Functional Servicing Report

272-274 Sunview Street

Waterloo, Ontario

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1.0 Introduction

This Functional Servicing Report has been prepared for a proposed residential development located at 272-274 Sunview Street in Waterloo, Ontario. The site is 0.134 hectares and is currently developed with two detached residential homes. The proposed development is a 16 townhouse units, constructed two blocks of 3 units and two blocks of 5 units.

The site is located on the east side of Sunview Street and south of Hickory Street West. The site location is shown in Figure 1.

This report reviews the functionality of the potable water supply, sanitary sewer servicing, and stormwater management.



Figure 1: Location of Subject Property (City of Waterloo GIS Mapping)

2.0 Overview of Proposed Development

The total site area is 0.134 ha. The existing single detached houses will be removed to be replaced by the proposed townhouses. Vehicle access to the site will be provided off Sunview Street.

The development will be serviced by municipal watermain, sanitary sewers and storm sewers. The water service will be brought to the site from the existing 150mm dia watermain in Sunview Street.

A 150mm diameter sanitary sewer will be extended into the site from the existing 200mm diameter municipal sanitary sewer in Sunview Street.

The proposed development will include a storm sewer connection to Sunview Street. On site quality and quantity control of storm water will be provided.

3.0 Environmental Features

The proposed development is not in close proximity to environmental features such as wetlands, woodlots, creeks or other water bodies. The site is not within GRCA regulated and Source Protection areas.

4.0 Water Servicing

The water demand for the residential development has been calculated in accordance with the Region of Waterloo Design Guidelines 2026 (DGSSMS 2026), the Ministry of the Environment Drinking Water Systems Design Guidelines (2008) and the City of Waterloo Development Charges Background Study dated Jan. 6, 2020.

In accordance with the DGSSMS 2026, the average residential daily demand is 225 L/person/day. The population density is 2.43 persons per unit for row housing based on the City of Waterloo Development Charges Background Study.

Townhouse Development = 16 townhouse units x 2.43 persons per unit = 38.9 people

Total Population = 39 people

The peaking factors used to calculate the maximum daily demand, and the peak hourly demand are based on the Ministry of the Environment's drinking water systems design guidelines. The peaking factor used to determine the maximum daily demand is 2.75, while the peak hourly demand factor is 4.13. The water demand is summarized in the Table 1. Water demand calculations are included in Appendix A.

Table 1: Summary of Water Demand for Proposed Development

Water Demand Category	Water Demand Rate
Average Day Demand	0.101 L/s
Maximum Day Demand	0.278 L/s
Peak Hour Demand	0.418 L/s

The required fire flow has been calculated in accordance with the Fire Underwriter's Survey, 2020. Table 8 presents a Suggested Required Fire Flow for Row Housing based on Exposure Distances. For exposure distance of less than 3m, and masonry or brick construction, the required fire flow is 9,000 L/min, or 150 L/s.

A hydrant flow test was conducted on the municipal watermain in Sunview on October 15, 2025. The flow test reported a static pressure of 46 psi. A flow of 2476 L/min was available at 44 psi, and a flow of 3702 L/min was available at 42 psi. Extrapolating the flow curve, it is estimated that 9,000 L/min is available without dropping the pressure below 20 psi in the municipal water system. The Hydrant Flow Test report and calculations are included in Appendix A.

A 50mm diameter watermain will be brought into the site from Sunview Street. Each Townhouse unit will be serviced by a 25mm diameter water service off the 50mm watermain. A water servicing model was created using EPA NET in PCSWMM. The static pressure in the municipal watermain was obtained from the hydrant flow test. The max day and peak hour demands were entered into the model and the resulting pressure and velocities in the 50mm watermain were reviewed. The results for the maximum day and peak hourly demand scenarios are summarized in Table 2.

Table 2: Water Servicing Model Results

Water Demand Scenario	Maximum Flow	Minimum Pressure	Maximum Velocity
Maximum Day Demand	0.278 L/s	46.29 PSI	0.142 m/s
Peak Hour Demand	0.418 L/s	46.24 PSI	0.213 m/s

The minimum pressure is greater than the minimum pressure of 40psi as per the Region's DGSSMS. As well, the maximum velocity is less than the maximum velocity of 5 m/s as per the Region's DGSSMS. Full water model results are included in Appendix A.

5.0 Sanitary Servicing

A 150mm diameter sanitary sewer will be brought into the site from the existing 200mm sanitary sewer in Sunview Street. Each townhouse unit will be serviced by 100mm diameter sanitary service.

The sanitary flow calculations are based on the Region of Waterloo's Design Guidelines which stipulate an average flow of 275 L/c/d for residential areas plus an allowance for inflow and infiltration of 0.25 L/s/ha.

The peak sewage flow from the proposed townhouse development to Sunview Street is 0.708 L/s.

The sanitary sewer design sheets have been included in Appendix B.

6.0 Stormwater Management

6.1 Geotechnical and Hydrogeological Conditions

Site specific geotechnical information was not available at the time this report was prepared. However, based on soils mapping soils are generally clayey silt till with low-medium permeability.

6.2 Existing Drainage Patterns

The site is located west of Sunview Street and south of Hickory Street W. There are no external lands draining to the site. Under existing conditions, the front of the lots drain overland towards Sunview Street. The existing 250mm diameter storm sewer along Sunview Street conveys the runoff north towards Hickory Street W. The back of the lots drains overland towards the backyard property line which drains north across the adjacent lot towards the existing storm sewer in Hickory Street W.

6.3 Proposed Drainage Patterns

The site will be graded to capture parking lot runoff, rooftop runoff and landscape runoff from the back of the units into catchbasins. Discharge will be controlled by a vortex valve and an orifice restriction. The restrictions installed on the outlet structure will cause stormwater to back up into the underground storage chambers. The storage chambers will provide stormwater retention volume. The on site storm sewers will connect to the storm sewer in Sunview Street, which outlets to the Hickory Street storm sewer outlet. Peak flows from the proposed development are controlled to match existing flows to the Sunview Street Storm Sewer.

An oil grit separator will be installed to provide quality control of runoff prior to discharge to the Sunview Street storm sewer.

The on site stormwater management system is designed to manage the 100 year storm event. However, in the event of rainfall that exceeds the 100 year storm event, the major overflow route will direct runoff to the north east corner. It is not possible to direct the major storm to Sunview Street due to the change elevations from the road to the back of the site.

6.4 Stormwater Management Design Criteria

The stormwater management design criteria are in accordance with the City of Waterloo's Development Engineering Manual.

The design criteria are:

1. Control the 2 year, 5 year to 100 year post development peak discharge rates to the existing discharge rates.
2. Provide quality control of runoff to an enhanced level, 80% removal of suspended solids.

The storm sewers upstream of the outlet control orifice and vortex valve function as a component of the stormwater retention volume, and as such, they are not sized for conveyance. The storm sewers downstream of the outlet controls have been sized to convey the controlled discharge during the 5 year storm event. The storm design sheet is included in Appendix F.

6.5 Stormwater Modeling

MIDUSS Modeling was used to determine the volume of runoff generated from the design storm events.

The design storm hyetographs were based on the "Chicago" rainfall distribution, with the A, B, and C parameters fitted to the following IDF curve for the City of Waterloo.

Table 3: City of Waterloo IDF Parameters

Return Period	A	B	C
2 Year	1101	9.258	0.882
5 Year	1755	12.347	0.895
100 Year	4692	17.437	0.956

The site was divided into the drainage catchment areas for the existing and proposed conditions as shown in the tables below.

Table 4: Existing Drainage Catchment Areas For MIDUSS Modeling

Catchment ID	Description	Area (ha)	Percent Impervious (%)	Flow Length (m)	Slope (%)
101	Existing Area to Sunview	0.046 ha	49%	10 m	2.0%
102	Existing Area to Back of Site	0.088 ha	20%	20 m	2.5%
Total		**0.134 ha**			

Table 5: Proposed Drainage Catchment Areas For MIDUSS Modeling

Catchment ID	Description	Area (ha)	Percent Impervious (%)	Flow Length (m)	Slope (%)
201	Uncontrolled Overland to Sunview	0.010 ha	20%	3m	2.0%
202	Proposed Site (Controlled)	0.124 ha	80%	30m	1.5%
Total		**0.134 ha**			

Stormwater storage will be provided through the use of underground storage units (Triton ADS Stormtech SC-800 or equivalent). The discharge rate from the underground storage will be controlled

using a two stage outlet control system. A vortex valve will provide control of the 2 year and 5 year storm events, while a second outlet pipe installed at a higher elevation will provide additional outlet capacity during the 100 year storm event.

The stage storage discharge calculations for the storage chambers, pipe storage and structure storage are included in Appendix C. The Hydro International design tool was used to calculate the flows for the vortex valve. The vortex valve design information is included in Appendix G.

The results from the MIDUSS modelling are summarized below and the output files are included in Appendix D.

Table 6: MIDUSS Model Results – Peak Discharge Under Existing and Proposed Conditions to Sunview Street

Storm Event	Existing Peak Flow to Sunview Street (m^3/s)	Proposed Peak Flow Sunview Street (m^3/s)
2 Year Storm	0.004 m^3/s	0.004 m^3/s
5 Year Storm	0.007 m^3/s	0.005m^3/s
100 Year Storm	0.013 m^3/s	0.013 m^3/s

The peak flow from the site under proposed conditions is less than or equal to the existing flow from the site for the 2 year, 5 year and 100 year storm events.

The performance of the stormwater management areas is summarized in the table below.

Table 7: Performance of Stormwater Quantity Control Components

Underground Storage Chambers, Pipe Storage, Structure Storage (Area 202)			
Vortex Valve Location	CBMH1		
Invert	344.28		
Base of Storage	344.28		
Top of Storage	344.78		
Total Storage Vol. Provided	62.6 m^3		
Orifice Location	CBMH1		
Orifice Diameter	75 mm		
Orifice Invert	344.95		
Overflow Elevation	345.55 (CBMH1)		
	2 Year Storm	**5 Year Storm**	**100 Year Storm**
Peak Inflow	0.019 m^3/s	0.028 m^3/s	0.055 m^3/s
Peak Discharge	0.004 m^3/s	0.004 m^3/s	0.013 m^3/s
Maximum Water Elevation	344.49 m	344.83 m	345.40 m
Maximum Storage Volume	9.8 m^3	25.2 m^3	51.8 m^3

6.6 Stormwater Quality Control

Stormwater quality control will be provided using an oil grit separator installed on storm sewer outlet prior to discharge to Sunview St.

The Stormceptor sizing program was used to select the appropriate OGS model as summarized in the table below. The sizing summary is included in Appendix E.

Table 8: Oil Grit Separator Performance Summary

Catchment ID	Area (ha)	Stormceptor Model	Quality Control Level (TSS Load Reduction)	Runoff Volume Capture
201	0.134 ha 80% Impervious	EFO4	97%	>90%

7.0 Erosion and Sediment Control

Erosion and sediment control measures will be implemented to minimize any impact to the adjacent properties during construction. The use of a mudmat at the property entrance will be used to eliminate material from entering the roadway. Catch basin sediment traps will be used to eliminate and sediment from entering the storm system during construction. The site will be surrounded by silt fencing during construction. Erosion and sediment control measures shall be inspected daily to be maintained and repaired as necessary.

8.0 Maintenance and Monitoring

The proposed stormwater management plan consists of several components. Each component, its primary function, and required maintenance is summarized in the table below.

SWM Component	Function	Maintenance Activity	Maintenance Frequency
Vegetated Swales at north and south property lines	Convey runoff to catchbasin and provide removal of TSS	• Maintain vegetation by mowing and weeding • Inspect side slopes for erosion and slumping	• Bi-weekly or as required • Annually and after major rain events
Underground Storage System	Provide underground storage of runoff	• Visually inspect storage system for sediment accumulation using inspection port • Maintain storage system by cleaning with jet-vac equipment	• As needed based on inspection and manufacturer's recommendations
Orifice at CBMH1	Restrict high flow discharge rates	• Inspect for debris and dirt clogging orifice	• Annually and after major rain events
Vortex valve at CBMH1	Restrict low flow discharge rates	• Inspect for debris and dirt clogging vortex valve	• Annually and after major rain events

9.0 Conclusions

The site will be serviced with municipal watermains, sanitary sewers, and storm sewers. A water service will be extended into the site from the municipal watermain in Sunview Street. The sanitary sewer will discharge to the existing sanitary sewer in Sunview Street and a storm sewer connection will be provided to Sunview Street.

Stormwater management will be achieved through the use of underground storage with controlled discharge. The total stormwater discharge from the subject property will be controlled to the existing discharge rates.

An oil grit separator unit will be installed the storm outlet to provide quality control to an enhanced, 80% removal, level.

All of which is respectfully submitted,

Sandra Swanton, P.Eng.
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APPENDIX A

Water Demand Calculations and Fire Flow Analysis

APPENDIX B

Sanitary Sewer Design Sheet

APPENDIX C

Underground Storage Stage Storage Discharge Calculations

APPENDIX D

MIDUSS Modeling Output

Existing Conditions

2 Year Storm
5 Year Storm
100 Year Storm

Proposed Conditions

2 Year Storm
5 Year Storm
100 Year Storm

APPENDIX E

Quality Control – Oil Grit Separator Sizing Report

APPENDIX F

Storm Sewer Design Sheet

APPENDIX G

Vortex Valve Design Information

APPENDIX H

FSR and SWM Checklist