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**FUNCTIONAL SERVICING,
STORMWATER MANAGEMENT, AND
PRELIMINARY DESIGN REPORT
FOR
BRANTHAVEN FOURTH LINE INC.**

**TOWN OF MILTON
REGION OF HALTON**

DSEL PROJECT 24-1399

OCTOBER 2024

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FOR
BRANTHAVEN – FOURTH LINE**

**TOWN OF MILTON
REGION OF HALTON**

**OCTOBER 2024
OUR FILE: 24-1399**

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1.0 INTRODUCTION

The Branthaven Fourth Line Inc. property (“*DeMarchi*”) is approximately 5.6 hectares bounded by Cedar Hedge Road to the east, existing residential to the west, a school block and the Centre Tributary (BP-4-C) channel to the north, and Derry Road to the south, as illustrated in **Figure 1**. This area, identified as the *Subject Lands*, are located within the Town of Milton, Region of Halton, in the Phase 1 urban expansion lands called the Bristol Survey.

The topography of the Subject Lands generally drains towards the existing channel that runs through the center of the DeMarchi property. The existing channel, Centre Tributary (BP-4-C), within the Subject Lands is proposed to be realigned as part of the development works. This realignment was identified in **Scoped SIS**.

The following report is submitted in support of the Draft Plan Approval and is intended to demonstrate the preliminary design and availability of municipal services to the subject property. The report will further demonstrate general conformance with Town of Milton and Region of Halton design criteria, the requirements of Conservation Halton (CH), and general industry practice.

2.0 PREVIOUS STUDIES AND REPORTS

The following material has been reviewed in order to identify the constraints which govern development within the Subject Lands:

- **Sixteen Mile Creek Subwatershed Planning Study, Areas 2 and 7, Town of Milton**
Philips Planning and Engineering Ltd., January 2000
(**SPS**)

- **Scoped Subwatershed Impact Study, Centre Tributary, Bristol Survey**
Philips Planning and Engineering, November 2000
(Scoped SIS)
- **Interim Technical Draft Scoped Subwatershed Impact Study, Centre Tributary Bristol Survey**
Philips Planning and Engineering Ltd., June 2001
(SIS)
- **Functional Stormwater Report Summerwood Estates**
Stantec Consulting, September 2007
(Summerwood FSR)
- **Functional Servicing and Preliminary Stormwater Management Report**
C.F. Crosier & Associates Inc., October 2015
(Valery FSR)
- **Mattamy Valery As-Built Drawings**
C.F. Crosier & Associates Inc., July 2016
(Valery Drawings)
- **DRAFT Town of Milton Engineering and Parks Standards**
January 2024
(Town Standards)
- **DRAFT Water and Wastewater Linear Design Manual – Version 6**
Region of Halton, May 2024
(Region Standards)
- **Design Criteria for Sanitary Sewer, Storm Sewers and Forcemains**
Ministry of the Environment, Conservation and Parks, May 2023
(MECP Standards)
- **Stormwater Management Planning and Design Manual**
Ministry of the Environment, May 2003
(SWMP Design Manual)
- **Design Guidelines for Drinking Water Systems**
Ministry of the Environment, 2008
- **Erosion & Sediment Control Guideline for Urban Construction**
Toronto and Region Conservation Authority, December 2019
(ESC Guidelines)

- **Conservation Halton Guidelines for Stormwater Management Engineering Submissions**
Conservation Halton, June 2024
(*CH SWM Guidelines*)

3.0 PROPOSED LAND USE

The Subject Lands are proposed to be developed for residential and related purposes. The development concept, shown in **Figure 2**, includes the following land uses listed in **Table 3-1**.

Table 3-1: Summary of Proposed Land Uses

Land Use	Area (ha)	Units
Townhouses	2.8	205
High Density Residential	0.26	160
Village Square	0.53	
Channel	0.76	
Channel Buffers	0.19	
16.0m ROW (376m)	0.30	
6.1m Condo ROW (897m)	0.58	
Derry Road Widening	0.21	
TOTAL	5.63	365

4.0 WATER SERVICING

4.1 Water Supply Servicing Design Criteria

The water supply servicing for the DeMarchi property will be designed in accordance with **Region Standards** and **MECP Standards**, by taking into consideration watermain sizing, depth, crossings, valves, hydrants, and service connections such that adequate pressures and fire flows can be achieved. Water design flows will be designed according to the criteria listed below in **Table 4-1** and **Table 4-2**:

Table 4-1: Water Design Criteria

Demand Type	Criteria
Average Daily Demand (L/capita/day)	275
Maximum Daily Demand Peaking Factor	2.25
Maximum Hourly Demand Peaking Factor	

Residential	4.00
Community Services	2.25

Table 4-2: Water Population Criteria

Development Type	Equivalent Population Density
Townhouse	135 persons / ha
High Density (Apartment Building)	400 persons / ha*

*Densities used are based on anticipated zoning provided by Glen Schnarr & Associates Inc.

The development must meet the Region of Halton pressure criteria for domestic flow conditions between 40 psi (275 kPa) and 100 psi (690 kPa) and fire flow conditions should be maintained above 20 psi (140 kPa). The Ontario Building Code requires individual pressure regulating valves if static pressures are above 80 psi (550 kPa).

4.2 Existing Water Services

The site is located within the existing Region of Halton’s Pressure District Zone 4 regional water system and within the Region of Halton Pressure District Zone for southern Milton. Existing watermains are available in the vicinity of the site as shown in **Table 4-3**.

Table 4-3: Summary of Existing Water Infrastructure

Street	Size	Pressure Zone	Location
Derry Road	900 mm	4/5	Appleby Line to Trafalgar Road
Fourth Line / Ceder Hedge Road	900 mm	5	Feedermain to Zone 5 Pump Station to Derry Road
Sauve Street	300 mm	4	Derry Road with stub extending north into the Subject Lands.
Rusk Avenue	200 mm	4	Miller Way to Plug
Beacham Court	200 mm	4	From Laking Terrace with stub extending east into the Subject Lands
Harwood Drive	300 mm	4	Cedar Hedge Road to Trudeau Drive
Evans Terrace	150 mm	4	From Harwood Drive to Harwood Drive

The existing watermains are illustrated in **Figure 3**. The Region of Halton has noted that no connections to the 900mm feedermain on Fourth Line will be permitted.

4.3 External Water Supply Requirements

In accordance with the **2022 DC Update**, Table 4-3 summarizes the planned water infrastructure in proximity of the Subject Lands.

Table 4-4: Summary of Proposed Regional Water Infrastructure

Regional ID	Size / Type	Anticipated Service Date	Location
Neyagawa Boulevard			
6702	40ML/d Expansion of Neyagawa Booster Pump Station	2026	Neyagawa Boulevard, south of Dundas Street West and north of Burnhamthorpe Road

The excerpts from the **2022 DC Update** are included in **Appendix A**.

4.4 Proposed Water Servicing

The Subject Lands will be serviced by a conventional water supply system designed in accordance with **Region Standards**.

The lands on the west side of the channel will be serviced by three connections: an existing 300 mm watermain stub connecting to the 900 mm trunk on Derry Road at Sauve Street intersection, the 200 mm watermain stub left at Rusk Avenue and the 200 mm watermain stub at Beacham Court connecting to the existing residential development to the west.

The lands on the east side of the channel will be serviced by two connections: an existing 300mm watermain on Harwood Drive and a new chamber will be dropped onto the existing 150 mm watermain on Evans Terrace to provide a secondary connection avoiding the existing feedermain in Cedar Hedge Road. Both connections into the eastern Subject Lands will be 300mm to accommodate the required velocity within the watermain pipes.

A watermain analysis was conducted by GeoAdvice Engineering Inc. using the Region's latest InfoWater model under 2021 and 2031 servicing conditions. The pressures are expected to range from 92 psi to 89 psi under 2021 conditions and 90 psi to 66 psi under 2031 conditions. The pressures for both the 2021 and 2031 conditions are within the **Region Standards** for water distribution systems.

While the modelled pressures by GeoAdvice Engineering Inc. using the Region's InfoWater model are below the OBC limit of 80 psi (550 kPa) under average day conditions in the future 2031 scenario, field pressures could be higher than modelled as the Region does not examine minimum hour conditions. Individual pressure reducing valves may be required and shall be validated through the detailed design and construction stage.

The watermain analysis referenced above has been included in **Appendix B**, and the corresponding modelling files are included in **Appendix I**. The conceptual watermain design is illustrated in **Figure 3**.

5.0 WASTEWATER SERVICING

5.1 Wastewater Design Criteria

The wastewater system will be designed according to the **Region Standards** and **MECP Standards** listed below in

Table 5-1 and **Table 5-2**:

Table 5-1: Wastewater Design Criteria

Demand Type	Criteria
Average dry weather flow	275 litres per capita per day
Infiltration	0.28 litres per second per hectare
Peaking Factor	Peak Flow Factor – Modified Harmon Formula
Maximum Capacity Used	450mm – Max Capacity = 60% Full

Table 5-2: Wastewater Population Criteria

Development Type	Equivalent Population Density
Townhouse	135 persons / ha
High Density (Apartment Building)	400 persons / ha*

*Densities used are based on anticipated zoning provided by Glen Schnarr & Associates Inc.

5.2 Existing Wastewater Services

Existing wastewater sewers are available to the site as shown in **Table 5-3**.

Table 5-3: Summary of Existing Wastewater Sewers

Street	Size	Location
Laking Terrace	200 mm	Costigan Road to Beacham Court
Beacham Court	300 mm	Laking Terrace to MH 23A
Cedar Hedge Road	150mm / 200 mm	MH 139A to Harwood Drive
Harwood Drive	200 mm	Fourth Line to Trudeau Drive

The existing sanitary sewers are generally illustrated in **Figure 4**.

5.3 External Wastewater Servicing Requirements

In accordance with the **2022 DC Update**, the Region is not planning future wastewater infrastructure to service lands throughout Milton Phase 1.

All external regional wastewater infrastructure is currently in place. The preferred servicing figures from the **2022 DC Update** illustrating the external projects are included in **Appendix A**.

5.4 Proposed Wastewater Servicing

The Subject Lands will be serviced by a conventional wastewater system designed in accordance with **Region Standards** and **MECP Standards**. The site will generally be serviced by entirely by 200mm wastewater sewers.

The wastewater drainage from Subject Lands west of the channel will be conveyed via local gravity sewers to the existing 200 mm sewer on Laking Terrace via Beacham Court and continue north towards the 300 mm regional wastewater sewer in Costigan Road.

The wastewater drainage for the Subject Lands east of the channel will be conveyed through local gravity sewers to the existing 200mm on Harwood Avenue and continue east to the 375mm wastewater sewer on Trudeau Drive. These pipes have been flattened, as with those in the western half of the Subject Lands, to ensure maximum depth of the wastewater sewer against Derry Road, and minimize additional private infrastructure that would be required to support the development.

The wastewater design sheets and drainage area plans are included in **Appendix C**. The conceptual wastewater servicing scheme for the development is illustrated in **Drawing 4**. Preliminary profiles are included in **Drawing 2** which illustrate the wastewater sewers and tributary areas within the Subject Lands.

6.0 STORM DRAINAGE

6.1 Existing Drainage Patterns

The Subject Lands generally drain to the existing channel. The existing storm drainage areas are illustrated in **Figure 5**. The eastern portion of the site also includes a ditch that takes the untreated runoff of Derry Road, and unurbanized section of Cedar Hedge Road between Harwood Drive and Derry Road.

6.2 Minor System Design

The Subject Lands will be serviced by a gravity storm sewer system designed to support the capture of the 100-year return frequency per IDF curves in the **Town Standards**. All units with

basements will be equipped with sump pumps as the hydraulic grade line is too shallow due to the depth of the storm system and on site storage requirements.

The storm flows for the lands west of the channel will generally be directed to the two 825 mm culverts under Derry Road, which continue south on Sauve Street and are captured in Summerwood Pond 15 where quality and quantity controls are implemented. As the major overland flow cannot cross Derry Road, 100-year capture is provided north of the intersection to convey 100-year flows in the minor system, the two 825 mm culverts. Sizing calculations are provided in **Appendix D**.

A new collector storm sewer (750mm – 825mm) is proposed along the northern limit of the Derry Road right-of-way which captures external roads and eastern development land storm runoff and conveys the drainage to the new channel at a single outlet headwall.

The development lands east of the channel will be collected in a 975 m³ storm tank, treated in a private oil grit separator (OGS) before discharging to the new storm sewer. The future apartment block proposed in the southeast corner of the Subject Lands will also be provided with on site controls (*to be determined through Site Plan Approval*) and will also discharge to the new storm sewer.

External minor system drainage from Fourth Line will be treated via OGS unit before discharging to the new collector storm sewer. External minor system drainage from Derry Road is currently discharging to the north roadside ditch which will be captured in the new storm sewer.

The Village Square and backyards adjacent to the channel block are considered clean and are proposed to drain overland to the channel directly.

The conceptual storm servicing scheme is illustrated in **Drawing 5** and preliminary profiles are included in **Drawing 2** which illustrate all storm sewers within the Subject Lands. The design sheets are included in **Appendix D**.

6.3 Conveyance of Major Storm Flows

Major system runoff in excess of the minor system will be conveyed through the Subject Land's laneways and streets to either north of Derry Road (west side) or the storm tank (east side). The major system flow will not exceed the width of the road allowance, and in no case will the depth of flow exceed 0.15 metres above the crown of the road during a 100-year event in accordance with **Town Standards**. Major system conveyance calculations have been included in **Appendix E**.

As noted above, the overland flow of the Subject Lands are not allowed to cross Derry Road. Therefore, 100-year capture is implemented north of the intersection to convey flows to the Summerwood Pond south of the site.

The conceptual major storm system is illustrated in **Drawings 1**.

6.4 External Drainage

External areas from the adjacent lands are not intended to be conveyed through the Subject Lands.

The external drainage areas are illustrated in **Figure 6**.

6.5 Fourth Line Drainage

Drainage from Fourth Line between Harwood Drive and Derry Road will be conveyed to the channel via a storm pipe that is proposed along the north limit of the Derry Road right of way. Approximately 0.3 ha from Fourth Line will be collected in the realigned channel.

6.6 Derry Road Drainage

Drainage from Derry Road west of the channel will continue to drain to the channel via the existing storm infrastructure. As outlined in **Section 6.3**, a stormwater management pipe is proposed to run along the Derry Road boulevard from Fourth Line to the east side of the realigned channel. This storm pipe will also convey the drainage from Derry Road into the channel.

7.0 STORMWATER MANAGEMENT

In accordance with the criteria outlined in the **SPS** the site must practice stormwater management as follows:

- | | |
|-------------------------------|---|
| Water Quality Control | ➤ Sized in accordance with the SWMP Design Manual for enhanced water quality protection |
| Water Quantity Control | ➤ 25-year flood storage: 714 m ³ /imp-ha cumulative
25-year discharge rate: 0.01 m ³ /s/ha
100-year flood storage: 795 m ³ /imp-ha cumulative
100-year discharge rate: 0.034 m ³ /s/ha |
| Erosion Control | ➤ 430 m ³ /imp-ha extended detention storage and unit extended detention discharge rate of 0.0011 m ³ /s/ha |

Excerpts of the storm tank sizing criteria can be found in **Appendix F**.

The only stormwater treatment for the site is provided by a storm tank located in the southeast corner of the Branthaven – Demarchi property. As outlined in **Section 6** the west portion of the site will be treated in Summerwood Pond 15 located outside of the site limits and the east portion of the site will be conveyed to the storm tank within the site boundary.

7.1 Preliminary Storm Tank Sizing

Preliminary storm tank sizing has been prepared to demonstrate that the storm control requirements as outlined in **Section 7.0** can be met.

Table 7-1: East Site Plan Storm Tank Sizing

Drainage Area (ha)			Impervious (%)		
1.327			80		
Storage Component	Unitary Volume (m ³ /imp. ha)	Unitary Discharge (m ³ /s/ha)	Target Volume (m ³)	Target Outflow (m ³ /s)	Provided Tank Volume (m ³)
Erosion Control	430	0.011	456	0.00	456
25 Year	714	0.01	758	0.01	758
100 Year	795	0.034	844	0.05	975

A preliminary on site control volume has also been completed for the future apartment development to ensure that the future site plan application accounts for the flow attenuation and retention volume requirements.

Table 7-2: Apartment On-Site Control Sizing

Drainage Area (ha)			Impervious (%)		
0.263			100		
Storage Component	Unitary Volume (m ³ /imp. ha)	Unitary Discharge (m ³ /s/ha)	Target Volume (m ³)	Target Outflow (m ³ /s)	Required Storage Volume (m ³)
Erosion Control	430	0.011	113	0.00	113
25 Year	714	0.01	188	0.01	188
100 Year	795	0.034	209	0.05	209

The impervious coverage has been estimated based on the land use and their respective sizes in the current plan. In accordance with the **Town Standards** a runoff coefficient of 0.75 has been applied for the Townhouses. Please note that the final impervious coverage will be updated at the

detailed design stage based on the characteristics of the actual plan, and the pond sizing adjusted accordingly.

8.0 CENTRE TRIBUTARY (TRIBUTARY BP-4-C)

The existing reach of tributary BP-4-C contained within the Subject Lands will be realigned as part of the development works. Flows will continue to be conveyed south through the DeMarchi property and ultimately downstream through a culvert in Derry Road.

Within the Subject Lands, a 75.0 m cross-section is proposed for the realigned channel comprised of the following features:

- 60.0 m wide channel realignment, inclusive of:
 - Approximately 43.0 m bottom width, and
 - 3:1 side slopes extending 8.5 m on either side of the bottom width.
- 7.5 m buffers adjacent to either side of channel realignment:
 - Western Buffer with a maximum of 2% slopes and future multi-use trail (by Others), and
 - Eastern Buffer with a maximum of 10% slopes.

A preliminary channel design prepared by GeoMorphix Ltd. is included in **Appendix H**. Slope stability analyses will be done through detailed design.

8.1 Channel Modelling

A HEC-RAS model was received from Conservation Halton for the east and west tributaries that converge at the Subject Land's northern boundary. The 100-year and Regional flow regimes for the centre tributary were updated to include the peak flow rates from the development areas outletting there, the peak flow rates to the channel can be found in **Appendix H. Table 8-1** below summarizes the changes in the HECRAS flow regimes through the development.

Table 8-1: HEC-RAS Flow Regime Changes at Section 6.8

Flow Regime	Original Model Flow (m ³ /s)	Updated Model Flow (m ³ /s)
100-Year	5.91	6.154
Regional	31.36	31.748

For this analysis, the ultimate conditions scenario was used to determine the impacts of the changes in flow regime would have on the channel water levels. The HEC-RAS cross sections were left unchanged in this analysis to better show the impacts of the increased flows except for some interpolated sections being introduced to help with model stability. **Table 8-2** and **8-3** below shows the original ultimate conditions and updated proposed water levels for the Regional and 100-Year storm events through the development area for the ultimate development scenario.

Table 8-2: Ultimate Conditions and Proposed (DSEL) Regional Water Levels

<i>River</i>	<i>Reach</i>	<i>River Station</i>	<i>Profile</i>	<i>Ultimate WSEL (m)</i>	<i>Proposed WSEL (m)</i>	<i>Difference (m)</i>
Centre Trib	BP-4-C	6.807	Regional	200.16	200.19	0.03
Centre Trib	BP-4-C	6.80	Regional	200.15	200.17	0.02
Centre Trib	BP-4-C	6.75*	Regional	200.11	200.14	0.03
Centre Trib	BP-4-C	6.70*	Regional	200.09	200.12	0.02
Centre Trib	BP-4-C	6.65	Regional	199.86	199.89	0.03
Centre Trib	BP-4-C	6.555	Ex. Derry Road Crossing			

*Sections were interpolated from original model to help with HEC-RAS model stability.

Table 8-3: Ultimate Conditions and Proposed (DSEL) 100-Year Water Levels

<i>River</i>	<i>Reach</i>	<i>River Station</i>	<i>Profile</i>	<i>Ultimate WSEL (m)</i>	<i>Proposed WSEL (m)</i>	<i>Difference (m)</i>
Centre Trib	BP-4-C	6.807	100-Year	199.22	199.23	0.01
Centre Trib	BP-4-C	6.80	100-Year	199.17	199.18	0.01
Centre Trib	BP-4-C	6.75*	100-Year	199.04	199.04	0.00
Centre Trib	BP-4-C	6.70*	100-Year	198.76	198.78	0.02
Centre Trib	BP-4-C	6.65	100-Year	198.48	198.67	0.19
Centre Trib	BP-4-C	6.555	Ex. Derry Road Crossing			

*Sections were interpolated from original model to help with HEC-RAS model stability.

As shown above, the difference in post development (DSEL) to original, ultimate conditions water levels for the Regional and 100-year storm events is negligible, with most water level changes being under 0.03m. Furthermore, as there was no flow rate allocation given to this development area in the original HEC-RAS model under existing or interim conditions, it is assumed the allocated release rates for this development area is being factored into the downstream Summerwood SWM facility and therefore these localized increases will not impact the

downstream water levels past the Summerwood SWM Facility. Please see **Appendix I** for the full existing and proposed HEC-RAS outputs and modelling files.

It is acknowledged there are some modelling limitations for the Subject Lands: (1) the HEC-RAS model provided by CH is not georeferenced, and (2) the flows in the model do not match those presented in the **SPS**. As the HEC-RAS model is currently in use and approved, the HEC-RAS model provided has been used to conduct our analysis including the post-development condition where the flows were added to the upstream cross sections within the Subject Lands to assess any development impacts.

9.0 LOW IMPACT DEVELOPMENT MEASURES

A combination of measures can be utilized to meet the pre-development infiltration target in the Subject Land's urbanized condition including the implementation of additional topsoil depth, rooftop disconnect for both freehold detached and townhouse residential units, and the installation of pocket wetlands within the channel blocks.

A site wide water balance will be completed at detailed design to assess the infiltration potential for both pre- and post-development conditions.

10.0 ROADS

Access to the west side of the Subject Lands is available from the south via Derry Road and from the west by Rusk Avenue and Beacham Court; Rusk Avenue will also be extended through the site as a 16.0m public right-of-way. The east side will have three connections to the Cedar Hedge Road, and include the urbanization of Cedar Hedge Road (sometimes also called Fourth Line) as a 20.0m public right-of-way. The cross sections are provided in **Figures 8, 9, and 10**.

Derry Road, external to the site, will be provided a road widening block from Cedar Hedge Road / Fourth Line to the western end of the Subject Lands. Derry Road will have an ultimate right of way width of 47 m, which will take 0.21 ha into the Subject Lands. It is expected additional design work to complete the signalization of the intersection of Derry Road at Rusk Avenue and Sauve Street will be done through detailed design. The intersection design of Cedar Hedge Road at Derry Road will be a right-in, right-out style intersection, also to be detailed through detailed design.

As it is acknowledged acoustic fences will be required for lots that flank Derry Road, these will be implemented through detailed design. Proposed sidewalk locations have been proposed as shown in **Figure 11**.

11.0 PRELIMINARY SITE GRADING

A preliminary grading plan has been prepared for the Subject Lands based on the engineering constraints identified above. The conceptual grading is illustrated in ***Drawing 1*** and includes preliminary road and lot grading.

Preliminary profiles have been prepared for all roads and are included in ***Drawing 2***.

12.0 EROSION AND SEDIMENT CONTROL

An erosion and sediment control strategy will be implemented during the construction of services, including the following:

- Environment fencing
- Stone mud mat at all construction entrances
- Regular inspection and monitoring of the erosion and sediment control devices
- Removal and disposal of erosion and sediment control devices after the site has been stabilized

Drawings showing erosion and sediment control plans will be submitted directly to the Town of Milton and CH through the Site Alteration Permit process.

13.0 CONCLUSIONS

This Functional Servicing, Stormwater Management, and Preliminary Design Report provides an overview of the servicing plan for the Branthaven Fourth Line Inc. property, within the Milton Bristol Survey. This report demonstrates the availability of water, wastewater, and storm services for the proposed subdivision in accordance with Town of Milton and Region of Halton design criteria, the requirements of Conservation Halton, and general industry practice.

We trust you will find the contents of this report satisfactory.

Prepared by,
David Schaeffer Engineering Ltd

Reviewed by,
David Schaeffer Engineering Ltd



Claire Di Prisco

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Alexander Dow, P. Eng