Servicing Report

NORTHGATE II

119 Cloverleaf Dr.
Belleville, ON

June 2026

WSE CONSULTING INC.

1.0 INTRODUCTION

WSE Consulting was retained to complete a servicing evaluation to be included with the application for rezoning for a proposed multi-unit residential development located at 119 Cloverleaf Drive in Belleville. The purpose of the report is to summarize the servicing requirements for the proposed development. The following services have been considered in this Report.

- Roads;
- Site Grading;
- Stormwater Management;
- Storm Sewers;
- Water Distribution System;
- Sanitary Servicing;
- Public Utilities;

This Report has been prepared with consideration to the following Policies and Design Guidelines:

- The Corporation of the City of Belleville Site Plan Guidelines.
- MOE Design Guidelines for Sewage Works.
- MOE Design Guidelines for Drinking Water Systems.
- MOE Watermain Design Criteria for Future Alterations Authorized Under a Drinking Water Works Permit.

This report has also been prepared with consideration to additional technical studies;

- Stormwater Management Report Upper No-Name Creek Millennium Parkway Wetland Facility “Mac-5 Pond”, October 28, 2016
- Servicing And Stormwater Management Report Northgate Condos, June 1, 2022

2.0 SITE DESCRIPTION

2.1 Existing Conditions

Existing 1.2ha site conditions include a single detached dwelling that fronts Cloverleaf Drive and consists of partially wooded areas near Cloverleaf Drive and adjacent to the Boyd Park Trail. The site is predominately flat with a slight slope to the southwest towards Cloverleaf Drive.

The site is bound to the south by Cloverleaf Drive, to the north by Boyd Park, to the west and east by residential development.

A Site Location Plan is included below as Figure 1 and an existing conditions ai photograph as Figure 2.

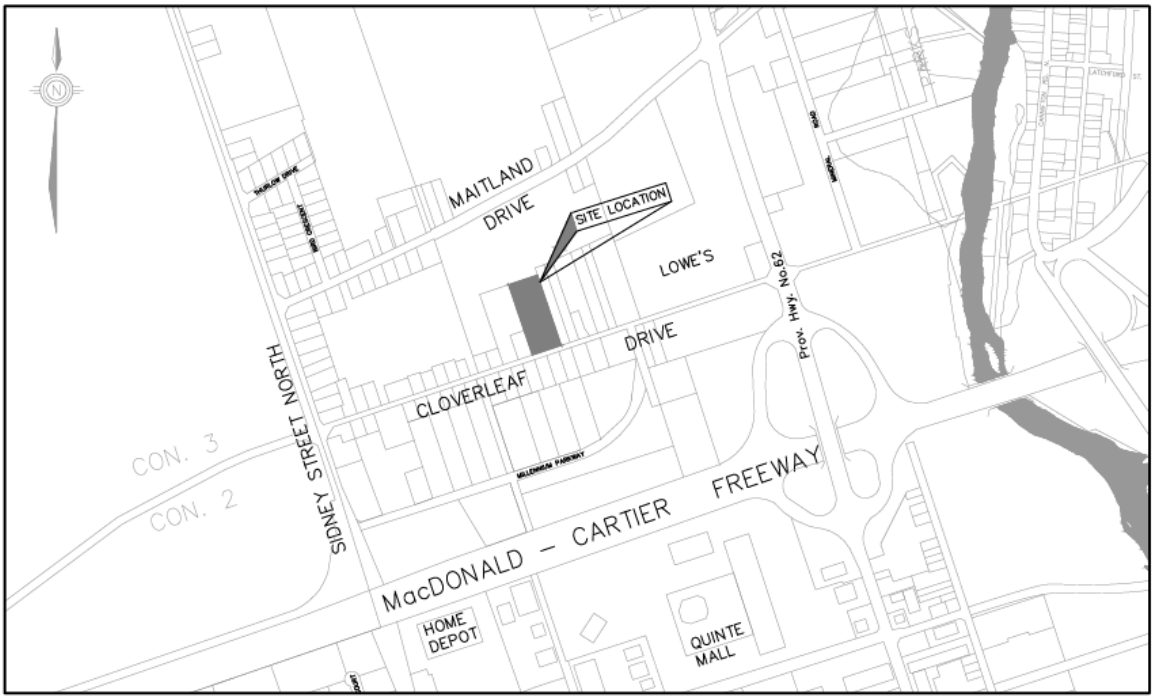

Figure 1 – Site Location

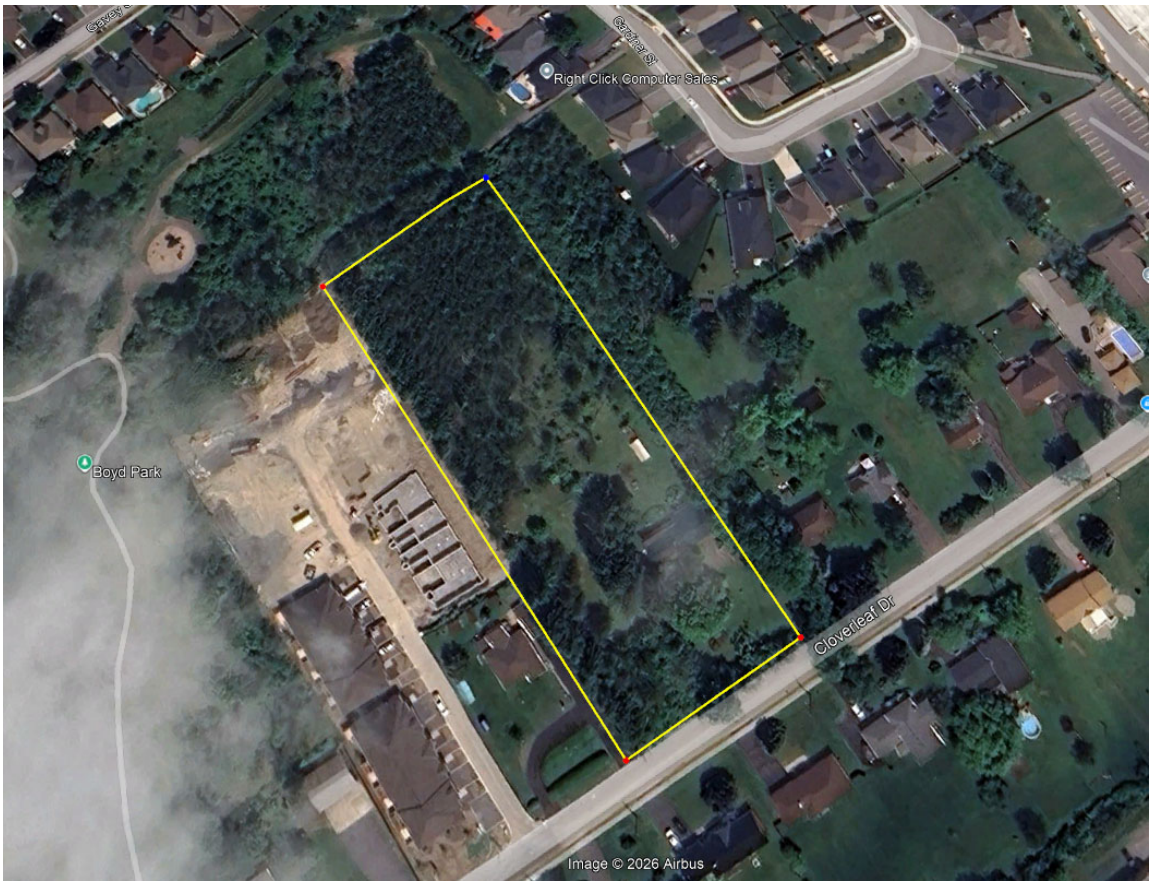

Figure 2 – Current Conditions

2.2 Proposed Conditions

The proposed development will include the following as shown in Figure 3:

- Thirty (30) Townhouse residential units;
- 6.5m wide paved laneway.

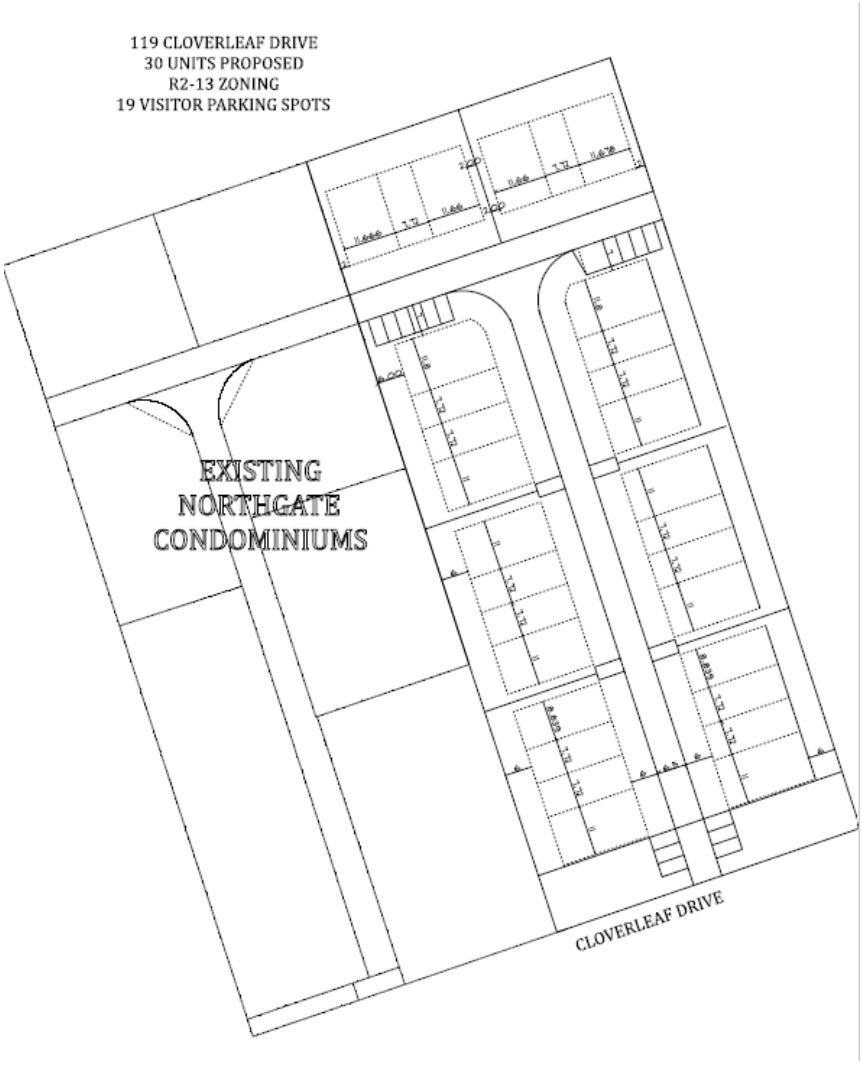

Figure 3 – Proposed Plan

3.0 ROADS

3.1 Existing Conditions

The subject property fronts Cloverleaf Drive and has an existing driveway at the eastern limits for the single family home.

Through the site area, Cloverleaf Drive is a 2-lane road providing one travel lane in each direction. The road has a urban cross-section with curb and gutter.

3.2 Proposed Road Access

A new 6.5m wide access centrally located within the subject sites frontage is proposed for both ingress and egress movements.

An internal laneway system and parking will be provided for the residents and there will be no commercial or community facilities.

At the north west limits the internal laneway is proposed to connect to the adjacent developments internal network providing for improved traffic movement for both developments.

3.3 Proposed Road Design

The private roads will be designed in accordance with TAC geometric design guidelines for local roads (with respect to the following):

- Horizontal Alignments;
- Vertical Curves;
- Road and Lane widths;
- Municipal Intersections;

All proposed roads will be designed with an urban cross-section standard with OPSD 600.040 (Modified) - Concrete Barrier Curb with Standard Gutter for Flexible Pavement.

3.4 Sightline Review

For a design speed of 60km/hr, the minimum stopping sight distance is 85m (Table 2.5.2 TAC) and the minimum decision sight distance is 95m (Table 2.5.6 TAC).

The sight lines for the site are well above 200m in each direction. As such the sightlines are acceptable.

Based on the above evaluation the proposed development will not have any impact on traffic movement.

4.0 SITE GRADING

The overall grading will be designed with respect to the following factors:

- Consideration of existing grades and surrounding lands.
- Consideration to the preliminary elevations of proposed buildings;
- Collection of the 5-yr flows into the storm sewer network;
- Safe conveyance of major system flows and overland flow routes;
- Stormwater outfall to no-name Creek through the existing storm sewer system(s) on Cloverleaf Drive.
- Maintaining a minimum soil cover over the proposed services;

The proposed site grading will generally follow the existing drainage pattern of the site, promoting runoff south to Cloverleaf Drive. Drainage from the yards will be conveyed to the roads by sheet drainage or captured by rear yard catch basins and connected to the storm sewer system.

5.0 STORMWATER MANAGEMENT

5.1 Pre-Development Drainage

The site is tributary to the No-Name Creek "Mac-5 Pond" watershed, and is subject to the direction of the Stormwater Management Report Upper No-Name Creek Millenium Parkway Wetland Facility, 2016.

5.2 Existing MAC-5 Stormwater Management Facility

The existing MAC-5 Stormwater Management (SWM) Facility was constructed in 2000 and was designed and constructed to provide the required quantity and quality treatment of the surrounding lands included the subject site.

The proposed Northgate Condos project falls within the facility's Sub-Catchment 105E modelled with 28% post-development imperviousness but the report did not specifically identify individual property contribution allowances. Based on the Mac-5 report it has been worked backwards to identify a total RC coefficient from basin 105E of 0.554 is applicable as outlined below.

Area (105E) 11.14

	% coverage	Area	RC	ARC	
Impervious	28%	3.1192	0.95	2.96324	
Pervious	72%	8.0208	0.4	3.20832	
				6.17156	total
				0.554	RC weighted

Note: Mac-5 report indicates a Type C, poor drainage soil. Using MTO charts this suggests a clay material with an RC of 0.4 for undeveloped areas (pasture or other improved)

Previous report for the west development assigned an RC of 0.4 for the entire 105E catchment but

appears to have missed the 28% impervious area requiring an RC assignment of 0.95 for hard surfaces.

Excerpts from the 2016 Jewell Report are provided in Appendix A for the soil background.

A summary of the overall catchment 105E RC is provided below in the proposed condition.

Post Development Capture Summary				
	Area (Ha)	**% Imp**	**Runoff Coeff.**	**AC**
Ex. MAC-5 Facility Sub-Catchment 105E	**11.14**	28	**0.554**	**6.172**
Proposed Development				
1. Proposed Northgate Condos (I & II)	2.22		0.60	1.332
2. Remaining / Other Land Use:				
a) Single Family Residential Development	5.96		0.40	2.384
b) Industrial	0.14		0.60	0.08
c) Grassed Area	2.82		0.25	0.71
Total Post-Dev (No. 1 and 2)	**11.14**		**0.404**	**4.506**

The proposed RC for the full catchment is estimated at 0.404 which is less than identified in the Mac-5 report of 0.554. Therefore, the post-development quantity and quality controls required for the proposed Northgate II development will be accommodated by the existing MAC-5 SWM Facility, and no additional on-site controls are required.

5.3 Infiltration

To help maximize the opportunity for infiltration of surface water, roof leaders will be diverted onto vegetated areas within the residential areas.

6.0 STORM SEWERS

The site is proposed to discharge runoff into a new internal storm sewer system that will convey 5 year runoff to Cloverleaf Drive and connect to the existing storm sewer system at the east limits of the property. The system discharges east towards the intersection with Millennium Parkway where it discharges to the open ditch network and ultimately the Mac-5 Pond.

It is expected during detailed design that some of the rear yard drainage of the units along the western limits and northern limits of the project will discharge into the adjacent developments storm sewer system.

The storm sewers will be reviewed further during detailed engineering to confirm capacity limits of the adjacent system both to the east and west.

7.0 WATER SERVICE

7.1 Existing Services

The property currently has an existing water and sanitary service for the existing dwelling and is proposed to be abandoned.

7.2 Proposed Services

It is proposed to connect to the existing 200mm watermain located along Cloverleaf Drive with a new 200 mm diameter PVC lateral to be within the laneways. Individual lateral to each unit will be installed from the new internal 'main'

All services, including the new 'main' will be privately owned and operated through the condo corporation.

This review has been prepared with consideration of the following documents and guidelines;

- Form 1 – Record of Watermains Authorized as a Future Alteration,
- Ministry of the Environment publication 'Watermain Design Criteria for Future Alterations Authorized under a Drinking Water Works Permit – June 2012',
- Ministry of the Environment publication 'Design Guidelines for Drinking Water Systems, 2008',
- OFM-TG-03-1999 (Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code),
- The Ontario Building Code, and
- The City of Belleville Engineering Design Standards

3.1 Domestic Water Demand

An evaluation of the anticipated water demand has been prepared using the guidelines set out in the Ministry of the Environment publication 'Design Guidelines for Drinking Water Systems, 2008'.

Based on the proposed 30 unit count the anticipated demands are;

- Average Day – 0.30 l/s,
- Maximum Day – 2.19 l/s,
- Minimum Hour – 0.03 l/s,
- Peak Hour – 3.30 l/s.

Supporting calculations included in **Appendix A**.

3.2 Fire Flow

Fire flow requirements have been evaluated based on OFM-TG-03-1999 (Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code)

The resulting Fire Flow requirement is 110,880L. The guideline indicates this is required over a 30min period resulting in a flow of 61.6L/s.

Supporting calculations included in **Appendix A**.

The resulting Maximum Day + Fire Flow requirement is 62.6 l/s.

A fire hydrant test was not available at the time of drafting this report. Water pressure and flow is not expected to be a concern based on local knowledge of the system.

8.0 SANITARY SERVICE

The subdivision will be serviced through the construction of new internal gravity sanitary sewers connecting to the existing municiapl main within Cloverleaf Drive.

Applying MOE standards it has been estimated that the site will generate approximatley 1.0L/s and a 200mm pipe is adeqaute to convey the flow, calculations included in **Appendix A**.

9.0 UTILITIES

The site has access to all required private utilities within the frontage on 119 Cloverleaf Drive.

The natural gas, electrical and telecommunication for the proposed development will be designed and installed in accordance with the distributors' specifications.

The public utilities are proposed to be underground within the common element laneway.

The results of the electrical and other wiring service designs will be included on the Utility Coordination Plan to be completed upon receipt of the utility provider designs and included with detailed engineering plans.

10.0 CONCLUSIONS

1. The proposed 1.20 ha development is located north of Cloverleaf Drive and west of Highway 62 in the City of Belleville, Hastings County.
2. The development will be built-out in one phase.
3. The proposed private roads will be designed to TAC Guidelines. All roads are proposed to have an urban cross-section standard with curb and gutter.
4. The proposed site grading will generally follow existing drainage patterns southwesterly to No-Name Creek.
5. The site is tributary to the No-Name Creek watershed, and
6. Drainage from the development will be conveyed via curb and gutter and a storm sewer system sized to convey the 5-year flows to the outfall at No-Name Creek. All site drainage will ultimately be discharged at the existing MAC-5 SWM facility south of the site sized to accommodate the proposed development.
7. Major system flows (in excess of the storm sewer capacity) will be safely conveyed to No-Name Creek via the developments roadways right-of-ways and Cloverleaf Dr.
8. Implementation of BMP measures have been considered. To help maximize theopportunity

for infiltration of surface water, roof leaders will be diverted onto vegetated areas.

9. The development will be serviced with a 200 mm diameter PVC Municipal watermain connecting to the existing watermain on Cloverleaf Drive.
10. The subdivision will be serviced through the construction of gravity sanitary sewers. It is proposed that the sanitary sewer is to be connected to the existing sanitary sewer on Cloverleaf Drive.
11. The natural gas, electrical and telecommunication for the proposed development will be designed and installed in accordance with the distributors' specifications.

We trust the above information meets your needs at this time and should you have any further questions or concerns, please do not hesitate to contact our office.

Sincerely,
WSE Consulting Inc.

Adam Wilson, P. Eng.
Senior Engineer

APPENDIX A

Calculations

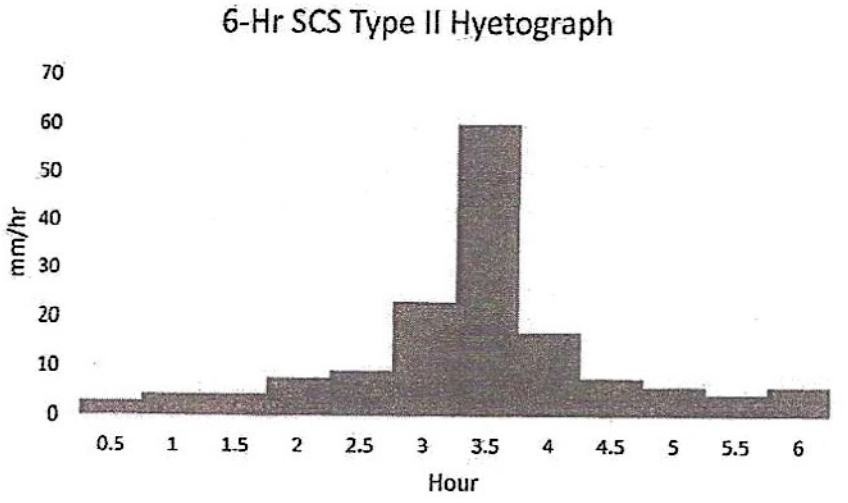

Figure 3-7: Hyetograph for 100-Yr Precipitation

3.2.3 Soils

Gore & Storrie reported the soils were Type C soils based on the hydrologic group classification. Type C soils have generally poor infiltration capacity and would not be suitable for any type of stormwater management techniques that rely on infiltration. GDJE obtained the soil classification mapping from the OMAFRA Agricultural Information Atlas.

Green lands are Type D soils, blue lands are Type C soils and beige are Type B. All three types are present with the majority being types B and C. A type C classification is conservative and has been used in the present study for consistency with previous modelling studies.

Poor.

Type C

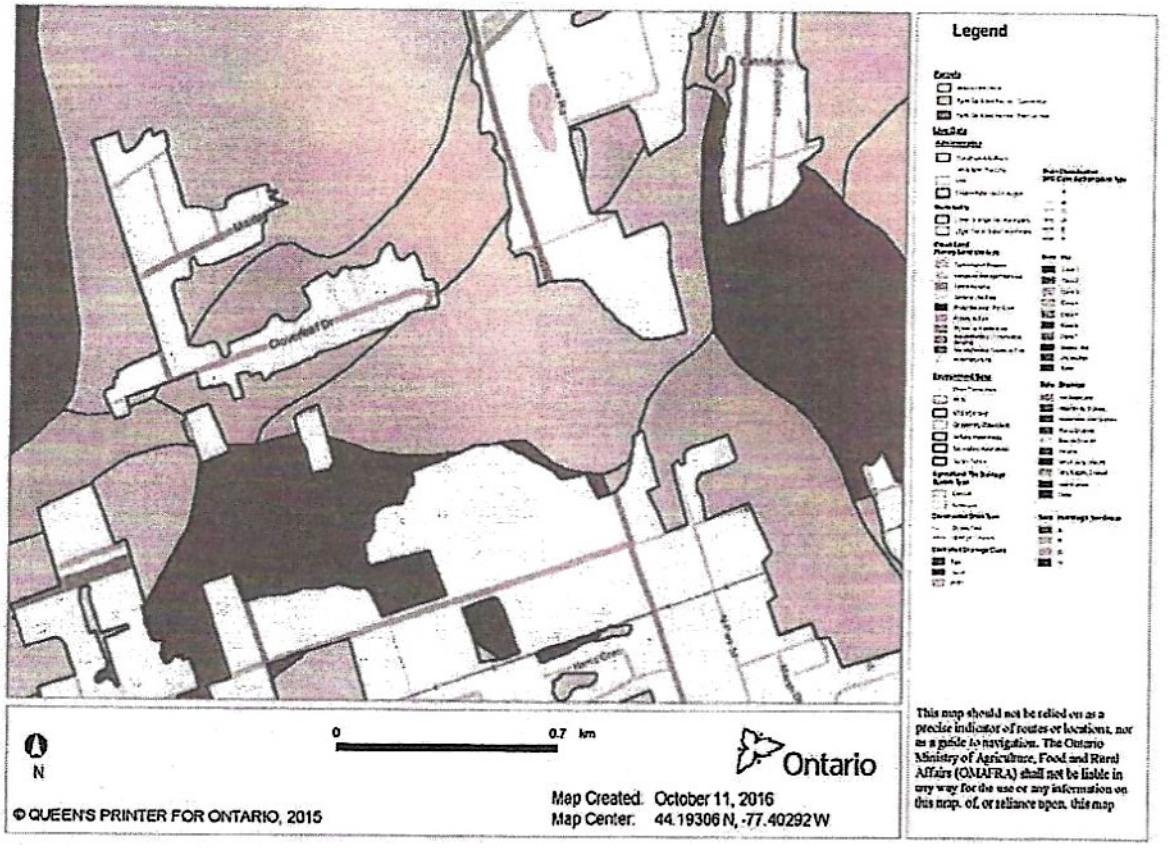

Figure 3-8: Soil Classification per Agricultural Information Atlas

3.2.4 Curve Number

The previous modelling used Nash hydrograph (Gore & Storrie) and developed runoff conditions with time to peak and 4 linear reservoirs. EGA simulated runoff conditions in Miduss by invoking the linear reservoir hydrograph simulation and applying Horton's infiltration coefficients for the pervious areas (Fo = 50 mm/hr, Fc = 7.5 mm/hr, K = 0.5 hr and SDS = 5.0 mm/hr. Impervious areas used a runoff coefficient of 0.97.

The current model was developed using the SCS curve number. This values is commonly derived from the Hydrologic Soil Class using MTO Drainage Manual (Design Chart 1.09). GDJE selected CN = 76 from the chart for Pasture and Other Improved Land.

use by Mac 5 model

3.2.5 Topographic Data

Topographic data was collected from the site by GDJE using GPS survey equipment and level. The survey was carried out over several days in September 2016 and included upland and water covered areas. The bathymetric data was measured to the inferred bottom of pond and to top of sediment. Bottom of pond was typically inferred as refusal of the paddle into the sediment. The bottom could be easily discerned as rock. Sediment was assumed to be the difference between the rock bottom and top of sediment. The depth from top of sediment to rock bottom was typically about 0.3m thick. In the event of a cleanout, sediment should not be removed to rock surface.

Design Chart 1.09: Soil Conservation Service Curve Numbers (Continued)

Land Use or Surface	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66** (62)	70** (68)	74	78	82	84	86 AMC I
Pasture & other unimproved land	58* (38)	62* (51)	65	71	76	79	81
Woodlots and forest	50* (30)	54* (44)	58	65	71	74	77
Impervious areas (paved)							98
Bare bedrock draining directly to stream by surface flow							98
Bare bedrock draining indirectly to stream as groundwater (usual case)							70
Lakes and wetlands							50

Notes

(i) All values are based on AMC II except those marked by * (AMC III) or ** (mean of AMC II and AMC III).

(ii) Values in brackets are AMC II and are to be used only for special cases.

(iii) Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.

Per Mac-S model.

Design Chart 1.08: Hydrologic Soil Groups (Continued)

- Based on Soil Texture

Sands, Sandy Loams and Gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium to Coarse Loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium Textured Loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt Loams, Some Loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, Clay Loams, Silty Clay Loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Source: U.S. Department of Agriculture (1972)

Design Chart 1.07: Runoff Coefficients (Continued)

- Rural

Land Use & Topography[3]	Soil Texture		
	Open Sand Loam	Loam or Silt Loam	Clay Loam or Clay
CULTIVATED			
Flat 0 - 5% Slopes	0.22	0.35	0.55
Rolling 5 - 10% Slopes	0.30	0.45	0.60
Hilly 10- 30% Slopes	0.40	0.65	0.70
PASTURE			
Flat 0 - 5% Slopes	0.10	0.28	0.40
Rolling 5 - 10% Slopes	0.15	0.35	0.45
Hilly 10- 30% Slopes	0.22	0.40	0.55
WOODLAND OR CUTOVER			
Flat 0 - 5% Slopes	0.08	0.25	0.35
Rolling 5 - 10% Slopes	0.12	0.30	0.42
Hilly 10- 30% Slopes	0.18	0.35	0.52
BARE ROCK	COVERAGE[3]		
	30%	50%	70%
Flat 0 - 5% Slopes	0.40	0.55	0.75
Rolling 5 - 10% Slopes	0.50	0.65	0.80
Hilly 10- 30% Slopes	0.55	0.70	0.85
LAKES AND WETLANDS	0.05		

[2] Terrain Slopes

[3] Interpolate for other values of % imperviousness

Sources: American Society of Civil Engineers - ASCE (1960)
U.S. Department of Agriculture (1972)

Northgate II
Evaluation of Water Demand

Population	single-semi	towns	
#units	0	30	
pop/unit	3	2.5	assumed
# people	75		

Average Day Flow

L/cap*d	350		assumed
ADF	26250	l/d	
	0.30	l/s	

Maximum Day Flow

factor	7.2		MOE Table 3.1
L/cap*d	350		
MDF	189000	l/d	
	2.19	l/s	

Minimum Hour

factor	0.1		MOE Table 3.1
ADF	0.30	l/d	
	0.03	l/s	

Peak Hour

factor	10.85		MOE Table 3.1
ADF	0.30	l/d	
	3.30	l/s	

Fire Flow
Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code
OFM-TG-03-1999

Q=KVStot

Q= minimum supply of water in litres (L)
K = water supply coefficient from Table 1
V = Total building volume in cubic metres
Stot = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula
Stot = 1.0 + S side 1 + S side 2 +..... Etc.

K	18	C, compustable w seperations		Qtotal	110880	L
V	3080	(560x5.5)	**	Q30	61.6	L/s
Stot	3.35	(2 max)				
			coefficent			
S1	6	m	0.35			
S2	1.2	m	1			
S3	18.5	m	0			
S4	1.2	m	1			

** assume 2 storey, with firewalls per every 2 units

SANITARY SEWER DESIGN SHEET

WSE

NORTHGATE II

HASTINGS COUNTY

Project: 106

Revised: Jun 28 26

Checked: AJW

RATIONAL METHOD Qt = Qp + Qi

Where: Qp = peak population flow (L/s)
= PqM / 86.4 (L/s)
where M = Harmon's Peak Factor
Qi = peak extraneous flow (L/s)
= i * A (L/s)

HARMON FORMULA

$M = 1 + \frac{14}{4 + P^{1/2}}$

where P population in 1000's

Residential Population : 3.00 Persons/unit
AND: 2.50 Persons/unit

Design Flow Rates
Residential (q) : 225 Lpcd
Extraneous (i) : 0.14 L/s/ha
N-value = 0.013

LOCATION			DESIGN FLOWS									SEWER DATA						
STREET	FROM MH	TO MH	INDIVIDUAL # of UNITS	INDIVIDUAL POP (persons)	INDIVIDUAL AREA (ha)	ACCUMULATIVE POP (persons)	ACCUMULATIVE AREA (ha)	PEAKING FACTOR (M)	FLOWS RES Qp (L/s)	FLOWS EXTRAN Qi (L/s)	FLOWS TOTAL Qt (L/s)	PIPE DIAMETER NOMINAL (mm)	PIPE DIAMETER INNER (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	Q/ Qcap
			30.0	75.0	1.20	75.0	1.20	4.28	0.8	0.2	1.0	200	200.0	1.00	24.30	32.8	1.04	0.03