Proposed Mixed-Density Condominium Residential Development
Millford Development Limited • Town of Newmarket

Functional Servicing and Stormwater Management Report

March 2011
Rev. March 2021
MAEL Reference 99-598

MASONGSONG ASSOCIATES ENGINEERING LIMITED
ENGINEERING SUSTAINABLE FUTURES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
(Stage 1-OPA + ZBA)

Proposed Condominium Residential Development

Town of Newmarket

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MAEL Project No: 99-958

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1 INTRODUCTION

1.1 Objectives and Location

Masongsong Associates Engineering Limited has been retained by Millford Development Limited, to prepare this Functional Servicing and Stormwater Management report for a proposed condominium residential development comprising 53 Townhouse units, 20 back-to-back town houses units, and 1 triplex in support of a rezoning application.
This report addresses conceptual design for zoning whereas detailed design shall be submitted during site plan approval.

The overall developable land of approximately 2.03Ha (5.02 acres) fronts onto Eagle Street, east of Yonge Street, between Dixon Blvd and Donlin Ave. It is bounded to the north by Western Creek which is tributary to the East Holland River in the Town of Newmarket; to the west by existing commercial/industrial sites and to the east by residential development and auto repair facility. Figure 1 below illustrates the location of the proposed development.

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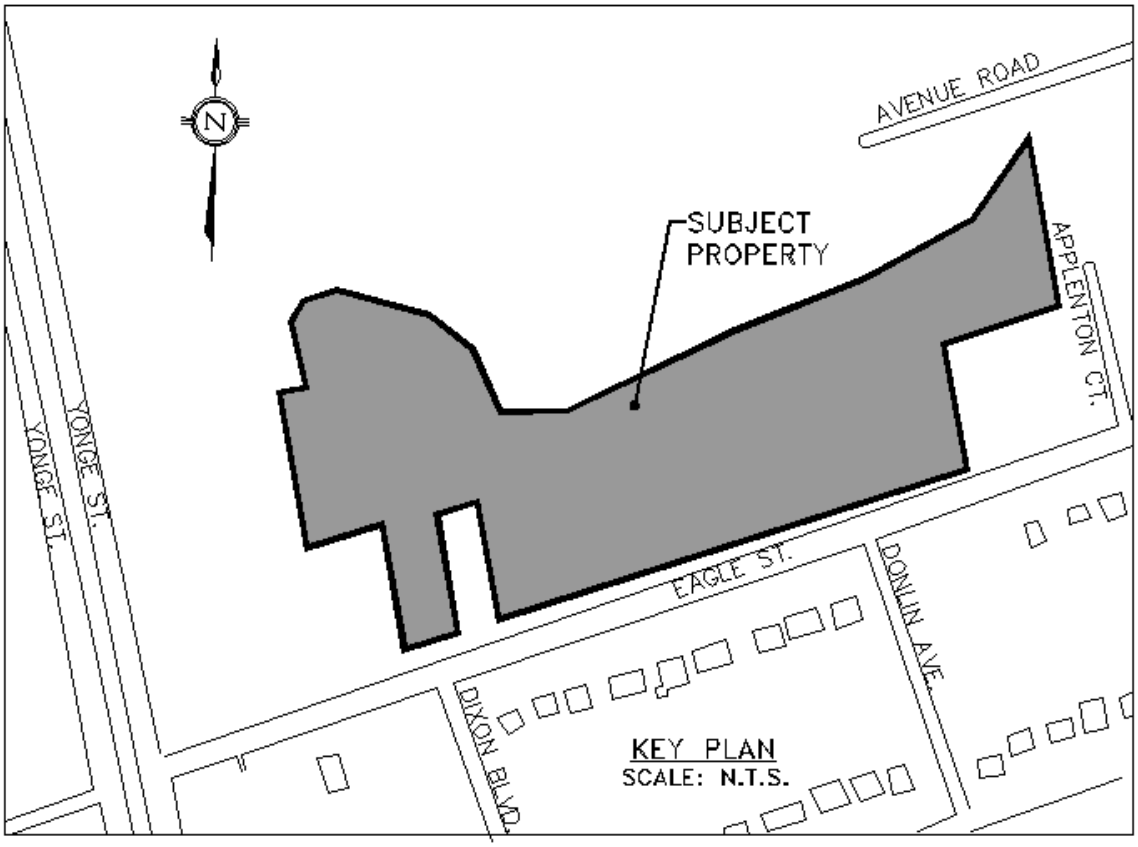


This report outlines the criteria and standards that have been implemented in the design of the site and will demonstrate how the site fits within the framework of existing receiving systems located along Eagle Street. This report will also describe the stormwater management controls proposed within the subject site to meet the established outflow targets outlined in current Town of Newmarket Design Standards and Criteria

1.2 Existing Site Description

1.2.1 Topography

The existing topographic survey indicates that the lands generally slope from the southwest to the northeast, with a 10.5m grade differential, ranging from a height of 267.0m on the table land, to a low of 256.5m at the base of the valley feature. The peak elevation is located on the southwest corner near Eagle Street, while the low elevations are on the opposite corner at the top of bank as established by Lake Simcoe Regional Conservation Authority (LSRCA) in April 2009 and confirmed in May 2012. Refer to LSRCA letter enclosed in Appendix D.

A topographic and legal survey plan prepared by Young and Young Surveying Inc. are included in Appendix A as Drawings TP1 and TP2.

The northerly portion of the site is bounded by Western Creek which is a tributary of the East Holland River. The tributary runs in a north-easterly direction and traverses the north side of the subject lands. As mentioned in the *Tree Inventory Report* (C.V. Bentley, 2007), remnants of planted areas of trees and shrubs suggest that the property was previously a residence or farm. Open areas, indicating old fields or other disturbed areas, are being colonized naturally by invasive or early successional species. There are no natural areas of native forest observed in the proposed area of development.

Field studies have been updated in 2020 and a new Environmental Impact Statement has been completed by GeoProcess Research Associates, dated March 2021.

A 6m wide buffer zone was established by LSRCA on April 16, 2009. The subject development will be located outside of the buffer zone and is proposed to maintain undisturbed any existing vegetation growing on and below the top of bank. Refer to slope stability report updated on September 2020 enclosed in Appendix D.

1.3 Proposed Development Plan

The subject site is currently vacant. As illustrated on the Conceptual Site Plan, Figure SP1, enclosed in Appendix A, the new residential development would consist of fifty-

three (53) townhouse units, twenty (20) back-to-back townhouses units and one (1) triplex/Rental unit, with a total of 74 residential units. The subject site is currently accessed from Eagle Street and all the residential units will be fronting a private condominium roadway network connecting to municipal road Eagle Street by two point of vehicular access. A 7.50m wide and a 8.20m wide vehicular accesses are proposed at the west and east limit of the site off Eagle Street.

Pedestrian walkways will be provided internally and well-connected to the existing public sidewalk network. A 3.0m right of way widening block is also proposed along Eagle Street Frontage.

The townhouses units will be owned under one single condominium corporation, therefore only one set of sanitary, storm and water service connection to municipal systems will be required for the entire future development.

2 Site Grading

The existing drainage pattern indicates that the subject site naturally drains in a north easterly directly towards Western Creek.

The northern portion of the site, of approximately 3.06 ha which represents almost 60% of the entire site, has been identified as an Open Space area and will remain undisturbed. The balance of the site, identified as developable area of 2.03 ha, will be graded to ensure that the storm drainage is self-contained. Driveways, road and laneway drainage will be directed towards a local low point at the internal road where both Low Impact Development (LID) measures and underground facilities will be located to capture and treat the storm drainage prior to discharge towards the Western Creek Ravine as per pre-development conditions. It is proposed to match the existing grade at the southern limit of the 6.0m buffer block to ensure that existing grading is maintained within the Open Space area.

Refer to preliminary grading plan, **Figure 3** enclosed in **Appendix B**.

3 WATER SERVICING

3.1 Existing Water Servicing

The surrounding development provides for a strong and well-looped water distribution network, with a connection to the boundary main on Yonge Street. An existing 300 mm diameter municipal main running along Eagle Street is available to service the subject site. Refer to **Figure 4** enclosed on **Appendix B.**

3.2 Proposed Water Servicing

The proposed development will be serviced by the existing 300mm diameter municipal main running along Eagle Street. Refer to **Figure 4** enclosed in **Appendix B** for proposed watermain connection details.

The subject site is proposed to be serviced by a 150mm and 200 mm diameter watermains that will be connected into the existing municipal watermain running on Eagle Street. Domestic service to the residential units will be via service connection laterals much like standard municipal water connections. Fire protection will be provided with on-street hydrants, also in accordance with typical municipal criteria.

It is recommended that on-site hydrant flow- and pressure-tests be carried out prior to detailed design to ascertain the available operating range of the existing municipal water system.

3.3 Proposed Water Demands

The water demand was calculated using a population equivalent of 2.88ppu for the residential units and 1.95 ppu for apartment units. The average water demand was calculated based on a on rate of 300 L/cap/d and the Town recommended peaking factors of 2.0 for maximum day and 3.0 for peak hour demand. The required maximum day domestic flow for the development is 1.5 L/s and a peak hour demand of 2.25 L/s. Refer to table 3.3 and triplex below.

Table 3.3

Site Description	Total Population (people)	Ave Day Demand (300 L/c/d)	Max Day Demand (2.0 Factor)	Max Hour Demand (3.0 Factor)
Residential Units	210	0.73 L/s	1.46 L/s	2.2 L/s
Triplex Unit (3 apartments)	6	0.0210	0.042L/s	0.063 L/s
Total flows			1.5 L/s	2.263 L/s

Preliminary watermain sizing was simulated using EPANet V2. A minimally available average-day pressures at Eagle Street (50 psi, 400 kPa) was assumed for the model.

Three water demand scenarios, peak daily demand plus fire flow, peak hourly demand, and minimum hourly demand, have been simulated using EPANET 2 modeling software to ensure the desired pressures and flows for the subject site are delivered under various demand scenarios.

Refer to table 3.3.1 enclosed in Appendix C for the Nodal demand calculations.

The following minimum values are used to calculate the water demands for this site in accordance with the City standards:

The summary of analysis result is provided in the following Table 3.3.2

Table 3.3.2

No	Scenarios	EPANET Results	City Criteria
1	Max. pressure during minimum hourly demand (kpa)	400.70	< 550 (Ok)
2	Min. pressure during the peak hourly demand (kpa)	400.79	> 350
3	Min. pressure during max. peak daily demand + fire	287.07	> 140

The above summary of EPANET 2 modeling result shows that proposed watermain system meets the Town's standard criteria for required pressures for noted scenarios.

Refer to EPANET result output enclosed in appendix C.

Prior to detail design, a flow test on the existing hydrants will be performed to confirm available pressure and supply and to confirm the sizing of the internal watermain system.

The proposed 150 mm and 200mm diameter watermain will be tapped off the existing 300mm diameter watermain running on Eagle Street to provide fire and domestic service.

4 SANITARY SERVICING

Research of the Town archives was unable to locate design sheets or other hydraulic calculations for the existing Eagle Street sewer systems. However, it is confirmed that an existing 250mm diameter sanitary sewer is draining easterly to service the surrounding area based on a sketch (Operation Storm Network 2009) provided by the Town of Newmarket. The sketch is enclosed on Appendix B in this report. Based on field observation an existing Sanitary manhole at the south east corner is identified. Based on correspondence between the landowners, Delcan consultants and the Town of Newmarket, it is confirmed that the downstream sanitary sewers (western sanitary subtrunk) were designed to accommodate the future residential development within the subject lands. Refer to historical documentation pertaining to western sanitary subtrunk, sewer dated 1984 on Appendix D.

4.1 Proposed Sanitary Servicing

It is proposed to connect into the existing sanitary sewer system on Eagle Street, providing a 200mm diameter PVC sanitary service connection and a control manhole at the property lane. The existing sanitary control manholes has and outlet invert at approximately elevation 255.99m.
For proposed sanitary connections details refer **to figure 5**, enclosed in **Appendix B**.

4.2 Sanitary Sewage Flows Estimates

The proposed development comprises 73 Townhouse units, and 1 triplex having an equivalent population of 216 persons as outlined in the following table 4.2.

Table 4.2 *Population estimated*

Sewage Generation Components and Criteria	Total # of Units	PPU	Total Population
Townhouses	73	2.88	210
Triplex (3 apartments)	3	1.95	6
Total Proposed Population (Residential)			**216**

The sanitary sewage flow estimates are calculated based on the Engineering Design Standards and Criteria of City of Newmarket, the. Using the above population estimates, the future sanitary sewerage rate from the subject site is calculated as follow.

Proposed Site Design Flow:

Peak Flow Design Parameters

Residential l Area *= 2.03 ha*
Total Population = 216 p
Average daily per capital flow (as per town std) = 360 L/cap/day

Peaking Factor $=1+ \{14/(4+(P/1000)^{0.50})\} =$

Where: M = ratio of peak flow to average flow
P = Total equivalent population
Peaking Factor = 4.14

Infiltration
Infiltration rate = 0.30L/s/ha as per MESP dated in March 2017
= 0.609L/s

Calculation of Peak Design Flows

Design flow, $Q_{SANITARY}$ *= population *average daily flow*Peaking factor+ Infiltration flow*
=360 L/c/day x 216 x 4.00 /86,400/1000 m^3/s + 0.00069 m^3/s
=**0.00429 m^3/s** = **4.29L/s**

A 200mm pipe at minimum 0.50% has enough capacity to accommodate the design flow of 4.29L/s generated by the subject site.

5 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management plan for the subject site will be designed in accordance with the Town of Newmarket Stormwater Criteria in conjunction with the Best Management Practice guidelines in the MOE SWMPs Manual and Low impact Development Guidelines by LRSCA Technical Guidelines and other Standards mentioned in the Engineering Design Standards and Criteria of Town of Newmarket. This site will comply with Lake Simcoe Protection Plan (LSPP) polices 4.8 to 4.12. During detailed design stage these polices will be implemented on the subject site.

The following sections will detail the pre- and post-development conditions and describe how the targets can be achieved on site.

Minor storm sewers within the subject lands will be capture the 100-year design storm flow generated from the residential/road areas as per the current storm drainage design criteria of the Town of Newmarket and will be collected by catchbasins connected to the storm sewer which discharges into an underground tank, to ultimately discharge into the existing creek as per pre-development drainage pattern.

The storm drainage system for the subject site will be designed to control the storm runoff to predevelopment levels prior to discharging into the existing creek.

Any resulting post-development runoff in excess of the original design discharge rate must be controlled or detained on-site.

All storm sewer flows in excess of the 100-year storm is proposed to remain overland, conveyed to private roads and finally into the Creek for emergency exit. Approximately 85% of the subject development will be tributary to the private road overland flow route. The remaining lands (rear yards, landscape areas) will drain northerly towards Western Creek as pre-development conditions.

5.1 Existing Storm Servicing

Through a review of Town archives and drawings of the surrounding road network, it is known that a 300 mm diameter storm sewer is available along Eagle Street.

Research of the Town archives was unable to locate design sheets or other hydraulic calculations for the existing Eagle Street sewer systems. However, it is confirmed that a 300mm diameter storm sewer is draining easterly to service the surrounding area based

on sketch (Operation Storm Network 2009) provided by the Town of Newmarket. The sketch is enclosed on Appendix B of this report.

Based on the existing topographical survey, to determine the residual capacity of the existing storm sewer system on Eagle Street, a drainage plan and a design sheet was prepared by this office. An overall runoff coefficient of 0.45 was assumed for the existing residential development draining to this system; as the actual storm sewer slopes are not shown on the drawings provided by the Town, it was assumed that the existing pipe slope is similar to the sanitary sewer slope.

Refer to storm drainage plan **Figure 2** enclosed on **Appendix B** and the storm design sheet Table B1 enclosed on Appendix C.

5.2 Proposed Post-development conditions.

5.2.1 Water Balance

The primary objective of the Lake Simcoe Protection Plan (LSPP) is to encourage a treatment train approach to water balance, such that the natural hydrologic cycle is maintained and managed through control of urbanized runoff.

To determine the pre- and post- development water budget an assessment completed by Soil Engineers Ltd, on July 15,2020 identified the subject site development with an infiltration deficit of 1637.79m^3/year.

Assuming conservatively that there is a minimum of 10 rain events per year, the LIDs off-site should be designed to retain and infiltrate a minimum of **163.78m^3** per event (10 event per year contributing to 1637.79m^3/year

It is recommended that this target to be achieved through the application of infiltration measures where soil conditions permit.

Stormwater Best Management Practices (BMPs) are measures to manage the quality and quantity of urban runoff to mitigate drainage impacts. A treatment train approach to BMPs can be divided into three groups as follows:

- **Source** controls such as roof leaders discharging to grass or soakaway pits;
- **Conveyance** controls such as grassed swales or vegetative filter strips; and,
- **End-of-pipe** controls such as communal extended detention ponds.

In reviewing options, each alternative BMP was evaluated based on its capabilities, limitations, physical constraints associated with implementation on the specific site, and its effectiveness in achieving the stormwater management objectives. BMPs should ideally accomplish the following goals:

- Emulate as closely as possible the hydrological conditions of the site in its existing condition.
- Reduce nutrient and pollutant loadings in untreated urban runoff.
- Minimize temperature increases in treated runoff.
- Integrate with the planned urban form and municipal service requirements; and,
- Be reasonably cost effective in comparison to other options and have acceptable future maintenance requirements for the local municipality.

The first step in the selection process is to review BMPs based on the following screening factors that focus on:

- Suitability of study area soils and groundwater elevations (where known);
- Existing hydrogeological relationship of site drainage to adjacent tributaries.
- Size of contributing drainage areas.
- Compatibility with urban form.
- Municipal servicing requirements; and,
- Water quality control effectiveness.

It is also important to promote infiltration where soils are suitable to help offset as much as possible the reduction in infiltration due to increased impervious area from the proposed development. Therefore, infiltration practices should be reviewed at the detail design stage to determine viable lot level and conveyance controls such as the following:

- Roof leaders directed to rear yard ponding areas, soakaway pits, cisterns, rain barrels, etc.
- Infiltration trenches.
- Bioretention swales.
- Vegetated filter strips; and
- Stream and valley corridor buffer strips.

Based on the proposed layout, Bioretention swales, grassed swales and pavement pavers are feasible BMP devices.

- **Bioretention Swale**

Bioretention systems are stormwater best management practices (BMPs) that use media filtration to treat stormwater runoff. These systems use vegetation, such shrubs, and grasses, and sand or aggregate media to remove pollutants from stormwater runoff.

A bioretention system is suitable for this site as it provides not only vegetated filtration and nutrient intake, but routing stormwater through vegetation also helps reduce water temperature. Furthermore, the bioretention swale serves a dual function as they will improve infiltration into the subsurface, enhancing recharge and moisture capture by the vegetation.

The Bioretention swale provide a volume of 29.8m^3 as follow:

Volume provided = 124.30m^2 x 0.6m (H) * 0.4 = **29.8m^3**

The geotechnical report prepared by Soil Engineers LTD dated in October 2004, 2009,2011 and updated by letter prepared by Soil engineers Ltd dated in September 2020 identifies the soil present on the subject site as silty clay and sandy silt till.

The estimated hydraulic conductivities range from 2.8x10^{-6} m/sec to 8.4x10^{-5}m/s confirming the low to moderate permeability for the native subsoil present on the subject site, therefore the installation of a subdrain above the permanent water level of the LID is recommended.

- **Enhanced Grass swale**

Enhanced grass swale is vegetated open channels deigned to convey and attenuate stormwater runoff and incorporate design features such a modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple gras channel and roadside ditch designs.

The Enhanced grass swale provide a volume of 44.7m^3 as follow:

Volume provided = 207 m (L) x 0.9m (W) 0.6m (H) * 0.4 = 44.7**m^3**

Installation of a subdrain along the grass swale, above the PWL is recommended as the estimated hydraulic conductivity of the native sol is less than 15mm/hr

- **Pervious pavement (Turfstone pavement):** Turfstone pavement will be implemented on a portion of the proposed laneway to allow percolation or infiltration of stormwater through the surface into the soil below where the water is

naturally filtered, and pollutants are removed. The proposed permeable pavement is located north of the proposed amenity area and south of Block #7, refer to Figure 2 enclosed on Appendix B.

Void ratio = 0.4
Depth = 0.6m
Area =382 m^2
Volume = 0.40 x 0.6m x 382m^2 **= 91.68 m^3**

The total volume provided for water balance purposes is **166.18m^3** = (29.8m^3+44.7m^3+91.68m^3).

5.2.2 Allowable Peak Flow- Pre-Development

In accordance with the LSRCA guidelines for Stormwater Management Section2.2.1 the peak flows rate for major development and linear development are not exceed the correspond pre-development peak flow rates 1 in 2 year, 1 in 5 year, 1 in 10 yr, 1 in 25 year, 1 in 50 year and 1 in 100 year storm events. post-development peak flow rates.

It is proposed to control the peak flows for each storm event (2 years, 5 years, 25 years 50 year and 100 years) to match the LSRCA peak flow targets.

The post-development storm flows have been quantified using the Modified Rational Method, as follow:

The allowable release rate for each storm event was calculated using the Town of Newmarket Rainfall Intensity equations as follows:

2-year storm rainfall intensity:

$I_2 = 648* (T+4)^{-0.784}$

5-year storm rainfall intensity:

$I_5 = 930* (T+4.0)^{-0.798}$

25-year storm rainfall intensity:

$I_{25} = 1100* (T+2)^{-0.776}$

50-year storm rainfall intensity:

$I_{50} = 1488* (T+3)^{-0.803}$

100-year storm rainfall intensity:

$I_{100} = 1770* (T+4)^{-0.82}$

Where:

i = rainfall intensity (mm/hr)
t_c= time of concentration (min) = 10

I_2= 81.84mm/hr I_5= 113.20mm/hr I_{25}= 159.937mm/hr I_{50}= 189.717mm/hr

I_{100}= 203.305mm/hr

A pre-development runoff coefficient of **R=0.25** is to be used for computing the target peak flows;.

$Q_{2\ yr\ Post}$ at Runoff coefficient of 0.75 to be e controlled to $Q_{2\ yr\ Pre}$ at Runoff coefficient of 0.25
$Q_{5yr\ Post}$ at Runoff coefficient of 0.75 to be e controlled to $Q_{5\ yr\ Pre}$ at Runoff coefficient of 0.25
$Q_{25yr\ Post}$ at Runoff coefficient of 0.75 to be e controlled to $Q_{25\ yr\ Pre}$ at Runoff coefficient of 0.25
$Q_{50yr\ Post}$ at Runoff coefficient of 0.75 to be e controlled to $Q_{25\ yr\ Pre}$ at Runoff coefficient of 0.25
$Q_{100yr\ Post}$ at Runoff coefficient of 0.75 to be e controlled to $Q_{100yr\ Pre}$ at Runoff coefficient of 0.25

The allowable release rate for each storm event is calculated as follows:

$$Q_{allow} = \frac{A_t i\ iR}{360}(m^3/s)$$

Where:

Q_{allow} = Peak Stormwater Flow (m^3/s)
R = Runoff coefficient = 0.450
i = Rainfall intensity (mm/hr) =
A_t = Total developable site Area (ha) = 2.03 ha

$$Q_{2yr\text{-}allow} = \frac{2.03*0.25*81.84}{360} = 0.115\ m^3/s$$

$$Q_{5yr\text{-}allow} = \frac{2.03*0.25*113.20}{360} = 0.159\ m^3/s$$

$$Q_{25yr\text{-}allow} = \frac{2.03*0.25*159.937}{360} = 0.225\ m^3/s$$

$$Q_{50yr\text{-}allow} = \frac{2.03*0.25*189.717}{360} = 0.267\ m^3/s$$

$$Q_{100yr\text{-}allow} = \frac{2.03*0.25*203.305}{} = 0.287\ m^3/s$$

Flows from certain areas within the site due grading cannot be controlled (Areas U1, U2, U3 and U4, refer to figure 6 enclosed in Appendix B). Therefore, drainage from these areas will be considered uncontrolled flow to municipal system and flow will be deducted from maximum allowable release rate.

Uncontrolled flow is calculated as follows:

$Q_{2yr} = \frac{0.287*0.25*81.84}{360} = 0.016 m^3/s$

$Q_{5yr} = \frac{0.287*0.25*113.20}{360} = 0.022 m^3/s$

$Q_{25yr} = \frac{0.287*0.25*159.937}{360} = 0.032 m^3/s$

$Q_{50yr} = \frac{0.287*0.25*189.717}{360} = 0.038 m^3/s$

$Q_{100yr} = \frac{0.19*0.25*203.305}{360} = 0.041 m^3/s$

Therefore, the net allowable release rate is calculated as follows:

$Q_{allow\ 2yr} = 0.115\ m^3/s - 0.016 m^3/s = 0.099 m^3/s$

$Q_{allow\ 5yr} = 0.159 m^3/s - 0.022 m^3/s = 0.137 m^3/s$

$Q_{allow\ 25yr} = 0.225\ m^3/s - 0.032 m^3/s = 0.193 m^3/s$

$Q_{allow\ 50yr} = 0.267\ m^3/s - 0.038 m^3/s = 0.229 m^3/s$

$Q_{allow\ 100yr} = 0.287\ m^3/s - 0.041 m^3/s = 0.246 m^3/s$

5.2.3 Post-development Discharge

To meet the stormwater quantity objectives, the subject site is proposed to provide on-site water quantity control up to the maximum allowable release rate for each storm event. The required storage volume has been calculated using Modified Rational Method included as Tables 5.2.3, 5.2.4 5.2.5 ,5.2.6 and 5.2.7 on Appendix C and a Runoff Coefficient of R=0.70 as outlined in the following table 5.2.2.1

Table 5.2.2.1 *Post-Development Composite Runoff Coefficient*

Surface Area component	Area (ha)	C	Weighted Runoff Coeff. "C"
			Area x C
Roofs	0.784	0.9	0.706
Roads/Sidewalks	0.549	0.9	0.494
Landscape	0.697	0.25	0.174
Totals	**2.03**		**1.374**
			1.374/2.03
	R= AxC/TOTAL AREA		0.68

Therefore, a runoff coefficient of 0.68 is used for the onsite storage calculations.

The runoff coefficient was adjusted using the routing coefficients as recommended the MTO, refer to design chart 1.07 (MTO) for each rain event.

From table 5.2.5 enclosed on Appendix C, the maximum required onsite storage for the subject site is 462.09 m^3 which will be provided by utilizing a below-grade storage tank.

- A storm trap, or approval equal, is sized as follows:

  Required volume = 462.09 m^3
  Tank A Volume = A x C_f x h
  =240m^2 x 1.30 (h)*0.90
  Volume (Tank A) = 280.8 m^3

- Storage pipes
  Volume = 24.23m^3

- LID
  Volume = 166m^3

In summary, the net available storage is 471.03m^3 when utilizing a combination of 26m length of 675mm storm pipe, 21 m length of 750mm stm pipe, 44m length of 450mm stm pipe, an underground tank, a bioretention, a grassed swale and permeable paver.

The internal piping has been designed to convey the 100-year flow generated by the site

to the tank (A).

The houses should not be connected into the storm sewers to avoid backing up into the basement.

To control the storm flow to the allowable release rates during each storm event, 2yr, 5yr, 25yr, 50 yr and 100-year control structures are required and will be sized at the detailed design stage. The control structures will be installed upstream of the stormfilter/OGS.

For location of the underground Tank (A) refer to figure 5, enclosed in Appendix B.

5.2.4 Stormwater Quality Control

The town **requires** the minimum acceptable level of quality control is to provide an *Enhanced or Level 1* protection in accordance with MOE guidelines, and consistent with the LSRCA Lake Simcoe Protection Plan Policy (LSPP) DP-4.8.

Additionally, this site falls within the Lake Simcoe drainage shed, and as part of the LSPP, all developments will be required to demonstrate and implement a reduction in Total Phosphorus (TP) runoff from the site, as a means to reduce loading to and eutrophication of Lake Simcoe.

The water quality control targets for the subject site are presented in the following sub-sections.

As per LSPP 4.10-DP and 4.11-DP, the condo corporation will be responsible to inspect, monitor and maintain the system.

5.2.4.1 TSS removal

The subject site will require best-practice treatment of stormwater runoff to achieve 80% TSS removal. Storm runoff from the site consists of the landscape, roof and pavement areas. Runoff from the roof areas is considered clean, while the landscape area runoff will attain an 80% TTS removal by natural filtration.

The overall baseline TSS removal efficiency is presented in the following Table 5.2.4.1

Table 5.2.4.1 *Baseline TSS Removal Rate and Average Runoff Coefficient*

Surface Area Component	Area	Percent Area	Baseline TSS Removal Rate	Weighted TSS Removal Rate
	(m^2)	(%)	(%)	
Roofs	0.784	38.54	80%	30.83%
Roads/Sidewalks	0.549	27.00	0%	0.0%
Landscape	0.701	34.46	80%	27.57%
Totals	**2.034**	100%		**58.40%**

The baseline weighted average TSS removal is 58.40%, which does not meet the targeted 80% long-term average rate required by the Town of Newmarket.

Therefore, the entire post-development drainage areas are routed into an Oil-Grit Separator (OGS). Newer media-filter based technology such as the Contech Stormfilter are recognized to provide a much higher removal rate of TSS (80%) a TP (79%) The Stormffilter would also function as pre-treatment settling chamber, removing larger solids, bitumous runoff, and the initial TSS settling. Based on the sizing report prepared by the manufacture, the specific model is a Contech Stormfilter SFPD 0822" PhospoSorb .

A Stormfilter & TP model has been selected to treat the subject site. Refer to detailed Stromfilter sizing report enclosed in Appendix C.

5.2.4.2 TOTAL PHOSPHOROUS

A primary cause of eutrophication of Lake Simcoe is the increase in nutrient loading due in part to the urban effects of increased runoff volume and lawn and landscape maintenance practices. Lake Simcoe Protection Plan (LSPP) Policy 4.8e requires that:

> "*An application for major development shall be accompanied by a stormwater management plan that demonstrates...*
> *e. through an evaluation of anticipated changes in phosphorus loadings between pre-development and post-development, how the loadings shall be minimized.*"

For the subject site, best efforts to promote LID measures for other stormwater quality control targets (TSS) and hydrologic water balance include:

- On-site storage for the first 5mm for water balance
- End-of-pipe quality control (OGS device)

The estimation of nutrient runoff within the LSPP watershed has been simplified with the Phosphorus Budget Guidance Tool for New Development in the Lake Simcoe Watershed (the Tool), which is a relational database of pre-calculated nutrient loading and mitigation factors calibrated specifically for the Lake Simcoe watershed.

5.6.1 BMP Performance – TP Reduction

The Tool was run for the subject site, using the East Holland subwatershed data, and following the guidance in describing pre-and post-development land use from Table 1 in the Tool Guidebook.

The post-development drainage from subject site are modeled to be directed to the OGS as having media *(PhosphoSorb)* to removes total phosphorus (TP) from the stormwater runoff by absorbing dissolved-P and filtering particulate-P simultaneously. Field tests of the *PhosphoSorb* media showed a load reduction 79% total phosphorus.

With the addition of the proposed LID measures, the additional TP loading is reduced to 0.05 kg/yr.

The TP model output is attached in Appendix C.

6 EROSION AND SEDIMENT CONTROL

Erosion and sediment control should be implemented for all construction activities within the subject site, including topsoil stripping, parking lot construction, foundation excavation and stockpiling of materials. The basic principles considered to minimize erosion and sedimentation and resultant negative environmental impacts include:

- Minimize local disturbance activities (e.g. limit area-wide grading);
- Expose the smallest possible land area to erosion for the shortest possible time;
- Implement erosion and sediment control measures before the outset of construction activities; and,
- Carry out regular inspections of erosion and sediment control measures and repair or maintain as necessary.

The proposed grading, servicing and building construction should be carried out in such a manner that a minimum amount of erosion occurs and such that sedimentation facilities control any erosion that does occur. Erosion and sediment control measures should include but not be limited to the following:

- Erection of silt fences around all site perimeters and double silt fence along the buffer of the top bank
- Provide sediment traps (e.g. rock check dams, straw bales, scour basins) along interceptor swales and points of swale discharge.
- Inlet controls at catchbasins, comprising filter cloth overlain with rip-rap;
- Implement a weekly street sweeping and cleaning program for any mudtracking onto Eagle Street;
- Provide gravel “mud mats” at construction vehicle access points to minimize off-site tracking of sediments; and,
- Confine refueling/servicing equipment to areas well away from inlets to the minor system or major system elements.
- All waste and unused building materials (including garbage, cleaning wastes, wastewater, toxic materials, or hazardous materials) shall be properly disposed of and not allowed to be mixed with and carried off by runoff from the site into a receiving watercourse or storm sewer.

Removal of the erosion and sediment controls should be done once construction is completed and sediment run-off from the construction activities has stabilized.

7 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

This functional servicing and stormwater management report demonstrates that the proposed residential development within the subject site can be accommodated by the existing local infrastructure. Specifically:

- **Water Service** will be provided by existing 300 mm diameter PVC service connection located along on Eagle Street. A 150 mm and 200mm lateral connection will be tapped off the main to provide residential water demand.

- **Sanitary Service** is accommodated by the existing 250 mm diameter sanitary sewer running on Eagle Street. A 200mm diameter service lateral is proposed to service the subject development.

- **Quantity Controls** will be provided for each storm event using a storage tank., storage pipes and LID measures. Control structures located upstream of the OGS, will control the release flow for each rain event.

- **Quality control** (Enhanced Level) will be provided by an OGS located downstream for the storage tank.

  TP reduction during post-development is achieved with a Stromfilter type filter.

- **Water balance** will be provided for Enhanced grass swale, pavement pavers and bioretention swale.

- **Erosion and Sediment Controls** will need to be implemented during development until the site has been stabilized with groundcover. Erosion and sediment control drawing show existing trees, silt fence, mud mat, and trees to be removed before earthworks. Silt fence to be inspected by arborist prior to works.

We trust that this analysis is complete and satisfactory. Should you require additional information, please contact the undersigned.

Respectfully Submitted,
MASONGSONG ASSOCIATES ENGINEERING LIMITED

Lucila Ensuncho, M.A.Sc., P.Eng.
Principal

Isabel Strauch,
Municipal Designer

H:\PROJECTS\99\598\2020\Reports\FSR\99-598-fsr-rev2.doc

Appendices

Appendix A

Site Plan and Survey

SURVEY INFORMATION:

SURVEY INFORMATION IS TAKEN FROM A COMPILED PLAN OF SURVEY ENTITLED:
PART OF LOTS 2 AND 3
REGISTERED PLAN 49
TOWN OF NEWMARKET
REGIONAL MUNICIPALITY OF YORK
PREPARED BY:
YOUNG & YOUNG SURVEYING INC., OLS
2 HOLLAND DRIVE, UNIT 5
BOLTON, ON L7E 1E1
DATED: MARCH 1, 2011

PROPERTY INFORMATION:

PROPERTY AREA:

VALLEY LANDS	28 477 SM (7.04 AC)
BUFFER ZONE	2 114 SM (0.52 AC)
NET DEVELOPMENT AREA	19 742 SM (4.88 AC)
PROPOSED ROAD WIDENING	589 SM (0.15 AC)
TOTAL PROPERTY AREA	50 922 SM (12.58 AC)

PROPOSED AREAS:

PRIVATE ROADS AND PARKING	4 869 SM
SIDEWALKS	621 SM
REMAINING LOT AREA	14 252 SM (3.52 AC)

PROPOSED BUILDING INFORMATION:

TYPE	DESCRIPTION	UNITS	UNIT FOOTPRINT (SQ.M.)	UNIT GFA (SQ.M)	TOTAL GFA (SQ.M.)
T1	3 STOREY TOWNHOME	11	80.3	196.7	2,163.7
T2	3 STOREY TOWNHOME	7	78.8	220.8	1,545.6
T3	3 STOREY TOWNHOME	5	57.5	169.5	847.5
T4	2 STOREY TOWNHOME	4	92.8	176.8	707.2
T5	3 STOREY TOWNHOME	13	85.3	240.3	3,123.9
T6	3 STOREY TOWNHOME	6	105.8	301.4	1,808.4
T7	3 STOREY TOWNHOME	6	106.0	274.0	1,644.0
T8	3 STOREY TOWNHOME	1	54.2	162.6	162.6
T9	3 STRY. B.T.B. T.H.	20	58.6	168.4	3,368.0
		73			15,370.9
T10	TRIPLEX	3	185.5	185.5	556.5
		76			15,927.4

SITE BUILDING STATISTICS:

LOT COVERAGE	41%	(5,885 SQ.M. / 14,252 SQ.M.)
FSI	0.81	(15,927 SQ.M. / 19,727 SQ.M.)
UNITS PER HA	38.6	(76 U /1.97 HA)

PROPOSED PARKING INFORMATION:

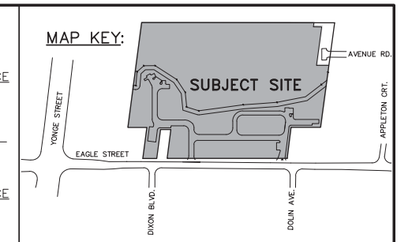
PARKING PER NEWMARKET ZONING BY-LAW 2010-40

UNIT TYPE	# UNITS	PARKING RATES	REQUIRED	PROVIDED	DIFFERENCE
TOWNHOUSE/ STACKED/ TRIPLEX	76	1.5	114	91	-23
VISITOR	76	0.25	19	35	16
			133	126	-7

PARKING PER NEWMARKET ZONING BY-LAW 2019-06

UNIT TYPE	# UNITS	PARKING RATES	REQUIRED	PROVIDED	DIFFERENCE
TOWNHOUSE/ STACKED/ TRIPLEX	76	1.0	76	91	15
VISITOR	76	0.15	11	35	24
			85	126	39

MAP KEY:



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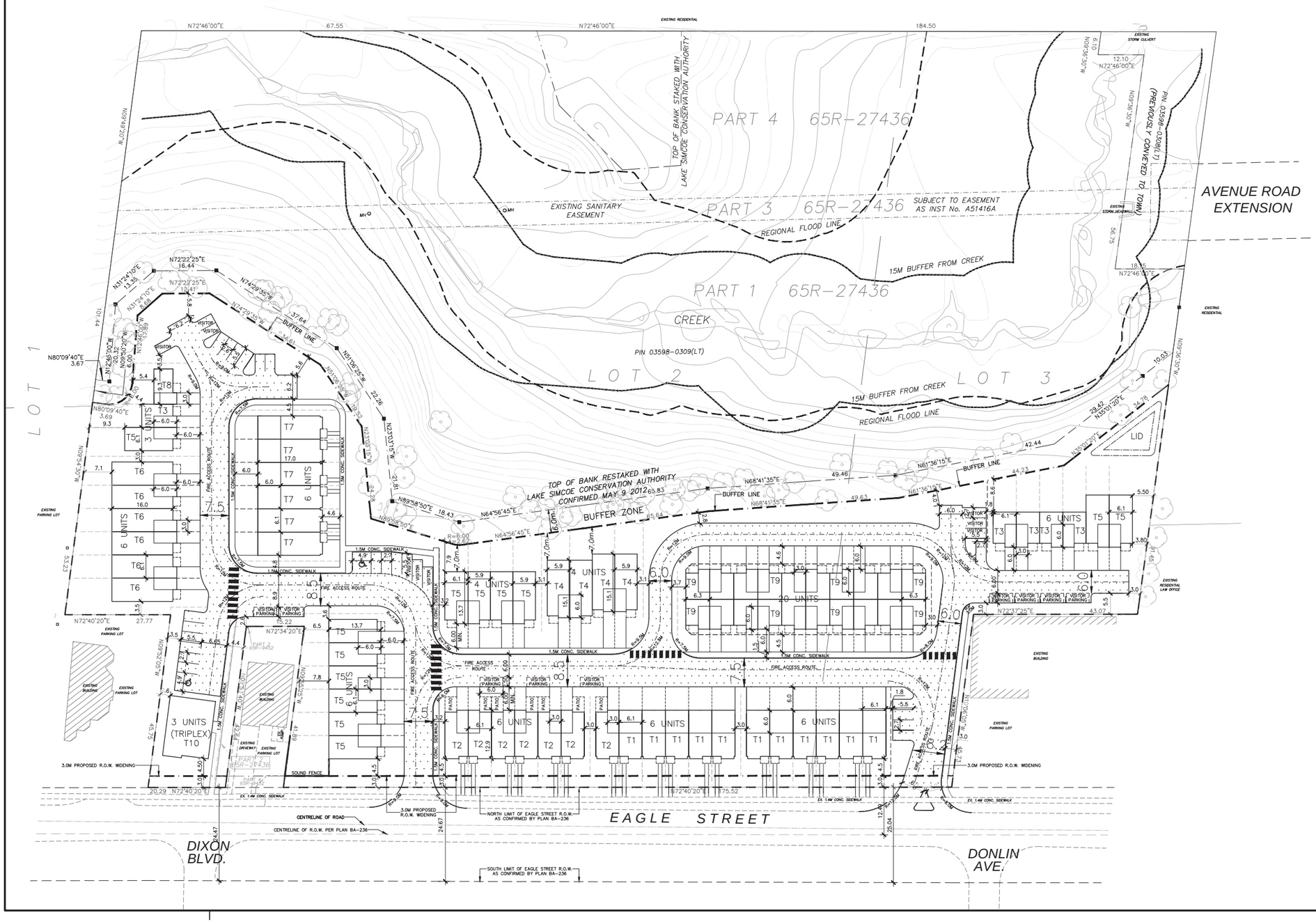


LEGEND:

- EXISTING CONTOUR
- EX. 15M BUFFER ZONE FROM CREEK
- EX. REGIONAL FLOODLINE
- EXISTING TREE TO BE PRESERVED
- EXISTING EASEMENT
- LIMIT OF DEVELOPMENT AREA
- LIMIT OF PROPERTY
- STAKED TOP OF BANK

CONCEPTUAL DRAWING TO BE READ IN CONJUNCTION WITH SUPPORTING BACKGROUND STUDIES SUBMITTED UNDER OFFICIAL PLAN AMENDMENT APPLICATION (D9-NP-11-09) AND ZONING BY-LAW AMENDMENT APPLICATION (D14-NP-11-09)

NORTH:

No.	DESCRIPTION	BY	DATE
	REVISIONS		
2	ADDED NOTES		FEB 2/21
1	REVISED CONCEPTUAL DRAWING FOR OPA / ZONING PROPOSAL		JULY 2020

OWNER:

MILLFORD DEVELOPMENT LIMITED
P.O. Box 215
Newmarket, ON L3Y 4X1
Tel: (905) 778-1818
Fax: (905) 778-0877

55 EAGLE STREET
CONDOMINIUM RESIDENTIAL TOWNHOMES AND TRIPLEX PROPOSAL
TOWN OF NEWMARKET
REGIONAL MUNICIPALITY OF YORK

CONCEPTUAL SITE PLAN

DESIGNED BY:	CAD
CHECKED BY:	
DATE:	JULY 2020
SCALE:	1:500

Drawing No. **SP1**

TOPOGRAPHIC SURVEY OF
PART OF LOTS 2 AND 3
REGISTERED PLAN 49
TOWN OF NEWMARKET
REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 500

0 5 10 20 30 40 50
METRES

YOUNG & YOUNG SURVEYING INC.
ONTARIO LAND SURVEYORS

N

REGISTERED PLAN 527

LOT 94
CONCESSION 1
EAST OF YONGE STREET

LOT 1 | LOT 2 | LOT 3 | LOT 4 | LOT 5 | LOT 6 | LOT 7 | LOT 8 | LOT 9 | LOT 10 | LOT 11 | LOT 12

AVENUE ROAD EXTENSION

BUSH

LOT 1

LOT 2

LOT 3

REGISTERED PLAN 49

EAGLE STREET

TOP OF BANK AS ESTABLISHED BY
LAKE SIMCOE CONSERVATION AUTHORITY
FEB. 19 2003

TOP OF BANK ADDED FEB. 25 2003

NOTE

NO UNDERGROUND SERVICES HAVE BEEN LOCATED OR ILLUSTRATED

THIS PLAN IS DERIVED FROM COMPILED DATA AND NOT FIELD MEASUREMENTS AND SHALL NOT BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.

BENCHMARK

YORK REGION BENCHMARK No. 55-700
ELEVATION = 268.79 Meters

DWG TP1

LEGEND

TL	DENOTES	TRAFFIC LIGHT
MH	DENOTES	MAINTENANCE HOLE
CB	DENOTES	CATCH BASIN
LS	DENOTES	LIGHT STANDARD
HP	DENOTES	HYDRO POLE
FH	DENOTES	FIRE HYDRANT
GV	DENOTES	GAS VALVE
WV	DENOTES	WATER VALVE
EV	DENOTES	EXHAST VENT
GWP	DENOTES	GUY WIRE POLE
GW	DENOTES	GUY WIRE

YOUNG AND YOUNG SURVEYING INC.
PROFESSIONAL LAND SURVEYORS

BOLTON
2 HOLLAND DRIVE UNIT 5
BOLTON ONTARIO L7E 1E1
PHONE 951-6000 FAX 857-4811

TORONTO
385 THE WEST MALL SUITE 400
ETOBICOKE,ONTARIO,M9C1E7, 621-2676

DRAWN BY: R.W./G.M.

PROJECT 03-B4461

COMPILED PLAN OF

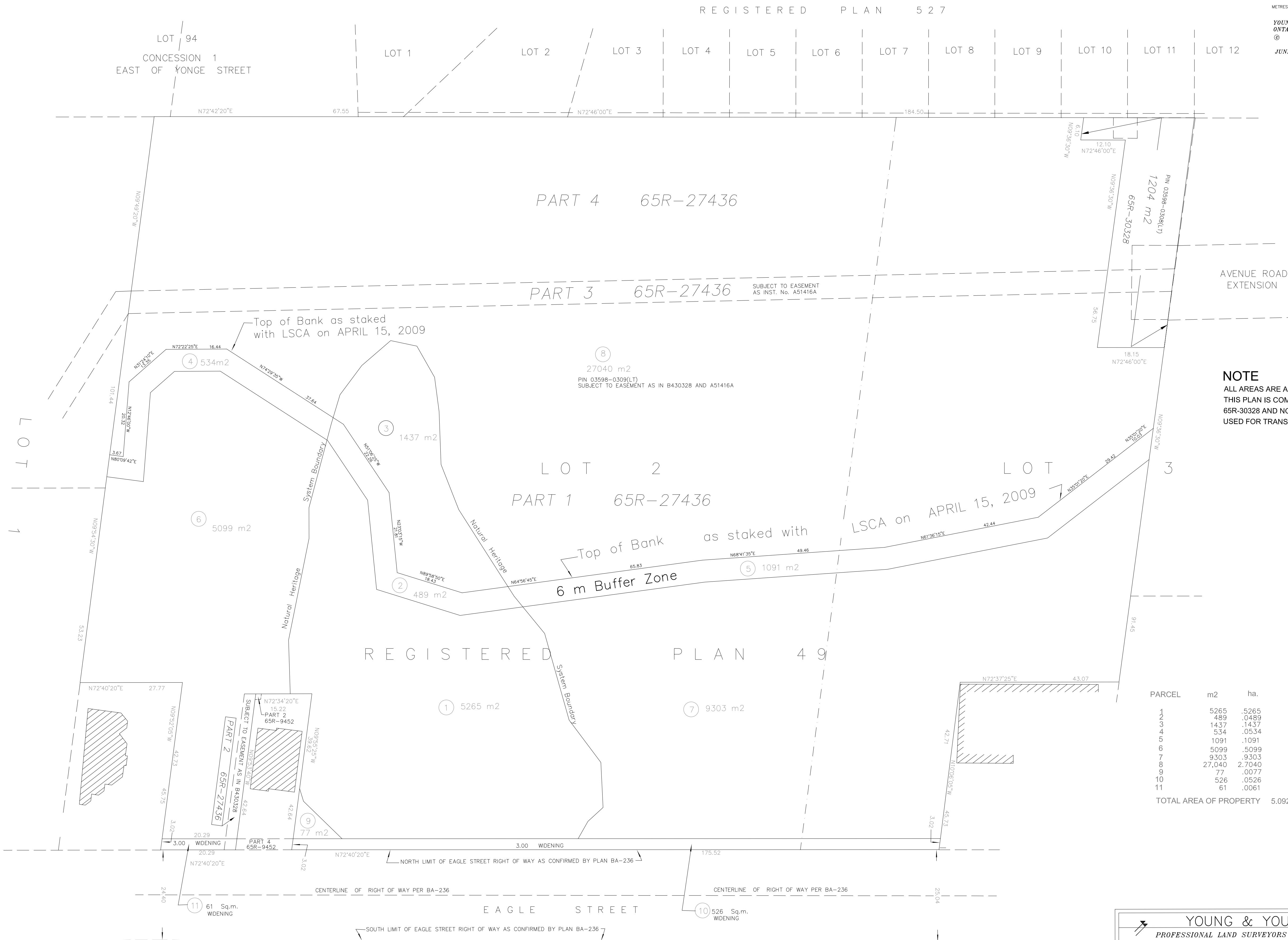
PART OF LOTS 2 AND 3
REGISTERED PLAN 49
TOWN OF NEWMARKET
REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 500

0 5 10 20 30 40 50
METRES

YOUNG & YOUNG SURVEYING INC.
ONTARIO LAND SURVEYORS
©

JUNE, 2010



REGISTERED PLAN 527
LOT 94
CONCESSION 1
EAST OF YONGE STREET
LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
N72°42'20"E
67.55
N72°46'00"E
184.50
PART 4 65R-27436
PIN 03598-0308(LT)
1204 m2
65R-30328
AVENUE ROAD EXTENSION
PART 3 65R-27436
SUBJECT TO EASEMENT AS INST. No. A51416A
Top of Bank as staked with LSCA on APRIL 15, 2009
8
27040 m2
PIN 03598-0309(LT)
SUBJECT TO EASEMENT AS IN B430328 AND A51416A
4 534m2
3 1437 m2
LOT 2
LOT 3
PART 1 65R-27436
6 5099 m2
Top of Bank as staked with LSCA on APRIL 15, 2009
5 1091 m2
2 489 m2
6 m Buffer Zone
Natural Heritage System Boundary
REGISTERED PLAN 49
1 5265 m2
7 9303 m2
PART 2 65R-27436
SUBJECT TO EASEMENT AS IN B430328
PART 2 65R-9452
PART 4 65R-9452
9 77 m2
3.00 WIDENING
NORTH LIMIT OF EAGLE STREET RIGHT OF WAY AS CONFIRMED BY PLAN BA-236
CENTERLINE OF RIGHT OF WAY PER BA-236
EAGLE STREET
11 61 Sq.m. WIDENING
10 526 Sq.m. WIDENING
SOUTH LIMIT OF EAGLE STREET RIGHT OF WAY AS CONFIRMED BY PLAN BA-236
N

NOTE

ALL AREAS ARE APPROXIMATE
THIS PLAN IS COMPILED FROM DEPOSITED PLANS 65R-27436 AND 65R-30328 AND NOT FIELD MEASUREMENTS AND SHALL NOT BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.

PARCEL	m2	ha.	ft2	Acres
1	5265	.5265	56,672	1.301
2	489	.0489	5,263	0.121
3	1437	.1437	15,467	0.355
4	534	.0534	5,747	0.132
5	1091	.1091	11,744	0.270
6	5099	.5099	54,886	1.259
7	9303	.9303	100,137	2.299
8	27,040	2.7040	291,058	6.682
9	77	.0077	829	0.019
10	526	.0526	5,662	0.130
11	61	.0061	657	0.015

TOTAL AREA OF PROPERTY 5.0922 ha. 12.583 Acres

DWG TP2

YOUNG & YOUNG SURVEYING INC.
PROFESSIONAL LAND SURVEYORS
BOLTON
2 HOLLAND DRIVE UNIT 5
BOLTON ONTARIO L7E 1E1
PHONE 951-6000 FAX 857-4811

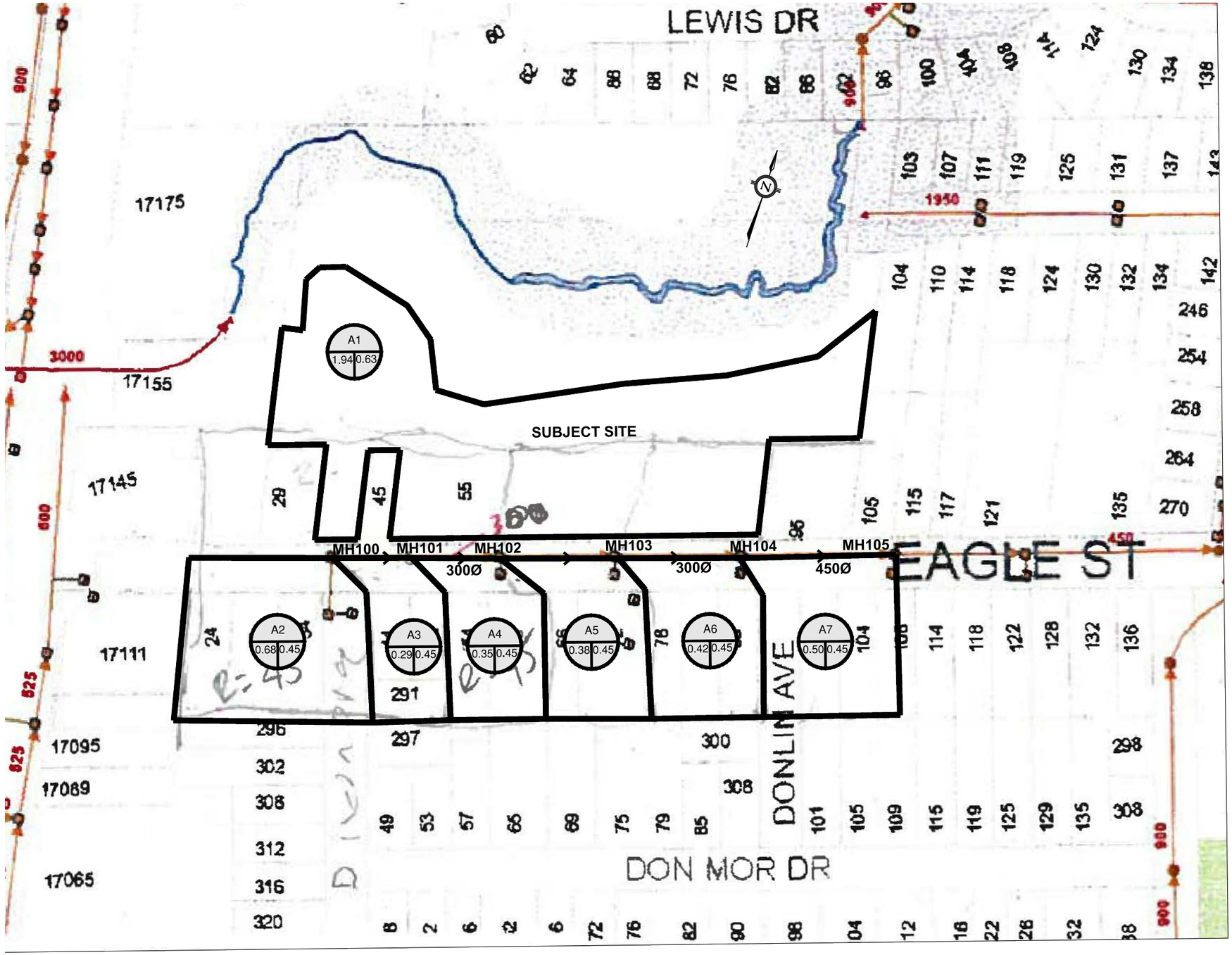
EXAMINED BY *J.F.G.Y. BSc. O.L.S.*
PARTY CHIEF
CALC BY B.C.
DRAWN BY B.C.

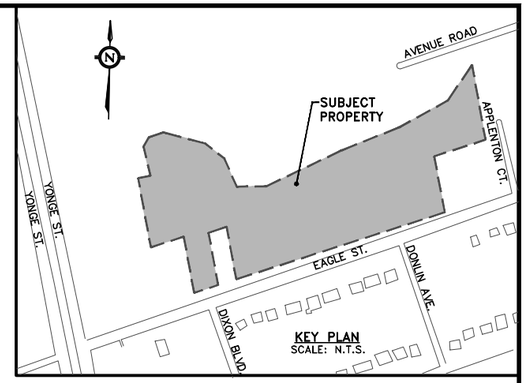
PROJECT 08-B5861

B5861/B5861-2.DWG
JANUARY 21,2011

Appendix B

Figures 2 to 8 and City drawings





LEGEND:

A4 (0.35 | 0.45) — Sub-Area No. / Run Off Coefficient

Area (ha)

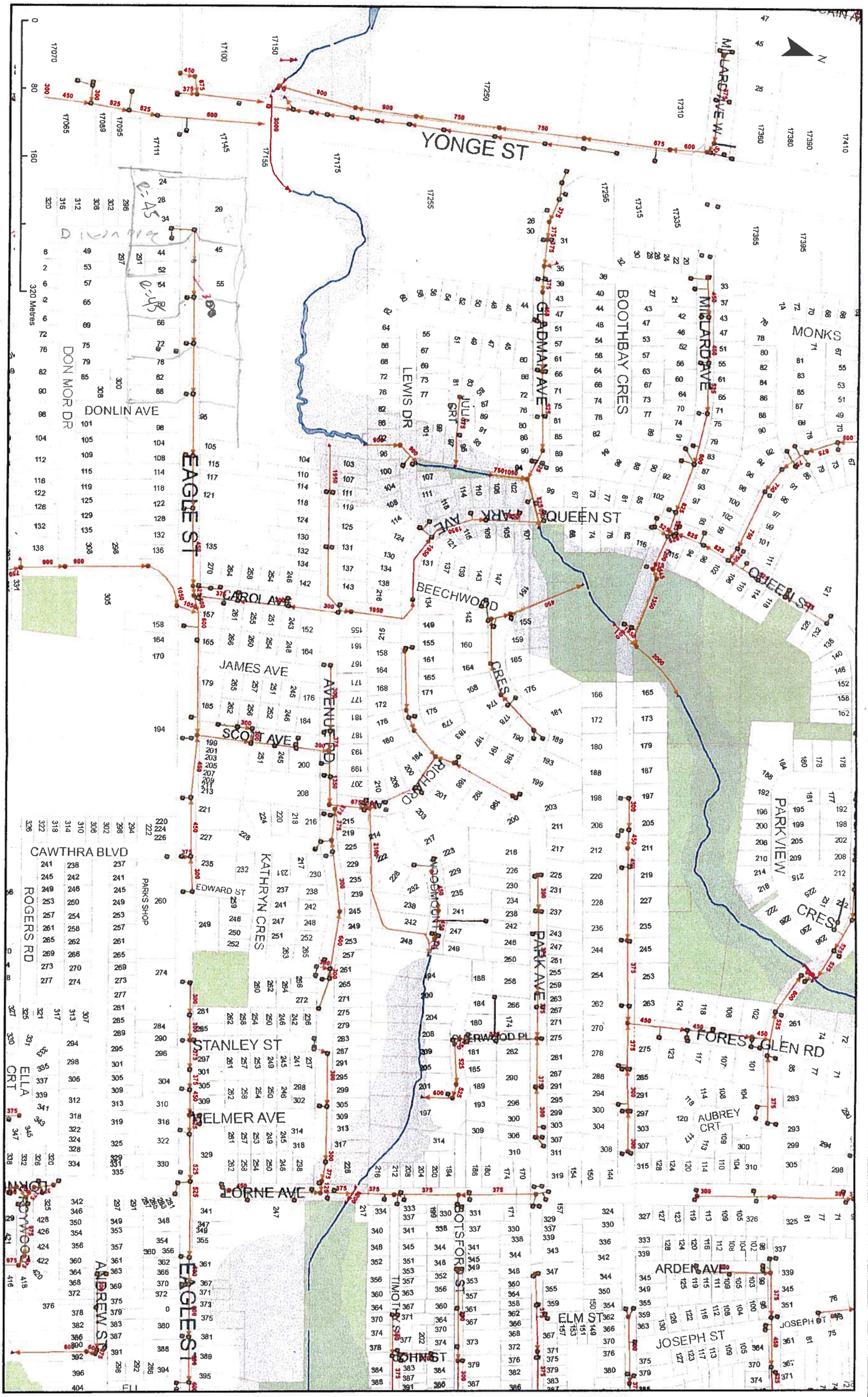
DRAINAGE AREA

MASONGSONG ASSOCIATES
7800 KENNEDY ROAD
SUITE 201
MARKHAM, ONTARIO
L3R 2C7
T: (905) 944-0162
www.maeng.ca

MILLFORD DEVELOPMENT LIMITED

PRELIMINARY STORM SEWER ASSESSMENT ON EAGLE ST.

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
AUG. 2020	N.T.S.		MAEL/CAD	99598	2

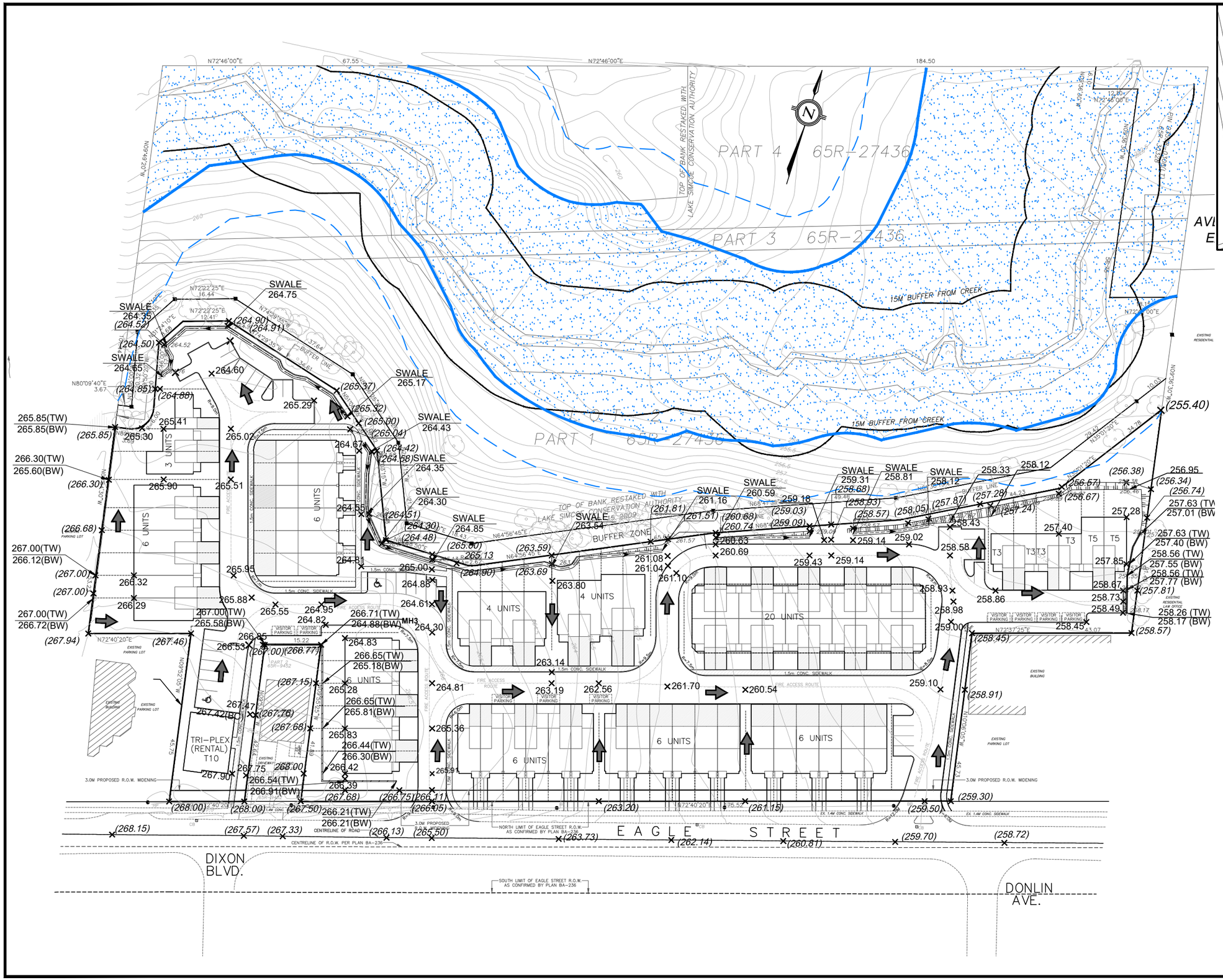


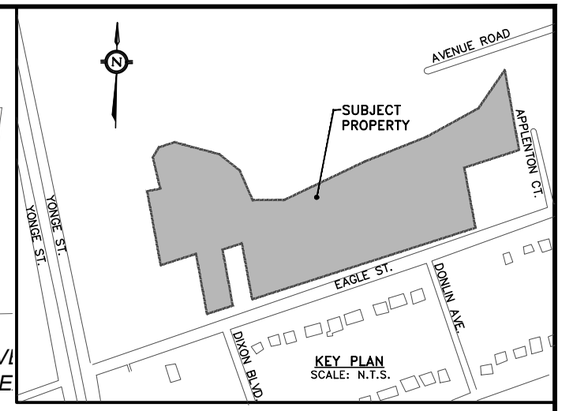
Storm Inlet
Storm Manhole
Private Inlet
Private Manhole
Gravity Sewer
Catchbasin Lead
Storm Outfall
Storm Catchbasin
Private Outfall
Private Catchbasin
Culvert
Rear Yard Catchbasin Lead
Railway
Private Sewer
Water Course
Water Body
Green Space
LSRCA Floodplain
Teranet

Operations Storm Network 2009

January 20, 2009

Jan 2009 SRVMAP01 - D:\Projects\Survey\Dwg\Catchments_Sanitary_2009.mxd





LEGEND:

- STUDY AREA
- × (175.5) EXISTING ELEVATION
- × 182.55 PROPOSED ELEVATION
- OVERLAND FLOW ROUTE
- FLOODPLAIN WITH 15m SETBACK
- FLOODPLAIN
- EX. TREE TO BE REMAIN

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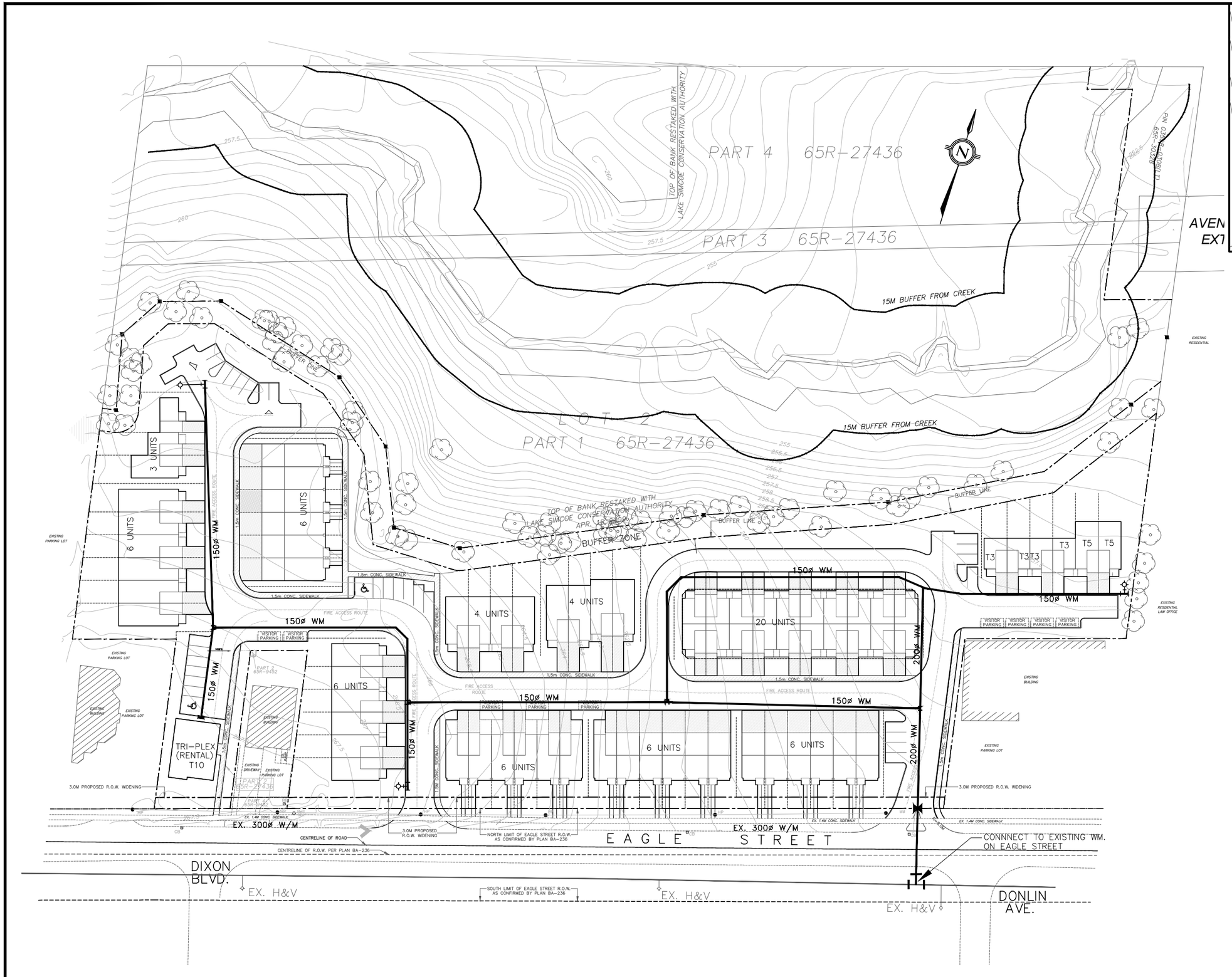
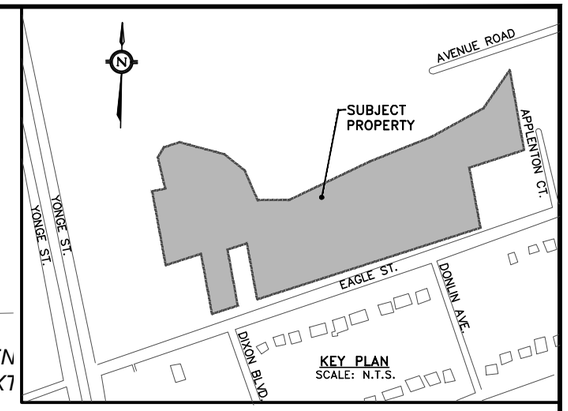
MILLFORD DEVELOPMENT LIMITED

PRELIMINARY GRADING PLAN

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	3





LEGEND:

- STUDY AREA
- PROPOSED WATERMAIN LINE
- EXISTING WATERMAIN LINE
- PROPOSED HYDRANT
- PROPOSED VALVE
- EX. TREE TO BE REMAIN

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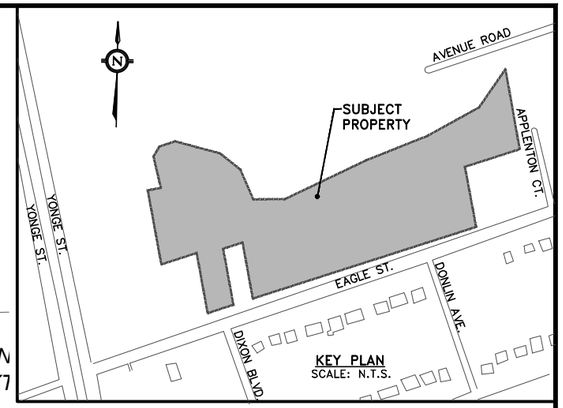
MILLFORD DEVELOPMENT LIMITED

WATERMAIN

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	4



LEGEND:

- STUDY AREA
- PROPOSED SANITARY LINE
- EXISTING SANITARY LINE
- A4 / 1.05 | 0.75 — Area (ha) / Population / Flow (L/s)
- BOUNDARY SANITARY DRAINAGE AREA
- EX. TREE TO BE REMAIN

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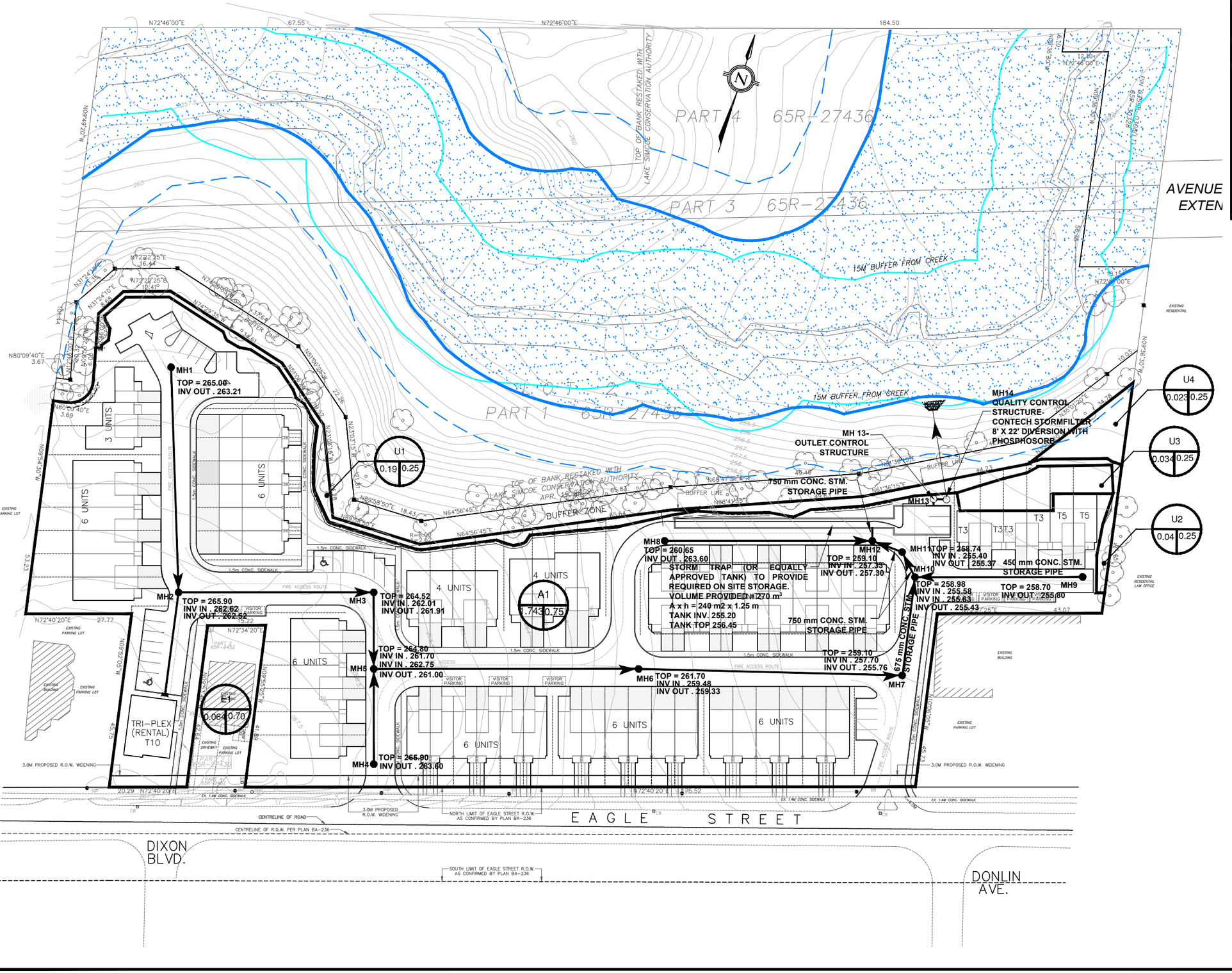
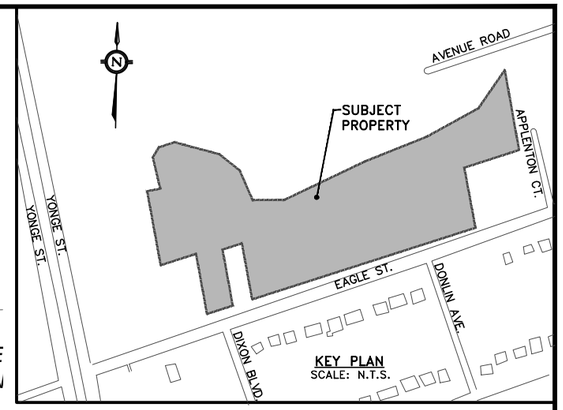
MILLFORD DEVELOPMENT LIMITED

SANITARY SEWER LAYOUT AND DRAINAGE PLAN

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	5





LEGEND:

- STUDY AREA
- PROPOSED STM LINE
- A4 | 1.05 | 0.75 — Area (ha) / Runoff coefficient / Area (ha)
- BOUNDARY STM DRAINAGE AREA
- FLOODPLAIN WITH 15m SETBACK
- FLOODPLAIN
- EX. TREE TO BE REMAIN

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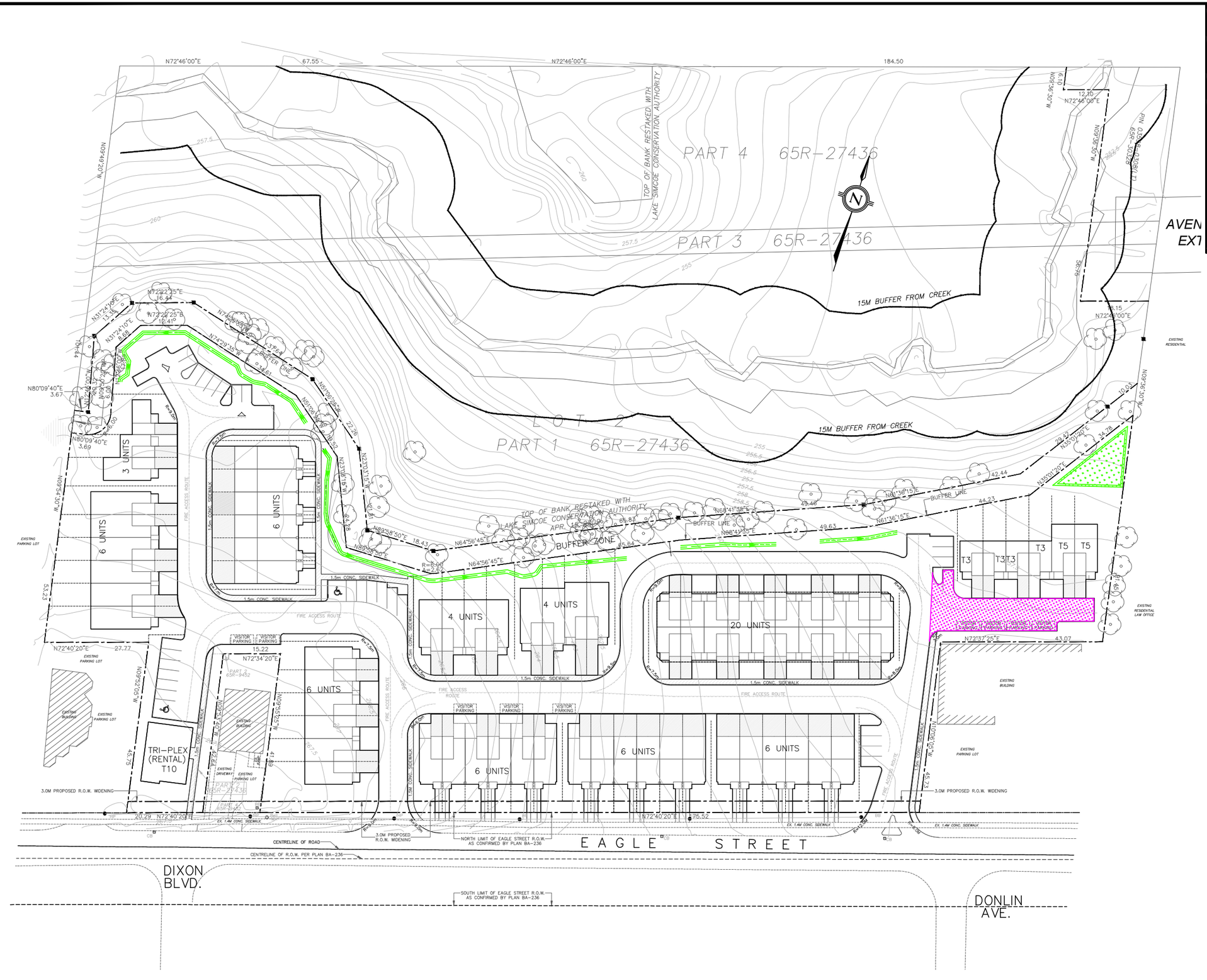
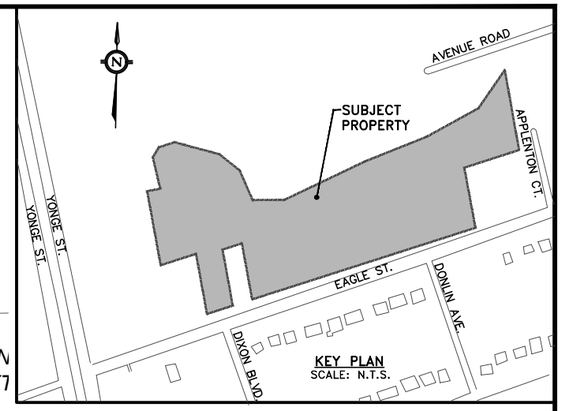
MILLFORD DEVELOPMENT LIMITED

STORM SEWER LAYOUT AND DRAINAGE PLAN

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	6





LEGEND:

- STUDY AREA
- PROP. ENHANCED SWALE
- PROP. BIORENTATION SWALE
- PROP. PAVEMENT PAVERS

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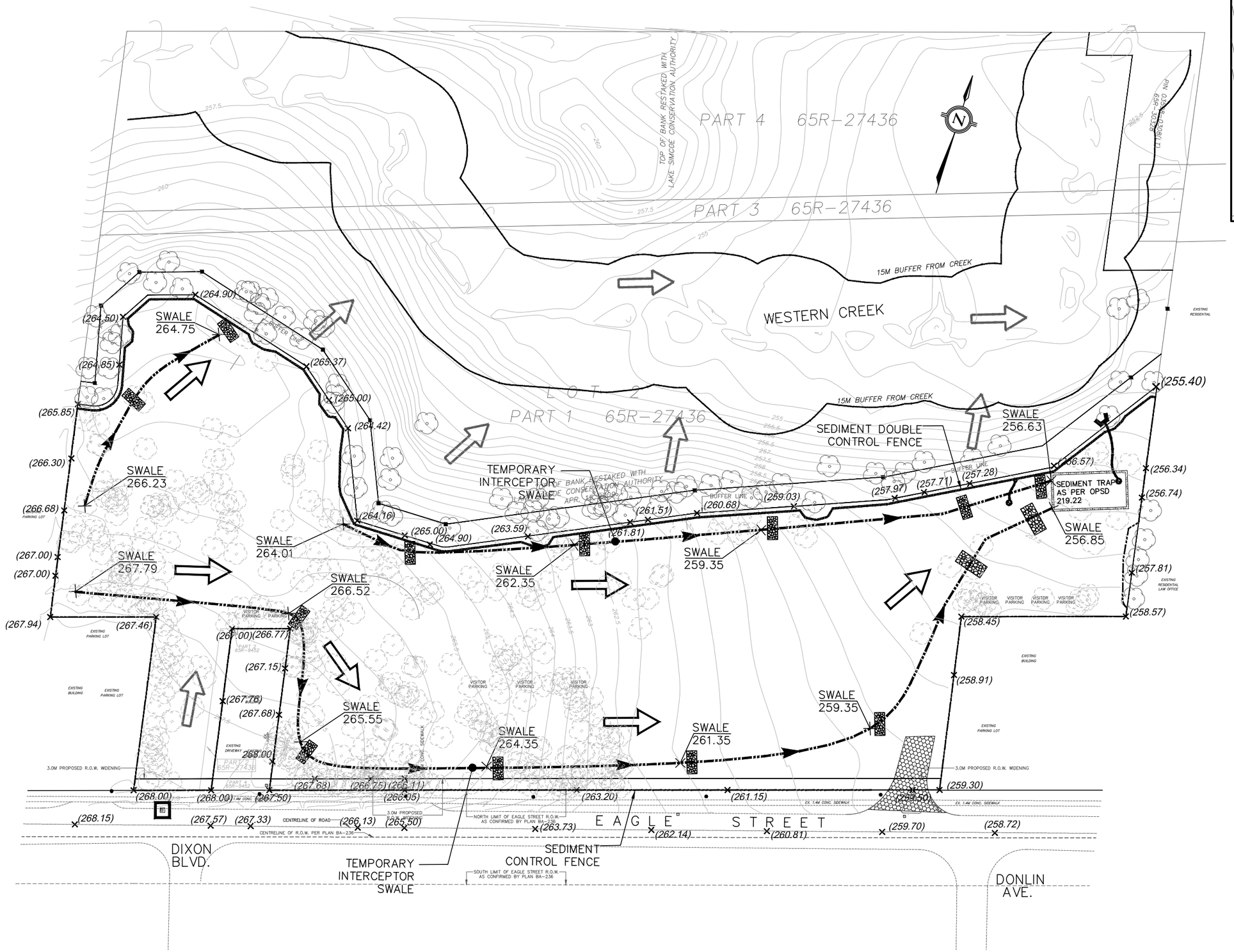
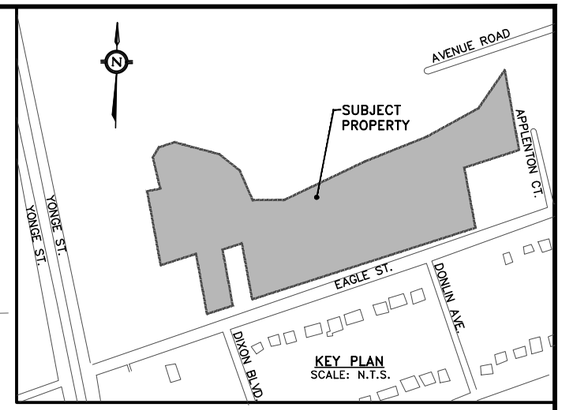
MILLFORD DEVELOPMENT LIMITED

PROPOSED LOW IMPACT DEVELOPMENT (LID)

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	7





LEGEND:

- STUDY AREA
- SEDIMENT DOUBLE CONTROL FENCE
- SEDIMENT CONTROL FENCE
- TEMPORARY GRAVEL ACCESS PAD
- TEMPORARY CATCHBASIN SEDIMENT CONTROL DEVICE
- OVERLAND FLOW ROUTE
- EXISTING OVERLAND FLOW ROUTE
- ROCK CHECK DAM
- TEMPORARY INTERCEPTOR SWALE DURING CONSTRUCTION
- DEWATERING DISCHARGE
- EX. TREE TO BE REMOVED
- EX. TREE TO BE REMAIN

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SUITE 201
MARKHAM, ONTARIO
L3R 2C7
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www.maeng.ca

MILLFORD DEVELOPMENT LIMITED

PRELIMINARY SEDIMENT & EROSION CONTROL PLAN

DATE:	SCALE	DESIGN BY:	DRAWN BY:	PROJECT No.	FIGURE
MAR. 2021	N.T.S.		MAEL/CAD	99598	8

Appendix C

Design sheet, Waterman Tables, preliminary sizing of OGS

Table 3.3.1. Nodal Demand Summary

Millford Developments - Eagle Street
Town of Newmarket
Fire demand = 10,000L/min for estate residential.

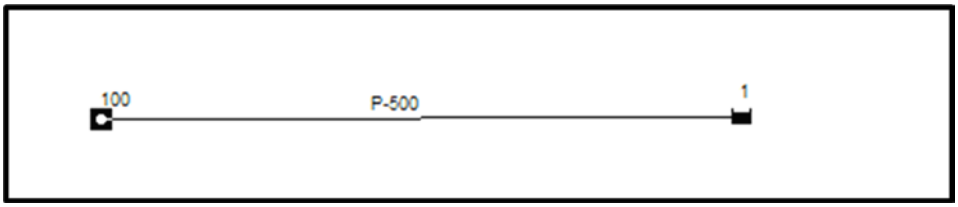
Node	Elev	No. Of Units	Density Factor	Demand Units	Demand Pop	Demand Flow (300L/capita/day)	Min Hour	Max Day	Max Hour
					2.88 ppu towhouse				
			1		*1.95 ppu triple/*	*L/s*	*0.70*	*2.00*	*3.00*
100		73.00	1	73.00	210.00	0.729	0.510	1.46	2.188
		1.00	1	3	5.900	0.020	0.014	0.041	0.061
Total						0.750	0.525	1.499	2.249

Elevation	259.50		10,000 L/min	166.667
Pressure	58.00	psi	40.85 m	
Total Head			300.35 m	

Fire demand and max day (L/s) 168.17

			Analysis Results		Newmarket Design Criteria	Type of Scenarios
Pressure	29.28	m	287.07	kPA	140 kPA min	Peak Daily Flow Plus Fire Scenario
(Node 100)			20.59	psi	20 psi	
Pressure	40.87	m	400.70	kPA	550 kPA max	Minimum Hourly Demand Scenario
(Node 100)			28.74	psi	80 psi	
Pressure	40.88	m	400.79	kPA	345kPA min	Peak Hourly Demand Scenario
(Node 100)			28.75	psi	50 psi	

Scheme WaterMain



```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.0                           *
******************************************************************

Input File: 99598MAXDAY-FIRE.net
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P-500	1	100	27	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
100	168.17	278.74	29.28	0.00	
1	-168.17	300.35	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
P-500	168.17	9.52	800.53	Open

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.0                            *
******************************************************************

Input File: 99598MAXHOUR.net


Link - Node Table:
------------------------------------------------------------------
Link           Start          End                Length  Diameter
ID             Node           Node                    m        mm
------------------------------------------------------------------
P-100          1              100                    27       150

Node Results:
------------------------------------------------------------------
Node                Demand      Head  Pressure   Quality
ID                     LPS         m         m
------------------------------------------------------------------
100                   2.25    300.34     40.87      0.00
1                    -2.25    300.35      0.00      0.00 Reservoir

Link Results:
------------------------------------------------------------------
Link                  Flow  VelocityUnit Headloss    Status
ID                     LPS       m/s      m/km
------------------------------------------------------------------
P-100                 2.25      0.13      0.27      Open
```

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.0                            *
******************************************************************

Input File: 99598MinHOUR.net
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P-100	1	100	27	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
100	0.53	300.35	40.88	0.00	
1	-0.53	300.35	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
P-100	0.53	0.03	0.02	Open

TABLE B1

TOWN OF NEWMARKET
ENGINEERING DEPARTMENT

Design Return Period = 5Yrs, n=0.013

SHEET NO:	1
JOB NO:	1999-598
DATE:	Aug-20
CONSULTANT	**MASONGSONG ASSOCIATES ENGINEERING LTD.**
TOWN FILE NO.:	

IDF parameters
A= 2464
B= 16
C= 1

LOCATION			RUNOFF				tc	Rainfall Intensity	Cumm Flow Q_5	STORM SEWER DESIGN INFORMATION			Full Capacity	Full Velocity	Qact/Qcap	Time (Entry 10 min)	
STREET NAME	MANHOLES FROM	MANHOLES TO	A area (ha)	C runoff coeff.	A x C	ACC. A x C	(min)	I (mm/hr)	AxCxCrxI (L/s)	size (mm)	slope (%)	length (m)	Q full (l/s)	V full (m/s)	SECT. x100%	Sect. (min)	Accum (min)
			0.68	0.45	0.31												
EAGLE STREET	MH100	MH101	0.29	0.45	0.13	0.44	0.51	94.77	114.91	300	4.26	86.0	199.57	2.82	0.58	0.51	10.00
EAGLE STREET	MH101	MH102	0.35	0.45	0.16	0.59	0.25	92.95	153.37	300	4.26	42.0	199.57	2.82	0.77	0.25	10.51
EAGLE STREET	MH102	MH103	0.38	0.45	0.17	0.77	0.33	92.09	195.70	300	4.24	56.0	199.10	2.82	0.98	0.33	10.76
EAGLE STREET	MH103	MH104	0.42	0.45	0.19	0.95	0.32	90.97	241.06	300	4.86	58.0	213.16	3.02	1.13	0.32	11.09
Subjet Site			**2.03**	0.63	1.28	1.28			128.00								
EAGLE STREET	MH104	MH105	0.50	0.45	0.23	1.18	0.38	89.90	422.43	450	3.30	74.0	517.88	3.26	0.82	0.38	11.41

Table 5.2.2

On-Site Storage Calculator

Project: Residential Development

Project No.: 99-598

By: IS

Date: 19-Feb-21

Town of Nemarket 2-Year

Location: **Eagle street between Dixon Blvd abd Donlin Ave.**

A =	2.0300	ha	
Composite C =	0.6800		$i_2 = 648*(T+4)^{-0.784}$
$i_{2\ (Allowable)}$ =	81.85	mm/hr	C=0.25
$Q_{Allowable}$ =	0.1154	m^3/s	
Q_{Actual} =	0.0990	m^3/s	

t_c (min)	(mm/hr)	Q_2 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	183.477	0.704	0.605	36.272	
2	159.039	0.610	0.511	61.299	
3	140.935	0.540	0.441	79.453	
4	126.927	0.487	0.388	93.046	
5	115.731	0.444	0.345	103.429	
6	106.555	0.409	0.310	111.449	
7	98.883	0.379	0.280	117.668	
8	92.363	0.354	0.255	122.477	
9	86.745	0.333	0.234	126.154	
10	81.848	0.314	0.215	128.906	
11	77.539	0.297	0.198	130.890	
12	73.713	0.283	0.184	132.227	
13	70.292	0.270	0.171	133.013	
14	67.211	0.258	0.159	133.323	***
15	64.422	0.247	0.148	133.219	
16	61.882	0.237	0.138	132.753	
17	59.560	0.228	0.129	131.967	
18	57.427	0.220	0.121	130.896	
19	55.460	0.213	0.114	129.571	
20	53.640	0.206	0.107	128.016	
21	51.951	0.199	0.100	126.254	
22	50.377	0.193	0.094	124.304	
23	48.909	0.188	0.089	122.182	
24	47.534	0.182	0.083	119.903	
25	46.244	0.177	0.078	117.480	
26	45.031	0.173	0.074	114.924	
27	43.888	0.168	0.069	112.245	
28	42.809	0.164	0.065	109.451	
29	41.789	0.160	0.061	106.552	

Table 5.2.3

On-Site Storage Calculator

Project: Residential Development
Project No.: 99-598
By: IS
Date: 19-Feb-21

Town of Nemarket 5-Year

Location: **Eagle street between Dixon Blvd abd Donlin Ave.**

A =	2.0300	ha	
$Composite\ C$ =	0.6800		$i_5 = 930*(T+4)^{-0.798}$
$i5_{(Allowable)}$ =	113.21	mm/hr	C=0.25
$Q_{Allowable}$ =	0.1596	m^3/s	
Q_{Actual} =	0.1370	m^3/s	

t_c (min)	(mm/hr)	Q_5 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	257.457	0.987	0.850	51.012	
2	222.596	0.854	0.717	85.984	
3	196.832	0.755	0.618	111.193	
4	176.936	0.678	0.541	129.949	
5	161.064	0.618	0.481	144.177	
6	148.075	0.568	0.431	155.083	
7	137.231	0.526	0.389	163.466	
8	128.025	0.491	0.354	169.875	
9	120.104	0.461	0.324	174.707	
10	113.207	0.434	0.297	178.251	
11	107.143	0.411	0.274	180.729	
12	101.764	0.390	0.253	182.311	
13	96.958	0.372	0.235	183.129	
14	92.635	0.355	0.218	183.291	***
15	88.723	0.340	0.203	182.884	
16	85.165	0.327	0.190	181.978	
17	81.913	0.314	0.177	180.632	
18	78.928	0.303	0.166	178.896	
19	76.177	0.292	0.155	176.810	
20	73.633	0.282	0.145	174.411	
21	71.273	0.273	0.136	171.730	
22	69.077	0.265	0.128	168.792	
23	67.028	0.257	0.120	165.620	
24	65.110	0.250	0.113	162.234	
25	63.312	0.243	0.106	158.652	
26	61.623	0.236	0.099	154.890	
27	60.031	0.230	0.093	150.961	
28	58.529	0.224	0.087	146.878	
29	57.110	0.219	0.082	142.651	

Table 5.2.4

On-Site Storage Calculator

Calculator

Town of Nemarket 25-Year

Project: Residential Development

Project No.: 99-598

By: IS

Date: 19-Feb-21

Location: **Eagle street between Dixon Blvd abd Donlin Ave.**

A =	2.0300	ha		
Composite C =	0.7480		$i_{25} = 1100 * (T+2.0)^{-0.776}$	
$i_{25\ (Allowable)}$ =	159.94	mm/hr	C=0.25	
$Q_{Allowable}$ =	0.2255	m^3/s	The proposed runoff coefiicent has been	
Q_{Actual} =	0.1930	m^3/s	increased as per MTO Design Chart 1.07	

t_c (min)	(mm/hr)	Q_{25} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	468.972	1.978	1.785	107.104	
2	375.141	1.582	1.389	166.716	
3	315.495	1.331	1.138	204.790	
4	273.872	1.155	0.962	230.919	
5	242.995	1.025	0.832	249.577	
6	219.076	0.924	0.731	263.174	
7	199.940	0.843	0.650	273.137	
8	184.244	0.777	0.584	280.377	
9	171.109	0.722	0.529	285.507	
10	159.937	0.675	0.482	288.957	
11	150.305	0.634	0.441	291.039	
12	141.905	0.599	0.406	291.988	***
13	134.507	0.567	0.374	291.983	
14	127.937	0.540	0.347	291.164	
15	122.057	0.515	0.322	289.642	
16	116.762	0.492	0.299	287.509	
17	111.964	0.472	0.279	284.838	
18	107.595	0.454	0.261	281.691	
19	103.598	0.437	0.244	278.119	
20	99.925	0.421	0.228	274.165	
21	96.537	0.407	0.214	269.867	
22	93.400	0.394	0.201	265.257	
23	90.488	0.382	0.189	260.363	
24	87.776	0.370	0.177	255.207	
25	85.242	0.360	0.167	249.813	
26	82.870	0.350	0.157	244.198	
27	80.644	0.340	0.147	238.379	
28	78.550	0.331	0.138	232.370	
29	76.577	0.323	0.130	226.185	

Table 5.2.5

On-Site Storage Calculator

Project: Residential Development

Project No.: 99-598

By: IS

Date: 19-Feb-21

Town of Nemarket 50-Year

Location: **Eagle street between Dixon Blvd abd Donlin Ave.**

A =	2.0300	ha	
Composite C =	0.8160		$i_{50} = 1488 * (T+3.0)^{-0.803}$
$i_{50\ (Allowable)}$ =	0.23	mm/hr	C=0.25
$Q_{Allowable}$ =	0.0003	m^3/s	The proposed runoff coefiicent has been
Q_{Actual} =	0.2674	m^3/s	increased as per MTO Design Chart 1.07

t_c (min)	(mm/hr)	Q_{50} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	488.820	2.249	1.982	118.909	
2	408.630	1.880	1.613	193.541	
3	352.978	1.624	1.357	244.218	
4	311.881	1.435	1.168	280.241	
5	280.170	1.289	1.022	306.527	
6	254.886	1.173	0.905	325.950	
7	234.209	1.078	0.810	340.314	
8	216.952	0.998	0.731	350.818	
9	202.311	0.931	0.664	358.291	
10	189.717	0.873	0.606	363.331	
11	178.757	0.823	0.555	366.378	
12	169.123	0.778	0.511	367.768	***
13	160.581	0.739	0.471	367.760	
14	152.951	0.704	0.436	366.558	
15	146.090	0.672	0.405	364.326	
16	139.883	0.644	0.376	361.197	
17	134.238	0.618	0.350	357.280	
18	129.081	0.594	0.327	352.666	
19	124.348	0.572	0.305	347.432	
20	119.987	0.552	0.285	341.642	
21	115.956	0.534	0.266	335.352	
22	112.217	0.516	0.249	328.609	
23	108.737	0.500	0.233	321.454	
24	105.492	0.485	0.218	313.923	
25	102.455	0.471	0.204	306.047	
26	99.609	0.458	0.191	297.855	
27	96.934	0.446	0.179	289.371	
28	94.415	0.434	0.167	280.616	
29	92.038	0.423	0.156	271.610	

Table 5.2.6

On-Site Storage Calculator

Town of Nemarket 100-Year

Project: Residential Development
Project No.: 99-598
By: IS
Date: 19-Feb-21

Location: **Eagle street between Dixon Blvd abd Donlin Ave.**

A =	2.0300	ha		
Composite C =	0.8500		i_{100} =1770* (T+4.0) $^{-0.82}$	
$i_{100\ (Allowable)}$ =	203.31	mm/hr	C=0.25	
$Q_{Allowable}$ =	0.2866	m^3/s	The proposed runoff coefiicent has been	
Q_{Actual} =	0.2460	m^3/s	increased as per MTO Design Chart 1.07	

t_c (min)	(mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	472.953	2.267	2.021	121.253	
2	407.276	1.952	1.706	204.732	
3	358.916	1.720	1.474	265.375	
4	321.691	1.542	1.296	311.012	
5	292.075	1.400	1.154	346.180	
6	267.900	1.284	1.038	373.702	
7	247.760	1.188	0.942	395.442	
8	230.698	1.106	0.860	412.680	
9	216.043	1.036	0.790	426.333	
10	203.305	0.974	0.728	437.072	
11	192.123	0.921	0.675	445.404	
12	182.220	0.873	0.627	451.720	
13	173.382	0.831	0.585	456.325	
14	165.444	0.793	0.547	459.463	
15	158.269	0.759	0.513	461.332	
16	151.750	0.727	0.481	462.092	***
17	145.799	0.699	0.453	461.877	
18	140.342	0.673	0.427	460.799	
19	135.318	0.649	0.403	458.950	
20	130.677	0.626	0.380	456.412	
21	126.375	0.606	0.360	453.252	
22	122.376	0.587	0.341	449.531	
23	118.647	0.569	0.323	445.297	
24	115.161	0.552	0.306	440.598	
25	111.894	0.536	0.290	435.471	
26	108.826	0.522	0.276	429.952	
27	105.939	0.508	0.262	424.071	
28	103.217	0.495	0.249	417.856	
29	100.645	0.482	0.236	411.330	

Determining Number of Cartridges for Flow Based Systems

Date **8/13/2020** **Black Cells = Calculation**

Site Information

Project Name	**Eagle Street Residential Development**		
Project Location	**Newmarket, ON**		
OGS ID	**Stormfilter**		
Drainage Area, Ad	**5.01**	ac	(2.03 ha)
Impervious Area, Ai	**3.46**	ac	
Pervious Area, Ap	**1.55**		
% Impervious	**69%**		
Runoff Coefficient, Rc	**0.70**		
Treatment storm flow rate, Q_{treat}	**1.81**	cfs	(51.2 L/s)
Peak storm flow rate, Q_{peak}	**8.72**	cfs	(247 L/s)

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**27**	in
Specific Flow Rate	**1.67**	gpm/ft²
Flow rate per cartridge	**18.79**	gpm

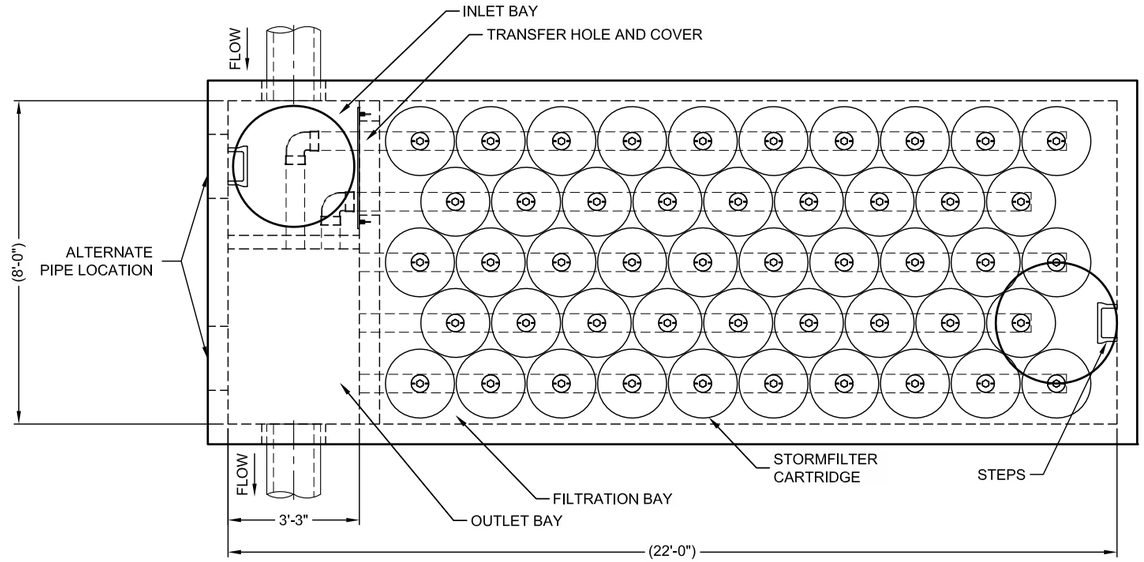
SUMMARY

Number of Cartridges	44
Media Type	Perlite

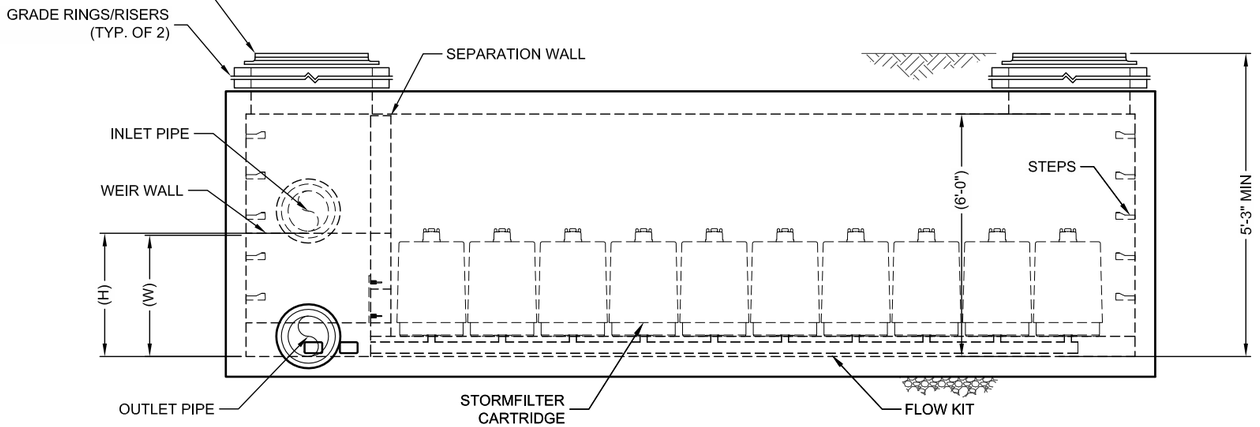
Event Mean Concentration (EMC)	**120**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend SFPD 0822

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN VIEW

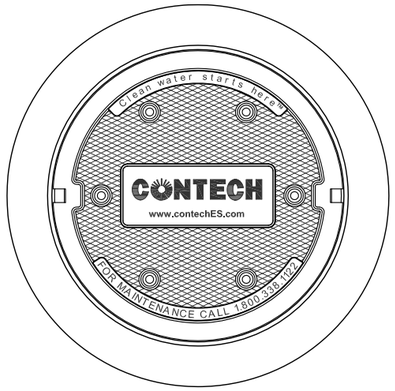


ELEVATION

STORMFILTER DESIGN TABLE

- THE 8' x 22' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**.
SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 22' PEAK DIVERSION STORMFILTER STANDARD DETAIL

The Stormwater Management StormFilter® with PhosphoSorb® Media

Performance Evaluation Study

Phosphorus is a common cause of impairment in freshwater bodies throughout the United States. In urban watersheds, loads contributed by stormwater runoff can be a dominant source, As a result, phosphorus removal requirements are increasingly common and innovative phosphorus removal technologies are needed that can be integrated into an urban environment. Phosphosorb® (PhosphoSorb) is a proprietary phosphorus removal media comprised of a perlite base with activated alumina coating developed by Contech Engineered Solutions LLC (Contech) for use in media filtration systems.

A Stormwater Management StormFilter® (StormFilter) using PhosphoSorb media was evaluated for the removal of sediment and phosphorus over a 17 month period starting in February 2012. During this period a total of 19 qualified storm events were sampled according to a Quality Assurance Project Plan (Contech, 2012) designed to conform to the requirements given in Guidance for Evaluating Emerging Stormwater Treatment Technologies, Technology Assessment Protocol – Ecology (TAPE) (Ecology, 2011). The stormwater treatment system tested during this evaluation is a StormFilter containing one 18-inch tall StormFilter cartridge with PhosphoSorb media operating at a specific flow rate of 1.67 gpm/ft2 or 12.5 gpm per cartridge (for an 18-inch cartridge).

The evaluation site is located on Lolo Pass Road at Bear Creek Bridge in ZigZag, Oregon. The 0.063 acre contributing drainage area upstream of the StormFilter catchment is 100% impervious and includes the bridge deck and adjacent roadway. Time of concentration (t_c) on the site is estimated to be 1.4 minutes. A photo of the drainage area can be seen in Figure 1.

Figure 1. View of the drainage area of the StormFilter evaluation site located on Lolo Pass Road, ZigZag, Oregon.

Individual volume-paced influent and effluent samples were collected over the course of each qualified storm event using individual ISCO 6712 Portable Automated Samplers. Influent and effluent flows were measured using Large 60°V Trapezoidal Flumes in conjunction with individual ISCO 730 Bubbler Flow Modules. At the conclusion of each qualified runoff event, individual influent and effluent samples were combined to create influent and effluent bulk composite samples. Event Mean Concentration (EMC) subsamples were then taken from the bulk composite sample and submitted to Apex Laboratories, LLC in Beaverton, Oregon for analysis.

All 19 events had detectable influent concentrations for total phosphorus (TP), total suspended solids (SSC), and suspended solids concentration (SSC). Significant reductions in TP, TSS and SSC pollutant loads were observed between influent and effluent sampling locations. Performance was calculated using two different methods, the Efficiency Ratio (ER) method and the Summation of Loads (SOL) efficiency calculation method. The ER method defines the efficiency as the average event mean concentration of pollutants over a given time period.

$$ER = 1 - \frac{mean\ effluent\ EMC}{mean\ influent\ EMC}$$

The ER method assumes; 1) The weight of all storm events is equal regardless of the relative magnitude of the storm event and 2) that if all storm events at the site had been monitored, the average inlet and outlet EMCs would be similar to those that were monitored (URS/ EPA 1999). A summary of ER performance data for TP, TSS and SSC for the 19 sampled events is presented in Table 1.

Table 1. Performance summary and Efficiency Ratios (ER) for the StormFilter with PhosphoSorb media for the 19 events sampled to date at the Lolo Pass Road evaluation site.

Parameter	TSS (mg/L)		SSC (mg/L)		Total Phosphorus (mg/L)	
Analytical Method	SM 2540D		ASTM D3977		SM 4500PF	
Sample Location	Influent	Effluent	Influent	Effluent	Influent	Effluent
Min	40.0	6.00	46.0	7.59	0.068	0.0043
Max	780	120	1000	120	0.583	0.140
Median	360	27.0	404	25.7	0.170	0.0498
Mean	340	34.2	435	35.8	0.231	0.0580
Efficiency Ratio	**90%**		**92%**		**75%**	

The SOL method defines the efficiency as a percentage based on the ratio of the summation of all influent loads to the summation of all effluent loads.

$$SOL = 1 - \frac{sum\ of\ all\ effluent\ loads}{sum\ of\ all\ influent\ loads}$$

The SOL method assumes; 1) monitoring data accurately represents the actual entire total loads in and out of the BMP for a period long enough to overshadow any temporary storage or export of pollutants and 2) any significant storm events that were not monitored had a ratio of inlet to effluent loads similar to the storms events that were monitored (URS/ EPA 1999). SOL efficiency results for TP, TSS and SSC for the 19 sampled events is presented in Table 2.

Table 2. Summation of Loads (SOL) efficiency calculations for the StormFilter with PhosphoSorb media for the 19 events sampled to date at the Lolo Pass Road evaluation site.

Parameter	TSS (g)		SSC (g)		Total Phosphorus (mg)	
Analytical Method	SM 2540D		ASTM D3977		SM 4500PF	
Sample Location	Influent	Effluent	Influent	Effluent	Influent	Effluent
Total	43352	3577	54426	3691	33643	7228
SOL Efficiency	**92%**		**93%**		**79%**	

Particle size distribution information collected during sampled events confirms that the influent solids have a silt loam distribution which is typical for the Pacific Northwest and is comparable to other field evaluation studies. pH was also measured for all storm events using EPA Method 105.1. Median influent and effluent EMCs were 6.7 and 6.6 respectively.

Although testing is ongoing through the remainder of the 2013-2014 rain season, the 19 TAPE qualified events sampled to date provide a robust data set suitable for characterizing PhosphoSorb media performance. Data suggests that PhosphoSorb media can provide significant solids load reduction for both TSS and SSC as well as total phosphorus load reductions at or above levels dictated by stormwater permitting requirements and TMDL compliance plans.

References

Contech Engineered Solutions LLC. (Contech). (2012) Quality Assurance Project Plan: The Stormwater Management StormFilter, PhosphoSorb at a Specific Flow Rate 1.637 gpm/ft2 Performance Evaluation. Portland, Oregon. (Revised September 2013).

URS Greiner Woodward Clyde, Urban Drainage and Flood Control District, Urban Water Resources Research Council (UWRRC) of ASCE, Office of Water, US Environmental Protection Agency (URS/EPA) (1999). Development of Performance Measures Task 3.1 – Technical Memorandum Determining Urban Stormwater Best Management Practice (BMP) Removal Efficiencies. Washington, D.C.

Washington State Department of Ecology (Ecology). (2011). Guidance for Evaluating Emerging Stormwater Treatment Technologies: Technology Assessment Protocol – Ecology (TAPE). Olympia, Washington.

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 2.0 Release Update
Update Date: 30-Mar-12

Project DEVELOPMENT Summary

DEVELOPMENT: Residential Development Eagle Street . Town of Newmarket
Subwatershed: East Holland

Total Pre-Development Area (ha):	2.03	Total Pre-Development Phosphorus Load (kg/yr):	0.26

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Low Intensity Development	2.03	0.13	0.26

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency		P Load (kg/yr)
Low Intensity Development	2.03	0.13	Other	80%	0.05

		P Load (kg/yr)
Post-Development Area Altered:	2.03	
Total Pre-Development Area:	2.03	
Unaffected Area:	0	
Pre-Development:		0.26
Post-Development:		0.26
Change (Pre - Post):		0.00
		0% Net Increase in Load
Post-Development (with BMPs):		0.05
Change (Pre - Post):		0.21
		80% Net Reduction in Load

DEVELOPMENT: **Residential Development Eagle Street . Town of Newmarket**
Subwatershed: **East Holland**

CONSTRUCTION PHASE LOAD

Site-Specific Input:		Constant / Lookup:	
		Calculation:	

Sub Area: **Townhouses**

Duration of Construction (months):		R (rainfall / runoff for Lake Simcoe)	90
Duration of Exposed Soil (months):		K (soil erodability factor):	0.26
Surface Slope Gradient (%):		NN (determined by slope):	
Length of Slope (m):		BMP prevention Efficiency:	
Slope Area (ha):	2.03	BMP capture Efficiency:	
% slope erosion prevention applied to:		LS (slope length gradient factor):	
% slope runoff capture applied to:		C (portion of year of exposed soil):	
Subwatershed Soil [P] (kg/kg):		P (prevention + capture):	
		Soil Loss (kg/year):	
		Phosphorus Load (kg):	

Developed AREA (ha): 2.02999997139

	Total
Construction Phase Phosphorus Load with BMPs (kg):	
Construction Phase Phosphorus Load no BMPs (kg):	

SUMMARY WITH IMPLEMENTATION OF BMPs	**P Load (kg/yr)**
Pre-Development:	**0.26**
Construction Phase Amortized Over 8 Years :	
Post-Development:	**0.05**
Post-Development + Amortized Construction:	
Pre-Development Load - Post-Development Load:	**0.21**
Conclusion:	**80% Reduction in Load**
Pre-Development Load - (Post-Development + Amortized Construction Load):	
Conclusion:	**% Reduction in Load**

Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:

Approve development as site specific appropriate.

Appendix D

Geotechnical Letter of Opinion, dated September 2020, prepared by Soil Engineers Ltd.
Historical documents for western sanitary subtrunk

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

September 25, 2020

Millford Development Limited
P.O. Box 215
Newmarket, Ontario
L3Y 4X1

Attention: Mr. Frank Orsi

Re: Geotechnical Letter of Opinion
Proposed Townhouse Development
55 Eagle Street
Town of Newmarket

Dear Sir:

Further to your request, we have reviewed the Functional Servicing and Stormwater Management Report (FSR) prepared by Masongsong Associates Engineering Limited together with the geotechnical investigation report, Reference No. 0409-S004 and offer the following opinion.

The geotechnical report revealed that beneath a topsoil/topsoil fill veneer or topsoil and earth fill layers, the site is underlain predominantly by strata of sandy silt till and silty clay. In places, strata of silty sand till, fine to coarse sand, silt or sandy silt and silty clay till were encountered. Groundwater was detected at depths ranging from 5.5 to 7.9 m from the ground surface.

A valley bank slope of a creek is located north of the property. Through a slope stability study, it was determined that the LSRCA staked top of bank can be considered the Long-Term Stable Top of Bank (LTSTOB) incorporating both the stable slope allowance and toe erosion allowance. A development setback of 6.0 m from the LTSTOB was recommended, which formed the development limit of the project.

A review of the FSR and associated engineering drawings show that all the elements of the proposed development fall behind the development limit except for a storm outlet which runs down to the creek at the northeast sector of the property. It is understood that this outlet will be properly designed during the design stage of the project.

The proposed townhouses typically would be founded on shallow spread and strip footings. The revealed native soil below the topsoil and earth fill is suitable for supporting the house footings. The existing earth fill can be upgraded to or replaced with engineered fill for foundation support.

A stormwater storage tank will be constructed near the northeast area of the development with the bottom of tank elevation at 255.20 m. Since the tank will be sitting at almost the same elevation as the bottom of the slope, it will not have any negative impact to the stability of the slope.

A grassed swale is proposed to run along the inside of the northern development limit. It is design to drain in a west and east direction. Provided that it does not channel the surface runoff to drain directly over the slope to the north, it should not have any negative impact to the stability of the slope.

Based on the above, it is our opinion that the proposed townhouse development as presented in the FSR and associated engineering drawings are geotechnically suitable.

We trust this meets your present requirements. Should you have any queries, please feel free to contact the undersigned.

Yours very truly,
SOIL ENGINEERS LTD.

Bernard Lee, P.Eng.
BL:dd

c. Soil Engineers Ltd. (Newmarket)
Mr. Stephen Lee, Branch manager

TOWN OF NEWMARKET

WATER AND WASTEWATER MASTER PLAN

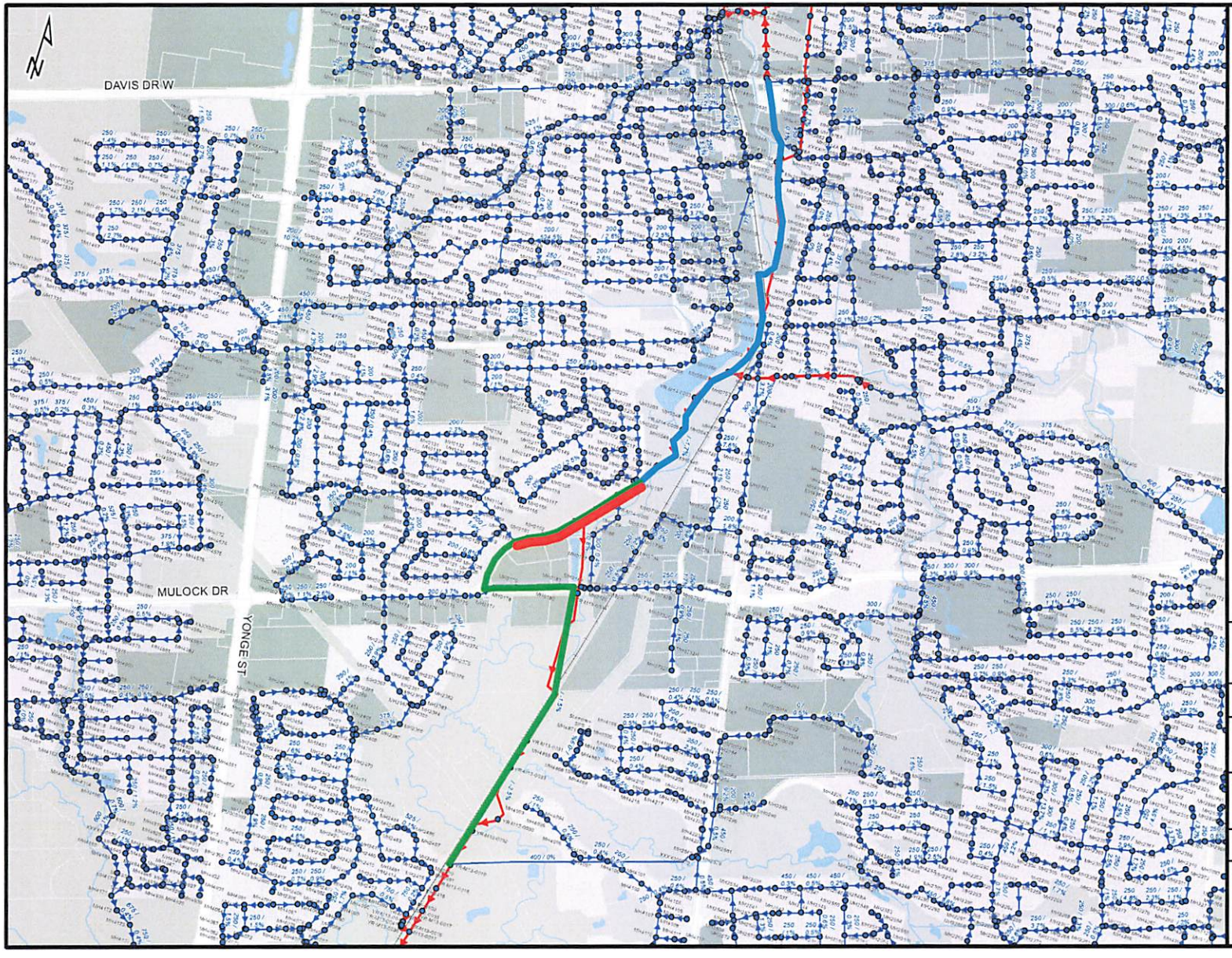
MASTER PLAN REPORT

MARCH 2017

WSP

XCG

Environmental Engineers & Scientists



Legend

- Manholes
- Sanitary Sewers
- Waterbodies
- Watercourses
- Parcels
- Railway
- York Region Sanitary Sewer

Land Use

- ICI
- Residential
- Open Space

Alternatives

- Alternative 1 - Upgrade Holland River Trunk Sewer
- Alternative 2 - New In-line storage sewer on Cane Parkway
- Alternative 3 - New sewer on Cane Parkway, Mulock Drive and rail corridor to YDSS

WSP XCG

Project No. 151-04561-00

Newmarket Water and Wastewater Master Plan

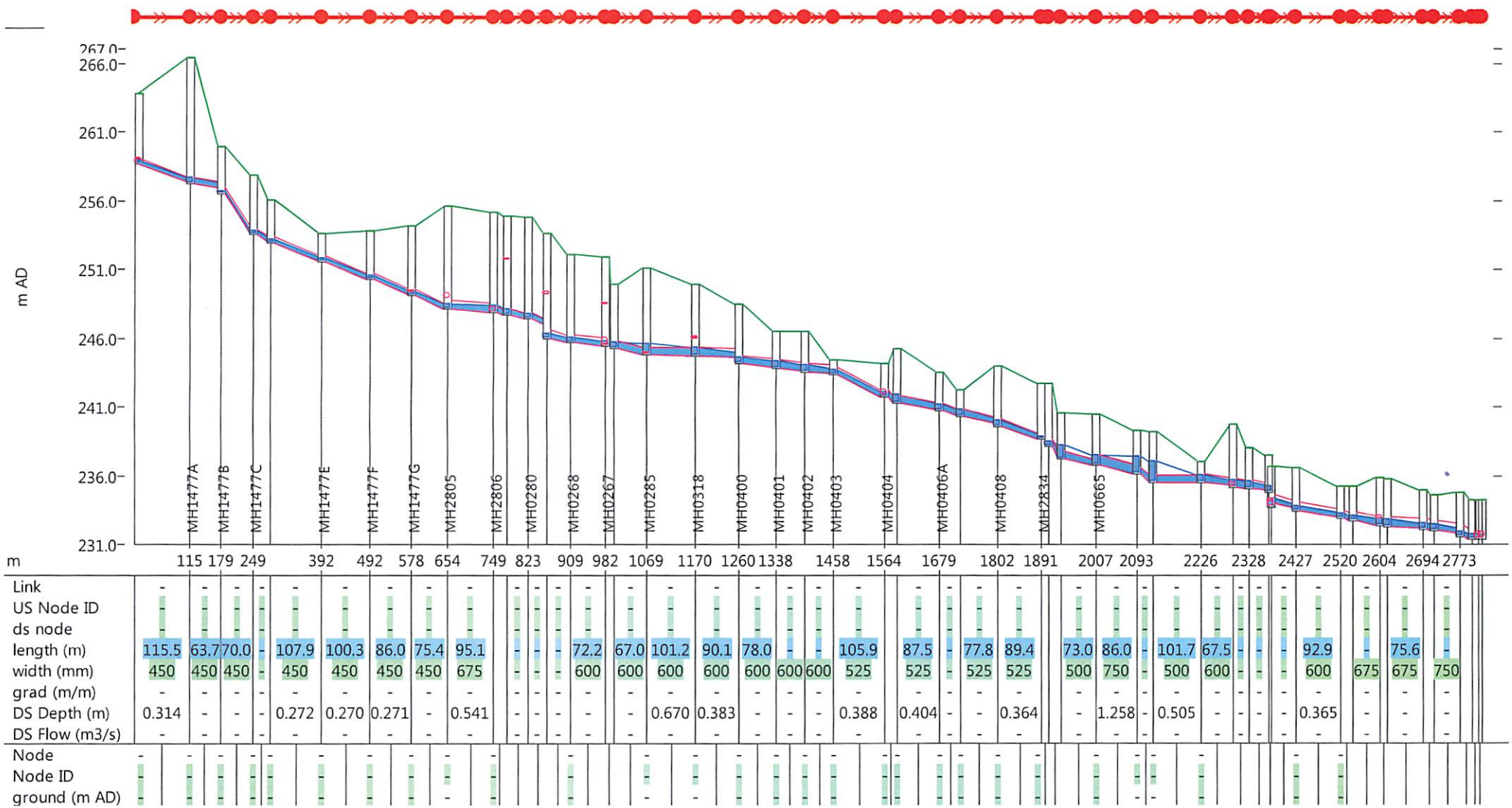
0 200 400 600 m

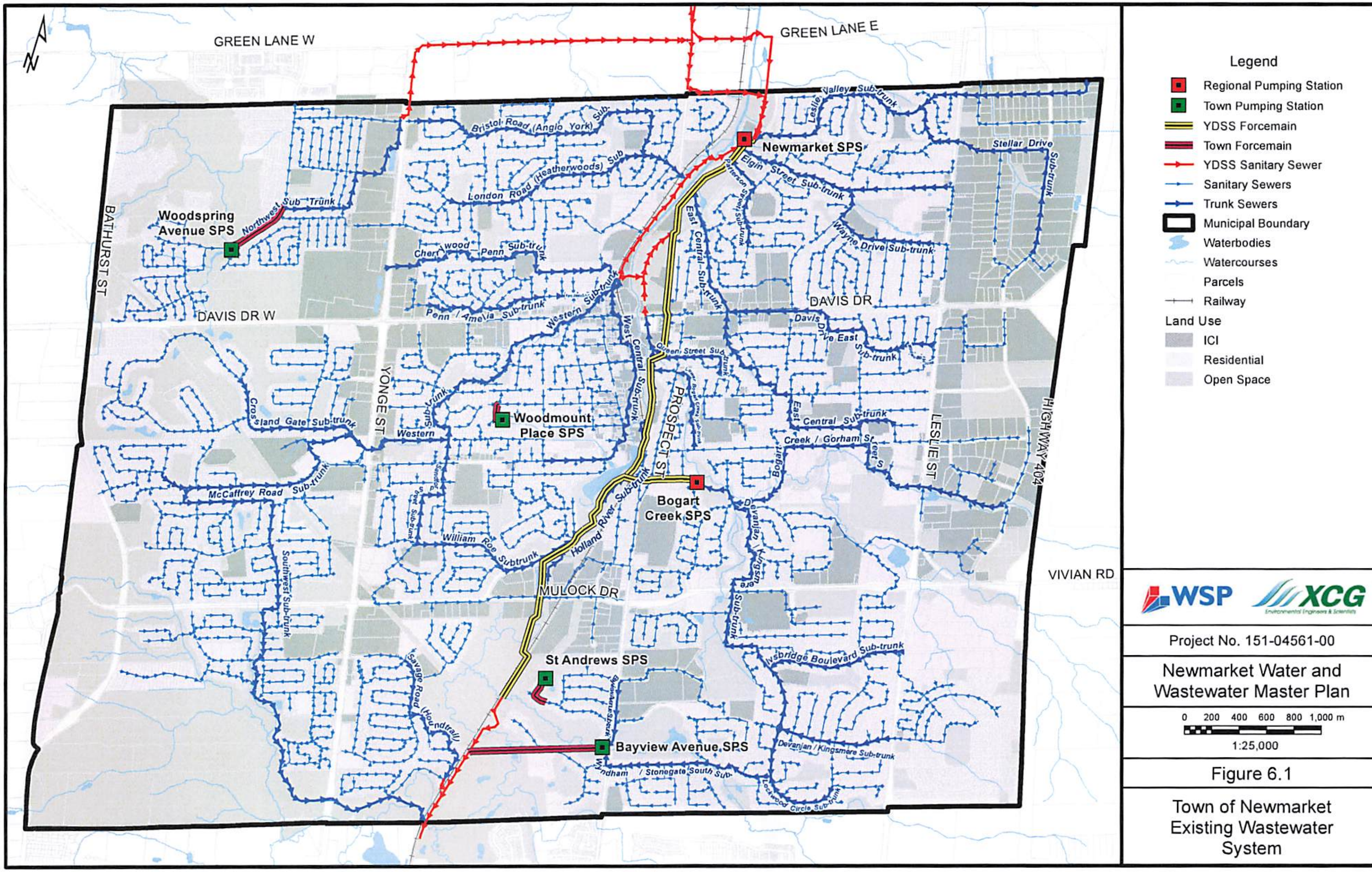
1:15,229

Figure 6.7

Wastewater Alternatives for Servicing Holland River Trunk Sewer

Western Sub-Trunk





Project No. 151-04561-00

Newmarket Water and Wastewater Master Plan

Figure 6.1

Town of Newmarket Existing Wastewater System

PATRICK FALBY & ASSOCIATES LTD.
CONSULTING ENGINEERS

May 2, 1984

G.M. Sernas & Associates Ltd.
85 The East Mall
Suite 111
Toronto, Ontario M8Z 5W4

Attention: Mr. V.J. Gupta, P.Eng.

Dear Sir:

RE: Sanitary ~~Drainage for~~ Orsi Lands
Yonge and Eagle Streets
Town of ~~Newmarket~~

Thank you for the transmittal of April 26th with the sanitary sewer design sheet for the outfall from Yonge Street across the Orsi lands east of Yonge Street. I note that your design sheet shows 28.0 ha. of apartment lands draining to the sanitary sewer, apparently from the Orsi lands, and an equivalent estimated 1,719 persons, totalling .0406 m^3/sec., or 1.43 cfs. Your letter of April 10th indicates that this 28 ha. is from the Orsi lands west of Yonge Street and 3.6 ha. is from the Orsi lands east of Yonge Street, and this is satisfactory.

In explanation of this current letter, the new proposals by the Town and the Region for a recreation complex, administration centre, and as we understand it, a land exchange with Glenway, apparently initiated certain changes to the design capacity of this sewer, and we were advised that we would receive new design information, which you have now forwarded to us.

I am still not certain as to what is intended, but as I understand your design sheet and your letter of April 10th, there is a sewage flow allowed from the Orsi lands of .0453 m^3/sec., and providing that this capacity is reserved for the Orsi lands, I believe that my clients are satisfied.

The Orsi's have already given permission for the tunnel contractor to enter onto their property, and I believe that they are satisfied to allow the sewer contractor to do the same, but he should double check that with them. The Orsi's had no intention of delaying the permission, and certainly did not want to penalize the contractor, but did feel that if they were going to give a contractor permission to work on their property to

.../pg 2

install a sanitary sewer, that they should at least be able to satisfy themselves that the sewer had enough capacity for their properties. It is in this context that they now give permission to the contractor to work on their property, and with the understanding that the sewer capacity as indicated on your design sheet is allocated to them, and that it is satisfactory to the Town of Newmarket.

We understand that your sewer design has been approved by the Town, and that this allocation is now acceptable to the Town. We quite understand that this does not have any relation to planning decisions or allocation for sewage treatment, but simply establishes a sewer capacity in the particular sewers that you have designed.

We also understand that the contractor agrees to restore the Orsi lands to equal or better condition than before he entered the site, and I believe that he has given the Orsi's a letter directly to confirm this.

Yours truly,

PATRICK FALBY & ASSOCIATES LTD.

P.R. Falby, P.Eng.
Consulting Engineer

CC: Mr. & Mrs. F. Orsi
: Mr. R. Howard, Town Engineer
: Mr. D. Brierley, P.Eng.

CONSULTING
PROFESSIONAL
ENGINEERS

G.M. SERNAS, M.A.Sc., P.ENG.
R.D. WEBSTER, B.ENG., P.ENG.
O.B. CARLSON, C.E.T.
A.B. SERGAUTIS, B.A.Sc., P.ENG.

G. M. SERNAS & ASSOCIATES LTD.

HEAD OFFICE:
85 THE EAST MALL, SUITE 111
TORONTO, ONTARIO M8Z 5W4
TELEPHONE (416) 259-6323
TELEX NO.: 06-986766 TOR

185 BROCK ST. NORTH, SUITE 207
WHITBY, ONTARIO L1N 4H3
TELEPHONE (416) 668-0764

April 10, 1984

RUSH COURIER

Patrick Falby & Associates Ltd.
877 Sweetwater Crescent
Mississauga, Ontario
L5H 4A7

Attention: Mr. P. Falby

Dear Sir:

RE: SANITARY DRAINAGE FOR ORSI LANDS
YONGE AND EAGLE STREETS
TOWN OF NEWMARKET

Further to your letter of March 15th, 1984, to Delcan, please note that the sanitary sewer design across Yonge Street and the Orsi lands, allows for the expected sewage from twenty-eight hectares of land owned by Mr. and Mrs. Orsi west of Yonge Street, and 3.6 hectares of land owned by Mr. and Mrs. Orsi east of Yonge Street, in addition to the expected sewage from Glenway Estates & Country Club and the Regional lands. We understand that you concur with the following expected sewage flows from the Orsi lands indicated on our sanitary sewer design sheets:

28 hectares	0.0406 cubic meters per second
3.6 hectares	0.0047 cubic meters per second

Please also note that the above flows were developed based on the latest land use information obtained from the Planning Department of the Town of Newmarket.

We appreciate your confirmation to Delcan in the above-mentioned letter that you have no problem with our design servicing

Patrick Falby & Associates Ltd.
Attn: Mr. P. Falby

the Orsi lands.

Yours very truly,

G. M. SERNAS & ASSOCIATES LTD.

Vijaygupta

VG:mjg

Vijay Gupta, P.Eng.

cc: Delcan, Attn: Mr. D. Brierley, P.Eng. (Rush Courier)
Town of Newmarket, Attn: Mr. R. E. Howard, P.Eng., Town Engineer (Overnight Courier)
Mr. and Mrs. Orsi (Overnight Courier)

Town of Newmarket

ONTARIO
HEART OF THE REGION OF YORK

OFFICE OF THE ENGINEER

BOX 328 – 171 MAIN STREET
NEWMARKET, ONTARIO
L3Y 4X7

Patrick Falby & Associates Ltd.
Consulting Engineers
877 Sweetwater Crescent
MISSISSAUGA, Ontario
L5H 4A7

1983 12 22

Dear Sirs:

RE: Orsi Properties
East & West Sides of Yonge St.
At Eagle Street

I acknowledge receipt of your letter of December 10th, 1983 regarding the Report of G.M. Sernas & Associates Ltd. dealing with the Western Sanitary Subtrunk Sewer.

I confirm my telephone advice to you that G.M. Sernas is presently addressing the second draft comments of our Checking Consultant, DeLCan.

For a study and report of the magnitude and importance of the aforementioned Western Sanitary Subtrunk Study, it will be necessary for the Town Engineer to clear the report through the Mayor's Industry and Subdivision Committee and obtain permission, at that time, to release the report. Any variance to this procedure which you may wish to request, in the interests of speed, must be processed through the Mayor's Office.

We trust that this information is useful to you at this time and would recommend that you contact this office from time to time in order to determine the status of the Report.

Yours very truly,

R.E. Howard

REH:cs

R.E. Howard, P. Eng.
Town Engineer

c.c. Mayor R. Twinney
R.N. Shelton, P. Eng., Deputy Town Engineer
D.J. Brierley, P. Eng., DeLCan