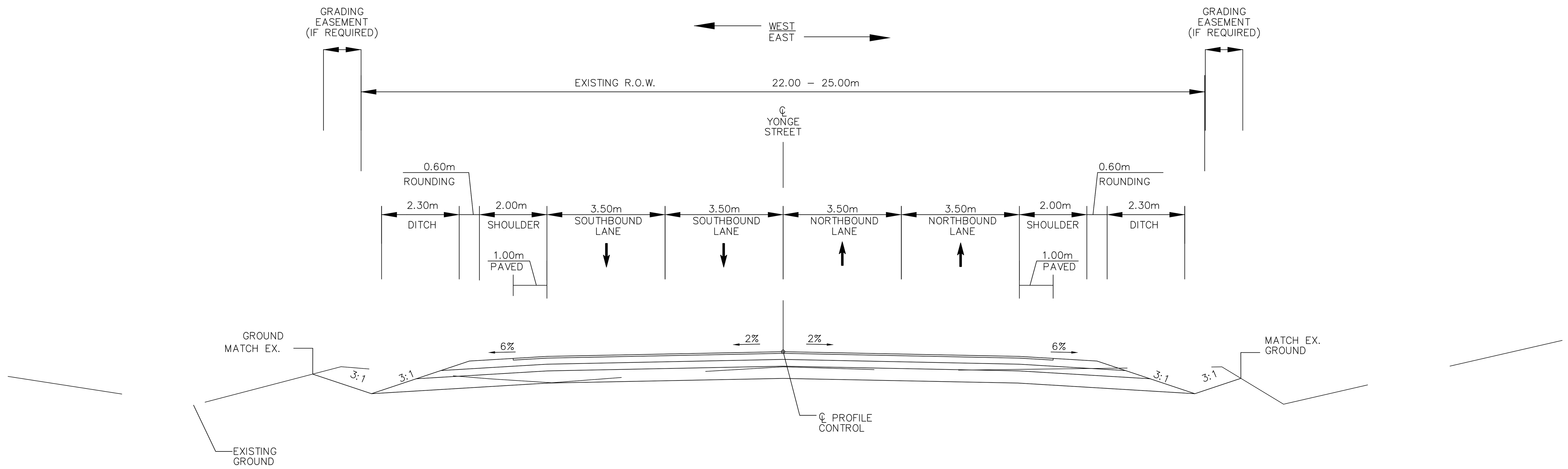


YONGE STREET
TYPICAL CROSS–SECTION
5 LANES WITH RAISED MEDIAN
STA. 1+960.00 TO 3+436.92

N.T.S.



YONGE STREET
TYPICAL CROSS–SECTION
4 LANES WITH PAVED SHOULDERS
STA. 3+436.92 TO 3+369.67

N.T.S.

Plotted by: DEMERY on November 9, 2018 at 8:25am
File: V:\17121\Drawings\Public Information Centre\17121–Option–Yonge–Phase 2 (PIC).dwg Layout: D1

GENERAL NOTES

REFER TO CURRENT CITY OF BARRIE STANDARDS FOR APPLICABLE GENERAL NOTES.

BENCH MARKS

NO.	REVISIONS	DATE	APPROVED
1.	30% DRAFT SUBMISSION	02/2018	RRW
2.	30% SUBMISSION	02/2018	RRW
3.	PUBLIC INFORMATION CENTRE	11/2018	TMK

CITY OF BARRIE ACCEPTED

DATE. . . . .

. . . .
DIRECTOR OF ENGINEERING

YONGE STREET IMPROVEMENTS

TYPICAL CROSS SECTIONS

Barrie
ENGINEERING DEPARTMENT

SCALE HOR. 1:100	VERT. N/A	CONTRACT NO. 20__–__
DESIGN C.J.	DRAWN J.M.M.	SHEET NO. D1
REVIEWED T.F.H.	DATE 2018.01.16	

c) The provision of water and wastewater services shall also relate to the phasing of development as set out in Section 9.7.3.2 of this Plan and the Master Plans and Class EAs identified in Section 9.6.4 b).

9.6.5 STORMWATER MANAGEMENT

a) All new development shall comply with the recommendations of the Drainage and Stormwater Management Master Plan with respect to stormwater management, including the use of Low Impact Development Design Standards which will be encouraged. No amendments to the Secondary Plan shall be required to implement the directions in the Master Plan, for changes to the number or location of stormwater management facilities or where the Plan supports the realignment or other modifications to streams or changes in the locations of drainage facilities.

b) Subwatershed Impact Studies for Sub-watershed Impact Areas are a submission requirement for a complete application. The study areas can be modified or consolidated subject to the approval of the City, in consultation with the applicable conservation authority. The goal of the Subwatershed Impact Studies will be to achieve a greater level of detail in the integration of land use, servicing and stormwater management. The objectives of the studies will be:

i) identification of a final preferred servicing plan (including public/private utilities);
ii) identification of a final preferred road layout;
iii) integration of stormwater management facilities;
iv) exploration of opportunities to integrate recreation opportunities with stormwater management;
v) phasing and cost sharing in areas of multiple ownership;
vi) validation of fisheries mitigation and compensation; and,
vii) the survey of the boundary of the Natural Heritage System.

9.6.6 UTILITIES

a) Prior to approval of development within the Hewitt's Secondary Plan Area, all interested telecommunications providers and required utilities providers shall work with the landowner(s) and hte City to confirm their plans for services to support the proposed development. The City shall work with the providers to determine appropriate locations for large equipment or cluster sites.

b) All telecommunications services and utilities should be located within an initial common trench, whenever possible, to avoid unnecessary digging and disruption on municipal rights of way.

c) Consideration shall be given to the location of telecommunication facilities and utilities within public rights of way as well as on private property. Utilities and telecommunications facilities shall be grouped/clustered or combined where possible and feasible to maximize the use of land and, where applicable, to minimize visual impact. Utilities and telecommunications facilities shall be placed in such a manner so as to not visually detract from the streetscape. The City shall encourage utility and

Hewitt's Secondary Plan Area Subwatershed Impact Study Lover's, Hewitt's and Sandy Cove Creeks

Hewitt's Landowner's Group
c/o Bratty and Partners
7501 Keele Street, Suite 200
Vaughan ON L4K 1Y2

R.J. Burnside & Associates Limited
128 Wellington Street West, Suite 301
Barrie ON L4N 8J6 CANADA

in partnership with:

Azimuth Environmental Consulting Inc.
642 Welham Road
Barrie ON L4N 9A1 CANADA

September 2016
300032860.0000

LEGEND

- STAKED NHS LIMITS (2015)
- NHS BUFFER LIMITS
- CoB GENERATED BUFFER LIMITS (2013)
- 2031 BOUNDARY
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

- 263.99 EXISTING ELEVATION
- 263.99 PROPOSED ELEVATION
- PROPOSED OVERLAND FLOW ROUTE

NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT

0 60 120 180 240
Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED CONDITION GRADING PLAN (2 OF 3)

Drawn	Checked	Date	Figure No.
AO	CC	17/09/14	FIG 7
Scale H 1:3,000		Project No. 300032860	

Appendix B
Stormwater Management Analysis

Project Name	1012 Yonge St., Barrie
Project No.	11226647
Subject	Post Development Uncontrolled Release Rate

Utilizing the rational method, the post development release rate can be determined:

Q = C I A where,

Q = Flow rate (cms)
C = Runoff Coefficient
I = Intensity (mm/hr)
A = Area (ha)

The Intensity can be calculated as:

I = a / (b + t)^c where,

		2 Year	5 Year	10 Year	25 Year	25 Year	100 Year
a =	Constant =	678.085	853.608	975.865	1146.275	1236.152	1426.408
b =	Constant =	4.699	4.699	4.699	4.922	4.699	5.273
c =	Constant =	0.781	0.766	0.760	0.757	0.751	0.759
t =	Time of Concentration (min) =	10	10	10	10	10	10
I =	Intensity (mm/hr) =	83.11	108.92	126.55	148.15	164.22	180.15

Based on the proposed land use the post development flow rates are:

Area ID	Area Description	Area (ha)	Runoff Coefficient (C)	Flow Rates (m^3/s)					
				2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
100	Private Site Drainaing East	4.02	0.80	0.742	0.973	1.130	1.323	1.467	1.609
103	New South municipal R.O.W. Drainaing East	0.77	0.80	0.142	0.186	0.217	0.254	0.281	0.308
Total		**4.79**	**0.80**	**0.885**	**1.159**	**1.347**	**1.577**	**1.748**	**1.918**

HYDROLOGICAL ASSESSMENT
WATER BUDGET DATA
6154142 KING SMOKE TREE AND 6150867 BUTTONVILLE A
FOR THE PERIOD 1974 - 2018

Pervious Area
WATER HOLDING CAPACITY...150 MM

Month	Temperature (°C)	Precipitation (mm)	Rainfall (mm)	Snowmelt (mm)	Potential Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Deficit (mm)	Water Surplus (mm)
January	-7	55	21	17	1	1	0	29
February	-6.2	48	19	23	1	1	0	38
March	-1.1	55	36	47	9	9	0	75
April	6.1	71	67	15	33	33	0	50
May	13.1	82	82	0	79	79	0	18
June	18	87	87	0	113	113	0	6
July	20.9	87	87	0	134	126	-8	0
August	19.9	84	84	0	118	102	-16	2
September	15.7	81	81	0	79	70	-9	3
October	8.9	73	73	0	39	37	-2	6
November	2.7	75	68	6	13	13	0	20
December	-3.5	60	29	15	2	2	0	24
Total		858	734	123	621	586	-35	271

Impervious Area
WATER HOLDING CAPACITY... 10 MM

Month	Temperature (°C)	Precipitation (mm)	Rainfall (mm)	Snowmelt (mm)	Potential Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Deficit (mm)	Water Surplus (mm)
January	-7	55	21	17	1	1	0	37
February	-6.2	48	19	23	1	1	0	41
March	-1.1	55	36	47	9	9	0	75
April	6.1	71	67	15	33	33	0	50
May	13.1	82	82	0	79	69	-10	18
June	18	87	87	0	113	81	-32	9
July	20.9	87	87	0	134	85	-49	3
August	19.9	84	84	0	118	82	-37	3
September	15.7	81	81	0	79	66	-13	12
October	8.9	73	73	0	39	37	-2	32
November	2.7	75	68	6	13	13	0	59
December	-3.5	60	29	15	2	2	0	42
Total		858	734	123	621	479	-143	381

HYDROLOGICAL ASSESSMENT
EXISTING CONDITIONS WATER BALANCE CALCULATIONS

Detail	*Units*	*Impervious Area*	*Pervious Area*	*Total*
Input Information				
Land Type	%	0	100	100
Area [1]	ha	0.00	4.90	4.90
Soil Type			Sandy Silt Till	
Hydrologic Soil Group			C	
Pervious Infiltration Factor [2]				
Topography		-	0.1	
Soil		-	0.2	
Land Type		-	0.1	
TOTAL		0	0.4	
Average Annual Depth [3]				
Precipitation	*mm*	858	858	
Evapotranspiration	*mm*	479	586	586
Output Information				
Annual Rainfall Volume	m^3	0	42,042	42,042
Annual Evapotranspiration Volume	m^3	0	28,714	28,714
Precipitation Surplus	m^3	0	13,328	13,328
Annual Groundwater Recharge Volume [4]	m^3	0	5,331	**5,331**
Annual Runoff Volume	m^3	0	7,997	7,997

Notes:

1. Total developable area of the Site
2. Table 3.1 from the Stormwater Management Planning and Design Manual (MECP, March 2003)
3. This amount was provided by Engineering Climate Service, Environment Canada to represent average annual conditions at the Environment Canada weather stations.
4. (Annual Groundwater Recharge Volume) = (Precipitation Surplus) x (TOTAL Pervious Infiltration Factor) x Area

HYDROLOGICAL ASSESSMENT
PROPOSED CONDITIONS WATER BALANCE CALCULATIONS

Detail	*Units*	*Impervious Area*	*Pervious Area*	*Total*
Input Information				
Land Type	%	65	35	100
Area [1]	ha	3.19	1.72	4.90
Soil Type			Sandy Silt Till	
Hydrologic Soil Group			C	
Pervious Infiltration Factor [2]				
Topography		-	0.1	
Soil		-	0.2	
Land Type		-	0.1	
TOTAL		0	0.4	
Average Annual Depth [3]				
Precipitation	*mm*	858	858	
Evapotranspiration	*mm*	479	586	516
Output Information				
Annual Rainfall Volume	m^3	27,327	14,715	42,042
Annual Evapotranspiration Volume	m^3	15,256	10,050	25,306
Precipitation Surplus	m^3	12,071	4,665	16,736
Annual Groundwater Recharge Volume [4]	m^3	0	1,866	**1,865.9**
Annual Runoff Volume	m^3	12,071	2,799	14,870

Notes:

1. Total developable area of the Site
2. Table 3.1 from the Stormwater Management Planning and Design Manual (MECP, March 2003)
3. This amount was provided by Engineering Climate Service, Environment Canada to represent average annual conditions at the Environment Canada weather stations.
4. (Annual Groundwater Recharge Volume) = (Precipitation Surplus) x (TOTAL Pervious Infiltration Factor) x Area

HYDROLOGICAL ASSESSMENT
SUMMARY OF CALCULATIONS

Details	*Precipitation* (m^3)	*Evapotranspiration* (m^3)	*Precipitation Surplus* (m^3)	*Infiltration* (m^3)	*Runoff* (m^3)
Pre-development					
Existing Conditions	**42,042**	**28,714**	**13,328**	**5,331**	**7,997**
Percentage of Annual Precipitation		68%		13%	19%
Post-development					
Proposed Conditions (uncontrolled)	**42,042**	**25,306**	**16,736**	**1,866**	**14,870**
Percentage of Annual Precipitation		60%		4%	35%
Pre- to Post-development Difference					
Proposed Conditions (uncontrolled)	**0**	**-3,408**	**3,408**	**-3,465**	**6,873**
Percentage Change		-12%	26%	-65%	86%

Estimate of Infiltration Area of LID System
11226647 1012 Yonge St., Barrie

Item	Value	Unit	Notes
Design Infiltration Rate			
Hydraulic Conductivity	1.0E-07	m/s	Consevative value used. Field test in Spring.
Infiltration Rate	25	mm/hr	
Safety Factor	2.5		
Geometric mean of design infiltration rates	10	mm/hr	
	239.8	mm/day	
	0.240	m/day	
	0.240	m/24-hrs	
Estimated Deficit Volume			
Estimated deficit based on water balance calculations	3465	m^3	
Storage to infiltrate to meet deficit	217	m^3/2-week	Assume 8 months/yr with rainfall.
LID Area and the Site			
Area of infiltration system required to mitigate infiltration deficit	903	m^2	
Drawdown time	24	hrs	24 to 48 hrs

StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management℠

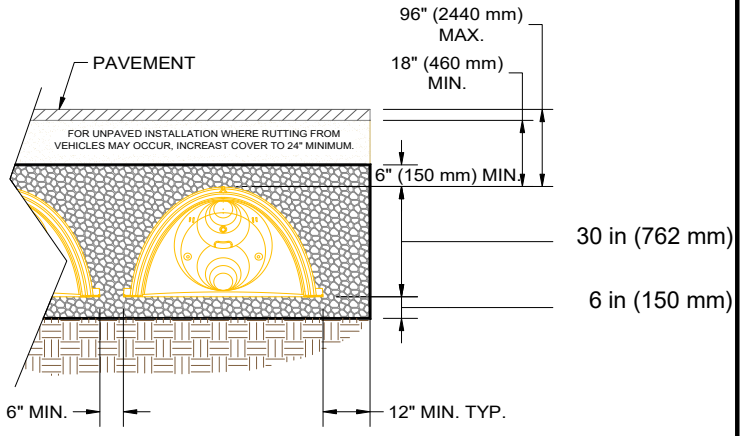
Units: **Metric**

Project: 11226647 1012 Yonge St., Barrie
By: MV
Point of Contact JZ
Date: 21-Jan-22

System Requirements

Required Storage Volume	**757**	cubic meters
Select Stormtech Chamber System	SC-740	
Stone Porosity (Industry Standard = 40%)	**40%**	
Stone Foundation Depth	150	mm
Storage Volume Per Chamber	2.12	cubic meters
Avg Cover over Chambers (460mm min. & 2440mm max.)	465	mm

Number of Chambers Required	357	Each
Required Bed Size	1,243	square meters
Tons of Stone Required	1,420	Tonnes
Volume of Excavation	1,711	cubic meters
Area of Filter Fabric	3,503	square meters
# of End Caps Required	**6**	Each
Length of ISOLATOR ROW	**258.23**	m
ISOLATOR FABRIC	**387**	square meters



Is the limiting dimension for the bed the width or length? **width**

Controlled by Width (Rows)

Width	**5**	m
# of Chambers Long	119	EA
# of Rows	3	EA
Actual Length	259.33	m
Actual Width	4.79	m

Controlled by Length

Length	**0**	m
# of Chambers Long	-	EA
# of Rows	-	EA
Actual Length	-	m
Actual Width	-	m

Material Estimate

To use this sheet: Please enter data into the blue and green cells. If switching between Imperial and Metric units please check the correct units and data is input in the green cells.

Please call StormTech @ 888-892-2694 for conceptual cost estimates.

Project: 1012 Yonge St., Barrie

StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management℠

Chamber Model -	SC-740	
Units -	**Metric**	Click Here for Imperial
Number of chambers -	357	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	267.00	m
Amount of Stone Above Chambers -	152	mm
Amount of Stone Below Chambers -	152	mm

☐ Include Perimeter Stone in Calculations

StormTech SC-740 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1067	0.00	0.00	11.39	11.39	757.14	268.07
1041	0.00	0.00	11.39	11.39	745.74	268.04
1016	0.00	0.00	11.39	11.39	734.35	268.02
991	0.00	0.00	11.39	11.39	722.96	267.99
965	0.00	0.00	11.39	11.39	711.57	267.97
940	0.00	0.00	11.39	11.39	700.18	267.94
914	0.00	0.56	11.17	11.72	688.79	267.91
889	0.00	1.65	10.73	12.38	677.07	267.89
864	0.01	2.85	10.25	13.10	664.69	267.86
838	0.02	6.11	8.95	15.05	651.58	267.84
813	0.02	8.10	8.15	16.25	636.53	267.81
787	0.03	9.61	7.55	17.16	620.28	267.79
762	0.03	10.86	7.05	17.91	603.12	267.76
737	0.03	11.93	6.62	18.55	585.21	267.74
711	0.04	12.79	6.27	19.07	566.66	267.71
686	0.04	13.70	5.91	19.61	547.59	267.69
660	0.04	14.70	5.51	20.21	527.98	267.66
635	0.04	15.41	5.23	20.64	507.77	267.64
610	0.04	16.00	4.99	20.99	487.13	267.61
584	0.05	16.60	4.75	21.35	466.14	267.58
559	0.05	17.18	4.52	21.70	444.79	267.56
533	0.05	17.72	4.30	22.02	423.09	267.53
508	0.05	18.22	4.10	22.33	401.07	267.51
483	0.05	18.75	3.89	22.64	378.74	267.48
457	0.05	19.14	3.74	22.87	356.10	267.46
432	0.05	19.55	3.57	23.12	333.23	267.43
406	0.06	19.97	3.40	23.37	310.11	267.41
381	0.06	20.32	3.26	23.58	286.73	267.38
356	0.06	20.67	3.12	23.79	263.15	267.36
330	0.06	20.98	3.00	23.98	239.36	267.33
305	0.06	21.28	2.88	24.16	215.38	267.30
279	0.06	21.55	2.77	24.32	191.22	267.28
254	0.06	21.77	2.68	24.46	166.90	267.25
229	0.06	22.01	2.59	24.60	142.45	267.23
203	0.06	22.22	2.50	24.73	117.85	267.20
178	0.06	22.31	2.47	24.78	93.13	267.18
152	0.00	0.00	11.39	11.39	68.35	267.15
127	0.00	0.00	11.39	11.39	56.96	267.13
102	0.00	0.00	11.39	11.39	45.56	267.10
76	0.00	0.00	11.39	11.39	34.17	267.08
51	0.00	0.00	11.39	11.39	22.78	267.05
25	0.00	0.00	11.39	11.39	11.39	267.03

PRE-DEVELOPMENT CONDITIONS ANNUAL PHOSPHORUS LOADS

Subcatchment ID/Description	Land Use Types (ha.)													Total Pre-development Annual Phosphorus Loading (kg/yr)	Rationale for choice in Land use Type
	Cropland	Hay-Pasture	Sod Farm/ Golf Course	High Intensity Commercial/ Industrial	High Intensity Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water	Total Catchment Area (ha.)		
1012 Yonge St Barrie	4.90												4.90	0.93	
Totals:	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.90	**0.93**	

Notes:

1 Total phosphorus loading based land use type, using phosphorus export coefficients from Table 2 of the MOE Phosphorus Budget Tool, Page 15:

Land Use	Cropland	Hay-Pasture	Sod Farm/ Golf Course	High Intensity Commercial/ Industrial	High Intensity Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water	
Phosphorus Export Coefficient (kg/ha/yr)	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26	Hewitts Creek

POST-DEVELOPMENT CONDITIONS ANNUAL PHOSPHORUS LOADS

Subcatchment ID/Description	Land Use Types (ha.)													Total Post-Development Annual Phosphorus Loading to BMP (kg/yr)	Treatment Train - First BMP			Net Total Post-Development Annual Phosphorus Loading (kg/yr)	Rationale for choice in Land use Type
	Cropland	Hay-Pasture	Sod Farm/ Golf Course	High Intensity Commercial/ Industrial	High Intensity Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water	Total Catchment Area (ha.)		Best Management Practice Selected	Phosphorus Removal Efficiency of Selected BMP (%)	Total Phosphorus Reduction of Selected BMP (kg/yr)		
1012 Yonge St Barrie					4.90								4.90	6.47	Manual input	93%	6.02	0.45	
Totals:	0.00	0.00	0.00	0.00	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.90	6.47				**0.45**	

Notes:

1 Total phosphorus loading based land use type, using phosphorus export coefficients from Table 2 of the MOE Phosphorus Budget Tool, Page 15:

Land Use	Cropland	Hay-Pasture	Sod Farm/ Golf Course	High Intensity Commercial/ Industrial	High Intensity Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water	
Phosphorus Export Coefficient (kg/ha/yr)	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26	Hewitts Creek

2 Phosphorus removal efficiencies for best management practices obtained from Table 3 of the MOE Phosphorus Budget Tool, Page 21:

BMP Class	*Manual input*	Bioretention System	Constructed Wetlands	Dry Detention Ponds	Dry Swales	Enhanced Grass/Water Quality Swales	Flow Balancing Systems	Green Roofs	Hydrodynamic Devices	Perforated Pipe Infiltration/Exfiltration Systems	Sand or Media Filters	Soakaways - Infiltration Trenches	Sorbtive Media	Underground Storage	Vegetated Filter Strips/Stream Buffers	Wet Detention Ponds
Median Removal Efficiency (%)	*93%*	0%	77%	10%	0%	0%	77%	0%	0%	87%	45%	60%	79%	25%	65%	63%

Summary of Phosphorus Loading Calculations

Item	Total P (kg/yr)
Total Pre-Development Phosphorus Loading	0.93
Total Post-Development Phosphorus Loading	6.47
Net Total Post-Development Phosphorus Loading (after application of BMPs)	0.45
Pre-Development Load - Net Post-Development Load	-0.48
Increase/decrease of:	-51%

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telephone (705) 446-0515 **fax** (519) 941-8120 **web** www.rjburnside.com

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Addendum No. 2

Date: December 9, 2021 **Project No.:** 300032860.0000

Project Name: Hewitt's Secondary Plan Area Subwatershed Impact Study

Client Name: Hewitt's Creek Landowners Group Inc.

Submitted By: Michelle Zettel, P.Eng.

Reviewed By: James Orr, P.Eng.

The Hewitt's Secondary Plan Area (SPA) Subwatershed Impact Study (SIS) was originally completed in September 2016. Following the receipt of comments from the City of Barrie (City) and the Lake Simcoe Region Conservation Authority (LSRCA), Addendum No. 1 was completed in November 2017 to rectify any issues raised by the agencies. Addendum No. 1, in concert with the original SIS, has set the framework for all developments within the Hewitt's SPA advancing through preliminary and detailed design. This memo, noted as Addendum No. 2 of the SIS, is presented to address a change in the proposed Lover's Creek and Hewitt's Creek subwatersheds, relative to Addendum No. 1.

Within the Hewitt's SPA there is an existing subwatershed divide between the Lover's Creek watershed and the Hewitt's Creek watershed. The grading design in the original Subwatershed Impact Study (SIS) and subsequent Addendum No. 1 (November 2017) resulted in a minor adjustment to this drainage divide. The SIS drainage divide between Hewitt's Creek and Lover's Creek watersheds were initially designed to limit the diversion of drainage from one watershed to the other, while optimizing earthworks across the site. As developers advance their individual designs, several landowners along this divide expressed interest in adjusting the proposed SIS divide in order to coincide better with property limits and phasing limits.

Through 2020, preliminary drainage divide revisions were circulated for coordination between landowners, and for discussion with the LSRCA. Most recently, a small area from the Lover's Creek watershed has been redirected to Hewitt's Creek, representing about 100m of ROW. With no further coordination or adjustments anticipated at this time, Addendum 2 has been finalized for approval as follows.

For reference, the previous drainage Figures 9 and 10 from Addendum 1 (November 2017) are included in Appendix A. The revised Figures 9 and 10 have been included, which are to replace the previously submitted drainage divide figures. An additional figure, DD, has also been included for clarity. The Addendum 2 Figures are found in Appendix B.

A comparison between the revised drainage divide and the SIS Addendum 1, is summarized in tabular form below.

Table 1: Summary of the Revised Drainage Divide and the Original SIS

SIS Addendum 1			
Swapped Area (ha)	**Lover's**	**Hewitt's**	**Description**
	-5.8	5.8	North commercial area and some residential to drain east.
	11.2	-11.2	Central residential and part of recreation centre area to drain west.
	-3.9	3.9	Part of school block to drain east.
Net Diversion (ha)	**1.5**	**-1.5**	
Percent Change in Watershed Area (%)	**0.61%**	**0.47%**	
Revised Scenario – Addendum 2			
Swapped Area (ha)	**Lover's**	**Hewitt's**	**Description**
	-4.6	4.6	North commercial area to drain east.
	13.1	-13.1	Central residential and additional 6.72 ha residential diverted to west.
	-8.6	8.6	Rec Centre and site plan diverted to east Part of school block to drain east.
Net Diversion (ha)	**-0.1**	**0.1**	
Percent Change in Watershed Area (%)	**0.04%**	**0.03%**	

As noted above, the proposed update will result in a negligible area being swapped between the Lover's Creek and Hewitt's Creek watersheds. The complete details of the calculations are in Appendix C. It is noted that Stormwater Management Facilities 3 and 7 will receive decreased drainage from the development area, while SWMFs 4 and 5 will need to accept an increased drainage area, relative to SIS Addendum 1. However, catchment 7a (draining to SWMF7) has been expanded to include the north portion of Yonge Street and any increased drainage associated with the proposed widening. Appropriate coordination has been had with all impacted developers to ensure that the ponds will still function as intended.

In keeping with the original SIS, the drainage diversion has been kept to a minimum. Once approved, this addendum is set to be the framework for all development and review moving forward.

R.J. Burnside & Associates Limited

Michelle Zettel, P.Eng.
Water Resources Engineer
MLZ:sp:sc

Enclosure(s) **Appendix A**
Addendum 1 Figures
Appendix B
Figure 9 – Proposed Storm Sewer Plan (1 of 3)
Figure 10 – Proposed Storm Sewer Plan (2 of 3)
Figure DD – Proposed Drainage Divide
Appendix C
Drainage Divide Calculations

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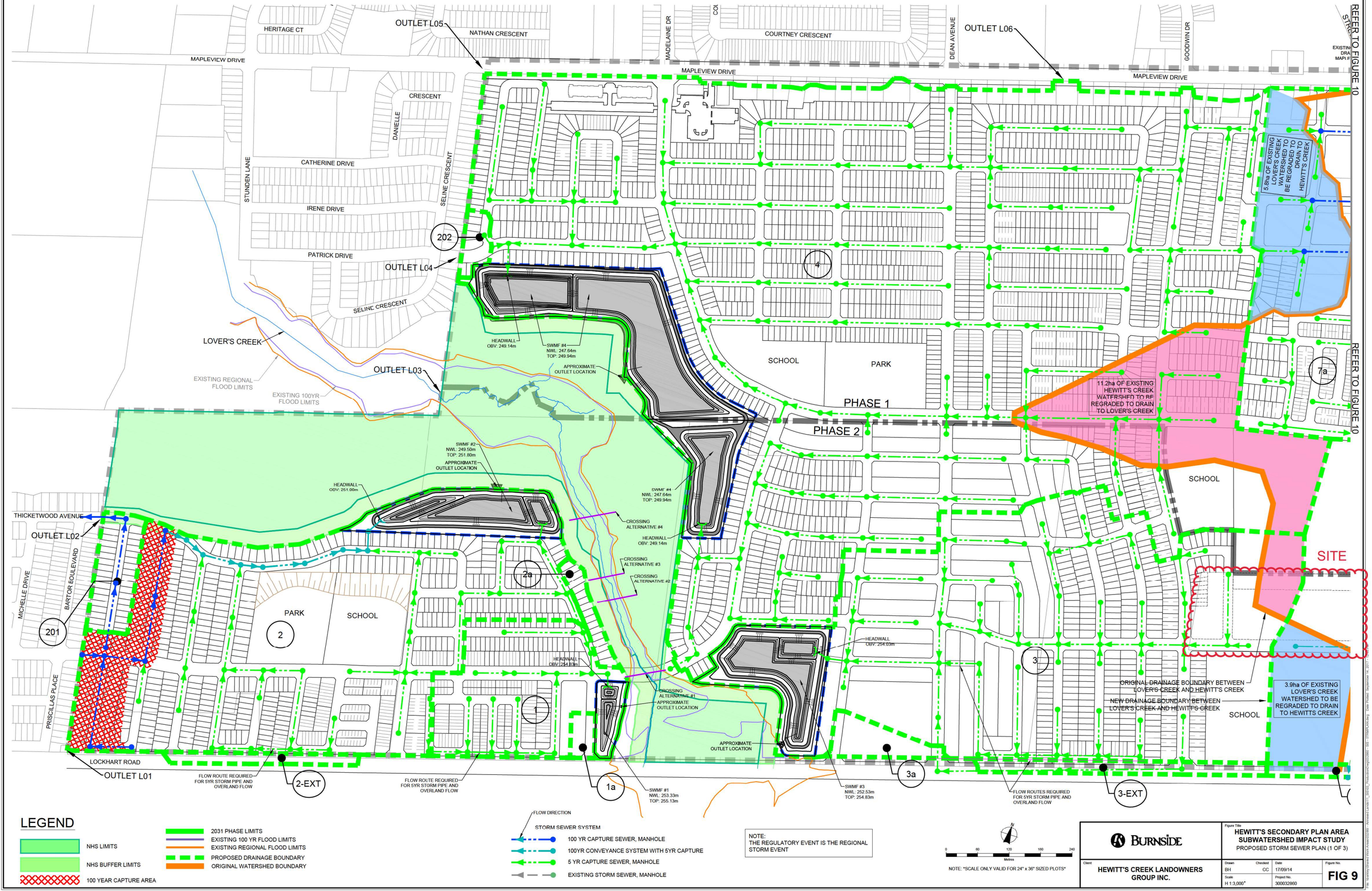
Appendix A

Addendum 1 Figures


OUTLET L05
OUTLET L06
HERITAGE CT
NATHAN CRESCENT
MADELAINE DR
COURTNEY CRESCENT
DEAN AVENUE
GOODWIN DR
MAPLEVIEW DRIVE
CRESCENT
DANIELLE
CATHERINE DRIVE
STUNDEN LANE
SELINE CRESCENT
IRENE DRIVE
PATRICK DRIVE
202
OUTLET L04
LOVER'S CREEK
EXISTING REGIONAL FLOOD LIMITS
EXISTING 100YR FLOOD LIMITS
OUTLET L03
HEADWALL OBV: 249.14m
SWMF #4 NWL: 247.64m TOP: 249.94m
APPROXIMATE OUTLET LOCATION
SWMF #2 NWL: 249.50m TOP: 251.80m
HEADWALL OBV: 251.00m
SCHOOL
PARK
PHASE 1
PHASE 2
4
7a
5.8ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK
11.2ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO LOVER'S CREEK
REFER TO FIGURE 10
THICKETWOOD AVENUE
OUTLET L02
MICHELLE DRIVE
BARTOR ROULEVARD
201
2
2a
PRISCILLAS PLACE
LOCKHART ROAD
OUTLET L01
FLOW ROUTE REQUIRED FOR 5YR STORM PIPE AND OVERLAND FLOW
2-EXT
1
1a
CROSSING ALTERNATIVE #4
CROSSING ALTERNATIVE #3
CROSSING ALTERNATIVE #2
CROSSING ALTERNATIVE #1
APPROXIMATE OUTLET LOCATION
SWMF #1 NWL: 253.33m TOP: 255.13m
HEADWALL OBV: 254.83m
SWMF #3 NWL: 252.53m TOP: 254.83m
HEADWALL OBV: 254.03m
3
3a
3-EXT
FLOW ROUTES REQUIRED FOR 5YR STORM PIPE AND OVERLAND FLOW
ORIGINAL DRAINAGE BOUNDARY BETWEEN LOVER'S CREEK AND HEWITT'S CREEK
NEW DRAINAGE BOUNDARY BETWEEN LOVER'S CREEK AND HEWITT'S CREEK
3.9ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK
SITE
LEGEND
NHS LIMITS
NHS BUFFER LIMITS
100 YEAR CAPTURE AREA
2031 PHASE LIMITS
EXISTING 100 YR FLOOD LIMITS
EXISTING REGIONAL FLOOD LIMITS
PROPOSED DRAINAGE BOUNDARY
ORIGINAL WATERSHED BOUNDARY
FLOW DIRECTION
STORM SEWER SYSTEM
100 YR CAPTURE SEWER, MANHOLE
100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
5 YR CAPTURE SEWER, MANHOLE
EXISTING STORM SEWER, MANHOLE
NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT
0 60 120 180 240
Metres
NOTE: *SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS*
BURNSIDE
Client
HEWITT'S CREEK LANDOWNERS GROUP INC.
Figure Title
HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (1 OF 3)
Drawn BH
Checked CC
Date 17/09/14
Scale H 1:3,000*
Project No. 300032860
Figure No.
FIG 9

REFER TO FIGURE 9

REFER TO FIGURE 11

REFER TO FIGURE 11

OUTLET H07

OUTLET H08

OUTLET H09

EXISTING ARE TO MAINTAIN DRAINAGE TO EXISTING MAPLEVIEW DRIVE INLETS

MAPLEVIEW DRIVE

SUN KING CRESCENT

SUCCESSION CRESCENT

WILLIAM WAY

APPROXIMATE OUTLET LOCATION

HYDROLOGICAL CONNECTION TO BE PROVIDED TO HEWITT'S CREEK TRIBUTARY, DETAILS TO BE PROVIDED AT FSR/DETAILED DESIGN STAGE

ST PAUL'S CRESCENT

GO TRANSIT RAIL

YONGE STREET

5.2ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK

6.5ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO SANDY COVE CREEK

11.4ha OF EXISTING SANDY COVE CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK

3.9ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK

SCHOOL

PARK

SITE

PHASE 1

PHASE 2

PHASE 3

LOCKHART ROAD

HEWITT'S CREEK TRUBITARY

HEWITT'S CREEK

HEADWALL OBV: 249.61m

HEADWALL OBV: 248.91m

HEADWALL OBV: 254.71m

HEADWALL OBV: 253.43m

HEADWALL OBV: 257.53m

HEADWALL OBV: 224.80m

SWMF #10 NWL: 248.81m TOP: 250.81m

SWMF #11 NWL: 254.21m TOP: 255.51m

SWMF #7 NWL: 248.11m TOP: 250.41m

SWMF #8 NWL: 249.37m TOP: 251.67m

SWMF #9 NWL: 251.95m TOP: 254.23m

SWMF #5 NWL: 256.03m TOP: 258.33m

SWMF #8 NWL: 253.90m TOP: 255.60m

1.0%

1.0%

APPROXIMATE OUTLET LOCATION

FOC4-1 MAM2-2 CUM1-1 SWD7 MAM2-4 SWC1 SWM1-1 MAM MAM2-5 HR FOC4-1 FOD5-2 MAM2-2 FOM7-2 MAS2-1 SWM1-1 WT2 FOM SWD SAS1 SWM MAM3-3 SWD4-3 SWT2-2 CUP3-2 FOM8

7 6 7a 10 10a 11 12 9 9a 8c 8a 8b 8 8e 8d 5 203 204 5-EXT 8-EXT

LEGEND

- NHS LIMITS
- NHS BUFFER LIMITS
- 100 YEAR CAPTURE AREA
- 2031 PHASE LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY
- ORIGINAL WATERSHED BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

FLOW DIRECTION

STORM SEWER SYSTEM

- 100 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- 100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
- 5 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- EXISTING STORM SEWER, MANHOLE

NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT

0 100 200 400 600
Metres

NOTE: *SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS*

BURNSIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (2 OF 3)

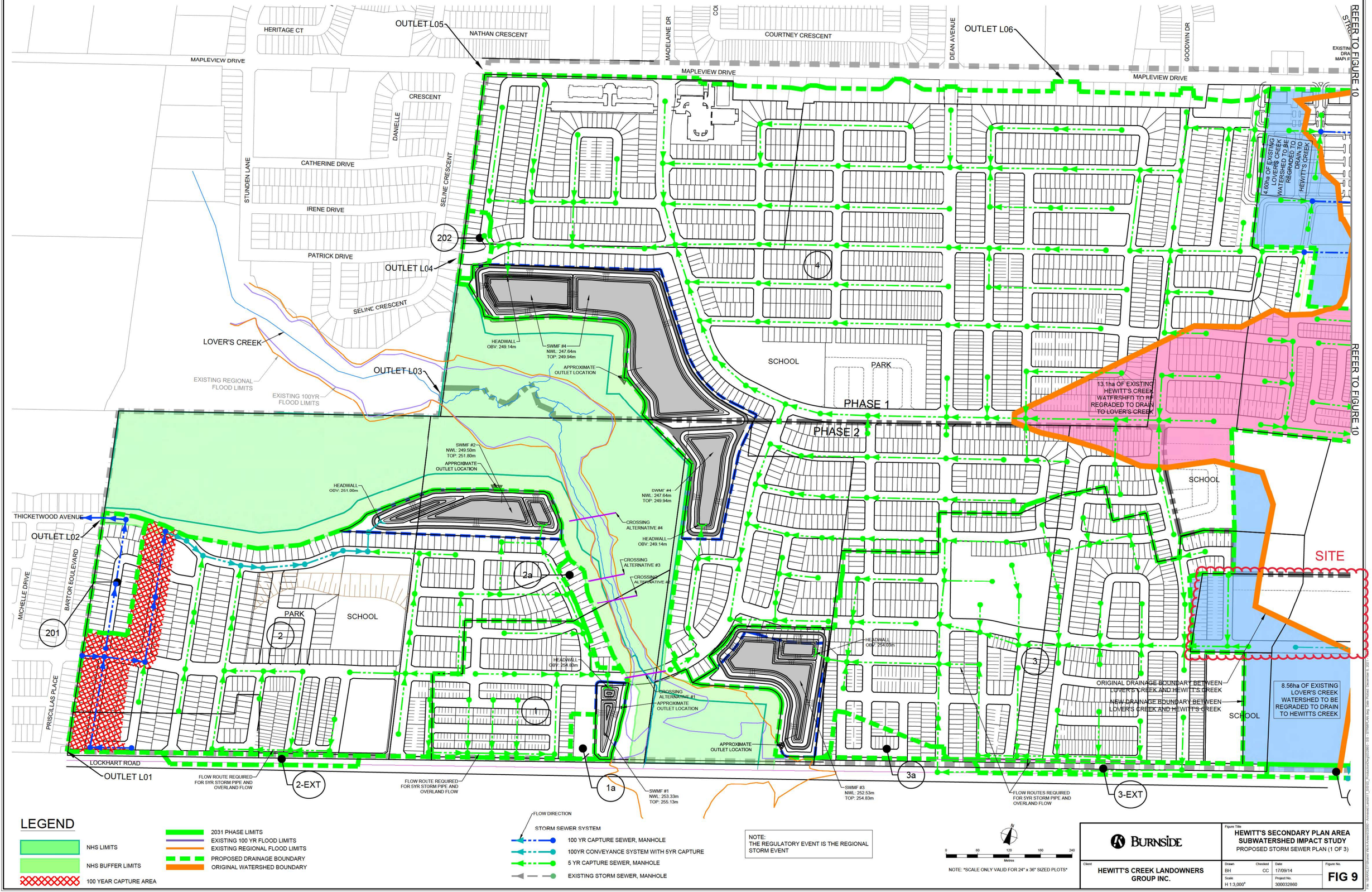
Drawn	Checked	Date	Figure No.
BH	CC	17/09/14	FIG 10
Scale: H 1:3,000*		Project No.: 300032660	

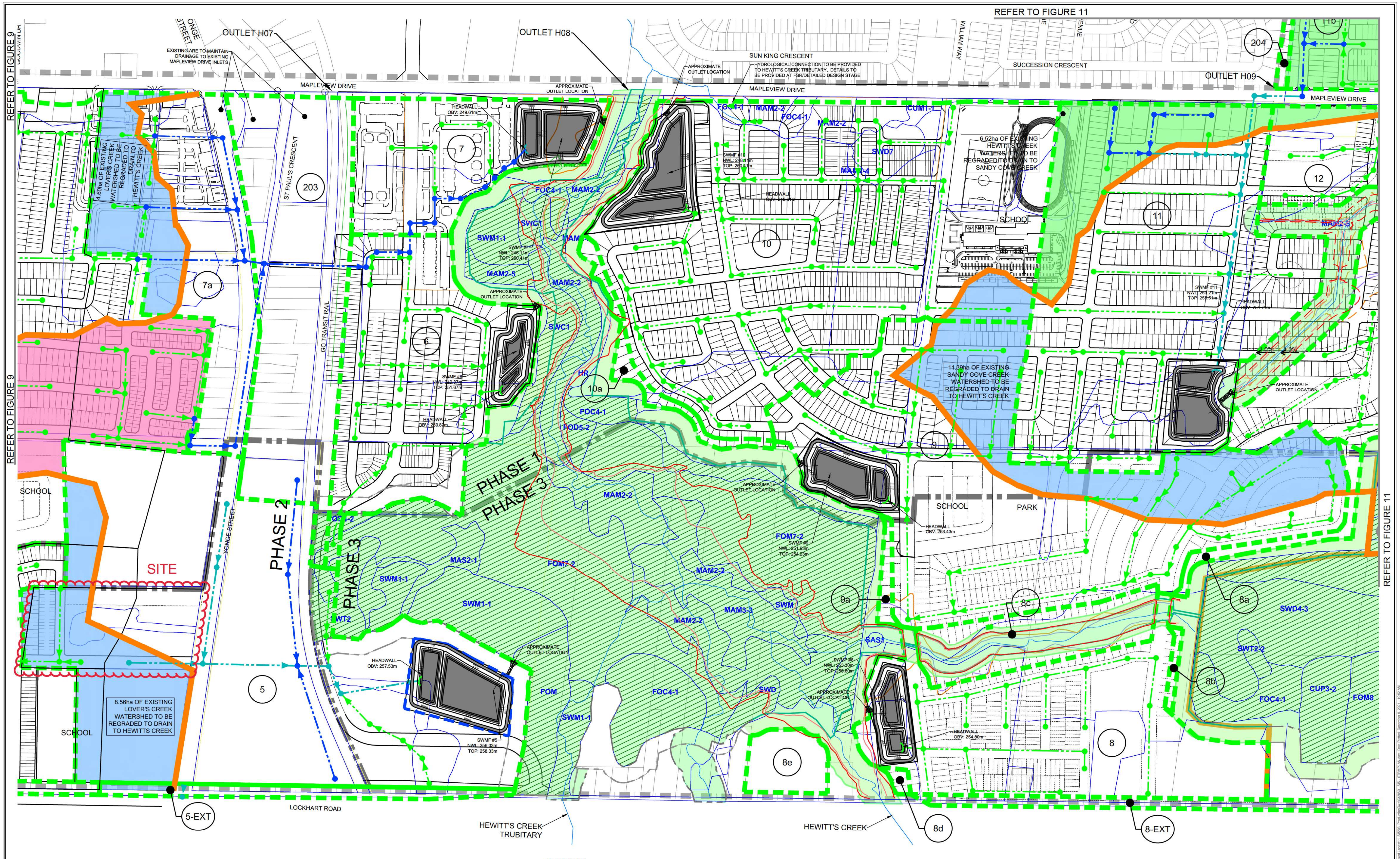
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Figure 9 – Proposed Storm Sewer Plan (1 of 3)
Figure 10 – Proposed Storm Sewer Plan (2 of 3)
Figure DD – Proposed Drainage Divide


OUTLET L05
OUTLET L06
HERITAGE CT
NATHAN CRESCENT
MADELAINE DR
COURTNEY CRESCENT
DEAN AVENUE
GOODWIN DR
MAPLEVIEW DRIVE
CRESCENT
DANIELLE
STUNDEN LANE
SELINE CRESCENT
CATHERINE DRIVE
IRENE DRIVE
PATRICK DRIVE
202
OUTLET L04
4
LOVER'S CREEK
EXISTING REGIONAL FLOOD LIMITS
EXISTING 100YR FLOOD LIMITS
OUTLET L03
HEADWALL OBV: 249.14m
SWMF #4 NWL: 247.64m TOP: 249.94m
APPROXIMATE OUTLET LOCATION
SCHOOL
PARK
PHASE 1
PHASE 2
4.60ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK
13.1ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO LOVER'S CREEK
REFER TO FIGURE 10
SWMF #2 NWL: 249.50m TOP: 251.80m
HEADWALL OBV: 251.00m
CROSSING ALTERNATIVE #4
CROSSING ALTERNATIVE #3
CROSSING ALTERNATIVE #2
THICKETWOOD AVENUE
OUTLET L02
BARTOR BOULEVARD
MICHELLE DRIVE
201
2a
2
HEADWALL OBV: 254.85m
1
CROSSING ALTERNATIVE #1
APPROXIMATE OUTLET LOCATION
PRISCILLAS PLACE
LOCKHART ROAD
OUTLET L01
FLOW ROUTE REQUIRED FOR 5YR STORM PIPE AND OVERLAND FLOW
2-EXT
1a
SWMF #1 NWL: 253.33m TOP: 255.13m
HEADWALL OBV: 254.09m
3
3a
SWMF #3 NWL: 252.53m TOP: 254.83m
FLOW ROUTES REQUIRED FOR 5YR STORM PIPE AND OVERLAND FLOW
3-EXT
ORIGINAL DRAINAGE BOUNDARY BETWEEN LOVER'S CREEK AND HEWITT'S CREEK
NEW DRAINAGE BOUNDARY BETWEEN LOVER'S CREEK AND HEWITT'S CREEK
8.56ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK
SITE
REFER TO FIGURE 10
LEGEND
NHS LIMITS
NHS BUFFER LIMITS
100 YEAR CAPTURE AREA
2031 PHASE LIMITS
EXISTING 100 YR FLOOD LIMITS
EXISTING REGIONAL FLOOD LIMITS
PROPOSED DRAINAGE BOUNDARY
ORIGINAL WATERSHED BOUNDARY
FLOW DIRECTION
STORM SEWER SYSTEM
100 YR CAPTURE SEWER, MANHOLE
100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
5 YR CAPTURE SEWER, MANHOLE
EXISTING STORM SEWER, MANHOLE
NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT
0 60 120 180 240
Metres
NOTE: *SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS*
BURNSIDE
Figure Title
HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (1 OF 3)
Client
HEWITT'S CREEK LANDOWNERS GROUP INC.
Drawn BH
Checked CC
Date 17/09/14
Scale H 1:3,000*
Project No. 300032860
Figure No.
FIG 9


REFER TO FIGURE 11
REFER TO FIGURE 9
OUTLET H07
OUTLET H08
OUTLET H09
EXISTING ARE TO MAINTAIN DRAINAGE TO EXISTING MAPLEVIEW DRIVE INLETS
MAPLEVIEW DRIVE
SUN KING CRESCENT
HYDROLOGICAL CONNECTION TO BE PROVIDED TO HEWITT'S CREEK TRIBUTARY. DETAILS TO BE PROVIDED AT FSR/DETAILED DESIGN STAGE
SUCCESSION CRESCENT
WILLIAM WAY
ST PAUL'S CRESCENT
GO TRANSIT RAIL
YONGE STREET
4.60ha OF EXISTING LOVERS CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK
6.52ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO SANDY COVE CREEK
11.39ha OF EXISTING SANDY COVE CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK
8.56ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK
PHASE 1
PHASE 2
PHASE 3
SITE
SCHOOL
PARK
APPROXIMATE OUTLET LOCATION
HEADWALL OBV: 249.61m
HEADWALL OBV: 257.53m
HEADWALL OBV: 253.43m
HEADWALL OBV: 254.80m
SWMF #5 NWL: 256.03m TOP: 258.33m
LOCKHART ROAD
HEWITT'S CREEK TRUBITARY
HEWITT'S CREEK
203
204
5
5-EXT
6
7
7a
8
8a
8b
8c
8d
8e
8-EXT
9
9a
10
10a
11
12

LEGEND

- NHS LIMITS
- NHS BUFFER LIMITS
- 100 YEAR CAPTURE AREA
- 2031 PHASE LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY
- ORIGINAL WATERSHED BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

FLOW DIRECTION

STORM SEWER SYSTEM

- 100 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- 100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
- 5 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- EXISTING STORM SEWER, MANHOLE

NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT

0 100 200 400 600
Metres

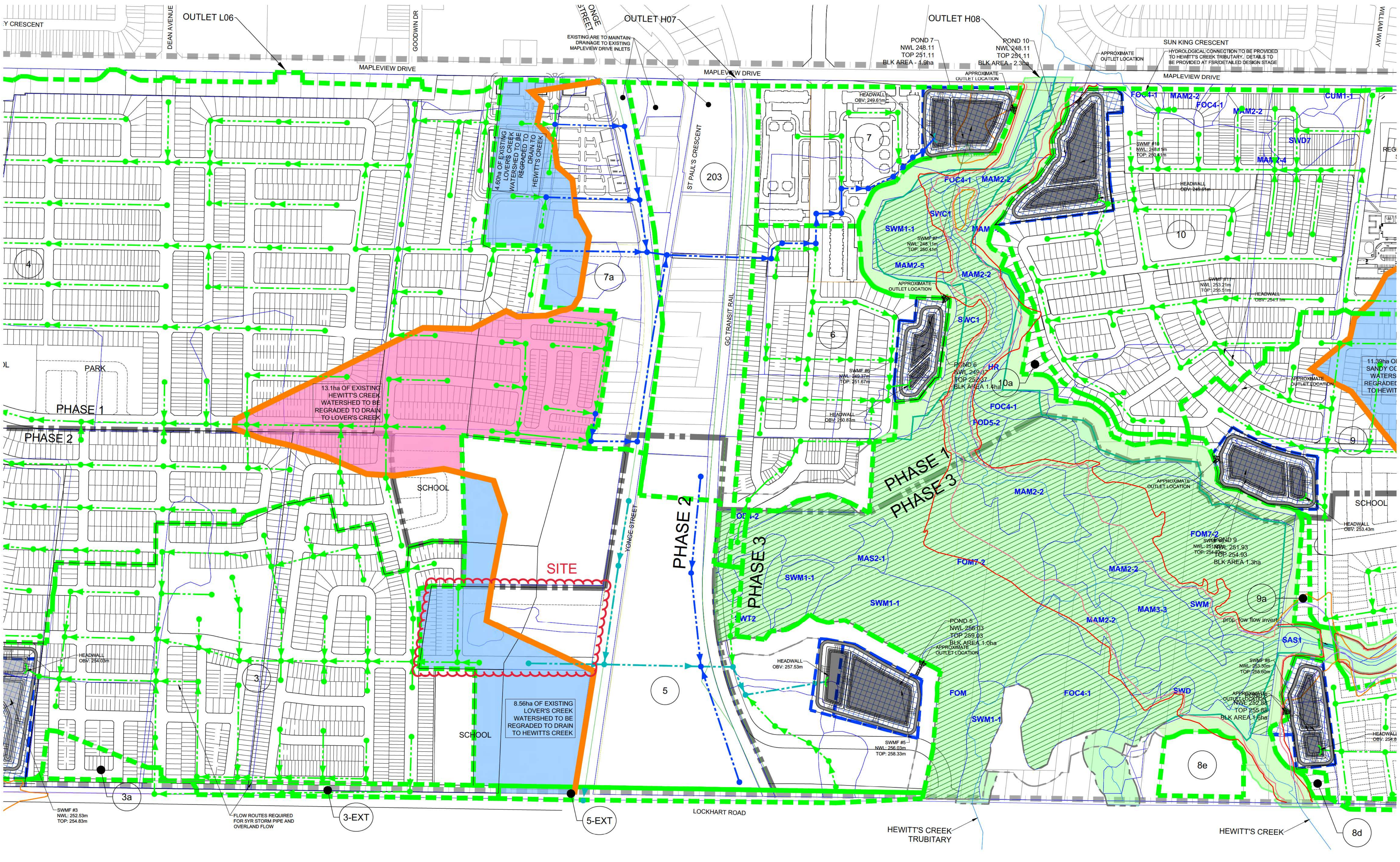
NOTE: *SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS*

BURNSIDE

Figure Title
HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (2 OF 3)

Client
HEWITT'S CREEK LANDOWNERS GROUP INC.

Drawn	Checked	Date	Figure No.
BH	CC	17/09/14	FIG 10
Scale		Project No.	
H 1:3,000*		300032860	



OUTLET L06
OUTLET H07
OUTLET H08
MAPLEVIEW DRIVE
EXISTING ARE TO MAINTAIN DRAINAGE TO EXISTING MAPLEVIEW DRIVE INLETS
POND 7 NWL 248.11 TOP 251.11 BLK AREA - 1.9ha
POND 10 NWL 248.11 TOP 251.11 BLK AREA - 2.3ha
SUN KING CRESCENT
HYDROLOGICAL CONNECTION TO BE PROVIDED TO HEWITT'S CREEK TRIBUTARY. DETAILS TO BE PROVIDED AT FSR/DETAILED DESIGN STAGE
4.60ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK
13.1ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO LOVER'S CREEK
8.56ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK
ST PAUL'S CRESCENT
GO TRANSIT RAIL
YONGE STREET
PHASE 1
PHASE 2
PHASE 3
SITE
SCHOOL
PARK
POND 6 NWL 249.37 TOP 252.37 BLK AREA 1.4ha
POND 5 NWL 256.03 TOP 259.03 BLK AREA 1.0ha
POND 9 NWL 251.93 TOP 254.93 BLK AREA 1.3ha
11.39ha OF SANDY CO WATERS REGRADED TO HEWIT
FLOW ROUTES REQUIRED FOR 5YR STORM PIPE AND OVERLAND FLOW
LOCKHART ROAD
HEWITT'S CREEK TRUBITARY
HEWITT'S CREEK
3-EXT
5-EXT

LEGEND

- NHS LIMITS
- NHS BUFFER LIMITS
- 100 YEAR CAPTURE AREA
- 2031 PHASE LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY
- ORIGINAL WATERSHED BOUNDARY
- AREA NOT DESIGNATED TO A CATCHMENT

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

FLOW DIRECTION

STORM SEWER SYSTEM

- 100 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- 100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
- 5 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- EXISTING STORM SEWER, MANHOLE

NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT

NOTE: *SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS*

BURNSIDE

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED DRAINAGE DIVIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Drawn	Checked	Date	Figure No.
BH	JO	21/04/22	FIG DD
Scale H 1:3,000*		Project No. 300032860	

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Drainage Divide Calculations

Project Number: 300032860
Date: Dec-21
Author: MZ

Hewitt's and Lover's Drainage Divide Revision

	Lover's Creek	Hewitt's Creek
Existing Watershed in Hewitt's SPA (ha)	245.69	320.77
Proposed Gains/Losses (ha)	1.5	-1.5
Proposed Watershed in Hewitt's SPA (ha)	247.19	319.27
Percent Change in Watershed Area (%)	0.61%	0.47%

	Lover's Creek	Hewitt's Creek
Existing Watershed in Hewitt's SPA (ha)	245.69	320.77
Proposed Gains/Losses (ha)	-0.1	0.1
Proposed Watershed in Hewitt's SPA (ha)	245.59	320.87
Percent Change in Watershed Area (%)	0.04%	0.03%

Appendix C
Sanitary Servicing Analysis

REFER TO DETAIL A ON FIGURE 15

REFER TO FIGURE 15

REFER TO FIGURE 13

REFER TO FIGURE 13

REFER TO FIGURE 15

MAPLEVIEW DRIVE

SUN KING CRESCENT

SUCCESSION CRESCENT

CONNECTION E4-A
EX. 250Ø OBV: 260.04
DEPTH: 3.0

CONNECTION E6
INV: 256.81

30.8ha

60.8ha

9.8ha

24.4ha

85.7ha

SWMF #7

SWMF #10

SWMF #6

SWMF #11

SWMF #9

SWMF #5

SWMF #8

SOBEY'S

CRISDAWN CONSTRUCTION INC.

BULUT LANDS 109-369 ONTARIO INC

NON PARTICIPA

2303757 ONTARIO INC.

NSCNG LAND VELOPMENT INC.

NON PARTICIPANT

SITE

PHASE 1

PHASE 2

PHASE 3

NON PARTICIPANT

CRISDAWN CONSTRUCTION INC.

NON PARTICIPANT

CRISDAWN CONSTRUCTION INC.

NON PARTI

GO TRANSIT RAIL

YONGE STREET

LOCKHART ROAD

HEWITT'S CREEK TRIBUTARY

HEWITT'S CREEK

FILL REQUIRED TO ACHIEVE SERVICING

CREEK CROSSING DEPTH @ 2.0m

CREEK CROSSING DEPTH @ 2m

OBV: 260.64 DEPTH: 5.8
OBV: 261.09 DEPTH: 6.2
OBV: 261.71 DEPTH: 6.3
OBV: 268.79 DEPTH: 3.0
OBV: 268.25 DEPTH: 3.0
OBV: 269.50 DEPTH: 3.0
OBV: 262.14 DEPTH: 6.5
OBV: 262.80 DEPTH: 6.4
OBV: 263.72 DEPTH: 6.3
OBV: 271.02 DEPTH: 3.0
OBV: 268.01 DEPTH: 3.7
OBV: 269.28 DEPTH: 3.0
OBV: 268.15 DEPTH: 3.8
OBV: 244.18 DEPTH: 1.5
OBV: 248.56 DEPTH: 5.8
OBV: 251.37 DEPTH: 3.9
OBV: 254.54 DEPTH: 3.9
OBV: 254.99 DEPTH: 6.4
OBV: 255.40 DEPTH: 7.4
OBV: 256.03 DEPTH: 6.3
OBV: 256.68 DEPTH: 7.0
OBV: 260.50 DEPTH: 3.7
OBV: 263.00 DEPTH: 4.0
OBV: 263.50 DEPTH: 3.4
OBV: 266.69 DEPTH: 3.0
OBV: 241.75 DEPTH: 6.3
OBV: 242.03 DEPTH: 6.0
OBV: 249.18 DEPTH: 3.0
OBV: 256.72 DEPTH: 4.0
OBV: 251.57 DEPTH: 7.5
OBV: 250.96 DEPTH: 7.3
OBV: 260.13 DEPTH: 3.0
OBV: 247.36 DEPTH: 8.9
OBV: 248.59 DEPTH: 7.5
OBV: 249.99 DEPTH: 7.1
OBV: 248.95 DEPTH: 6.9
OBV: 250.25 DEPTH: 8.5
OBV: 251.35 DEPTH: 7.6
OBV: 253.83 DEPTH: 5.8
OBV: 260.39 DEPTH: 4.2
OBV: 253.30 DEPTH: 3.0
OBV: 257.06 DEPTH: 3.8
OBV: 253.87 DEPTH: 6.9
OBV: 255.87 DEPTH: 3.0
OBV: 255.71 DEPTH: 3.0
OBV: 257.00 DEPTH: 3.2
OBV: 258.75 DEPTH: 3.0
OBV: 251.23 DEPTH: 3.0

LEGEND

- SURVEYED NHS LIMIT (2015)
- NHS BUFFER LIMIT
- 2031 PHASE LIMITS
- DEV. LIMITS
- PHASING LIMITS
- 2031 PHASE LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

- FLOW DIRECTION ARROW
- SANITARY DC TRUNK SEWER
- SANITARY LOCAL TRUNK SEWER
- SANITARY LOCAL COLLECTOR SEWER
- SANITARY FORCEMAIN
- SANITARY MANHOLE
- EXISTING SANITARY SEWER
- FLOW DIRECTION ARROW DEPICTS SEWER CONTINUES ON IN ARROW DIRECTION

P PUMP STATION

NOTE:
THE REGULATORY EVENT IS THE REGIONAL STORM EVENT

0 60 120 180 240 Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED SANITARY SEWER PLAN (2 OF 3)

Drawn	Checked	Date
BH	CC	17/09/14

Scale: H 1:3,000"
Project No.: 300032860
Figure No.: FIG 14

Project Name: 1012 Yonge Street
Project Number: 11226647
Date Created: January 28, 2022
Date Printed: January 28, 2022

Wastewater Flow Calculations (Existing vs. Proposed)

	Single and Semi Detached	Townhouses (Medium Density)	Condo Apartment (High Density)	Total Unit Count	Commercial Retail (sq.m)	Residential Population	Residential Generation Rate (L/day)	Commercial Generation Rate (L/day)	Infiltration Allowance (0.1 l/s/ha)	Total Generation Peak Rate (L/s)
Existing Development	0	0	0	0	0	0	0	0	0	**0.00**
Proposed Development	0	10	1090	1100	1179.5	1846	415,350	3,303	0.491	**21.69**

Residential sanitary generation rate (Existing & Proposed) =	225	L/person/day
Residential sanitary generation rate (Existing) =	225	L/person/day
Low population density =	3.13	persons/unit
Medium population density =	2.57	persons/unit
High population density =	1.67	persons/unit
Commercial or Retail population density =	28.0	m3/day/ha
Site Area =	4.91	hectares
Harmon Peaking factor =	3.60	
Babbit Peaking factor =	4.40	
Infiltration factor =	0.10	L/s/ha

*Harmon Peaking factor or Babbit Peaking factor, whichever is higher will be used.

Luis Vieira

Subject: FW: Crown Communities, 1012 Yonge Street, City File No. D09-ANN

From: Nadine Rush [mailto:Nadine.Rush@barrie.ca]
Sent: October-28-19 8:58 AM
To: Peter Slama <pslama@coleengineering.ca>
Cc: Adam Taverna <adam@thecrowncommunities.com>; May Taverna <may@thecrowncommunities.com>; Darren Vella <dvella@ipsconsultinginc.com>
Subject: RE: Crown Communities, 1012 Yonge Street, City File No. D09-ANN

Hi Peter,

We recommend using the High Density ppu for your sanitary flow calculations as your site is considered high density.

Regards,

Nadine Rush, C.E.T.
Senior Development Services Technologist
Development Services
Engineering
The City of Barrie
Central Ontario's Premier Waterfront Community

Mailing Address:
P.O. Box 400, Barrie ON, L4M 4T5
Tel: 705-739-4220 ext. 5231

From: Peter Slama [mailto:pslama@coleengineering.ca]
Sent: October 25, 2019 2:41 PM
To: Nadine Rush <Nadine.Rush@barrie.ca>
Cc: Adam Taverna <adam@thecrowncommunities.com>; May Taverna <may@thecrowncommunities.com>; Darren Vella <dvella@ipsconsultinginc.com>
Subject: Crown Communities, 1012 Yonge Street, City File No. D09-ANN

Hello Nadine,

We are in receipt of the City's comments related to the Conformity Review process for the above referenced development project, in particular the Engineering Comments letter dated September 5, 2019.

As we prepare for a resubmission, we have a question related to calculating the sanitary peak flow generation rate.

The proposed site plan (attached for reference) is considered High Density, based on the Units/Hectare of 140UPH. The City of Barrie's Sanitary Design Population for High Density (Apartments) is 1.67 ppu.

However, the proposed built form of the development is Stacked Townhouses Back-To-Back, which more closely aligns with the Medium Density designation within the City's standards requiring a Sanitary Design Population of 2.34ppu.

We're kindly requesting confirmation from the City as to which Design Population rate (1.67ppu or 2.34ppu) is most appropriate and acceptable for the present site plan.

Thank you.

Peter Slama, P.Eng.
Project Manager, Urban Development

Cole Engineering Group Ltd.
70 Valleywood Drive, Markham, ON Canada L3R 4T5
T: 905-940-6161 Ext. 375 Tor. Line: 416-987-6161
F: 905-940-2064
E: pslama@ColeEngineering.ca
www.ColeEngineering.ca

Peter Slama

Subject: FW: 375mm Local Sanitary Sewer Mapleview / Kneeshaw

From: James Orr [mailto:James.Orr@rjburnside.com]
Sent: October-29-19 9:44 AM
To: Frank Palka <Frank.Palka@barrie.ca>; Bala Araniyasundaran <Bala.Araniyasundaran@barrie.ca>; Larry Klein <Larry.Klein@barrie.ca>
Cc: Ray Duhamel <RDuhamel@jonesconsulting.com>; jhermann0812@gmail.com <DRichardson@jonesconsulting.com>
Subject: RE: 375mm Local Sanitary Sewer Mapleview / Kneeshaw

Hi Frank,

Thanks for this response. I was out yesterday and just catching up on your e-mail.

I acknowledge that we'll need to assess each development in terms of how it compares to the design assumption, but the Group is just looking for assurance that this pipe can go to a d/D of 0.70, regardless of how the density distribution plays out amongst the various owners.

Based on density increases assumed on a proportional basis (which in reality will be variable, and must be negotiated among developers – the Group will manage allocation), the land owners are comfortable proceeding so long as they can have this assurance that the "full pipe" criteria will be based on d/D of 0.7 which is approximately 85% full, still allowing a buffer.

Could you acknowledge your understanding and acceptance of this – your response below is alluding to it but I just want to ensure we're 100% clear for the owners.

We have a group meeting today at 1:30 and I'm aware of a number of owners who are quite keen on ensuring this is resolved.

Thanks,

James

From: Frank Palka <Frank.Palka@barrie.ca>
Sent: Friday, October 25, 2019 4:42 PM
To: James Orr <James.Orr@rjburnside.com>; Bala Araniyasundaran <Bala.Araniyasundaran@barrie.ca>; Larry Klein <Larry.Klein@barrie.ca>
Cc: Ray Duhamel <RDuhamel@jonesconsulting.com>; jhermann0812@gmail.com <DRichardson@jonesconsulting.com>
Subject: RE: 375mm Local Sanitary Sewer Mapleview / Kneeshaw

Good afternoon James,

As previously discussed and messaged to the LOG the City would look at each individual project and assess the merits of any increase in pipe size were warranted on an individual basis. I believe the below assumption on theoretical flows provided enough background to allow this project to proceed towards construction as designed.

Through the master plans certain assumptions were made therefore resulting in appropriate sewer sizing based on the design criteria of the day. Through best practices we all agree it may be appropriate to increase certain pipes to allow for "potential increase in densities". You can appreciate that we do not have that mandate at this time, however, if individual or the landowners group wish upsize pipes beyond the local service requirement we would not be opposed but caution any expectation of DC credits for these works.

Regards

Frank E. Palka C.E.T.
Manager of Approvals
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Barrie

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From: James Orr
Sent: Friday, October 18, 2019 3:59 PM
To: bala.araniyasundaran@barrie.ca; 'Frank Palka' <Frank.Palka@barrie.ca>; Larry Klein <Larry.Klein@barrie.ca>
Cc: Ray Duhamel <RDuhamel@jonesconsulting.com>; jhermann0812@gmail.com <DRichardson@jonesconsulting.com>
Subject: 375mm Local Sanitary Sewer Mapleview / Kneeshaw
Importance: High

Good afternoon Bala,

As presented to you at the Working Group meeting yesterday, given the City's interest in promoting higher densities not only in existing Barrie but in Hewitt's secondary plan, I am formally requesting the following on behalf of the Hewitt's Landowners Group:

- ***That the 375mm DIA sanitary sewer branch west of the Hewitt's Trunk (running west along Mapleview Drive and south on future Kneeshaw to Lockhart) be approved at its current size (375mm), but also be considered as a trunk sewer (per the Local Servicing policy), such that the d/D standard for the sewer be set at 0.70, instead of 0.50.***

The City of Barrie's design guidelines for Trunk Sanitary Sewers speak to the 85% or 0.7 d/D as the maximum design criteria.

The City's acceptance of this request will allow the current, approved design of the infrastructure to remain unchanged, allowing construction to proceed imminently, while allowing for a significant increase in population to the contributing catchments that gives the landowners far more flexibility to propose higher densities, which is the City's vision for this area.

The approved Sanitary Drainage Plans and Design Sheet for the sewer (designed by Jones) are attached. This design was approved with a maximum d/D of 0.58, and this was based on previous discussions with the City about the fact that applying the new sanitary design standards would theoretically increase the pipe size to a 450mm DIA, which would be

DC eligible. Recall that the City's position was to grant an exception to the new standard rather than increase the pipe size.

The notion of this sewer being considered a trunk is supported by the fact that that it only has direct connections at the top end (within Ballymore), and has a considerably sized catchment and length, therefore not behaving nearly as "peaky" as a local sewer.

Technical Summary:

1. **Current Design – max 0.58 d/D**

   Sanitary Sewer Design Street "Sanitary Sewer Design – Trunk Sewer, Development Details Basis", dated 08-15-19
   Corresponding EX-SAN-1 and EX-SAN-2 sanitary sewer catchment plans, stamp dated 08-16-2019

   The above identifies the current design population allocation or peak flow allocation in the case of Institutional lands.

2. **Increased population to max 0.70 d/D**

   Sanitary Sewer Design Sheet "Sanitary Sewer Design – Trunk Sewer, Development Details Basis – d/D at 0.7", dated 10/16/2019

   Commentary: See "ADD POP. Max downstream d/D = 0.7" line highlighted in blue.

   The d/D of 0.7 in the downstream sewer is reached with an additional upstream population of approximately **4730** above the approved design.

From our meeting, we understood you were agreeable to this in principle, subject to seeing verification of the request, which I have provided herein.

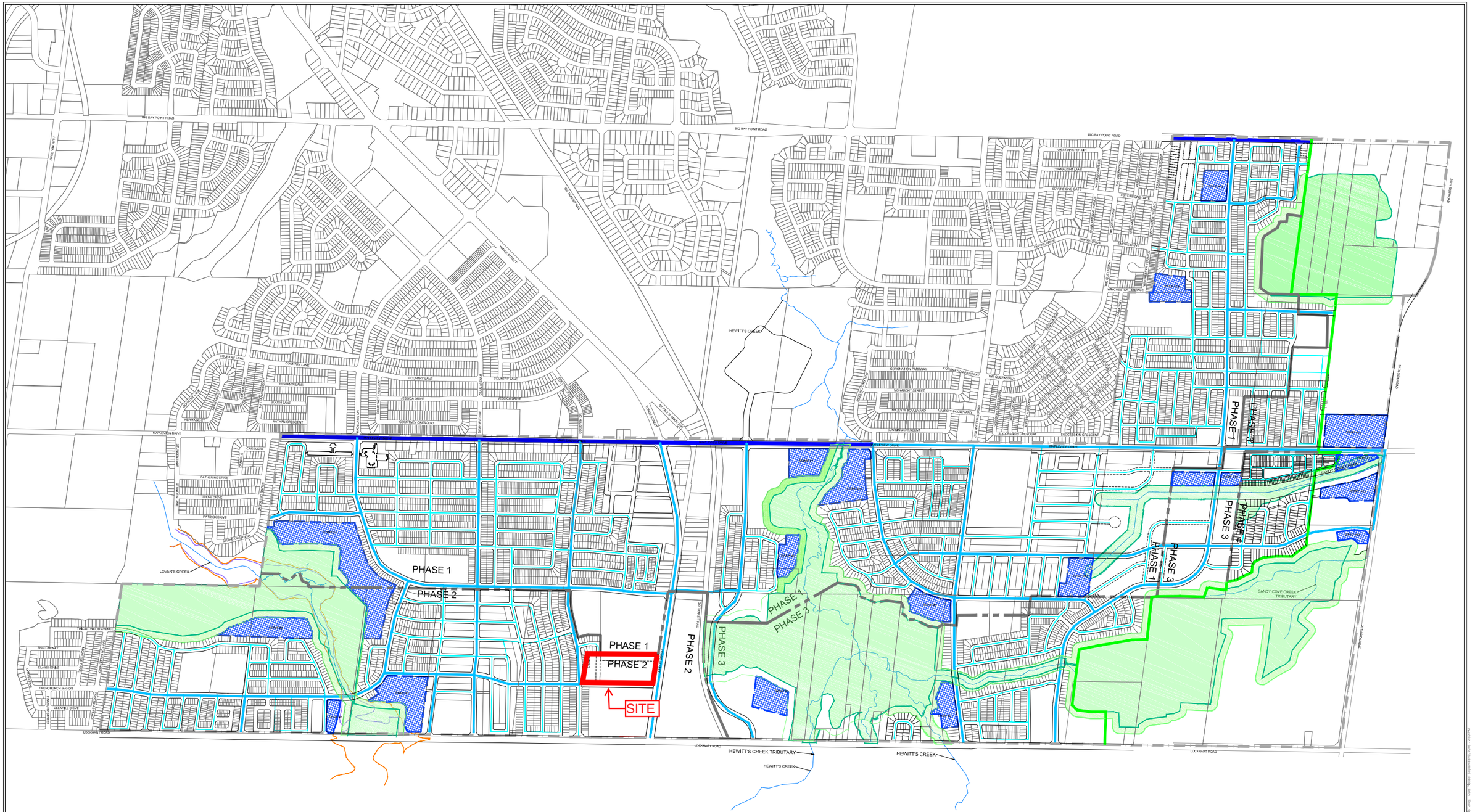
The Group has asked that the City of Barrie provide confirmation of your acceptance by Monday October 21st at 9 am, to ensure we do not have to make other arrangements for the imminent construction contract we are about to execute.

Thank you kindly, and we look forward to your confirmation.

Have a great weekend,

James

Appendix D
Water Demand Calculations



LEGEND

- DC TRUNK WATERMAIN
- LOCAL TRUNK WATERMAIN
- LOCAL WATERMAIN
- SURVEYED NHS LIMITS (2015)
- NHS BUFFER LIMITS
- 2031 PHASE LINE
- PHASING LIMITS
- LIMIT OF HEWITT'S CREEK SECONDARY PLAN
- STAKED 2015 NHS LIMITS
- NHS BUFFER LIMITS

0 100 200 400 600 Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

Figure Title: **HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY**
PROPOSED WATER DISTRIBUTION PLAN

Client: **HEWITT'S CREEK LANDOWNERS GROUP INC.**

Drawn	Checked	Date
AO	BH	16/01/28

Scale: H 1:4,000"
Project No.: 300032860
Figure No.: **FIG 12**

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C Coefficient related to type of construction [yes/no] — **Building A**

◆ Wood frame		1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (> 2 hrs)	yes	0.6

C=0.8 will be used for conservative purposes

A Area of structure considered (m^2) ***8,940*** <==> 96,232 ft^2

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ ***17,000 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

17,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) yes 30% ***5,100 L/min*** **(2)**

Exposure surcharge (cumulative (%), 1 side) [yes/no]

0 - 3 m		25%		
3.1 - 10 m		20%		
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m	yes	5%	2 side	10%
		Cumulative Total		**20%**

3,400 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***15,000 L/min***

(2,000 L/min < Fire Flow < 45,000 L/min) ***or*** ***250.00 L/s***

or ***3,963 USGPM***

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C Coefficient related to type of construction [yes/no] — **Building B**

◆ Wood frame		1.5	
◆ Ordinary construction		1	
◆ Non-combustible construction		0.8	C=0.8 will be used for
◆ Fire resistive construction (> 2 hrs)	yes	0.6	conservative purposes

A Area of structure considered (m^2) ***4,200*** <==> 45,204 ft^2

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ ***11,000 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

11,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) yes 30% ***3,300 L/min*** **(2)**

Exposure surcharge (cumulative (%), 1 side) [yes/no]

0 - 3 m		25%		
3.1 - 10 m		20%		
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	2 side	20%
30.1- 45 m		5%		
		Cumulative Total		**35%**

3,850 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***12,000 L/min***

(2,000 L/min < Fire Flow < 45,000 L/min) ***or 200.00 L/s***

or 3,170 USGPM

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C **Coefficient related to type of construction** [yes/no] — **Building C**

◆ Wood frame		1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (> 2 hrs)	yes	0.6

C=0.8 will be used for conservative purposes

A **Area of structure considered (m^2)** ***4,200*** <==> 45,204 ft^2

F **Required fire flow (L/min)**

$F = 220\ C\ (A)^{0.5}$ ***11,000 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

11,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) yes 30% ***3,300 L/min*** **(2)**

Exposure surcharge (cumulative (%), 1 side) [yes/no]

0 - 3 m		25%		
3.1 - 10 m		20%		
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	2 side	20%
30.1- 45 m		5%		
		Cumulative Total		**35%**

3,850 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***12,000 L/min***

(2,000 L/min < Fire Flow < 45,000 L/min) ***or*** ***200.00 L/s***

or ***3,170 USGPM***

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C Coefficient related to type of construction — **Building D**

	[yes/no]		
◆ Wood frame		1.5	
◆ Ordinary construction		1	
◆ Non-combustible construction		0.8	C=0.8 will be used for conservative purposes
◆ Fire resistive construction (> 2 hrs)	yes	0.6	

A Area of structure considered (m^2) — ***2,533*** <==> 27,265 ft^2

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ — ***9,000 L/min***

Occupancy hazard reduction of surcharge

	[yes/no]	
◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

9,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3)	yes	30%	***2,700 L/min***	**(2)**

Exposure surcharge (cumulative (%), 1 side)

	[yes/no]			
0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m	yes	15%	2 side	30%
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m		5%		
		Cumulative Total		**60%**

5,400 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]

(2,000 L/min < Fire Flow < 45,000 L/min)

12,000 L/min

or 200.00 L/s

or 3,170 USGPM

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C **Coefficient related to type of construction** [yes/no] **Building E**

◆ Wood frame		1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (> 2 hrs)	yes	0.6

C=0.8 will be used for conservative purposes

A **Area of structure considered (m^2)** ***2,533*** <==> 27,265 ft^2

F **Required fire flow (L/min)**

$F = 220\ C\ (A)^{0.5}$ ***9,000 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

9,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) yes 30% ***2,700 L/min*** **(2)**

Exposure surcharge (cumulative (%), 1 side) [yes/no]

0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m	yes	5%	1 side	5%
		Cumulative Total		**50%**

4,500 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***11,000 L/min***

(2,000 L/min < Fire Flow < 45,000 L/min) ***or*** ***183.33 L/s***

or ***2,906 USGPM***

Fire Flow Calculations

As per Fire Underwriter's Survey Guidelines

PROJECT: The Roselawn Project | **DATE CREATED: 21-Nov-19**

JOB#: 12560188 | **DATE PRINTED: January 21, 2022**

C **Coefficient related to type of construction** [yes/no] — **Building F**

◆ Wood frame		1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (> 2 hrs)	yes	0.6

C=0.8 will be used for conservative purposes

A **Area of structure considered (m^2)** ***1,095*** <==> 11,786 ft^2

F **Required fire flow (L/min)**

$F = 220\ C\ (A)^{0.5}$ ***6,000 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible		-15%
◆ Combustible	yes	0%
◆ Free burning		15%
◆ Rapid burning		25%

6,000 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) 30% ***0 L/min*** **(2)**

Exposure surcharge (cumulative (%), 1 side) [yes/no]

0 - 3 m		25%		
3.1 - 10 m	yes	20%	2 side	40%
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m		5%		
		Cumulative Total		**50%**

3,000 L/min **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***9,000 L/min***

(2,000 L/min < Fire Flow < 45,000 L/min) ***or 150.00 L/s***

or 2,378 USGPM