Functional Servicing and Stormwater Management Report

5688 Main Street

October 2024 — Project No. 100319
Hyson Properties Inc.

TYLin

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1. Introduction

TYLin has been retained by Hyson Properties Inc. to prepare a detailed Functional Servicing and Stormwater Management Report along with a corresponding grading and servicing design in support of the Zoning By-law Amendment (ZBA) application for the proposed development. The subject property is located at the north-west corner of Main Street and Palmwood gate at municipal address 5688 Main Street in the Town of Whitchurch-Stouffville, Ontario (refer to **Figure 1-1**).

This report will:

- Provide background information regarding the subject property;
- Summarize the existing site conditions;
- Provide information regarding the proposed development conditions;
- Outline the proposed grading for the development; and
- Outline the existing and proposed municipal servicing.

The recommended servicing has been developed in accordance with the applicable design criteria and requirements of the Town of Whitchurch-Stouffville (the Town), the Regional Municipality of York (the Region) and Lake Simcoe Region Conservation Authority (LSRCA).

Figure 1-1 Location Plan

1.1. PROJECT BACKGROUND

The subject property is 4,022 m^2 in area at municipal address 5688 Main Street in the Town of Whitchurch-Stouffville. The site is presently occupied by a single commercial building and a parking lot.

The subject site is bound by Main Street to the south, future residential development to the west, residential to the north and Palmwood Gate to the east. The site is located in an area that is well established and serviced by a network of municipal infrastructure including roads, sewer, watermains, and other services and utilities.

The existing topography of the site is generally flat with gentle sloping from north to south. Existing site drainage primarily is captured by internal catchbasins which are connected and discharged to existing adjacent municipal storm infrastructure. No external drainage enters the site.

1.2. PROPOSED DEVELOPMENT

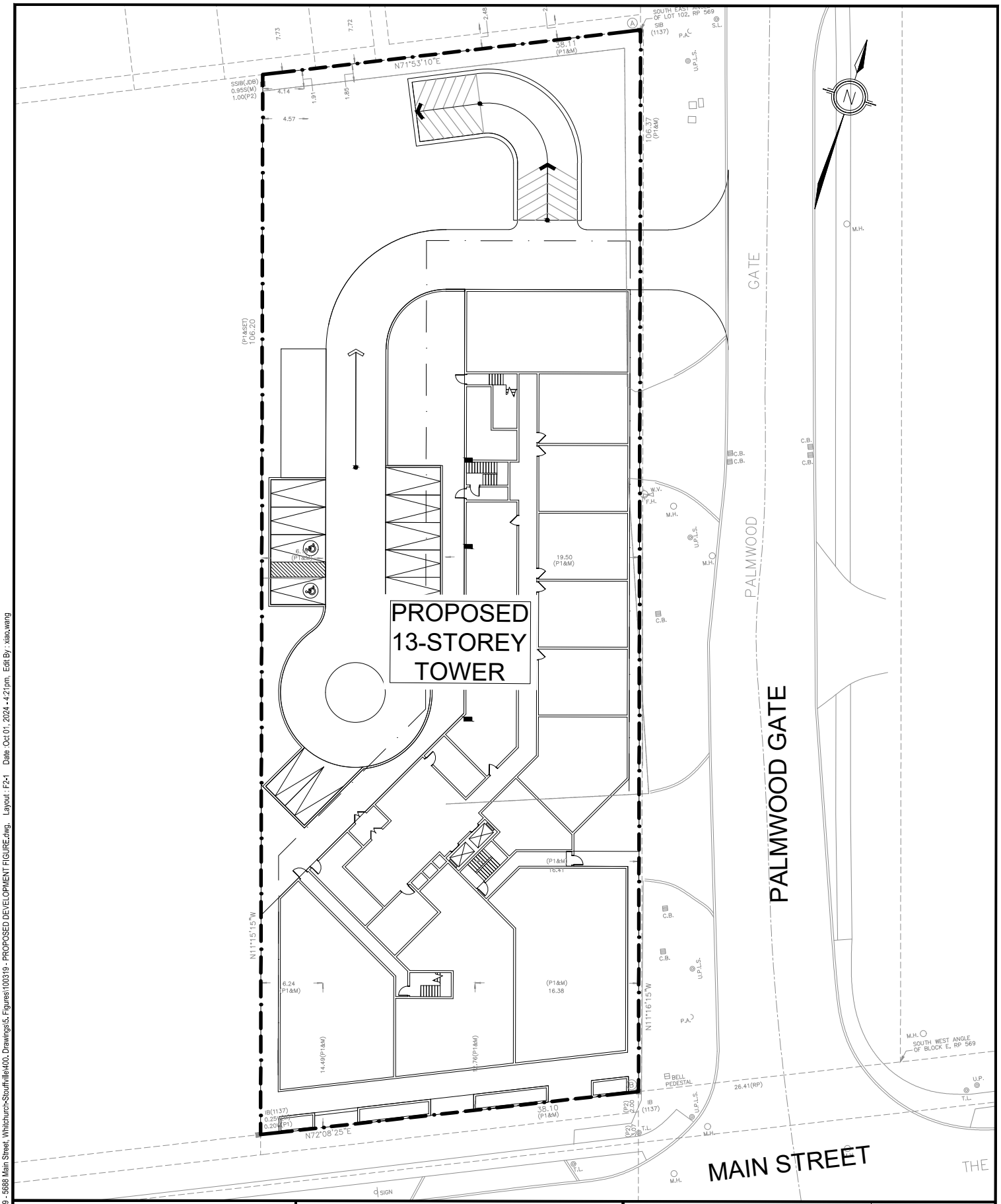
The proposed development includes the demolition of the existing buildings and the construction of a 13-storey mixed-use building with a 6-storey podium totalling 254 residential units. The building will utilize a two-level underground parking structure which will cover most of the subject site. Refer to **Figure 1.2** for the proposed development plan.

1.3. SITE ACCESS

The site's main vehicular access will be through an entrance along the east side off Palmwood Gate with pedestrian access along the east and south sides of the property. Site loading and underground parking structure ramp access will be along the north side of the building. The proposed site vehicular access to the site will require the removal of existing curb and gutter and construction of a new vehicular entrance.

1.4. UTILITIES

As this site is a redevelopment of an existing property within a developed area of Town of Whitchurch-Stouffville, all utilities including telephone, cable, electricity and gas are readily available to service the subject property.



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5688 MAIN STREET
HYSON PROPERTIES INC.
PROPOSED DEVELOPMENT PLAN

SCALE:	1:500
DATE:	OCTOBER 2024
DESIGNED BY:	H.E./X.W.
CHECKED BY:	B.D.

PROJECT No. 100319

FIGURE No. 1-2

2. Stormwater Management

2.1. Existing Stormwater Management

The existing topography of the site is generally flat with gentle sloping from north to south. Existing site drainage primarily drains towards catchbasins along the east side of the site within the municipal boulevard. Based on review of existing record drawings it appears that these catchbasins are then connected and discharge out towards the Palmwood Gate right-of-way existing municipal storm sewers, which then flow into the storm sewers along Main Street. Under existing conditions, it appears that no external drainage enters the site and that no stormwater management quantity or quality controls exist on site. It should be noted that under existing conditions 1138m^{2}of drainage area flows towards the neighbouring property on the west side of the site. Refer to **Figure 2.1** for the **Existing Drainage Area Plan**.

The existing site servicing details obtained from The Town of Whitchurch-Stouffville engineering plan and profiles and a topographical survey completed of the area, indicate that there is an existing 900mm storm sewer on the west side of Palmwood Gate adjacent to the subject site. It appears that the subject site catchbasins are connected to this sewer in existing conditions. It appears that the catchbasins in the adjacent Main Street and Palmwood Gate rights-of-ways also connect to this storm sewer. The 900mm storm sewer flows south down Palmwood Gate and connects to the storm sewer along Main Street. The existing sewer infrastructure is shown on **Servicing Plan (S1)**.

2.1.1. Stormwater Management Design Criteria

The proposed stormwater management design is based on the MOE 2003 Stormwater Management Planning & Design (SWMPD), The Town of Whitchurch-Stouffville "Design Guidelines and Standard Drawings" (April 2021), and The Toronto and Region Conservation Authority "Stormwater Management Criteria" (August 2012).

The subject site is within the Rouge River Watershed. The subject site drainage flows south through municipal storm infrastructure on Main Street, which ultimately discharges into the Rouge River and subsequently Lake Ontario.

Stormwater Quantity Control

- The design of the storm sewer drainage system shall provide controls to match the existing capacity of the adjacent storm sewer, which is designed to the 5-year storm event. All site flows up to and including the post development 100-year storm event will be captured and controlled to the existing 5-year design flow rate.

Stormwater Quality Control

- A minimum of "Normal" level of water quality treatment, as defined in the MOE design guidelines (2003) is required for all SWM facilities. This is equivalent to a 70% TSS reduction.

Stormwater Water Balance

- As per the SWM Design Manual (MOE, 2003), water balance impacts should be evaluated during the design of a site stormwater management system. All efforts should be made to match pre- and post-development infiltration volumes in order to maintain groundwater recharge.

- A minimum of 5mm for all storm events will be retained through infiltration, evapotranspiration and/or rainwater reuse.

Construction Erosion and Sediment Control

- All applicants must include an Erosion and Sediment Control plan demonstrating that fish habitat and water quality are not affected by sediment from the property during or following site construction.
- Guidelines and strategies to develop Erosion and Sediment Control plans can be found in the *Erosion and Sediment Control Guidelines for Urban Construction* manual (GGHA CA, 2006).

2.1.2. Proposed Stormwater Outlet Connection

The proposed storm connection will be made to the existing 900mm storm sewer adjacent to the south-east corner of the site via a 300mm storm service connection at 1.0% within Palmwood Gate. Based on the review of the existing record drawings, it appears that the 900mm storm sewer in Palmwood Gate currently receives drainage from the subject property. In order to discharge to this storm sewer, the proposed development will be required to match the post development storm flows to the existing development flows.

The proposed sewer infrastructure is shown on the **Servicing Plan (S1).**

2.1.3. Stormwater Management Design Strategy

Since the subject proposed development has nearly full coverage underground parking structure, the proposed stormwater management will need to be located within the building parking structure. It is expected that the vast majority of the quantity storage will be contained with a stormwater tank on the P1 level of the building. For water quality an Oil-grit-separator will be required for treatment of the surface runoff upstream from the stormwater tank. The tank will have a re-use chamber to retain clean stormwater run-off for site landscape irrigation purposes. The storm control maintenance hole will have an orifice to control site flows to the existing development flows. It is anticipated that the proposed design will have a net improvement on the downstream storm sewer network and the Rouge River watershed.

2.1.4. Stormwater Quantity Control

The subject site stormwater management design criteria are based on The Town of Whitchurch-Stouffville "Design Guidelines and Standard Drawings" (April 2021). The design of the storm sewer drainage system shall provide controls to match the existing capacity of the adjacent storm sewer, which is designed to the 5-year storm event. All site flows up to and including the post development 100-year storm event will be captured and controlled to the existing 5-year design flow rate.

The existing allocation for the allowable release rate has been determined based the exiting site topography and area land use. Under proposed conditions the site will be required to control storm water runoff to the 5-year rate which is currently discharging to the 900mm storm sewer in Palmwood Gate. All stormflows greater than the 5-year event which exceed the capacity of the sewer will be controlled on site through a proposed stormwater management tank. The existing site area is a mix of landscaping, rooftop, and asphalt. Based on these areas a composite runoff coefficient was determined.

The stormwater flows were determined using a time of concentration 10 minutes and a composite runoff coefficient of 0.82 for existing and 0.77 for proposed. Town of Stouffville design guidelines were used in conjunction with pre and post site condition data to compute the storm water management

design. See **Figure 2-1 and 2-2** for area type breakdown and catchment areas.

The total required stormwater storage to achieve the allowable post development flows is 38.1m^3. This will be achieved through a storm vault storage on the P1 level. The tank will be equipped with a 220mm outlet orifice plate which will control peak 100-year storm discharge to 90.4L/s, which is less than the existing 5-year allowable release rate of 94.5L/s, and therefore achieving the stormwater quantity criteria objective.

As per **Table 1** below, in existing conditions 1138m^2 of pervious site area flows towards the neighboring property to the west. From the existing conditions it would result in 284.5m^3/hr of flow directed towards the property on the west side. In proposed conditions 33m^2 of landscape and 22m^3 of impervious area flows towards the neighboring property, which results in a flow of 28.1m^3/hr of flow. As per riparian rights, due to the neighboring western property receiving flows from the subject site in existing conditions, the proposed development may continue to maintain existing drainage patterns.

Table 1-1: Pre-Development and Post-Development Flow Comparison to Neighboring West Property

	Drainage Area(m^2)	Runoff Coefficient	Q(m^3/hr)
Existing	1138	0.25	294.7
Proposed	33	0.25	8.3
Proposed	22	0.90	19.8

2.1.5. Stormwater Quality Control

Based on the requirements of the MOE and The Town of Whitchurch-Stouffville, stormwater quality is required to achieve an average of 70% long-term removal of total suspended solids based on an annual loading basis from all runoff leaving the site.

Most of the site is rooftop or pedestrian hardscape and landscape. Runoff from rooftop areas is considered "clean" water and does not require quality control. Asphalt pavement driveways and vehicular loading areas of the proposed development area will have the potential to generate contaminated runoff and will require treatment to achieve the water quality objective. An analysis was completed to determine the TSS removal rate would achieve a 67% removal rate without any additional controls. In order to achieve the requirement, an Oil Grit Separator is proposed which will increase overall treatment of TSS removal to be 87%, achieving the TSS removal requirement.

2.1.6. Stormwater Water Balance

The site has been designed so that at minimum, the 5mm storm event can be retained on site through infiltration. Based on a total developed area of 4,022m^2, the 5mm volume required to be retained on site is 20.1m^3 (4,022m^2 x 5mm).

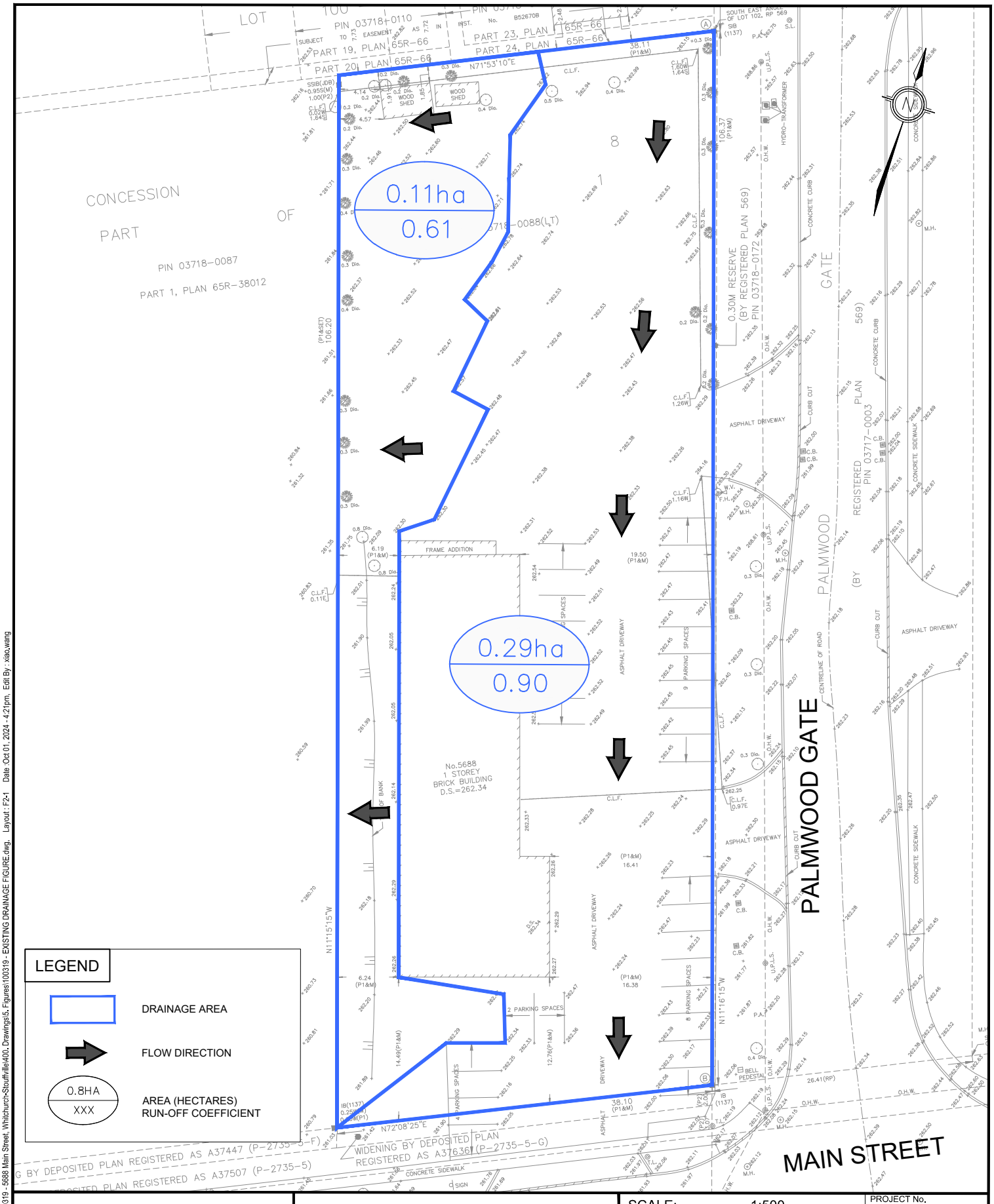
The first step in the analysis of water balance is initial abstraction. The initial abstraction of water depends on the surface with which the water lands. For example, a landscaped area with permeable soils has an initial abstraction of 5mm whereas an impervious surface like an asphalt road has an initial abstraction of 1mm. The initial abstraction for the is 9.9m^3 for the total site area therefore the remaining 10.2m^3 of water will need to be retained and reused on site.

2.2. CONSTRUCTION EROSION & SEDIMENT CONTROL

Details for erosion and sedimentation control during construction will be subject to the Town of Whitchurch-Stouffville approval prior to issuance of Building Permit. During the site grading and servicing works, there is potential for sediment-laden runoff to be directed toward the adjoining properties, municipal streets, and existing storm infrastructure. Therefore, prior to any grading activity, sediment control fencing and hoarding must be installed along the site perimeter. Additional measures will include construction of an entrance "mud-mat' on the access to be used during construction to minimize mud tracking offsite. Material stockpiles are to be located in appropriate locations. Inlet sediment control devices are to be used on existing catchbasins in municipal right-of-ways that may be affected by the construction of this site. The sequencing of the implementation of the above and additional erosion and sediment control measures is summarized in the following table.

Table 2-2: Erosion Control Sequencing

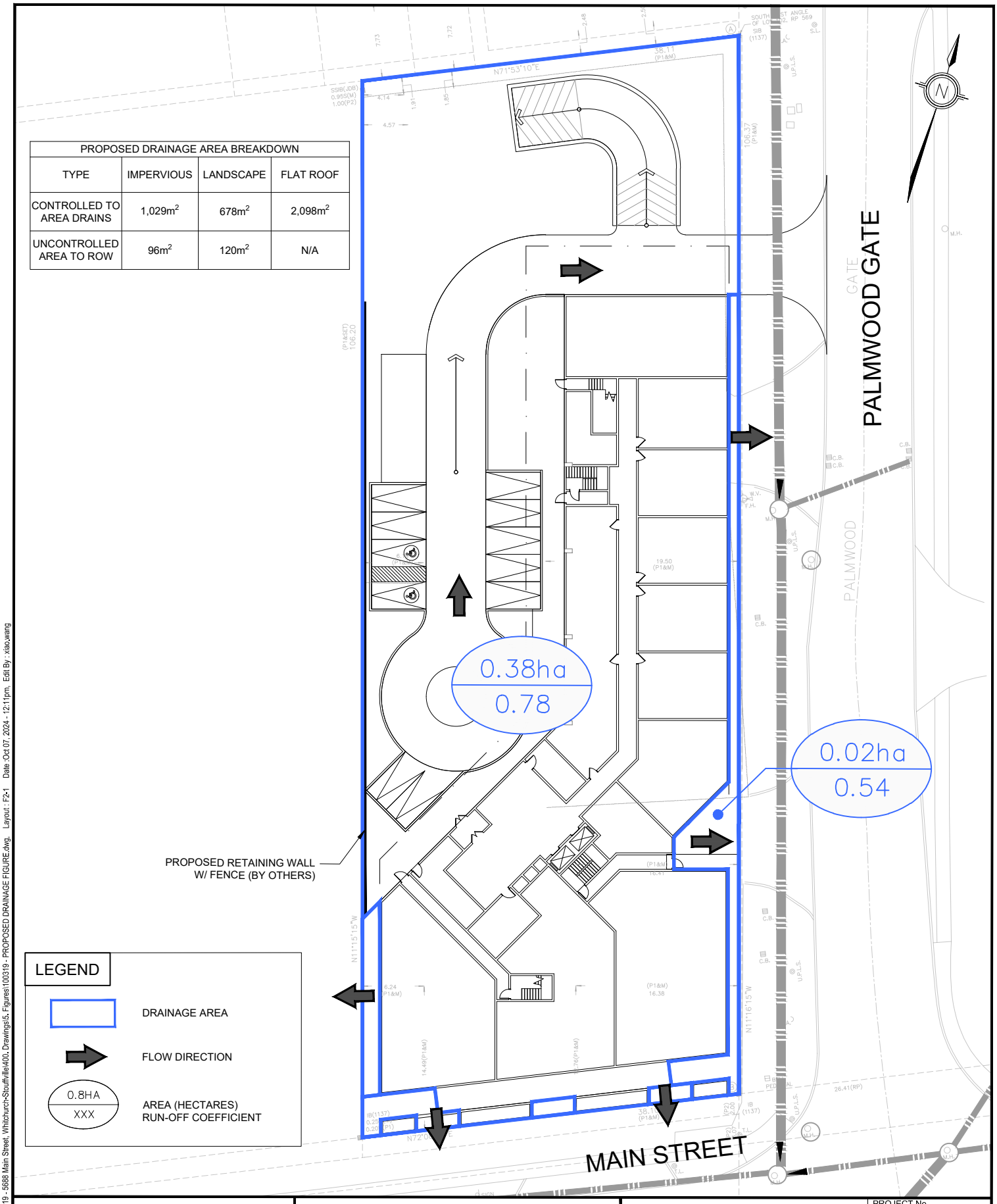
Activity	**Erosion Control Practice**
Area Grading	• Construct and maintain entrance "mud-mat". • Construct and maintain sediment control fencing around the downstream perimeter of the site. • Locate stockpiles away from sensitive areas.
Servicing and Asphalt Works	• Limit open trench lengths to minimize erosion potential of excavated material. • Prevent erosion of material stockpiles. • During work stoppages or inclement weather, plug ends of open sewers to prevent downstream sedimentation. • Protect catchbasin inlets with Terrafix Silt Sack.
Maintenance	• Remove accumulated sediments when depth exceeds 0.30 m. • Maintain and repair sediment control fencing as required. • Maintain and repair catchbasin sediment controls as required.



TYLin 3381 STEELES AVENU EAST, Suite 315 TORONTO, ON M2H 3S7 p: 905.738.5700 f: 905.738.0065	5688 MAIN STREET HYSON PROPERTIES INC. EXISTING DRAINAGE PLAN	SCALE: 1:500 DATE: OCTOBER 2024 DESIGNED BY: H.E./X.W. CHECKED BY: B.D.	PROJECT No. 100319 FIGURE No. 2-1

File : G:\Projects\2023\100319 - 5688 Main Street, Whitchurch-Stouffville\400_Drawings\5_Figures\100319 - EXISTING DRAINAGE FIGURE.dwg, Layout : F2-1 Date: Oct 01, 2024 - 4:21pm, Edit By : xiao.wang

PROPOSED DRAINAGE AREA BREAKDOWN			
TYPE	IMPERVIOUS	LANDSCAPE	FLAT ROOF
CONTROLLED TO AREA DRAINS	1,029m^2	678m^2	2,098m^2
UNCONTROLLED AREA TO ROW	96m^2	120m^2	N/A



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5688 MAIN STREET
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FIGURE No. 2-2

3. Sanitary Servicing

3.1. Existing Sanitary Servicing

The existing site servicing details obtained from The Town of Whitchurch-Stouffville engineering plan and profiles and a topographical survey completed of the area indicate that there is sanitary sewer infrastructure in the vicinity of the site. The following sanitary infrastructure is adjacent to the subject site;

- A 200mm diameter sanitary sewer in Palmwood Gate flowing south. This sewer conveys sanitary flow north of the site towards Main Street and then connects into a 200mm sanitary sewer which flows west on Main Street.
- A 200mm diameter sanitary sewer in Main Street flowing west.

The site is currently occupied by a single commercial building and a parking lot. Based on the Town of Whitchurch-Stouffville design flow rate of 350L/d/capital and population density of 80 person/hectare, the total peak sanitary flow for the existing condition (including infiltration allowance) has been calculated as 0.17L/s. Refer to **Appendix B** for the sanitary calculations and **Servicing Drawing (S1)** for the existing sanitary sewer infrastructure and proposed sanitary service design.

3.2. Proposed Sanitary Servicing

The average flows and densities for the various areas of the site and building types was obtained from the Town of Whitchurch-Stouffville *Design Guidelines and Standard Drawings*. The total peak sanitary flow for the proposed development (including the infiltration allowance) has been calculated as 8.09L/s. This is an estimated peak increase of 7.92 L/s from the existing sanitary flow rate of 0.17 L/s. This flow rate would represent 28.1% of the capacity of the existing 200mm sanitary sewer main on Main Street. Refer to **Appendix B** for details of the calculations.

The subject site's proposed sanitary sewer outlet will be to the existing 200mm sanitary sewer along Main Street. The subject site sanitary sewer will connect directly into the Main Street sanitary sewer via a 200mm storm service connection at 1.0% slope into a proposed maintenance hole. Refer to **Servicing Drawing (S1)** for the location of the proposed sanitary infrastructure.

4. Water Servicing

4.1. Existing Water Servicing

The existing site servicing details obtained from The Town of Whitchurch-Stouffville engineering plan and profiles and a topographical survey completed of the area, indicate that there is watermain infrastructure in the vicinity of the site. The following watermain infrastructure is adjacent to the subject site;

- A 250mm diameter watermain on the west side of Palmwood Gate,
- A 250mm diameter watermain on the north side of Main Street,

Refer to the **Servicing Drawing (S1)** for the location of the existing watermain infrastructure.

4.2. PROPOSED WATER SERVICING

The proposed water service connection will be made to the 250 mm diameter watermain located within the Main Street right-of-way just south of the site. The connection will consist of a proposed 150mm main connection with 100mm domestic watermain as per Town of Whitchurch-Stouffville standard drawing WS-614. The water service will have a backflow preventer and meter located in the mechanical room within the building's P1 level. Refer to **Servicing drawing (S1)** for additional details.

Under proposed conditions the development is anticipated to have a maximum required fire flow demand of 67L/s based on the Fire Underwriters Survey and assuming non-combustible construction and a standard NFPA sprinkler system. The maximum day, minimum hour, and peak hour domestic flow demands for the development under proposed conditions has been calculated as 3.43L/s, 1.83L/s, and 5.14L/s, respectively.

A hydrant flow test was completed on November 9, 2023 in order to verify that the watermain has adequate flow and pressure to service the development. In accordance with the Fire Underwriters Survey (FUS), fire flows for residential areas will not be less than 4,800 L/min (80L/s) for a 2-hour duration in addition to maximum daily domestic demand, delivered with a residual pressure of not less than 140kPa (20.3psi). With a maximum day demand + fire flow of 70.1/s, accounting for major and minor losses in the system from the residual hydrant from the flow test, the residual pressure is 76.5psi, which is above the minimum requirement of 20.3psi.

Refer to **Appendix C** for fire and domestic flow demand calculations and the proposed and existing watermain infrastructure are shown on the **Servicing Drawing (S1)**.

4.3. FIRE HYDRANT COVERAGE

There is one main existing fire hydrant located within the proximity of the proposed development:

- An existing fire hydrant at the east side of the site on Palmwood Gate, located approximately 60m north of Main Street.

Due to the height and size of the proposed development there will be a siamese connection required which will need to be serviced within 45m of a fire hydrant. The siamese connection will be next to the primary entrance of the proposed development.

5. Conclusion

The proposed development will see the construction of a 254-unit mixed-use development at 5688 Main Street in the Town of Whitchurch-Stouffville. The proposed development can be serviced utilizing the existing and proposed infrastructure outlined in the **Servicing Drawing (S1)**. Our conclusions and recommendations for servicing of the proposed development is summarized as follows:

Stormwater Servicing

- The proposed development will match 100-year post-development peak flows to existing development peak 5-year flows.
- The proposed development site stormwater drainage will have a net improvement to the downstream sewer infrastructure.
- Stormwater quality will be achieved by the high percentage of rooftop, landscape coverage, and the installation of the proposed oil-grit-separator.
- The proposed development will be serviced by a new 300mm storm sewer with a slope of 1.0%, connecting to the existing 900mm storm sewer within the Palmwood Gate.
- Under post-development conditions it is expected that stormwater runoff will have had an improvement in quality and quantity as compared with existing development condition.
- A stormwater storage vault will be constructed within the first level of the underground parking facility. The vault will be designed with a 220mm orifice plate, restricting flows and achieving a total storage volume of 38.3m^3 to control the 100-year post-development flows to the allowable release rate of 90.36L/s.

Sanitary Servicing

- The anticipated peak sanitary peak flow for the proposed development is 8.09L/s.
- It is expected that this additional loading will not have a negative impact on the existing municipal sanitary sewer system and will sufficiently handle the increased loading.
- The new service connection will consist of 200 mm diameter connection at a 1.0% slope and will be made to the existing 200mm sanitary sewer within Main Street.

Water Servicing

- The calculated fire flow demand due to the proposed development is 67 L/s.
- The calculated maximum day, peak hour, and minimum hour domestic demands are 3.43L/s, 5.14L/s, and 1.83L/s, respectively.
- The proposed development will be serviced by the proposed fire and domestic service connections provided off of the 250mm diameter watermain on Main Street.
- Under fire flow demand loading condition, water pressure will remain at approximately 76.5 psi, which is above the minimum required pressure of 20.3 psi.
- Additional confirmation of the fire and domestic branch sizing and fire flow requirements should be provided by the Mechanical Consultant at the Building Permit stage of approval.

Recommendations

In summary, the site can be adequately serviced in respect to water supply, sanitary drainage, stormwater drainage, and stormwater management. The stormwater quantity and quality controls can be implemented in accordance with The Toronto Region Conservation Authority "Stormwater Management Criteria" (August 2012).

Accordingly, we hereby recommend the adoption of this report as it relates to the provision of servicing works, and for the purposes of site plan application, and building permit application approvals. We trust that this Functional Servicing and Stormwater Management Report is sufficient for your purposes. If you have any questions or comments, please do not hesitate to contact the undersigned.

Sincerely,

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Prepared by:

Xiao Wang, E.I.T.

Urban Development

Reviewed by:

Ben Davies, P.Eng

Director, Urban Development

Appendix A

STORMWATER MANAGEMENT CALCULATIONS

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Project Name: 5688 MAIN STREET	
Project #: 100319	Prepared by: H.E./X.W.
Date: 10/7/2024	Checked by: B.D.

Portion of Site = Phase 1

ALLOWABLE RELEASE FLOW

1. Pre, External & Post Development Uncontrolled Area:

Note: Post Dev. Controlled Area is shown in Orifice Calculations

Table 1. a) Total Uncontrolled Area

			Uncontrolled Area (m^2)			
Type of Land	**T (min)**	**Runoff Coef. (C)**	**Pre Dev. Site (A)**	**Pre Dev. Incoming External (A)**	**Total Pre Dev. (A)**	**Post Dev. Uncontrolled (A)**
Total Unrestricted Area			**4021.77**	**-**	**4021.77**	**216.45**
Combined T (min)					**10**	**10**
Combined Runoff Coefficient			**0.82**	**-**	**0.82**	**0.54**
Landscape	10	0.25	500.21	0	500.21	120.13
Impervious	10	0.90	3521.56	0	3521.56	96.32
Gravel	10	0.75	0	0	0	0

2. Formulas, Coefficients & Average Rainfall Intensity:

$i = a(T+b)^{-c}$, where i (mm/h) ; T (min)

Q = A(i)C/3600, where A (m^2) ; i (mm/h)

Note: a,b,c = coefficients as per municipal standards

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
a		696.679	1015.963	1279.709	1546.81	1802.604	2051.707
b		4.957	5.255	5.715	5.746	6.029	6.23
c		0.811	0.826	0.841	0.845	0.853	0.86
Total Unrestricted Area	i (mm/h)	77.67	107.00	126.19	150.60	169.09	186.74

3. Pre Development Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	**Q (L/s)**	**71.15**	**98.02**	**115.60**	**137.96**	**154.90**	**171.07**

Summary: The Pre Development Flow is Q2=71.1L/s, Q5=97.9L/s, Q10=115.5L/s, Q25=137.8L/s, Q50=154.7L/s, Q100=170.9L/s.

4. Post Development Uncontrolled Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	Q (L/s)	2.52	3.47	4.10	4.89	5.49	6.06
Restricted Flat Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Green Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Flow	**Q (L/s)**	**2.52**	**3.47**	**4.09**	**4.88**	**5.48**	**6.05**

Summary: The Post Development Uncontrolled Flow is Q2=2.5L/s, Q5=3.5L/s, Q10=4.1L/s, Q25=4.9L/s, Q50=5.5L/s, Q100=6.1L/s.

5. Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Pre Development Flow	Q (L/s)	71.07	97.92	115.48	137.82	154.74	170.89
Allowable Release Flow	**Q (L/s)**	**71.07**	**97.92**	**115.48**	**137.82**	**154.74**	**170.89**
Post Development Uncontrolled Flow	Q (L/s)	2.52	3.47	4.09	4.88	5.48	6.05
Uncontrolled Release Flow	**Q (L/s)**	**2.52**	**3.47**	**4.09**	**4.88**	**5.48**	**6.05**
Remaining Release Flow for Orifice	**Q (L/s)**	**68.56**	**94.45**	**111.38**	**132.94**	**149.26**	**164.84**

Summary: The Allowable Release Flow is Q2=71.1L/s, Q5=97.9L/s, Q10=115.5L/s, Q25=137.8L/s, Q50=154.7L/s, Q100=170.9L/s.
Summary: The Uncontrolled Release Flow is Q2=2.5L/s, Q5=3.5L/s, Q10=4.1L/s, Q25=4.9L/s, Q50=5.5L/s, Q100=6.1L/s.

Summary: The Remaining Release Flow for Orifice is Q2=68.6L/s, Q5=94.4L/s, Q10=111.4L/s, Q25=132.9L/s, Q50=149.3L/s, Q100=164.8L/s.

TYLin

Project Name: 5688 MAIN STREET	
Project #: 100319	Prepared by: H.E./X.W.
Date: 10/7/2024	Checked by: B.D.

Portion of Site = Phase 1

ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

6. Summary Table of Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Allowable Release Flow	Q (L/s)	71.07	97.92	115.48	137.82	154.74	170.89
Uncontrolled Release Flow	Q (L/s)	2.52	3.47	4.09	4.88	5.48	6.05
Remaining Release Flow for Orifice	**Q (L/s)**	**68.56**	**94.45**	**111.38**	**132.94**	**149.26**	**164.84**

Summary: The remaining release flow for the orifice is Q5=94.4L/s.

7. Total Post Development Area:

			Area (m^2)				
Types of Land	**T (min)**	**Runoff Coef. (C)**	**Post Dev. Uncontrolled (A)**	**Post Dev. Controlled (A)**	**Total Post Dev. (A)**	Note: Max. treatment inflow = 154L/s.	
Total Area			**216.45**	**3805.32**	**4021.77**	**TSS Removal Rate without treatment**	**TSS Removal Rate with Oil Grit Separator**
Combined T (min)			**10**	**10**	**10**		
Combined Runoff Coefficient			**0.54**	**0.78**	**0.77**		
Landscape	10	0.25	120.13	677.55	797.68	100%	100%
Impervious	10	0.9	96.32	1029.35	1125.67	0%	80%
Unrestricted Flat Roof	10	0.9	0	2098.42	2098.42	90%	90%
					Total	**67%**	**87%**

Summary: The maximum storage facility inflow (Q) = 154L/s.
Summary: The TSS removal rate without treatment < 80%, therefore an Oil Grit Separator is required to be constructed upstream of the storage facility to provide a TSS removal rate of 87%.

8. Orifice Design:

Orifice Details:

Post Development Return Period to be Controlled	=	100	year
Pre Development Return Period to Control to	=	5	year
Orifice Discharge Coefficient (C)	=	0.62	Plate
Orifice Inside Diameter	=	220	mm
Orifice Area	=	0.038	m^2
High Water Head from invert (h)	=	0.75	m
Allowable Orifice Flow (Q)	=	94.45	L/s
Actual Orifice Flow (Q)	=	$CA(2gh)^{1/2}$	
	=	90.36	L/s

Summary: The Orifice is a Plate with an Inside Diameter of 220mm.
Summary: The Actual Orifice Flow is Q100=90.4L/s.

9. Storage Facility Design:

Storage Facility	=	Vault	
Storage Volume Required (V_1)	=	38.2	m^3 (Storage Calc's)

Vault Elevations:

Surface Elevation	=	262.43	m
Top of Vault Elevation	=	261.93	m
High Water Level (HWL)	=	261.63	m
Orifice Invert Elevation	=	260.88	m
Bottom of Vault Elevation	=	260.68	m
P1 Slab Elevation	=	257.93	m

Vault Details:

Freeboard Height	=	0.3	m
High Water Head from invert (h)	=	0.75	m
Area Required (A_1)	=	V_1 / h	
	=	51	m^2
Area Provided (A_2)	=	51	m^2
Sump Height	=	V / A_2	
	=	0.2	m
Storage Volume Provided	=	A_2 (h)	
	=	**38.3**	m^3

Summary: The Vault Storage Volume Required is 38.2m³.
Summary: The Vault Storage Volume Provided is 38.3m³.

Storm Service Connection:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
300	1	1.37	96.7	93%

5mm Storm Retention:

Initial Abstraction	**Depth (mm)**	**Area (m^2)**	**IA (m^3)**
TOTAL		**4021.77**	**9.9**
Landscape	5	798	4.0
Impervious	0.6	1126	0.7
Gravel	5	0	0.0
Building (Flat Roof)	2.5	2098	5.2
Building (Green Roof)	5	0	0.0

Total Unrestricted Area	A =	4021.77	m^2
Storm Event to be Captured	E =	5	mm
Initial Abstraction	IA =	9.90	m^3
Dead Storage Volume	V =	A(E)-IA	
	=	4021.77(5)/1000-9.9	
	=	10.2	m^3

Summary: The Dead Storage Volume Required & Provided is 10.2 m³.

TYLin

Project Name: 5688 MAIN STREET	
Project #: 100319	Prepared by: H.E./X.W.
Date: 10/7/2024	Checked by: B.D.

Portion of Site = Phase 1

STORAGE CALCULATIONS

10. Storage Calculations

Controlling the 100 Year Post Development Flow to the 5 Year Pre Development Flow.

$i = a[(T+b)/60]^{-c}$, where i (mm/h) ; T (min)	i = average rainfall intensity (mm/h)
$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)	a,b,c = coefficients as per municipal standards
	T = time of concentration (min)
a = 2051.707	Q = flow (m^3/s)
b = 6.23	A = area (m^2)
c = 0.86	C = runoff coefficient

Note: Restricted Flat Roof & Restricted Green Roof are controlled to 42L/s/ha.

	Total Site	Vault	Restricted Flat Roof	Restricted Green Roof
Area (m^2)	4021.77	3805.32	-	-
Runoff Coef.	0.77	0.78	-	-
$Q_{controlled}$ (m^3/s)	0.09445	0.09036	-	-

Note: 'Vault' Inflow calculation = 100 year flow + 'restricted flat roof' flow (0m³/s) + 'Green Roof' flow (0m³/s).
Note: Max. 'Vault' Inflow = 0.154m³/s

		Total Site Storage			Vault Storage			Restricted Flat Roof Storage			Restricted Green Roof Storage		
Time (min)	i (mm/h)	Inflow, Q (m^3/s)	Flow Stored, Q (m^3/s)	Req. Storage, V (m^3)	Inflow, Q_1 (m^3/s)	Flow Stored, Q_1 (m^3/s)	Req. Storage, V_1 (m^3)	Inflow, Q_2 (m^3/s)	Flow Stored, Q_2 (m^3/s)	Req. Storage, V_2 (m^3)	Inflow, Q_3 (m^3/s)	Flow Stored, Q_3 (m^3/s)	Req. Storage, V_3 (m^3)
Maximum	-	-	-	**39.8**	**0.154**	-	**38.2**	-	-	**0.0**	-	-	**0.0**
10	186.74	0.161	0.066	39.712	0.154	0.064	38.164	0.000	0.000	0.000	0.000	0.000	0.000
11	177.38	0.153	0.058	38.370	0.146	0.056	36.887	0.000	0.000	0.000	0.000	0.000	0.000
12	168.98	0.145	0.051	36.655	0.139	0.049	35.253	0.000	0.000	0.000	0.000	0.000	0.000
13	161.40	0.139	0.044	34.620	0.133	0.043	33.313	0.000	0.000	0.000	0.000	0.000	0.000
14	154.51	0.133	0.038	32.308	0.127	0.037	31.107	0.000	0.000	0.000	0.000	0.000	0.000
15	148.23	0.128	0.033	29.754	0.122	0.032	28.669	0.000	0.000	0.000	0.000	0.000	0.000
20	123.58	0.106	0.012	14.226	0.102	0.012	13.836	0.000	0.000	0.000	0.000	0.000	0.000
25	106.36	0.091	0.000	0.000	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	93.61	0.081	0.000	0.000	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
35	83.76	0.072	0.000	0.000	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40	75.91	0.065	0.000	0.000	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	69.49	0.060	0.000	0.000	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	55.72	0.048	0.000	0.000	0.046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	49.37	0.042	0.000	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
80	44.41	0.038	0.000	0.000	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	40.41	0.035	0.000	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	32.00	0.028	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	26.64	0.023	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
180	22.90	0.020	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Summary:

Vault Storage

1 'Vault Storage' Required = 38.2m³.
2 'Vault Storage' Provided = 38.3m³.

Restricted Flat Roof Storage

3 'Restricted Flat Roof Storage' Available = 50% (0.5) x flat roof area (0m²) x 150mm ponding depth (0.15m) = 0m³.
4 'Restricted Flat Roof Storage' Utilized < Available. Utilized Storage = 0m³.

Green Roof Storage

5 'Restricted Green Roof Storage' Available (saturation storage) = 25mm (0.025m) x green roof area (0m²) = 0m³.
6 'Restricted Green Roof Storage' Utilized > Available storage. Utilized storage = 0m³.
7 Ponding Depth = [utilized storage (0m³) - available storage (0m³)] / green roof area (0m²) x 1000 = 0mm.

Total Site Storage

8 'Total Site Storage' Required = 39.8m³.
9 'Total Site Storage' Available = Vault (38.3m³) + Flat Roof (0m³) + Green Roof (0m³) = 38.3m³.
10 'Total Site Storage' Utilized = Vault (38.3m³) + Flat Roof (0m³) + Green Roof (0m³) = 38.3m³.

SWM Measure	Value
Allowable Release Flow (Q)	97.92L/s
Uncontrolled Release Flow (Q)	3.47L/s
Allowable Orifice Flow (Q)	94.45L/s
Actual Orifice Flow (Q)	90.36L/s
Orifice Type:	220mm Plate
'Vault Storage' Required	38.2m³
'Vault Storage' Provided	38.3m³
'Restricted Flat Roof Storage' Utilized	0m³
'Restricted Green Roof Storage' Utilized	0m³
'Total Site Storage' Required	39.8m³
'Total Site Storage' Utilized	38.3m³
TSS Removal Rate without treatment	67%
TSS Removal with treatment (Max. Inflow = 154L/s)	87%
Vault Area Provided	51m²
'Dead Storage' Required & Provided	10.2m³
Sump Height	0.2m

Appendix B

SANITARY CALCULATIONS

Project Name : **5688 Main Street**
Project # : **100319**
Sanitary Servicing Analysis

TYLin

Prepared by: H.E./X.W.
Checked by: B.D.
Date: October 7, 2024

Standards = Stouffville

Formulas

Peaking Factor (Harmon) = $1+14/[4+(P/1000)^{1/2}]$

Peak Flow = p(q)M(unit conversion) + infiltration

Existing Sanitary Design Flow

Land Type	Area (m^2)	# of Units /Floor Area	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	4021.77				0.23 L/s/ha		0.09
Commercial - 1 Storey	571.12		0.008 Persons/m2	5	350 L/day/person	4.00	0.07
Total	**571.12**						**0.17**

Proposed Sanitary Design Flow

Land Type	Area (m^2)	# of Units /Floor Area	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	4021.77				0.23 L/s/ha		0.09
Residential (Peak Flow)		254 Units	2.2 Persons/unit	559	350 L/day/person	3.50	7.92
Commercial	610.92		0.008 Persons/m2	5	350 L/day/person	4.00	0.08
Total	**610.92**						**8.09**

Summary

Existing Sanitary Design Flow =	0.17	L/s
Proposed Sanitary Design Flow =	8.09	L/s
Increased Flow =	7.92	L/s

Service Connection	Diameter (m)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Spare Capacity (L/s)	Usage Increased (%)	Total Usage (%)
Service	200	1.0	1.04	32.80	24.71	-	24.7%
Ex. Main	200	0.7	0.90	28.21	20.12	28.1%	28.7%

Notes

1. The proposed development is an increase of 7.92 L/s of peak sanitary flow to the downstream sanitary sewer system.
2. This increase is equal to 28.1% of the total pipe capacity of the existing 200mm municipal sanitary sewer.
3. This flow is equal to 24.7% of the total pipe capacity of the proposed 200mm diameter service connection.

Appendix C

WATER DEMAND CALCULATIONS

FIRE HYDRANT FLOW TEST (BRUCEFIRE ENGINEERING)

TYLin

5688 Main Street Prepared by: **XW**

100319 Checked by: **BD**

Required Fire Flow Date: **10/7/2024**

as per Fire Underwriters Survey Water Supply for Public Fire Protection, 2020

1. Initial Required Fire Flow (Step A, B, C)

Construction Type =	Type II Noncombustible Construction	
Construction Coefficient, C =	0.8	
Total Effective Area, A =	2269.05	m^2
Required Fire Flow, RFF =	8383.68	LPM
RFF, rounded =	**8000**	**LPM**

2. Occupancy and Contents Adjustment Factor (Step D)

Contents =	Noncombustible contents	
Adjustment Factor =	-25%	
RFF =	**6000**	**LPM**

3. Automatic Sprinkler Protection (Step E)

Sprinkler Design	Designed	Building Coverage	Credit
Automatic sprinkler protection designed and installed in accordance with NFPA 13	Yes	100%	30%
Water supply is standard for both the system and Fire Department hose lines	Yes	100%	10%
Fully supervised system	Yes	100%	10%
	Total Sprinkler Credit =		50%

Reduction = 3000 LPM

4. Exposure Adjustment Charge (Step F)

Direction	Distance	Charge
North	20.1m to 30m	10%
South	Greater than 30m	0%
East	Greater than 30m	0%
West	20.1m to 30m	10%
	Total Charge =	20%
	Charge =	**1200 LPM**

5. Final Required Fire Flow (Step G)

RFF =	6000	LPM
Reduction =	3000	LPM
Charge =	1200	LPM
RFF =	4200	LPM

Final RFF, rounded =	**4000**	**LPM**
	1057	**GPM**
	67	**L/s**

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5688 Main Street
100319
Domestic Demand

Prepared by: **XW**
Checked by: **BD**
Date: **10/7/2024**

as per York Region Design Guidelines

Population =	564	
Per Capita Demand =	350	L/cap/day
Average Daily Demand =	197400	L/day
	2.28	L/s

	Average Day	Minimum Hour	Peak Hour	Maximum Day	
Peaking Factor	n/a	0.80	2.25	1.50	
Demand	**2.28**	**1.83**	**5.14**	**3.43**	**L/s**
	36.21	28.97	81.48	54.32	GPM

Fire Flow =	66.67	L/s
Max Day Flow =	3.43	L/s
Total Flow =	**70.1**	**L/s**

Domestic

Diameter	Area (m^2)	Length (m)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
100	0.0079	2.7	0.4	0.025	0.00	0.01	0.010
					Total major loss (psi) =		**0.010**

Fire

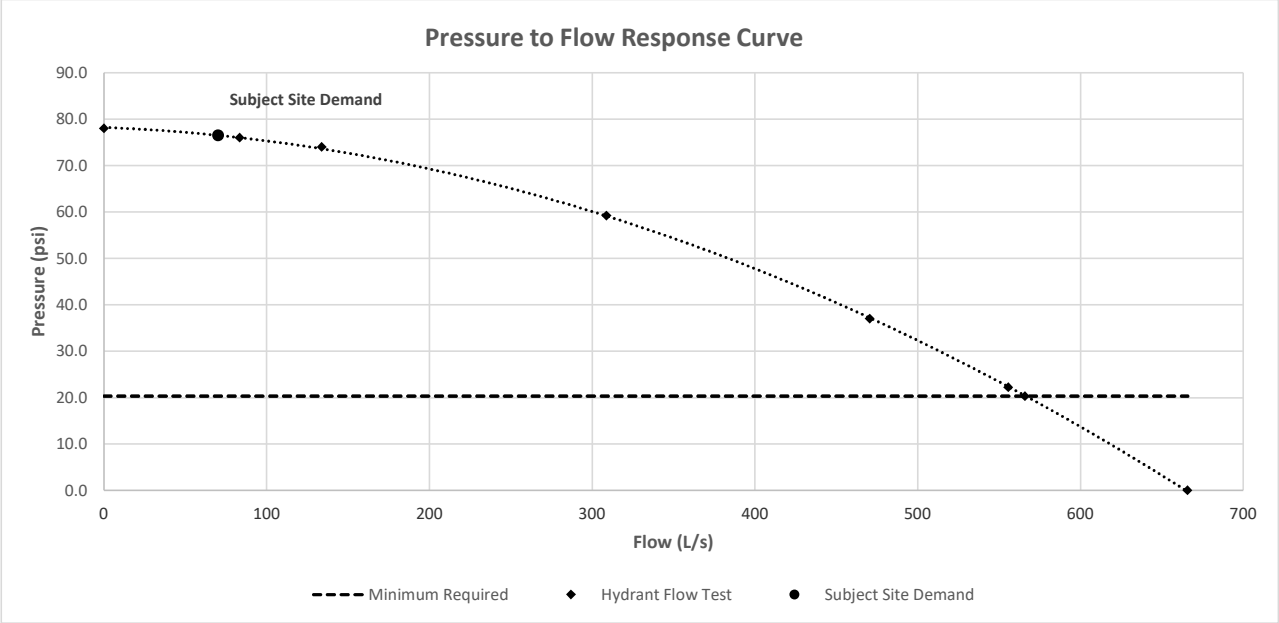
Diameter	Area (m^2)	Length (m)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
150	0.0177	4.3	0.2	0.0375	0.00	0.00	0.002
					Total major loss (psi) =		**0.002**

Total Headloss =	**0.012 psi**

Flow Test Results & Servicing Hydraulic Analysis

Pressure (psi)	*Flow (L/s)*	
78	0	*Static Pressure*
76	83.4	
74	133.9	

Flow Requirement =	***70.1***	L/s
Theoretical Pressure =	***76.5***	psi
With Pressure Losses =	***76.5***	psi
Minimum Required =	***20.3***	psi



"Fire Protection with Intelligence"
BRUCE Fire Engineering

Bruce Fire Engineering Ltd.

400 Applewood Crescent, Suite 100
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L4K 0C3

Phone: 905 482 4678
Fax: 905 581 3203
Toll Free Phone/Fax: 1 800 260 0187

Email: artem@brucefire.ca

Professional Engineers Ontario

HYDRANT FLOW TEST REPORT

TEST DATE: **Nov 9, 2023.** **TIME:** **1:30 pm**

LOCATION: **5688 Main St, Whitchurch-Stouffville, ON L4A 2T1**

TESTED BY: **Artem Matthew – Bruce Fire Engineering**

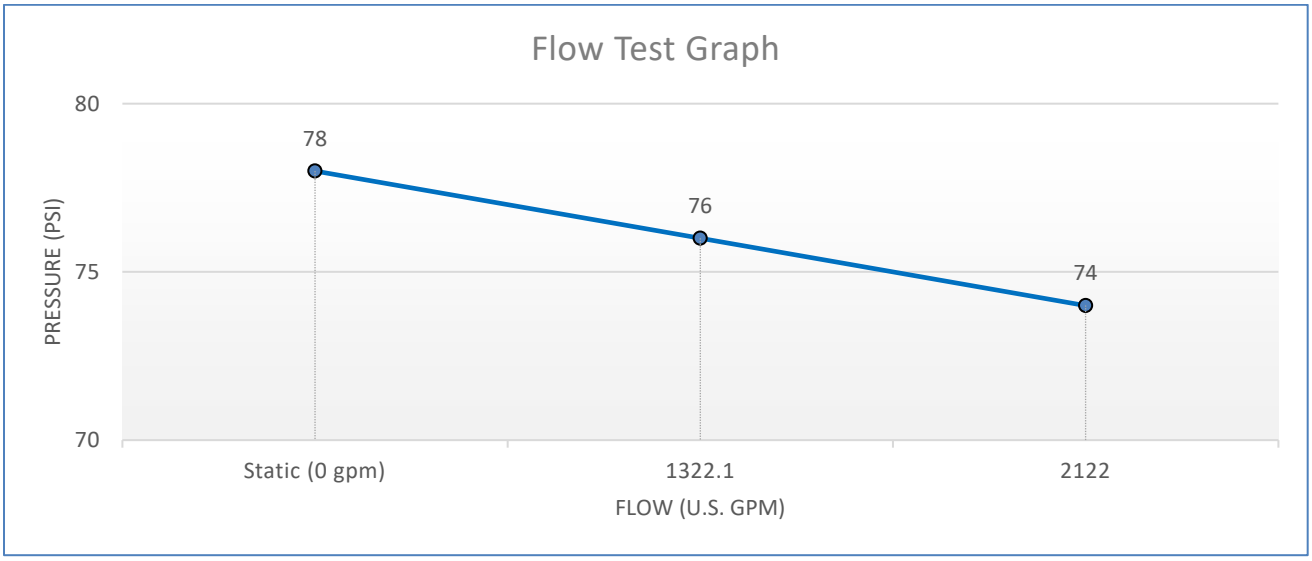
TEST RESULTS:

STATIC PRESSURE (psi)	78

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (inch)	DISCHARGE COEFFICIENT	RESIDUAL PRESSURE (psi)	PITOT PRESSURE (psi)	DISCHARGE (gpm)
1	1	2½"	0.9	76	62	1322.1
2	2	2½"	0.9	74	38/38	2124

Flow test done as per NFPA 291 recommendations.

Calculated Flow 9002 gpm @ 20 psi



AREA MAP


Rupert Ave
Service Rd
Palmwood Gate
Service Rd
Tokyo Smoke Stouffville Main
Reesor's Market & Bakery
Shoppers Drug Mart
Leggat Stouffville Ford
Car dealer
LCBO
Let Us Shop For You Today
STATIC AND RESIDUAL HYDRANT
Main St
Main St
FLOW HYDRANT
Main St
Main St
Main St
Palmwood Gate
Firehouse Subs Stouffville
Sandwich · $$
The Beer Store
CIBC Branch with
Firehouse Subs Stouffville
Order Firehouse Subs Today
East Side Mario's
All-You-Can-Eat
One Plant Cannabis Dispensary - Stouffville
Mostar St
Starbucks
A New Spin On Festive Flavours