

**FUNCTIONAL SERVICING REPORT  
PROPOSED TOWNHOUSE DEVELOPMENT  
FOUNTAIN HILL CONSTRUCTION AND CONSULTING LTD  
2207 DIXIE ROAD  
CITY OF MISSISSAUGA  
REGIONAL MUNICIPALITY OF PEEL**



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## **1.0 INTRODUCTION**

Skira & Associates Ltd. has been retained by Fountain Hill Construction and Consulting Ltd. to investigate and prepare a Functional Servicing Report (FSR) in support of an Official Plan Amendment and Zoning By-Law Amendment for a proposed residential townhouse development at 2207 Dixie Road, in the City of Mississauga, Region of Peel.

The purpose of this report is to define the existing municipal services to the subject parcel of land and the proposed servicing details in support of the proposed residential development.

It is intended this FSR will result in ‘approval in principal’ of the design proposal by the City of Mississauga, Regional Municipality of Peel and any other relevant authorities.

## **2.0 STUDY AREA INFORMATION**

The subject property is part of Lot 5, Concession 1, South of Dundas Street in the City of Mississauga, Regional Municipality of Peel. The site is located on the northwest corner of Dixie Road and Venta Avenue intersection. Refer to **Figure 1 Key Plan**.

The majority of the site is relatively flat in topography with gentle sloping towards the northeast with a grade differential of approximately 0.50m. Currently, the site is comprised of an existing single-family residential home fronting Dixie Road, and surrounded by existing residential properties to the west and north. The existing building will be demolished prior to the start of construction.

The proposed residential development will consist of 4 townhouse units and a private laneway on approximately 0.07Ha.

### **3.0 SITE ACCESS**

The site is in a good location to be serviced by existing local roads; Dixie Road will provide good access to arterial road Queensway East and major highways, such as Highway No. 427, 401 and Queen Elizabeth Way.

The proposed access to the site will be via a proposed driveway from Venta Avenue. The internal private laneway will be designed in accordance with City of Mississauga Condominium Road Standards.

The existing access driveway will be removed; the existing curb cut depression will be reused and extended to provide access to the site and the waste pick-up truck standing area. Refer to **Figure 6 Concept Site Grading Plan**.

#### **4.0 WATER DISTRIBUTION SYSTEM**

According to available records, there is an existing 200mm diameter watermain on Venta Avenue and an existing 600mm diameter watermain on Dixie Road.

The existing 25mm water service to the existing single family residential home will be disconnected as per Region of Peel standards.

The proposed development will be serviced by a **150mm diameter** connection to the existing 200mm diameter watermain located on the north side of Venta Avenue. The **150mm diameter** watermain connection will provide water supply for fire protection and domestic usage. Each townhouse will be supplied with a 25mm water service connection. Refer to **Figure 2 Water Distribution Plan**.

#### **Water Demand Calculation**

Fire hydrant flow required based on Fire Underwriters Survey 1999 using formula:

$$F = 220 \times C \times \sqrt{A}$$

Where C = Construction coefficient, 1.0 (ordinary construction)  
A = Total Floor Area of Building (largest building considered excluding basement)  
(852.9m<sup>2</sup> - 4 storey building)

$$\begin{aligned} F &= 220 \times 1.0 \times \sqrt{852.9} \\ &= 6425 \text{ L/min} \\ &= \mathbf{107.1 \text{ L/s}} \end{aligned}$$

The estimated domestic water demand from the site was calculated as follows:

$$\text{Proposed population} - 4 \times 3.5 \text{ (townhouse)} = 14$$

$$\begin{aligned} \text{Total Expected Peak Flow Rate} &= 280 \times 14 \times 3.0 \\ &= 11,760 \text{ L/day} \\ &= \mathbf{0.136 \text{ L/s}} \end{aligned}$$

$$\begin{aligned} \text{Total Peak Flow} &= 107.1 \text{ L/s} + 0.136 \text{ L/s} \\ &= \mathbf{107.2 \text{ L/s}} \end{aligned}$$

$$\begin{aligned} \text{Total Expected Maximum Daily Flow} &= 280 \times 14 \times 2.0 \\ &= 78,400 \text{ L/day} \\ &= \mathbf{0.907 \text{ L/s}} \end{aligned}$$

$$\begin{aligned} \text{Site Average Day Flow} &= 280 \times 14 \\ &= 3,920 \text{ L/day} \\ &= \mathbf{0.045 \text{ L/s}} \end{aligned}$$

## 5.0 SANITARY DRAINAGE SYSTEM

According to available records, there is an existing 900mm diameter sanitary sewer on Dixie Road and a 250mm diameter sanitary sewer on Venta Avenue.

The existing 125mm sanitary connection to the existing single family residential home will be disconnected as per Region of Peel standards.

The proposed development will be serviced by a new **150mm diameter** sanitary sewer connected to the existing 250mm diameter sanitary sewer on Venta Avenue. Individual 125mm connections will be constructed to the proposed 150mm diameter sanitary sewer.

The proposed tentative finished floor elevation is approximately 112.45m. The proposed 150mm diameter sanitary sewer invert elevation is approximately 110.61m. Based on this invert and the tentative finished floor elevation, each townhome will have sufficient depth to be serviced by gravity flow. Refer to **Figure 3 Sanitary Drainage Plan**.

### Sanitary Flow Calculations

The average additional flow from the development to the 250mm sanitary sewer on Venta Avenue:

$$\text{Proposed population} - 4 \times 3.5 \text{ (townhouse)} = 14$$

$$\begin{aligned} \text{Average Daily Flow} &= 302.8 \text{ L/cap/day} \times 14 \text{ persons} \\ &= 4,239.2 \text{ L/day} \\ &= 0.049 \text{ L/s} \end{aligned}$$

$$\begin{aligned} \text{Peak Factor} &= 1 + \frac{14}{4 + P^{0.5}} && \text{Where, P = population in thousands} \\ &= 1 + \frac{14}{4 + 0.014^{0.5}} \\ &= 1 + 3.40 \\ &= 4.40 \end{aligned}$$

Maximum Peak Factor is 4.0.

$$\begin{aligned} \text{Peak Flow Rate} &= 302.8 \times 14 \times 4 \\ &= 16,956.8 \text{ L/day} \\ &= \mathbf{0.196 \text{ L/s}} \end{aligned}$$



## 6.0 STORM DRAINAGE SYSTEM

According to available records, there is an existing 450mm storm sewer on Dixie Road and an existing 450mm storm sewer on Venta Avenue.

Currently, the site is developed with approximately 0.013Ha draining towards Dixie Road and 0.057Ha draining towards Venta Avenue. Refer to **Figure 4 Existing Site Storm Drainage Plan**.

The proposed development will be serviced to the existing 450mm diameter storm sewer on Venta Avenue. Refer to **Figure 5 Storm Drainage Plan**.

## QUANTITY CONTROL

### Dixie Road

The proposed residential development design will ensure post-development flows will be equal to or less than pre-development levels.

#### Pre-Development Conditions

As mentioned above, the site is currently developed with approximately 0.013Ha draining towards Dixie Road.

The existing site runoff to Dixie Road for each storm event is as follows:

$$Q = CIA / 360$$

Where C = Runoff coefficient, 0.50  
A = Area in hectares, 0.013Ha  
Tc = 15.00min  
I<sub>2-yr</sub> = 59.89 mm/hr  
I<sub>5-yr</sub> = 80.51 mm/hr  
I<sub>10-yr</sub> = 99.17 mm/hr  
I<sub>25-yr</sub> = 113.89 mm/hr  
I<sub>50-yr</sub> = 127.13 mm/hr  
I<sub>100-yr</sub> = 140.69 mm/hr

$$\begin{aligned} Q_{2\text{-yr}} &= \mathbf{0.0011m^3/s} \\ Q_{5\text{-yr}} &= \mathbf{0.0015m^3/s} \\ Q_{10\text{-yr}} &= \mathbf{0.0018m^3/s} \\ Q_{25\text{-yr}} &= \mathbf{0.0021m^3/s} \\ Q_{50\text{-yr}} &= \mathbf{0.0023m^3/s} \\ Q_{100\text{-yr}} &= \mathbf{0.0026m^3/s} \end{aligned}$$

### Post-Development Conditions

The following are the site statistics draining to Dixie Road.

Total Drainage Area = 0.0136 Ha  
 Total Paved/Concrete Area = 0.0029 Ha  
 Total Landscaped Area = 0.0107 Ha

$$\text{Weighted C} = [(0.90 \times 0.0029) + (0.25 \times 0.0107)] / 0.0136 = \mathbf{0.39}$$

The proposed site runoff to Dixie Road for each storm event is as follows:

$$Q = CIA / 360$$

Where C = Runoff coefficient, 0.39  
 With adjustment factors for:  
 25-yr = 1.1  
 50-yr = 1.2  
 100-yr = 1.25  
 A = Area in hectares, 0.0136Ha  
 Tc = 15.00min  
 I<sub>2-yr</sub> = 59.89 mm/hr  
 I<sub>5-yr</sub> = 80.51 mm/hr  
 I<sub>10-yr</sub> = 99.17 mm/hr  
 I<sub>25-yr</sub> = 113.89 mm/hr  
 I<sub>50-yr</sub> = 127.13 mm/hr  
 I<sub>100-yr</sub> = 140.69 mm/hr

Q<sub>2-yr</sub> = **0.0009m<sup>3</sup>/s**  
 Q<sub>5-yr</sub> = **0.0012m<sup>3</sup>/s**  
 Q<sub>10-yr</sub> = **0.0015m<sup>3</sup>/s**  
 Q<sub>25-yr</sub> = **0.0018m<sup>3</sup>/s**  
 Q<sub>50-yr</sub> = **0.0022m<sup>3</sup>/s**  
 Q<sub>100-yr</sub> = **0.0026m<sup>3</sup>/s**

Therefore, the front yard drainage area to Dixie Road from the proposed development will not exceed the existing flows for each storm event.

### Summary Chart

Storm Event (Year)	Pre-Development Flow (m <sup>3</sup> /s)	Post-Development Flow (m <sup>3</sup> /s)
2	0.0011	0.0009
5	0.0015	0.0012
10	0.0018	0.0015
25	0.0021	0.0018
50	0.0023	0.0022
100	0.0026	0.0026

### Venta Avenue

On-site stormwater management will ensure that the **100-year** storm event post-development flows will not exceed pre-development release rates of the **2-year** storm with a runoff coefficient **C = 0.50**.

Maximum required storage volume for the site was arrived at using the Modified Rational Method.

#### Pre-Development Conditions

As mentioned above, approximately an area of 0.057Ha drains towards Venta Avenue.

The site runoff for a **2-year** storm event is as follows:

$$\begin{aligned} A &= 0.057 \text{ Ha} \\ C &= 0.50 \\ T_C &= 15.00 \text{ min} \\ I_{2\text{-yr}} &= 59.89 \text{ mm/hr} \\ Q &= CIA / 360 \\ Q_{2\text{-yr}} &= 0.50 \times 59.89 \times 0.057 / 360 \\ &= \mathbf{0.0047m^3/s} \end{aligned}$$

#### Post-Development Conditions

$$\begin{aligned} \text{Total Site Area} &= 0.0564 \text{ Ha} \\ \text{Total Roof Area} &= 0.0314 \text{ Ha} \\ \text{Total Paved/Concrete Area} &= 0.0168 \text{ Ha} \\ \text{Total Landscaped Area} &= 0.0082 \text{ Ha} \end{aligned}$$

Maximum allowable discharge for site to Venta Avenue shall be as follows:

$$Q_{2\text{-yr allow}} = \mathbf{0.0047m^3/s}$$

Due to the small allowable discharge of **0.0047m<sup>3</sup>/s**, the discharge for the site will be controlled by means of a vertical vortex orifice restrictor installed on the downstream outlet of **CBMH-1**, with a maximum **100 year** ponding elevation of **111.80m**.

The orifice restrictor sizing was determined by using the Veolia logarithmic chart, with a flow rate of **4.74L/s** and a head of **1.17m**. Refer to **Appendix A**.

Based on this chart, a **75 VHV-1** will be required from a manufacturer such as Contech Engineering Solutions.

Due to the size, clogging is a possibility, and annual maintenance of CBMH 1 will be required.

$$\text{Weighted C} = [(0.25 \times 0.0082) + (0.95 \times 0.0314) + (0.90 \times 0.0168)] / 0.0314 = \mathbf{0.833}$$

**YEAR**  
**STORM**

100

**CITY**

Mississauga

C = **0.833**

A (ha) = **0.0314**

Allow. Discharge Qa (m3/s) = **0.0047**

Safety Factor Sf = **0%**

Max. Required

Detention (m3) = **5.10**

RAINFALL DURATION	RAINFALL INTENSITY	TOTAL UNCONTROLLED RUNOFF	INFLOW VOLUME	OUTFLOW VOLUME	REQUIRED DETENTION VOLUME
<i>Tc (min)</i>	<i>I (mm/hr)</i>	<i>Q=CIA/360 (m3/sec)</i>	<i>Vi (m3)</i>	<i>Vo (m3)</i>	<i>D=(Vi-Vo)*Sf</i>
5	242.53	0.0176	5.29	1.55	3.74
10	176.31	0.0128	7.69	2.82	4.87
15	140.69	0.0102	9.20	4.10	<b>5.10</b>
20	118.12	0.0086	10.30	5.39	4.91
25	102.41	0.0074	11.16	6.68	4.48
30	90.77	0.0066	11.87	7.97	3.90

Maximum storage required = **5.10 m<sup>3</sup>**

The required detention volumes will be provided inside the underground storm sewer system and are as follows:

Sewer Leg	Size (mm)	Slope (%)	Flow Area (m <sup>2</sup> )	Sewer Length (m)	Sewer Volume (m <sup>3</sup> )	Available Storage Volume (m <sup>3</sup> )
CBMH1-STMMH2	450	0.50	0.16	21.0	3.36	3.36
CBMH1 (1200mm)	- 1 pc x 1.13m <sup>2</sup> x 1.17m					1.32
STMMH2 (1200mm)	- 1 pc x 1.13m <sup>2</sup> x 1.33m					1.50
<b>TOTAL</b>						<b>6.18</b>

The total available storage volume of **6.18m<sup>3</sup>** satisfies the storage requirements.

## QUALITY CONTROL

Various source control options have been introduced to reduce suspended solids prior to runoff being discharged to storm sewer. Based on Wet Weather Flow Management Manual, the following source control TSS removal has been applied:

- Roof downspouts discharged onto landscaped areas
  - 90% TSS removal (clean water source)
- Enhanced yard vegetation including increased topsoil at the rear, front and side yards
  - 90% TSS removal (natural filtration)

As the site is a small 0.07Ha residential development, significant surficial sediments and debris is not expected to contribute to receiving storm sewers or watercourses.

## WATER BALANCE CONSIDERATION

The City of Mississauga's water balance target/criteria requires the site to retain a 5mm rainfall and allow it to evaporate, infiltrate back into the ground, or reuse for irrigation.

The required volume is as follows:

$$\begin{aligned}\text{Area} &= 0.07\text{Ha} \\ V_{5\text{mm}} &= 701.90\text{m}^2 \times 0.005\text{m} \\ &= 3.51\text{m}^3\end{aligned}$$

Roof downspouts will be direct to discharge onto landscaped areas to allow for evaporation and infiltration, accounting for 72% of the site being captured:

$$\begin{aligned}\text{Roof area} &= 0.0314 \text{ Ha} \\ \text{Landscape area} &= 0.0082 \text{ Ha} + 0.0107 \text{ Ha} = 0.0189 \text{ Ha} \\ \text{Total area} &= 0.0503 \text{ Ha} \\ V &= 503.0\text{m}^2 \times 0.005\text{m} \\ &= 2.52\text{m}^3\end{aligned}$$

## 7.0 CONCLUSION

Our findings reveal the proposed residential townhouse development can be fully serviced to the existing available services on Venta Avenue.

The following summarizes the foregoing analysis:

- The proposed access to the site will be via a proposed driveway from Venta Avenue. The internal private laneway will be designed in accordance with City of Mississauga Condominium Road Standards.
- The proposed development will be serviced by a **150mm diameter** connection to the existing 200mm diameter watermain from Venta Avenue. Each townhouse will be supplied with a 25mm water service connection.
- The proposed development will be serviced by a **150mm diameter** sanitary sewer connected to the existing 250mm diameter sanitary sewer on Venta Avenue. Individual 125mm connections will be supplied.
- The proposed development will be serviced by a **150mm diameter** storm sewer to the existing 450mm diameter storm sewer on Venta Avenue. Front yard drainage to Dixie Road will not exceed the existing flows and on-site stormwater management will ensure that the 100-year storm event post-development flows will not exceed pre-development release rates of the 2-year storm to Venta Avenue.

We respectfully submit this report and trust the information provided meets with the requirements. The report's recommendations will be implemented in detail design during the site plan and building permit process.

Yours truly,

**SKIRA & ASSOCIATES LTD**



Kathy Grycko, P.Eng



**NOTE:** Limitation of Report

*This report was prepared by Skira & Associates Ltd. for Fountain Hill Construction and Consulting Ltd. for review and approval by government agencies only.*

*In light of the information available at the time of preparation of this report, any use by a **Third Party** of this report are solely the responsibility of such **Third Party** and Skira & Associates Ltd. accepts no responsibility for any damages, if any, suffered by the **Third Party**.*

**APPENDIX A**

ORIFICE RESTRICTOR  
Veolia Logarithmic Chart

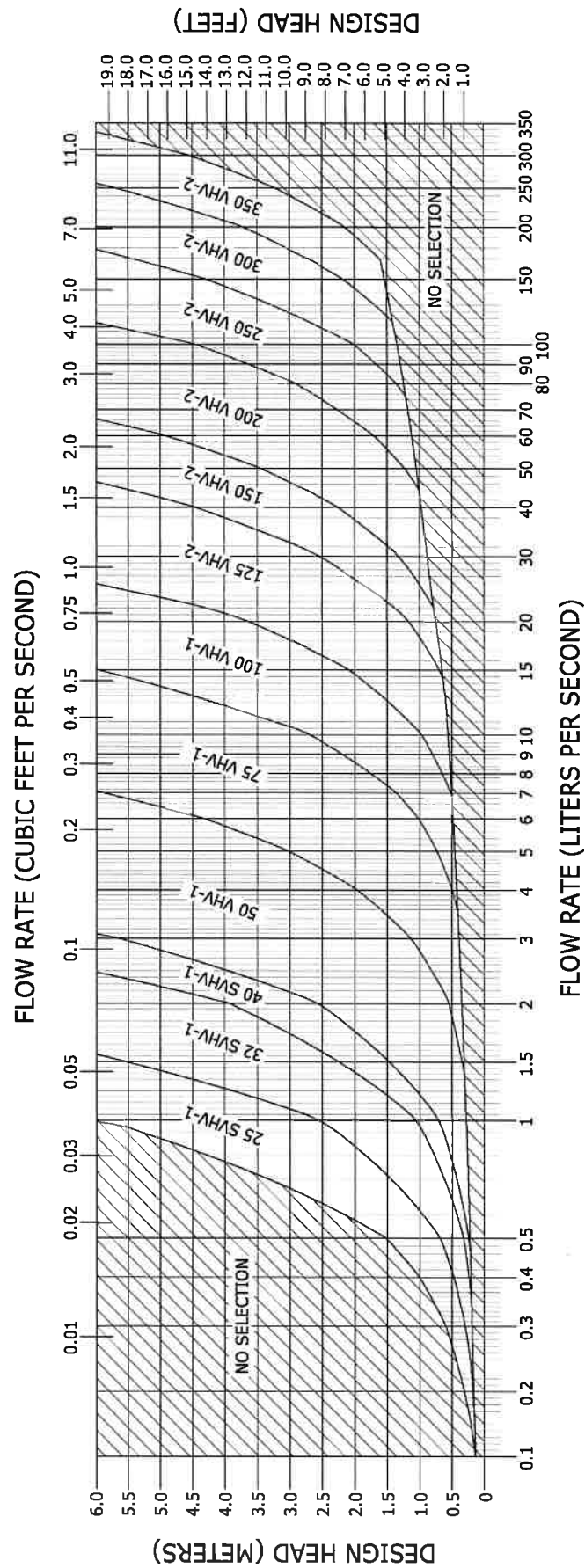


Figure 3 : HYDROVEX® VHV/SVHV Selection Chart