TATHAM ENGINEERING

Enhancing our communities

The Gateway Centre

PRELIMINARY FUNCTIONAL SERVICING REPORT

Charis Developments

File 120119 | September 16, 2024

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Issue	Date	Description
1	April 6, 2022	OPA/ZBA 1st Submission
2	September 16, 2024	Revised Site Plan

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Richard Ziegler Architect Inc.

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Tatham Engineering Limited

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1 Introduction

Tatham Engineering has been retained by Charis Developments to prepare a Preliminary Functional Servicing Report to support an official plan amendment (OPA) and zoning by-law amendment (ZBA) for the proposed Gateway Centre Commercial Development in the Town of Collingwood, County of Simcoe.

1.1 OBJECTIVES

The primary objective of this report is to address the servicing requirements of the Town of Collingwood and Simcoe County with respect to the existing and proposed sanitary servicing, water supply and distribution, drainage and stormwater management (SWM), safe vehicular access to the site and utilities common to support a commercial development (phone, hydro, cable, TV, gas, etc.).

1.2 GUIDELINES & BACKGROUND REPORTS

This report was prepared recognizing municipal and provincial guidelines, including the following publications:

- *Design Guidelines for Sewage Works*, Ministry of the Environment (2008);
- *Town of Collingwood Development Standards* (2007);
- *Water Supply for Public Fire Protection, Fire Underwriters Survey* (2019);
- *Town of Collingwood 2022 Wastewater Performance Report* (2023); and
- *Collingwood Drinking Water System 2022 Annual Compliance Report* (2024).

Additional reports have been prepared in conjunction with this report in support of the proposed commercial development and are summarized below:

- *Geotechnical Investigation Proposed Commercial Development – 839 and 869 Hurontario Street* (March 2022) by G2S Consulting Inc.;
- *Additional Geotechnical Investigation – 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad* (September 2024) by G2S Consulting Inc.;
- *Preliminary Stormwater Management Report* (September 2024) by Tatham Engineering; and
- *The Gateway Centre Traffic Impact Study* (September 2024) by Tatham Engineering.

2 Development Site

2.1 SITE LOCATION & DESCRIPTION

The subject property consists of approximately 3.75 ha of mostly undeveloped land located northeast of the Hurontario Street and Poplar Sideroad intersection in the Town of Collingwood. The proposed development incorporates four properties, the municipal addresses being part of 839 Hurontario Street, 853 Hurontario Street, 869 Hurontario Street and 7564 Poplar Sideroad. The subject property is bounded by Poplar Sideroad to the south, Hurontario Street to the west, residential homes to the east and a pedestrian path and the Hamilton Drain to the north. Figure 1 illustrates the location of the subject property.

2.2 SURFACE CONDITIONS

Information regarding the existing topography, ground cover and drainage patterns were obtained through collection of detailed topographic survey data (completed by J.D. Barnes Ltd. on September 13, 2023) and aerial imagery.

The site is currently vacant, and primarily grass covered. The centre of the site includes a vegetated 1.2 ha fill pad, and an overgrown wooded portion occupies the northern and eastern sections of the property. An existing single family residential dwelling is located on 853 Hurontario Street.

2.3 SUBSURFACE CONDITIONS

A geotechnical investigation, submitted under a separate cover, was completed by G2S Consulting Inc. dated March 2022 and an additional investigation was completed dated September 2024. Fieldwork was conducted between September 30 and October 22, 2021, consisting of 23 exploratory sampled boreholes. Two more boreholes were conducted on June 4 and 5, 2024. The boreholes extended to depths ranging from 2.1 m to 8.2 m below existing grade. Subsurface conditions are as follows:

- 75 to 360 mm of surficial topsoil;
- 9 boreholes indicated a clayey silt fill layer ranging from depths of 0.8 m to 1.2 m below grade;
- 8 boreholes indicated a granular fill (sand and gravel) layer ranging from depths of 0.9 m to 1.6 m below grade;
- a layer of clayey silt extending 1.5 m to 4.6 m below grade was identified below the fill (17 applicable boreholes) or topsoil (6 applicable boreholes);

- silt deposits were identified below the clayey silt layer at 11 borehole locations. The silt deposit depths ranged from 3.1 m to 6.1 m below grade;
- lower clayey silt deposits were encountered beneath the silt deposits in two borehole locations, extending to depths between 4.6 m and 6.1 m below grade;
- sandy silt till was encountered below the silt deposits in 12 locations with depths ranging from 5.2 m to 8.2 m below grade;
- sandy gravel till was encountered beneath the sandy silt till in both of the additional boreholes with depths ranging from 6.9 m to 7.5 m below grade; and
- limestone/dolostone was encountered at depths ranging from 6.9 m to 7.5 m below grade, and bedrock was encountered at depths ranging from 7.5 m to 11.1 m below grade.

For the purposes of hydrologic modelling, the soil has been classified as silt loam (Type BC).

Groundwater monitoring wells were previously installed in seven boreholes. Two new monitoring wells were installed in the additional boreholes. The groundwater was found to be approximately 0.4 m to 1.4 m below existing grade.

2.4 PROPOSED DEVELOPMENT

The proposed development will consist of the following facilities, as shown on the attached Site Plan. The site will be constructed in three phases, as summarized below.

Phase 1

- Building 1 – Starbucks
- Building 2 – Dollarama
- Building 7 – McDonald's
- 210 parking Spaces (including 11 barrier free spaces and 4 electric charging stations)

Phase 2

- Building 5 – Grocery Store
- Building 6 – Retail/Pet Valu
- 40 parking spaces (including 1 barrier free space)
- 2 loading bays

Phase 3

- Building 3 – 12-storey mixed-used building including 165 two-bedroom apartment units, rooftop amenity space and commercial area
- Building 4 – Retail building with offices above
- 38 parking spaces
- 207 underground parking spaces (including 6 barrier free spaces)

3 Sanitary Sewage Collection & Conveyance

3.1 EXISTING INFRASTRUCTURE

An existing 200 mm diameter sanitary stub extends off an existing 200 mm diameter sanitary sewer flowing north underneath Hurontario Street. The stub extends into the subject site 70 m north of Poplar Sideroad. Additionally, an existing 250 mm diameter sanitary sewer flowing east to west is located north of the property, under the Hamilton Trail, which also connects to the existing 200 mm diameter Hurontario Street sanitary sewer. Ultimately sewage is discharged to the Collingwood Wastewater Treatment Plant (WWTP). The existing sanitary sewer network is depicted in drawing *SAN.1: Sanitary Layout Plan*.

In reviewing the *Town of Collingwood 2022 Annual Wastewater Performance Report* (2023), the plant has an average day flow rated capacity of 24,548 m^3/day and a maximum day flow rate capacity of 60,900 m^3/day. The report shows an average day flow and maximum day flow of 17,997 m^3/day and 51,088 m^3/day respectively, operating at 73% of its average day flow rated capacity and 84% of its maximum day flow rated capacity. The available average day and maximum day surplus capacities are 6,551 m^3 and 9,812 m^3 respectively.

3.2 PROPOSED INFRASTRUCTURE

3.2.1 Sewage Loading

The *Town of Collingwood Development Standards* (2007), *MOE Design Guidelines for Sewage Works* (2008) and the *Ontario Building Code* were used as a guide to determine the expected sanitary sewage flow from this site. The commercial and residential sewage flows were calculated separately. In the absence of flow data, the average sewage generation from the commercial buildings was estimated using Table 8.2.1.3.B in the Ontario Building Code and the sewage generation from the apartment building was calculated using the Town design standards. The peak factor for the site was calculated using the Harmon Formula. The total sewage generated by the commercial and residential development and extraneous flow results in an estimated peak flow of 7.9 L/s. Supporting calculations are attached in Appendix A.

3.2.2 Sanitary Sewer

It is anticipated that a proposed 200 mm PVC sanitary sewer will flow north through the site's service corridor. The sanitary sewer will be sized at detailed design to accommodate the proposed. A sanitary sewer stub near the southeast corner of the subject property was also provided. Refer to drawing *SAN.1: Sanitary Layout Plan* for further details pertaining to the proposed sanitary sewer. A preliminary sanitary sewer design sheet is attached in Appendix D.

The proposed sanitary sewer will be installed as part of Phases 1 and 2. No additional sanitary sewer will need to be installed as part of Phase 3.

3.2.3 Sanitary Sewer Connection

The sewer will connect to the existing 250 mm diameter sanitary sewer north of the subject site. An additional maintenance structure at the connection will be required. The sanitary flows from the neighbouring Pretty River Estates development to the east utilizes the 250 mm sanitary sewer. In reviewing the Functional Servicing Report completed by exp Services (July 2012), a total of 1383 residents in the Pretty River Estates contribute to the sanitary sewer, resulting in a peak flow of 32.4 L/s of sewage, utilizing the Town previous standards of 2.9 cap/unit and 450 L/cap/day. Utilizing the Town's current design standards, Pretty River Estates and the Gateway development will generate a combined peak sanitary flow of 28.4 L/s, which is 56% of the existing sewer's 50.8 L/s capacity. Thus, the existing sanitary sewer has sufficient capacity to accommodate the peak flows from the proposed development. Refer to the Sanitary Sewer Design Sheets in Appendix D for further details.

The connection point to the trunk sewer was investigated and confirmed that the existing sanitary sewer is at sufficient depth for a sanitary service connection to the proposed buildings.

The presence of a sanitary stub 70 m north of Poplar Sideroad to the subject site indicates that the Hurontario Street sanitary sewer considers loading from the proposed site. While this stub is not being utilized, the sanitary flows from the site will connect to the Hurontario Street sanitary sewer 157 m north of the stub. The Town of Collingwood operates a hydraulic model of their sanitary sewer system. We request that the Town add the proposed development to their model and confirm that the downstream sewer system can accommodate the proposed development.

3.2.4 Sanitary Service Connections

Each building will connect to the proposed 200 mm diameter sanitary sewer main via a 125 mm diameter PVC sanitary service. The minimum required slope of these services is 1.0%. The required flow and maximum capacity of the sanitary services is summarized in Appendix B. The capacity of the sanitary services exceeds the flow requirements of each building, and therefore is of sufficient size.

4 Water Supply & Distribution

4.1 EXISTING INFRASTRUCTURE

An existing 200 mm water service stub with a main and curb stop valve enters the subject site approximately 70 m north of Poplar Sideroad. The water service stub connects to an existing 200 mm diameter ductile iron watermain running north-south on the west side of Hurontario Street across from the proposed development. The watermain terminates immediately south of the water service stub connection with a plug, thrust block and 25 mm blow off valve. North of the proposed development there is an existing 500 mm watermain running under and parallel to the Hamilton Trail. The existing water distribution network is depicted in drawing *WAT.1: Water Layout Plan*.

The Collingwood Water Treatment Plant has a rated capacity of 31,140 m^3/ day per the *Town of Collingwood 2023 Annual Summary Report*. The report showed maximum day flow of 24,260 m^3/day (78% of rated capacity).

4.2 PROPOSED INFRASTRUCTURE

4.2.1 Water Demand

The Town of Collingwood Development Standards (2007) and the Ontario Building Code were used as a guide to determine the expected water demand consumption for this site. The average commercial water consumption demand was calculated using Table 8.2.1.3.B in the Ontario Building Code. The average day commercial flow was calculated to be 73.5 m^3/day and the average day residential flow was calculated to be 81.5 m^3/day making the total average day flow 155.0 m^3/day which is equivalent to 136.9 single detached units. Refer to Appendix A for a breakdown of the expected water demands of each commercial building.

4.2.2 Watermain

A proposed 250 mm PVC watermain running underneath the subject site's access corridors will service the proposed development. The proposed watermain will connect to the existing 500 mm diameter watermain along the Hamilton Drain and will be reduced to connect to the existing 200 mm diameter stub from the Hurontario Street watermain, creating a looping system. Refer to drawing *WAT.1: Water Layout Plan* for further details. The proposed watermain will be installed as part of the works associated with Phases 1 and 2. No additional watermain will need to be installed as part of Phase 3. Refer to Appendix B for watermain calculations confirming the 250 mm diameter watermain will provide sufficient capacity to achieve the peak hour demand and requisite fire flows.

4.2.3 Watermain Connection

The proposed watermain connects to the existing 200 mm diameter stub from the Hurontario Street watermain and the existing 500 mm diameter watermain adjacent to the Hamilton Drain. As the Town of Collingwood operates a hydraulic model of their water distribution system, we request that the Town add the proposed development to their model and confirm that the required demand flows can be achieved within the applicable pressure ranges.

4.2.4 Water Service Connections

It is anticipated that Buildings 1, 2, 4, 6 and 7 will connect to the proposed watermain via 50 mm diameter water service lines, whereas Buildings 3 and 5 (grocery store) will connect via 150 mm diameter water services. The required flow and maximum capacity of the water service lines are summarized in Appendix B.

Water meters will be installed internal to each individual building to record water consumption. The proposed facilities will be provided with backflow prevention devices in accordance with the Ontario Building Code and the Town's water by-law. The backflow prevention devices will also be installed internal to the building to allow for testing and maintenance as may be required.

4.3 FIRE PROTECTION

Two fire hydrants exist near the proposed development, located on the west side of Hurontario Street approximately 80 m and 180 m north of Poplar Sideroad, respectively. It is anticipated that internal fire hydrants will be required to provide the requisite fire flows for the development. The proposed fire hydrant locations will be provided at the detailed design stage.

The required fire flows for each building were calculated in accordance with the *Fire Underwriters Survey Water Supply for Public Fire Protection Practices* (2019) and the *Town of Collingwood Development Standards* (2007) are summarized in Appendix C. The preliminary calculations account for a separate fire line for a sprinklered system in Building 3 and the grocery store. These fire lines will not be metered.

Both the Town of Collingwood's and the Fire Underwriters Survey's preferred fire flow standards and residual pressure can be sufficiently met by the proposed 250 mm watermain. However, to confirm that the required fire demand flows can be achieved within the applicable pressure ranges, we request that the Town add the proposed development to their hydraulic model of their water distribution system.

5 Stormwater Management

A separate Stormwater Management (SWM) Report has been prepared by Tatham Engineering to address drainage and stormwater management requirements for the development. A summary of the SWM servicing strategy is as follows:

- Stormwater management quantity control will be provided by a proposed underground storage system under the parking area between Building 2 and the grocery store. Additional storage capacity will be provided by rooftop storage on the grocery store. Stormwater will be conveyed via an internal storm sewer network to the underground storage system that will attenuate major peak flows (up to and including the 100-year storm event) from the site to pre-development levels. Stormwater will discharge into the Hamilton Drain.
- Emergency overland flow routes will be designed to convey stormwater to the northern most parking area. Excessive runoff will spill through curb cuts, across the Hamilton Trail and into the Hamilton Drain. The maximum ponding depth will not exceed 300 mm before spilling off-site.
- Stormwater quality control will be provided by a HydroStorm HS10 located downstream of the underground system. The HydroStorm HS10 will provide a minimum of 80% total solids removal and will treat 90% of the surface runoff generated from its contributing drainage area. Additional quality control will be provided by isolator rows as part of the underground storage system.

The SWM report should be read in conjunction with this report.

6 Transportation

A Traffic Impact Study has been completed by Tatham Engineering under separate cover. A summary of the conclusions and recommendations are as follows:

- The proposed parking provisions, loading space provisions and circulation are all considered appropriate.
- The study area traffic operations, Poplar/Country Road 32 with Hurontario Street/County Road 124 were analyzed under existing (2024) and future (2026, 2030, 2035 and 2040) conditions with the following recommendations set forth:
  - 2030 Background Conditions - consider a southbound advance green on Hurontario Street at Poplar Sideroad;
  - 2040 Background Conditions - provide an eastbound right turn land on Poplar;
  - 2026 Total Conditions (Phase 1) - extend the 50 km/h speed zone on Hurontario Street to south of Poplar Sideroad; extend the centre turn lane on Hurontario Street 100 metres to the south; construct a centre turn lane on Poplar Sideroad from Hurontario Street to Portland Street; and construct a westbound right taper (60 metres) at Access 2.
- The proposed drive-thru lanes are considered appropriate.
- The available sight lines along both Poplar Sideroad/County Road 32 and Hurontario Street/County Road 124 exceed the design guidelines for site distance requirements.

7 Utilities

7.1 ELECTRICAL SERVICES

As part of the detailed design is support of site plan approval, Tatham Engineering will be reviewing the proposed development from an electrical servicing standpoint and will confirm if external plant upgrades are required to service the site following submission of an electrical distribution plan.

7.2 GAS SERVICES

Enbridge Gas was contacted about their existing gas mains in the area and their ability to service the proposed development. They advised that they have a 200mm extra high-pressure gas main adjacent to the proposed development, one on the east side of Hurontario Street and another on the north side of Poplar Sideroad. Enbridge suspects these mains will provide sufficient capacity for the site but will require load information to confirm. Tatham Engineering will be reviewing the proposed development and providing gas load estimations at the detailed design stage.

7.3 TELEPHONE & INTERNET SERVICES

Bell has confirmed the site can be serviced with fibre optic cable. Bell advised that eight ducts exist on the east side of Hurontario Street and three ducts exist on the north side of Poplar Sideroad.

Rogers has indicated that they have an existing vault at the northeast corner of Poplar Sideroad and Hurontario Street.

7.4 POSTAL SERVICES

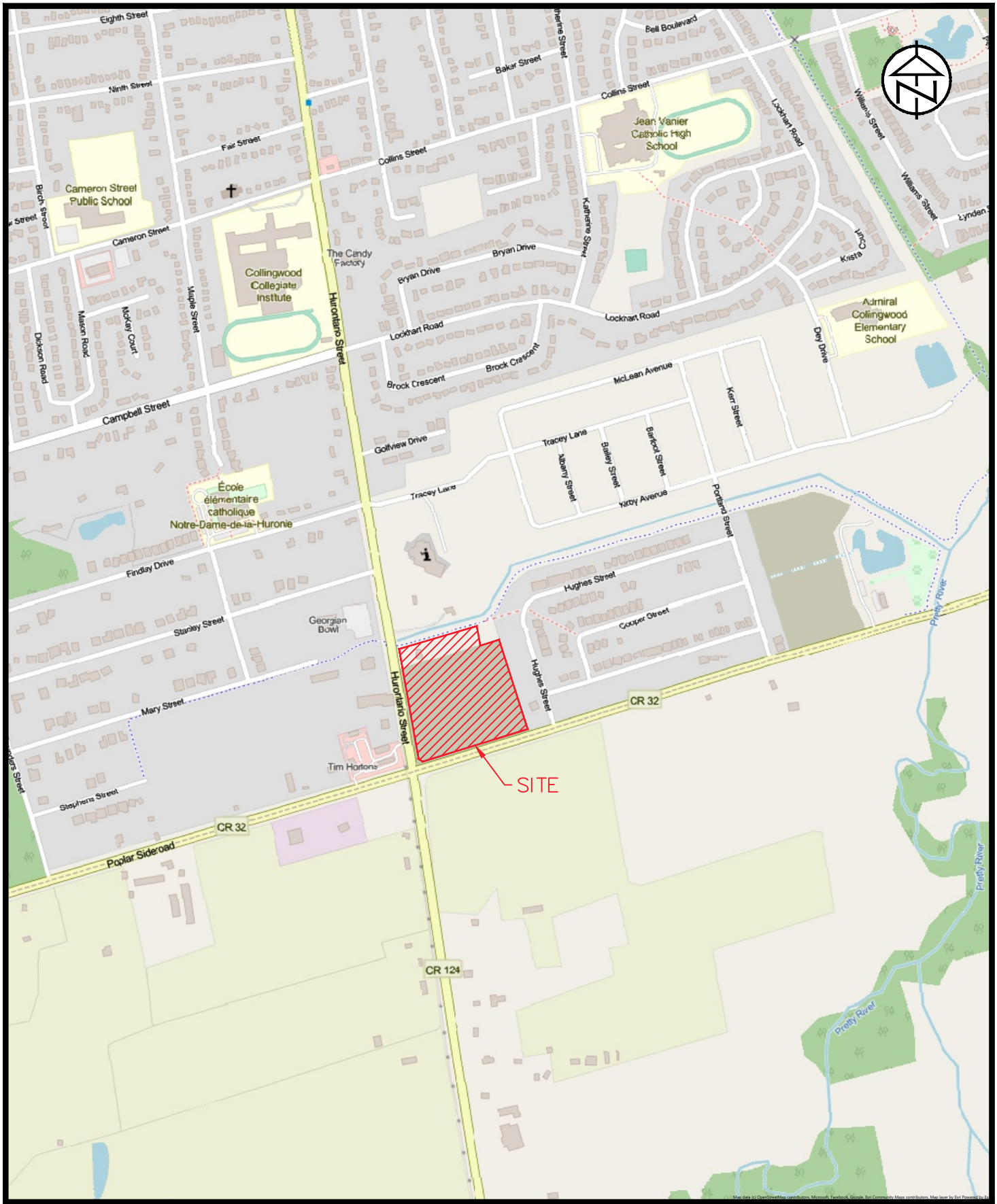
Canada Post has confirmed that a lock box assembly supplied by the developer would be required for postal services.

8 Summary

As outlined above, existing infrastructure surrounding the subject property can adequately service the development for sanitary sewage, potable water, stormwater management, hydro, natural gas, and telecommunications. A summary of the servicing strategy is as follows:

- Sanitary sewage from the proposed development will drain to the existing municipal sanitary sewer north of the proposed site via a proposed 200 mm diameter PVC sanitary sewer. An additional maintenance structure will be required to tie into the existing sanitary sewer.
- Potable water will be provided via a 200 mm watermain connecting to the existing 200mm diameter watermain stub on Hurontario Street and the existing 500mm diameter watermain that runs along the Hamilton Drain north of the site.
- Stormwater management quantity control will be provided by a combination of an underground storage system under the parking area, and rooftop storage on the grocery store. Stormwater will discharge into the Hamilton Drain.
- Stormwater management quality control will by provided by isolator rows within the underground storage system and a HydroStorm HS10, providing at least 80% total solids removal and treatment of 90% of the surface runoff generated from its contributing drainage area.
- Hydro, natural gas, Bell and cable TV will be extended from their existing plants to service the proposed development.
- Postal services require a lock box assembly supplied by the developer.

Detailed drawings will be completed for approval by the Town and relevant regulatory agencies in support of Site Plan Approval.



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THE GATEWAY CENTRE

KEYPLAN

DWG. No. **FIG. 1**

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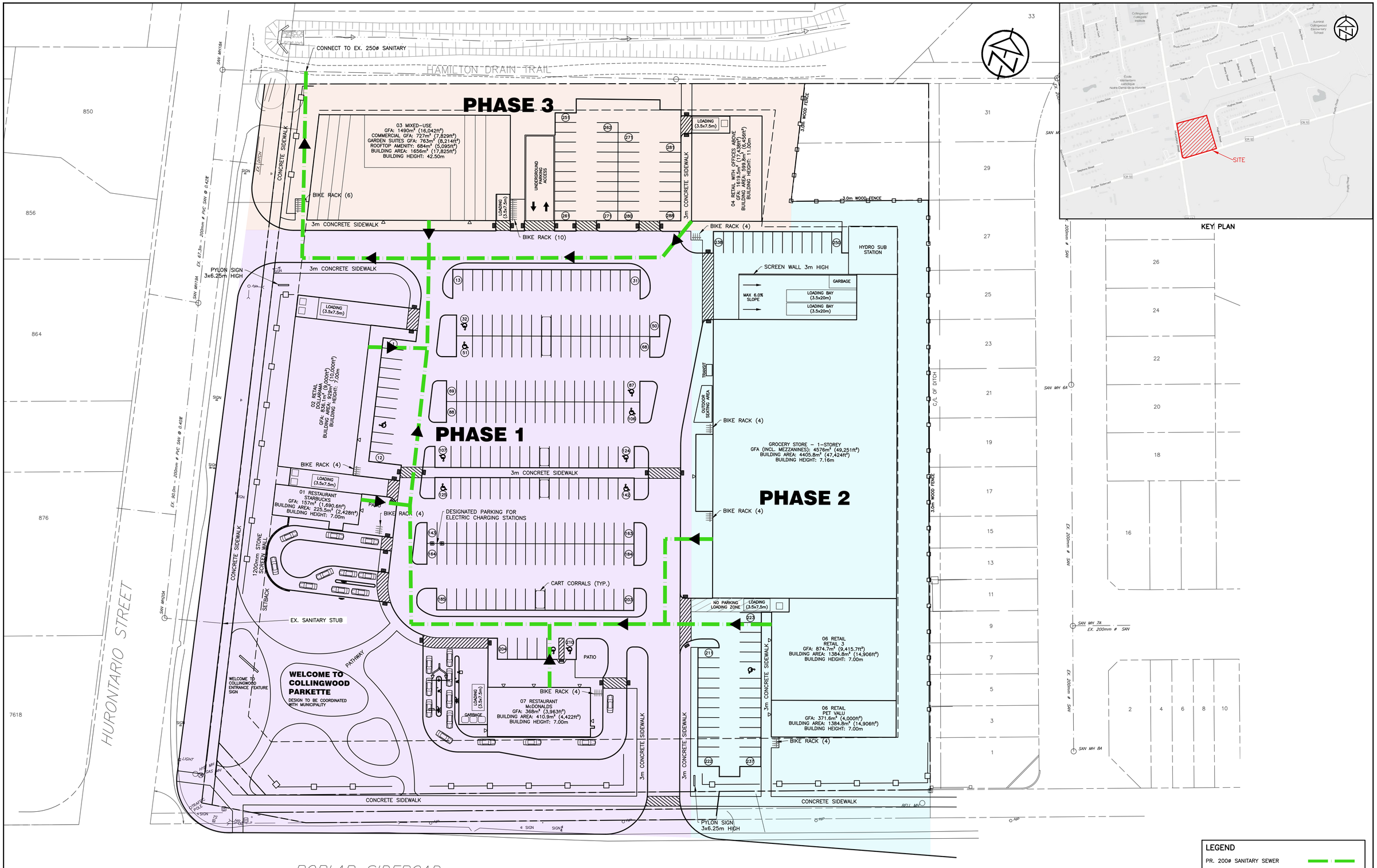

LEGEND

PR. 200ø SANITARY SEWER

EX. SANITARY SEWER

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BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM BENCH MARK NO. 0011965U9504 HAVING A PUBLISHED ELEVATION OF 177.873 METRES.

NOTES

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TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN FROM SURVEY PREPARED BY J.D. BARNES LIMITED DATED SEPTEMBER 22, 2021.

No.	REVISION DESCRIPTION	DATE
1.	FOR CIRCULATION	SEPT 2024

ENGINEER STAMP

TOWN APPROVAL

THE GATEWAY CENTRE
COLLINGWOOD, ON

TATHAM ENGINEERING

SANITARY LAYOUT PLAN

DESIGN: AS	FILE: 120119	DWG:	
DRAWN: KH	DATE: SEPT 2024	**SAN.1**	
CHECK: JPA/RS	SCALE: 1:500		

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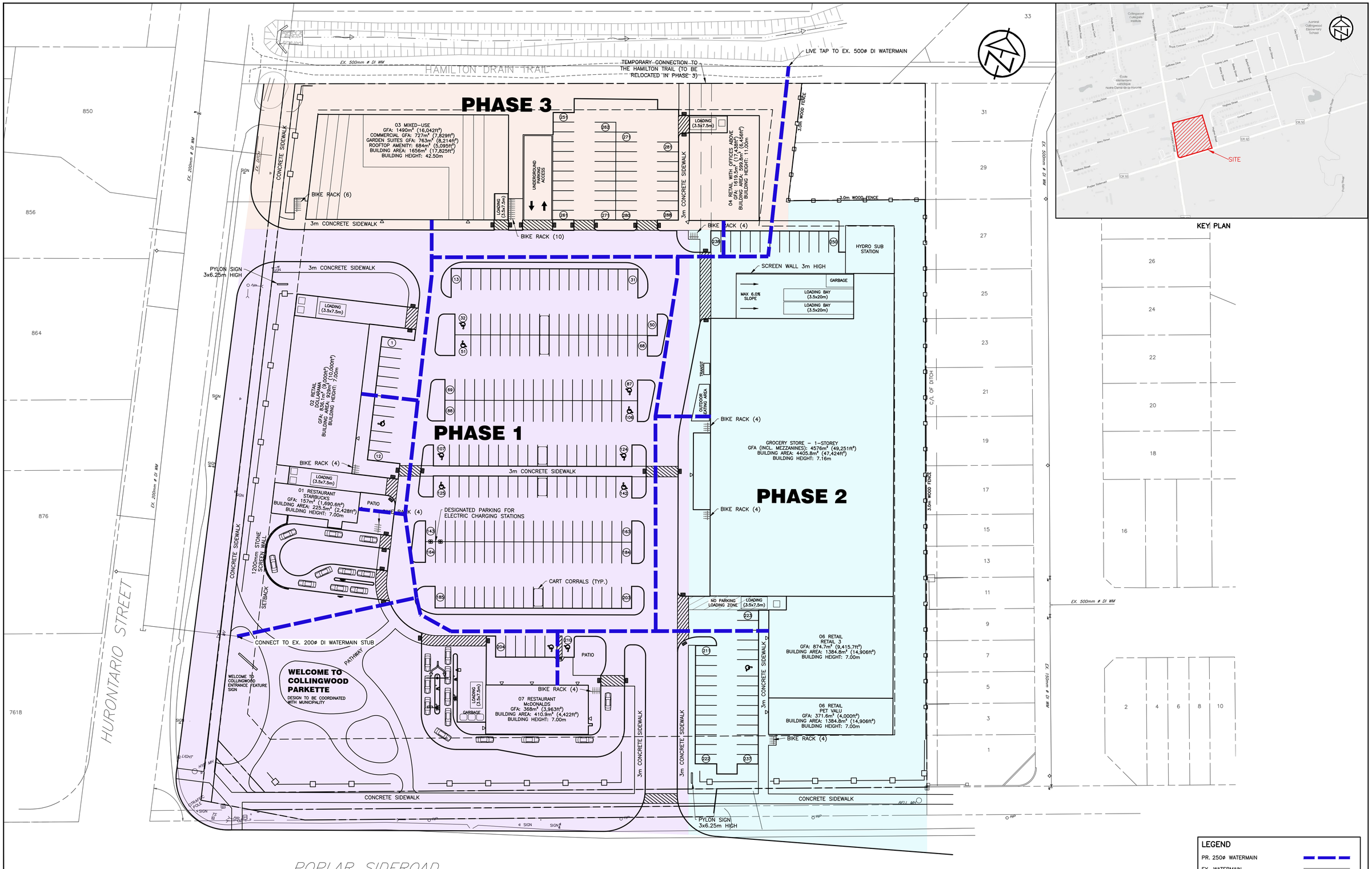

LEGEND

PR. 250ø WATERMAIN

EX. WATERMAIN

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ENGINEER STAMP

TOWN APPROVAL

THE GATEWAY CENTRE
COLLINGWOOD, ON

TATHAM ENGINEERING

WATERMAIN LAYOUT PLAN

DESIGN: AS	FILE: 120119	DWG:	
DRAWN: KH	DATE: SEPT 2024	**WAT.1**	
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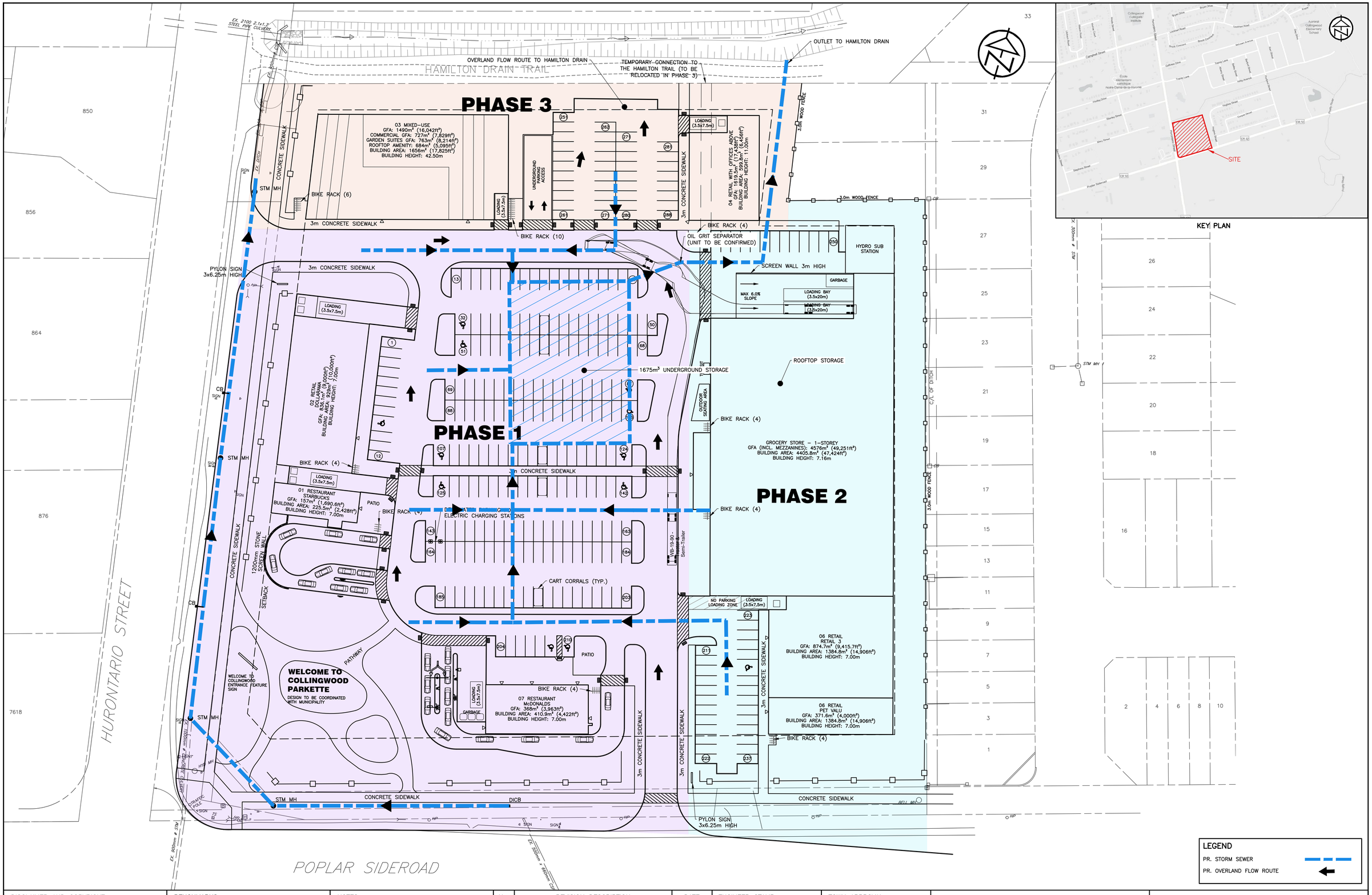

LEGEND

PR. STORM SEWER

PR. OVERLAND FLOW ROUTE

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1.	FOR CIRCULATION	SEPT 2024

ENGINEER STAMP

TOWN APPROVAL

THE GATEWAY CENTRE
COLLINGWOOD, ON

TATHAM ENGINEERING

STORM LAYOUT PLAN

DESIGN: AS	FILE: 120119	DWG:
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Drawing Name: 120119-FSR FIGURES.dwg, Plotted: Sep 17, 2024

Appendix A: Water Demand & Sanitary Calculations

TATHAM ENGINEERING	Project: The Gateway Village: Option C	Date: 16-Sep-24
	File No.: 120119	Designed: JB
	Subject: Water Demand and Sanitary Calculations	Checked: DC

Commercial Water Demand Calculations

PHASE 1

Building 1

Restaurant		125 L/d per seat - OBC Table 8.2.1.3.B. Item 12 a)		
157	m^2	125 L/d * 40 seats	=	**5,000 L/d**

Building 2

Retail		5 L/d per m^2 of floor space - OBC Table 8.2.1.3.B. Item 22 a)		
836	m^2	5 L/d * 836 m^2	=	**4,180 L/d**

Building 7

Restaurant		125 L/d per seat - OBC Table 8.2.1.3.B. Item 12 a)		
368	m^2	125 L/d * 90 seats	=	**11,250 L/d**

TOTAL PHASE 1 = **20,430 L/d**

PHASE 2

Building 6:

Retail		5 L/d per m^2 of floor space - OBC Table 8.2.1.3.B. Item 22 a)		
1246	m^2	5 L/d * 1246 m^2	=	**6,230 L/d**

Building 5

Grocery Store		40 L/d per 9.25m² of floor space - OBC Table 8.2.1.3.B. Item 12 j(i)		
4576	m^2	40 L/d * 4576 /9.25m² of floor space :		**19,788 L/d**
		AND		
Deli Department		190 L/d per 9.25m² of Deli Dept. floor space - OBC Table 8.2.1.3.B. Item 12 j(ii)		
100	m^2	190 L/d * 100 /9.25m² of floor space :		**2,054 L/d**
		AND		
Bakery Department		190 L/d per 9.25m² of Bakery Dept. floor space - OBC Table 8.2.1.3.B. Item 12 j(iii)		
100	m^2	190 L/d * 100 /9.25m² of floor space :		**2,054 L/d**
		AND		
Meat Department		380 L/d per 9.25m² of Meat Dept. floor space - OBC Table 8.2.1.3.B. Item 12 j(iv)		
100	m^2	380 L/d * 100 /9.25m² of floor space :		**4,108 L/d**
		AND		
		950 L/d per water closet - OBC Table 8.2.1.3.B. Item 12 j(v)		
		950 L/d * 4 water closets	=	**3,800 L/d**

TOTAL PHASE 2 = **38,034 L/d**

PHASE 3

Building 3

Retail		5 L/d per m^2 of floor space - OBC Table 8.2.1.3.B. Item 22 a)		
727	m^2	5 L/d * 727 m^2	=	**3,637 L/d**

Building 4

Retail		5 L/d per m^2 of floor space - OBC Table 8.2.1.3.B. Item 22 a)		
540	m^2	5 L/d * 540 m^2	=	**2,699 L/d**
Office		75 L/d per employee 8 hour shift - OBC Table 8.2.1.3.B. Item 15 a)		
1080	m^2	75 L/d * 90 shifts	=	6,750 L/d
		OR		
		75 L/d per 9.3 m^2 of floor space - OBC Table 8.2.1.3.B. Item 22 a)		
		75 L/d * 116 m^2	=	**8,710 L/d**

TOTAL PHASE 3 = **15,045 L/d**

TATHAM ENGINEERING	Project: The Gateway Village: Option C	Date: 16-Sep-24
	File No.: 120119	Designed: JB
	Subject: Water Demand and Sanitary Calculations	Checked: DC

Average Commercial Daily Demand

= **73,510 L/d**

= **73.5 m^3/d** or **0.85 L/s**

Maximum Commercial Daily Demand

Maximum Commercial Daily Demand = Assumed maximum day factor (2.0) * Average Commercial Daily Demand

= 2.0 * 73,510 L/d = **147,019 L/d**

= **147.0 m^3/d** or **1.70 L/s**

Peak Commercial Hour Demand

Peak Commercial Hour Demand = Assumed peak hour factor (3.0) * Average Commercial Daily Demand

= 3.0 * 73,510 L/d = **220,529 L/d**

= **220.5 m^3/d** or **2.55 L/s**

SDU Equivalent Calculation in accordance with the ICBL Exemption and Process Report

SDU Equivalent = 0.754 * Average Commercial Daily Demand

= 0.754 * 73.5 m^3/d = **55.4 SDUs**

Public works has identified the following water servicing demand requirements based on dwelling type. The use of the metric SDU (Single Detached Unit) provides a common term of reference for quantifying water and wastewater system capacity relative to building type. Non-residential water servicing capacity demands will also be communicated in SDUs for consistency.

Dwelling Type	Average Demand (m^3/unit/day)[1]	SDU Equivalents
Single Detached	0.754	1.00
Semi-detached	0.702	0.93
Townhouse	0.624	0.83
Apartment	0.494	0.66

This table demonstrates the greater servicing efficiencies on a unit basis associated with apartments, townhomes and semi-detached homes compared to single detached homes. For example: a 100 unit apartment building would require 66 SDU of servicing capacity whereas 100 single detached houses would require 100 SDU.

TATHAM ENGINEERING	Project: The Gateway Village: Option C	Date: 16-Sep-24
	File No.: 120119	Designed: JB
	Subject: Water Demand and Sanitary Calculations	Checked: DC

Residential Water Demand Calculations

Population Density & Design Flows

Population Density = 1.9 capita/unit - per Amendment to Town of Collingwood Development Standards (2007)
Design Flow = 260 L/capita/day - per Amendment to Town of Collingwood Development Standards (2007)

Building 3

Average Residential Daily Demand = Population Density * Design Flow * No. of Units
165 (2 bedroom units) = 1.9 capita/unit * 260 L/capita/day * 165 units = **81,510 L/d**
= **81.5 m^3/d** or **0.94 L/s**

Average Residential Daily Demand

= **81,510 L/d**
= **81.5 m^3/d** or **0.94 L/s**

Maximum Residential Daily Demand

Maximum Day Factor = 1.77 - per Amendment to Town of Collingwood Development Standards (2007)
Maximum Commercial Daily Demand = Max. Day Factor * Average Residential Daily Demand
= 1.77 * 81,510 L/d = **144,273 L/d**
= **144.3 m^3/d** or **1.67 L/s**

Peak Residential Hour Demand

Peak Hour Factor = 2.70 - per Amendment to Town of Collingwood Development Standards (2007)
Peak Residential Hour Demand = Peak Hour Factor * Average Residential Daily Demand
= 2.70 * 81,510 L/d = **220,077 L/d**
= **220.1 m^3/d** or **2.55 L/s**

SDU Equivalent Calculation in accordance with the ICBL Exemption and Process Report

SDU Equivalent = 0.494 * Total No. of Units
= 0.494 * 165 Units = **81.5 SDUs**

Commercial + Residential Water Demand

Average Daily Demand =	73.5	m^3/d	+	81.5	m^3/d	=	**155.0**	**m^3/d**	or	**1.79 L/s**
Maximum Daily Demand =	147.0	m^3/d	+	144.3	m^3/d	=	**291.3**	**m^3/d**	or	**3.37 L/s**
Peak Hour Demand =	220.5	m^3/d	+	220.1	m^3/d	=	**440.6**	**m^3/d**	or	**5.10 L/s**
SDU Equivalent =	55.4	SDU	+	81.5	SDU	=	**136.9**	**SDU**		

TATHAM ENGINEERING	Project:	The Gateway Village: **OPTION C**	Date: 16-Sep-24
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	Subject:	Water Demand and Sanitary Calculations	Checked: DC

Sewage Generation Calculations

Infiltration

Infiltration Rate = 0.23 L/ha/s - per Town of Collingwood Development Standards (2007) Sec. 4.3.3.1
Site Area = 3.76 ha
Infiltration = Infiltration Rate * Site Area
= 0.23 L/ha/s * 3.76 ha = 0.86 L/s

Equivalent Population

Water Design Flow = 260 L/cap/day - per Amendment to Town of Collingwood Development Standards
Average Commercial Daily Flow = 73,510 L/day
Commercial Population = 73,510 L/day ÷ 260 L/cap/day = 282.7 capita

Population Density = 1.9 capita/unit - per Amendment to Town of Collingwood Development Standards
Total No. of Units = 165 units
Residential Population = 1.90 capita/unit * 165 units = 313.5 capita

Equivalent Population = Commercial Population + Residential Population
= 282.7 capita + 313.5 capita = 596.2 capita

Harmon's Peaking Factor

Harmon's Peaking Factor = $1 + 14 \div (4 + \sqrt{[\text{Population}/1000]})$
= $1 + 14 \div (4 + \sqrt{[596.2/1000]}) = 3.93$

Maximum Daily Flow

Average Daily Flow = 155.0 m^3/d = 1.79 L/s

Maximum Daily Flow = Harmon's Peaking Factor * Average Daily Demand + Infiltration
= 3.93 * 1.79 L/s + 0.86 L/s = **7.92 L/s** or **684.5 m^3/d**

Appendix B: Water & Sanitary Service Calculations

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 1 - PHASE 1

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	**50**	65	75	100	130	150
14	1.8	6.9	12.5	43.0	**77.3**	154.2	224.6	478.6	954.3	1390.3

Flow rate provided by 50 mm diameter water service

$Q_{provided}$ = 77.3 m^3/hr
$Q_{provided}$ = 21.48 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand 5000 L/d
Peak Hour Factor 3.0
Peak Hour Demand, $Q_{required}$ = 0.17 L/s

$Q_{provided}$ =	21.48	L/s	>	$Q_{required}$ =	0.17	L/s	Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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BUILDING 1 - PHASE 1

Calculation of Water Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Average Day Flow =	5000	L/d =	0.06	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.36	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.08	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 0.31 L/s

Check:	**$Q_{provided}$ =**	**9.37**	**L/s**	**>**	**$Q_{required}$ =**	**0.31**	**L/s**	**Acceptable**

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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BUILDING 2 - PHASE 1

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	**50**	65	75	100	130	150
17	1.6	6.3	11.2	38.7	**69.6**	138.8	202.2	431.0	859.3	1251.9

Flow rate provided by 50 mm diameter water service

$Q_{provided}$ = 69.6 m^3/hr
$Q_{provided}$ = 19.34 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand 4180 L/d
Peak Hour Factor 3.0
Peak Hour Demand, $Q_{required}$ = 0.15 L/s

Check: $Q_{provided}$ = 19.34 L/s > $Q_{required}$ = 0.15 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 2 - PHASE 1

Calculation of Water Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Average Day Flow =	4180	L/d =	0.05	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.75	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.17	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 0.36 L/s

Check: $Q_{provided}$ = 9.37 L/s > $Q_{required}$ = 0.36 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 7 - PHASE 1

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	**50**	65	75	100	130	150
18	1.6	6.1	10.9	37.5	**67.5**	134.6	196.1	417.9	833.2	1213.9

Flow rate provided by 50 mm diameter water service

$Q_{provided}$ = 67.5 m^3/hr
$Q_{provided}$ = 18.75 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand 11250 L/d
Peak Hour Factor 3.0
Peak Hour Demand, $Q_{required}$ = 0.39 L/s

$Q_{provided}$ =	18.75	L/s	>	$Q_{required}$ =	0.39	L/s	Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 7 - PHASE 1

Calculation of Water Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Average Day Flow =	11250	L/d =	0.13	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.93	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.21	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 0.73 L/s

Check: $Q_{provided}$ = 9.37 L/s > $Q_{required}$ = 0.73 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
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	Design:	JB
	Checked:	AS
	Revision:	2

Grocery - PHASE 2

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	50	65	75	100	130	**150**
38	1.1	4.1	7.3	25.1	45.1	89.9	131.0	279.1	556.5	**810.8**

Flow rate provided by 150 mm diameter water service

$Q_{provided}$ = 810.8 m^3/hr
$Q_{provided}$ = 225.24 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand 31804 L/d
Peak Hour Factor 3.0
Peak Hour Demand, $Q_{required}$ = 1.10 L/s

$Q_{provided}$ =	225.24	L/s	>	$Q_{required}$ =	0.97	L/s	Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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Grocery - PHASE 2

Calculation of Sewage Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Average Day Flow =	31804	L/d =	0.37	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.75	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.17	L/s			

Required Flow, $Q_{required}$ = Max. Daily Flow • Peak Factor + Extraneous Flow = 1.62 L/s

Check: $Q_{provided}$ = 9.37 L/s > $Q_{required}$ = 1.62 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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	Date:	16-Sep-24
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	Checked:	AS
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Building 6 - PHASE 2

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	**50**	65	75	100	130	150
30	1.2	4.6	8.3	28.5	**51.2**	102.1	148.8	317.1	632.3	921.2

Flow rate provided by 50 mm diameter water service

$Q_{provided}$ = 51.2 m^3/hr
$Q_{provided}$ = 14.23 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand	6230	L/d
Peak Hour Factor	3.0	
Peak Hour Demand, $Q_{required}$ =	0.22	L/s

$Q_{provided}$ =	14.23	L/s	>	$Q_{required}$ =	0.15	L/s	Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

Building 6 - PHASE 2

Calculation of Water Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Maximum Daily Flow =	6230	L/d =	0.07	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.38	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.09	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 0.37 L/s

Check:	**$Q_{provided}$ =**	**9.37**	**L/s**	**>**	**$Q_{required}$ =**	**0.37**	**L/s**	**Acceptable**

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 3 - PHASE 3

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: Copper
Hazen Williams Coefficient, C = 140
Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	50	65	75	100	130	**150**
11	2.1	7.9	14.2	49.0	88.1	175.6	255.8	545.2	1087.0	**1583.7**

Flow rate provided by 150 mm diameter water service

$Q_{provided}$ = 1583.7 m^3/hr
$Q_{provided}$ = 439.91 L/s

Water Demand (from Water Demand and Sanitary Calculations)

	Commercial		Residential	
Average Day Demand	3637	L/d	81510	L/d
Peak Hour Factor	3.0		2.7	
Peak Hour Demand=	0.13	L/s	2.55	L/s
Total Peak Hour Demand, $Q_{required}$ =	**2.67**			

Check: $Q_{provided}$ = 439.91 L/s > $Q_{required}$ = 2.68 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
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	Date:	16-Sep-24
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	Checked:	AS
	Revision:	2

BUILDING 3 - PHASE 3

Calculation of Sewage Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Average Day Flow =	85147	L/d =	0.99	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.94				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.38	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.09	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 3.97 L/s

Check: $Q_{provided}$ = 9.37 L/s > $Q_{required}$ = 3.97 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 4 - PHASE 3

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material:	Copper	
Hazen Williams Coefficient, C =	140	
Pressure drop over the pipe length, DP =	275	kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	**50**	65	75	100	130	150
11	2.1	7.9	14.2	49.0	**88.1**	175.6	255.8	545.2	1087.0	1583.7

Flow rate provided by 50 mm diameter water service

$Q_{provided}$ = 88.1 m^3/hr

$Q_{provided}$ = 24.46 L/s

Water Demand (from Water Demand and Sanitary Calculations)

Average Day Demand	11409	L/d
Peak Hour Factor	3.0	
Peak Hour Demand, $Q_{required}$ =	0.40	L/s

Check: $Q_{provided}$ = 24.46 L/s > $Q_{required}$ = 0.40 L/s Acceptable

TATHAM ENGINEERING	**Project:**	The Gateway Centre
	File No.:	120119
	Date:	16-Sep-24
	Design:	JB
	Checked:	AS
	Revision:	2

BUILDING 4 - PHASE 3

Calculation of Water Flow Rates for Sanitary Services

Manning's Equation as used in this spreadsheet:

$Q = (A \cdot R^{2/3} \cdot S^{1/2})/n$

where Q is the water flow rate in m^3/s
A is the pipe area in m^2
R is the pipe hydraulic radius in m
S is the slope of the pipe
n is the Manning's Coefficient

Flow rate provided by 125 mm diameter sanitary service

Pipe Material:	PVC	
Manning's Coeff. =	0.013	
Slope =	0.01	m/m
Diameter =	0.125	m
Area =	0.012	m^2
Perimeter =	0.39	m
Hydraulic Radius =	0.03	m
Flow Rate, $Q_{provided}$ =	0.009	m^3/s
Flow Rate, $Q_{provided}$ =	9.37	L/s

Sanitary Loading

Maximum Daily Flow =	11409	L/d =	0.13	L/s	(As per Water Demand Calculation)
Harmon's Peaking Factor =	3.9				(As per Town of Collingwood Standards)
Extraneuos Flow Criteria =	0.23	L/ha-s			(As per Town of Collingwood Standards)
Contribuiting Area =	0.21	ha			(As per SAN01 - Sanitary Drainage Plan)
Extraneuos Flow =	0.05	L/s			

Required Flow, $Q_{required}$ = Av. Day Flow • Peak Factor + Extraneous Flow = 0.57 L/s

Check:	**$Q_{provided}$ =**	**9.37**	**L/s**	**>**	**$Q_{required}$ =**	**0.57**	**L/s**	**Acceptable**

TATHAM ENGINEERING

Project:	The Gateway Centre
File No.:	120119
Date:	16-Sep-24
Design:	JB
Checked:	AS
Revision:	2

SITE - MAIN WATERMAIN

Calculation of Water Flow Rates for Different Pipe Sizes
(Hazen Williams Formula - S.I. units)

Pipe Material: PVC Hazen Williams Coefficient, **C** = 150

Pressure drop over the pipe length, DP = 275 kN/m^2

Pipe Length (m)	Water Flow Rate (m^3/hr) Pipe Diameter (mm)									
	12	20	25	40	50	75	100	130	150	**250**
332	0.4	1.3	2.4	8.3	15.0	43.5	92.8	185.0	269.5	**1032.8**

Flow rate provided by 250 mm dia. water service	=	1032.8	m^3/hr
	=	**286.90**	**L/s**
Water Demand (from Water Demand and Sanitary Calculations)			
Commercial			
Average Day Demand	=	73510	L/d
Peak Hour Factor	=	3.0	
Peak Hour Demand	**=**	**2.55**	**L/s**
Residential			
Average Day Demand	=	81510	L/d
Peak Hour Factor	=	2.7	
Peak Hour Demand	**=**	**2.55**	**L/s**
Total Peak Hour Demand	**=**	**5.10**	**L/s**
Total Fire Flow Demand	**=**	**267**	**L/s**
Total Demand	**=**	**272.10**	**L/s**

Hazen Williams Equation as used in this spreadsheet:

$$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Appendix C:
FUS Fire Flow Calculations

Project:	The Gateway Centre - Building 1	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

BUILDING 1

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
1	Frame Use for Construction of Unit	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
2	Type of Occupancy	**Floor Space Area**						
		Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	157	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**157**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	3,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0.00	N/A	3000
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.00	N/A	0
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	3.1-10	0.20	0.20	N/A	600
			East Side	>30	0.00			
			South Side	>30	0.00			
			West Side	>30	0.00			
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								4000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						67
		Required Duration of Fire Flow of 4,000 L/min (hrs):						2
		Required Volume for Fire Flow of 4,000 L/min (m^3):						480

Project:	The Gateway Centre - Building 2	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

BUILDING 2

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Type of Occupancy	Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	836	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**836**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): ($FF = 220 \times C \times A^{0.5}$)					L/min	6,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Free burning	0.15	N/A	6900
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.00	N/A	0
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	20.1-30	0.10	0.30	N/A	2070
			East Side	>30	0.00			
			South Side	3.1-10	0.20			
			West Side	>30	0.00			
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								9000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						150
		Required Duration of Fire Flow of 9,000 L/min (hrs):						2
		Required Volume for Fire Flow of 9,000 L/min (m^3):						1,080

Project:	The Gateway Centre - Building 3	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

Building 3

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Type of Occupancy	Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	1620	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**1620**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): ($FF = 220 \times C \times A^{0.5}$)					L/min	9,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited	-0.15	N/A	7650
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	Complete automatic sprinkler protection	-0.30	N/A	-2295
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	>30	0.00	0.30	N/A	2295
			East Side	10.1-20	0.15			
			South Side	10.1-20	0.15			
			West Side	>30	0.00			
					Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:			8000
6	Required Fire Flow, Duration and Volume				Total Required Fire Flow (above) in L/s:			133
					Required Duration of Fire Flow of 8,000 L/min (hrs):			2
					Required Volume for Fire Flow of 8,000 L/min (m^3):			960

Project:	The Gateway Centre - Building 4	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

BUILDING 4

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Type of Occupancy	Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**3**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	1620	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**1620**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	9,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited	-0.15	N/A	7650
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	Complete automatic sprinkler protection	-0.30	N/A	-2295
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	>30	0.00	0.10	N/A	765
			East Side	>30	0.00			
			South Side	20.1-30	0.10			
			West Side	>30	0.00			
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								6000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						100
		Required Duration of Fire Flow of 6,000 L/min (hrs):						2
		Required Volume for Fire Flow of 6,000 L/min (m^3):						720

Project:	The Gateway Centre - Building 5	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

Grocery Store (Building 5)

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
1	Frame Use for Construction of Unit	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
2	Type of Occupancy	**Floor Space Area**						
		Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	4576	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**4576**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	15,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited	-0.15	N/A	12750
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	Complete automatic sprinkler protection	-0.30	N/A	-3825
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	10.1-20	0.15	0.55	N/A	7013
			East Side	10.1-20	0.15			
			South Side	0-3	0.25			
			West Side	>30	0.00			
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								16000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						267
		Required Duration of Fire Flow of 16,000 L/min (hrs):						2
		Required Volume for Fire Flow of 16,000 L/min (m^3):						1,920

Project:	The Gateway Centre - Building 6	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

BUILDING 6

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Type of Occupancy	Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	1246	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**1246**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	8,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Free burning	0.15	N/A	9200
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.00	N/A	0
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	0-3	0.25	0.40	N/A	3680
			East Side	10.1-20	0.15			
			South Side	>30	0.00			
			West Side	>30	0.00			
					Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:			13000
6	Required Fire Flow, Duration and Volume				Total Required Fire Flow (above) in L/s:			217
					Required Duration of Fire Flow of 13,000 L/min (hrs):			2
					Required Volume for Fire Flow of 13,000 L/min (m^3):			1,560

Project:	The Gateway Centre - Building 7	Date:	September 16, 2024
File No.:	120119	Designed:	JB
Subject:	Fire Flow Calculations	Checked	AS
Revisions:			

BUILDING 7

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Type of Occupancy	Type of Occupancy	Single Family	1			Units	N/A
			Townhouse / Apartment- inform # of units	1				
			Other (Comm. Ind., etc.)	1		**1**		
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**1**	Storeys	N/A
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	368	m^2	N/A
		Measurement Units	Square Feet (ft2)	0.093	1	**368**		
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	4,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Free burning	0.15	N/A	4600
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.00	N/A	0
			Standard hoses for both system & Fire Department	-0.10				
			Surpervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	>30	0.00	0.00	N/A	0
			East Side	>30	0.00			
			South Side	>30	0.00			
			West Side	>30	0.00			
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								5000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						83
		Required Duration of Fire Flow of 5,000 L/min (hrs):						2
		Required Volume for Fire Flow of 5,000 L/min (m^3):						600

Appendix D:
Sanitary Design Sheet

TATHAM ENGINEERING

Sanitary Sewer Design Sheet

Version Number: 1 **Version Date:** March 18, 2021

Project Information

The Gateway Centre Option C.06-L	120119

Drawing Reference

GS02	September 16/24

Prepared By

John Birchard	September 16/24

Reviewed By

Andrew Schoof	September 16/24

Municipality

Town of Collingwood

Population Density

Capita per Unit	Low	Medium	High
	1.90	2.90	-

Infiltration

Infiltration (L/s/ha)	0.23

Flow

Development Type	Average (L/cap/day)	Peaking Factor
Residential	260	Harmon
Development Type	**Average (L/ha/day)**	**Peaking Factor**
Institution	-	-
Commercial	-	3
Industrial High Intensity	-	-
Industrial Low Intensity	-	-

Manning's Coefficient

Pipe Material	Value
Concrete	0.013
PVC	0.013
Applied	0.013

Engineer Stamp

Street Name	Area Label/ID	Upstream Maintenance Hole	Downstream Maintenance Hole	Development Type	Population Density	Number of Units	Population (cap)	Accumulated Population (cap)	Peaking Factor	Area (ha)	Cumulative Area (ha)	Average Flow (L/s)			Peak Flow (L/s)			Proposed Sanitary Sewer							
												Development	Infiltration	Total	Development	Infiltration	Total	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)
The Gateway Centre - Commercial	-	-	MH6B	Commercial		-		0.0	3.00	3.76	3.76	0.85	0.86	1.71	2.55	0.86	3.41	220.0	0.8%	200	0.90	28.40	0.59	90	12.0%
The Gateway Centre - Residential	-	-	MH6B	Residential	Low	165	313.5	313.5	4.07	0.00	0.00	0.94		0.94	3.84		3.84	75.0	0.8%	200	0.90	28.40	0.61	94	13.5%
Flow From Pretty River Estates	201	MH2A	MH1A	Residential	Med.	477	1383.3	1383.3	3.70	24.62	24.62	4.16	5.66	9.83	15.42	5.66	21.08	108.5	0.4%	250	0.78	38.08	0.76	200	55.4%
Hamilton Drain Easement	202	MH1A	MH6B	Residential	Med.	0	0.0	1383.3	3.70	0.03	24.65	4.16	5.67	9.83	15.42	5.67	21.09	41.9	0.4%	250	0.74	36.17	0.73	204	58.3%
Hamilton Drain Easement	203	MH6B	MH62A	Residential	Med.	0	0.0	1696.8	3.64	0.04	28.45	5.96	6.54	12.50	21.81	6.54	28.36	69.6	0.4%	250	0.74	36.17	0.74	228	78.4%
Hamilton Drain Easement	204	MH62A	MH18A	Residential	Med.	0	0.0	1696.8	3.64	0.01	28.46	5.96	6.55	12.50	21.81	6.55	28.36	17.7	2.4%	200	1.62	50.81	1.59	161	55.8%

1. See Appendix A of The Gateway Centre Functional Servicing Report (March 2022) for Commercial Water Demand Calculations
2. Flow rates from Pretty River Estates obtained from Sanitary Design Sheet completed by exp (No. 1584-ADD3 June 2012)

Pretty River Estates Subdivision

Sanitary Sewer Design

(WITH PROPOSED INTENSIFICATION)

exp Project No.: 1584-ADD3
R.P. No.:

Design Parameters

Residential Density =	2.9 cap/unit
Manning 'n' =	0.013
Residential =	450 L/cap/day
Extraneous Flow =	0.23 L/s/ha

Street	Manhole #		INDIVIDUAL		CUMULATIVE		Peaking	Population	Peak Ex.	Peak Design	PIPE SELECTION		Q	V
	from	to	Pop	Area (ha)	Pop	Area (ha)	Factor (M)	Flow (Qp) (l/s)	Flow (Qi) (l/s)	Flow (Qd) (l/s)	Diameter (mm)	Slope (%)	Full (l/s)	Full (m/s)
Hughes St	8A	7A	11.6	0.21	11.6	0.21	4.41	0.27	0.05	0.31	200	0.50%	23.19	0.74
Hughes St	7A	6A	31.9	0.46	43.5	0.67	4.33	0.98	0.15	1.13	200	0.50%	23.19	0.74
Hughes St	6A	5A	23.2	0.63	66.7	1.3	4.29	1.49	0.30	1.79	200	0.50%	23.19	0.74
Hughes St	5A	2A	2.9	0.12	69.6	1.42	4.28	1.55	0.33	1.88	200	0.50%	23.19	0.74
Robertson St	7A	9A	52.2	0.61	52.2	0.61	4.31	1.17	0.14	1.31	200	1.00%	32.80	1.04
Robertson St	9A	10A	87	1.1	139.2	1.71	4.20	3.05	0.39	3.44	200	0.50%	23.19	0.74
Robertson St	10A	11A	87	1.02	226.2	2.73	4.13	4.86	0.63	5.49	200	0.45%	22.00	0.70
Robertson St	11A	17A	55.1	0.68	281.3	3.41	4.09	5.99	0.78	6.78	200	0.40%	20.74	0.66
Portland St	16A	17A	23.2	0.24	23.2	0.24	4.37	0.53	0.06	0.58	200	1.24%	36.52	1.16
Portland St	17A	18A	43.5	0.47	348	4.12	4.05	7.34	0.95	8.29	200	0.55%	24.32	0.77
Hughes St	3A	4A	17.4	0.46	17.4	0.46	4.39	0.40	0.11	0.50	200	0.98%	32.47	1.03
Hughes St	4A	20A	46.4	1.08	63.8	1.54	4.29	1.43	0.35	1.78	200	0.54%	24.10	0.77
Hughes St	20A	21A	46.4	0.9	110.2	2.44	4.23	2.43	0.56	2.99	200	0.39%	20.48	0.65
Hughes St	21A	19A	34.8	0.71	145	3.15	4.20	3.17	0.72	3.89	200	0.47%	22.49	0.72
Portland St	Eden Oak	PLUG	391.5	9.25	391.5	9.25	4.03	8.21	2.13	10.34	250	0.40%	37.61	0.77
Portland St	PLUG	19A	23.2	0.25	414.7	9.5	4.01	8.67	2.19	10.86	250	0.44%	39.45	0.80
Portland St	19A	18A	46.4	0.54	606.1	13.19	3.93	12.41	3.03	15.44	250	0.38%	36.66	0.75
To Ph2	18A	SPS	290	4.05	1374.6	24.2	3.71	26.54	5.57	32.10	250	0.34%	34.68	0.71
Forcemain	SPS	3A	1374.6	24.19	1374.6	24.19	3.71	26.54	5.56	32.10	200	0.80%	29.34	0.93
Hughes St	3A	2A	8.7	0.28	1383.3	24.47	3.70	26.69	5.63	32.32	200	0.81%	29.52	0.94
Easement	2A	1A	0	0.07	1383.3	24.54	3.70	26.69	5.64	32.34	250	0.40%	37.61	0.77
Easement	1A	ExMH	0	0.08	1383.3	24.62	3.70	26.69	5.66	32.35	250	0.40%	37.61	0.77