DRAFT PLAN Stormwater Management Report 1000118982 Ontario Limited (formerly 1045502 & 1048605 Ontario Limited)

August 2025 | TYLin Project 09102

Town of Milton / Regional Municipality of Halton

FIELDGATE DEVELOPMENTS | TYLin

TABLE OF CONTENTS

APPENDICES

APPENDIX A STORMWATER MANAGEMENT DESIGN CALCULATIONS

APPENDIX B WATER BALANCE MEMO

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 Objective

TYLin has been retained by 1000118982 Ontario Limited (Fieldgate Developments) to assist in obtaining the necessary approvals to permit the Proposed Development of the property generally located on the south side of Louis St. Laurent and west side of Bronte Street South, east of the Canadian National Railway tracks. The Subject Lands are legally described as Part of Lots 7 & 8, Concession 1, New Survey. The entire Draft Plan of Subdivision lands which were Draft Plan Approved in January 2024, and which are subject to the proposed red lined revision consist of 36.5 ha (90.19 acres) and the portion of the Subject Lands that are subject to the proposed Official Plan Amendment and Zoning By-Law Amendment (northern portion of Draft Plan of Subdivision) have an area of 14.74 hectares (36.42 acres). All lands are currently vacant.

Applications were previously processed and approvals were granted for these lands related to an Official Plan Amendment (OPA No. 77 enacted in March 2023), Zoning By-Law Amendment (By-Law No. 018-2023 enacted in March 2023) and Draft Approved Plan of Subdivision (24T-21005/M approved in January 2024) to permit the development of high density residential uses, townhouse residential uses, commercial uses (all inside of the Secondary Mixed Use Node), a district park, active transportation link, NHS channel, related NHS buffers, and the servicing and stormwater management blocks.

This report has been prepared to support the applications which seek to modify the Draft Approved Plan of Subdivision through a red line revision to create a resized 'Secondary Mixed Use Node' (SMUN) consisting of a commercial component and a high-density residential component. Specifically, the SMUN is proposed to consist of three blocks comprised of 2 commercial blocks and one high density residential block, consisting of 6.33 ha (15.64 ac) in total. The applications also seek to facilitate ground-related townhouse development beyond the limits of the SMUN on a new public road network within the northern portion of the Draft Plan of Subdivision.

The proposed resized SMUN and reconfiguration of the townhouse development beyond the limits of the SMUN requires an Official Plan Amendment and Zoning By-Law Amendment. Overall, the development proposal in the northern portion of the Draft Plan of Subdivision consists of townhouses, high-density residential uses, and commercial uses. The modification of the SMUN will now exclude the grade related residential units. The southern portion of the Draft Plan of Subdivision (consisting of the district park, active transportation link, NHS channel, related NHS buffers, and the servicing and stormwater management blocks) is not proposed to be changed through this application.

As shown on **Figure 1.1**, the draft plan lands are bound on the north by Louis St Laurent Avenue, on the east by Bronte Street South, on the south by Elsie MacGill Secondary School and a private property, which is also proposed for development and on the west by the Canadian National Railway (CNR) tracks. Additionally, Tributary I-NE-1B traverses the south-west portion of the subject site.

The purpose of this report is to provide the functional stormwater management strategy and demonstrate its' feasibility for the proposed redline to the approved Draft Plan.

The recommended stormwater management strategy has been developed in accordance with applicable design criteria and requirements of the Town of Milton (Town), the Halton Region (Region), the Ontario Ministry of Environment, Conservation and Parks (MECP), and Conservation Halton (CH).

Figure 1-1: Location Plan

1.2 Background Reports

The following reports have been compiled historically for the subject site:

- Sixteen Mile Creek, Areas 2 and 7 Subwatershed Update Study (SUS), November 2015.
- Functional Stormwater and Environmental Management Strategy (FSEMS), Boyne Survey

Secondary Plan Area, Final, November 2015, including the Implementation Principles for the Boyne Survey Natural Heritage System; and

- Boyne Survey Block 1, Subwatershed Impact Study (SIS), Town of Milton, December 2018, addended June 2019.

1.3 Existing Conditions

The subject site is located within the Indian Creek subwatershed, and is comprised mainly of agricultural lands, with a relatively flat topography. The existing topography generally slopes from an elevation of 195 m at the northern boundary to 188 m at the southern boundary.

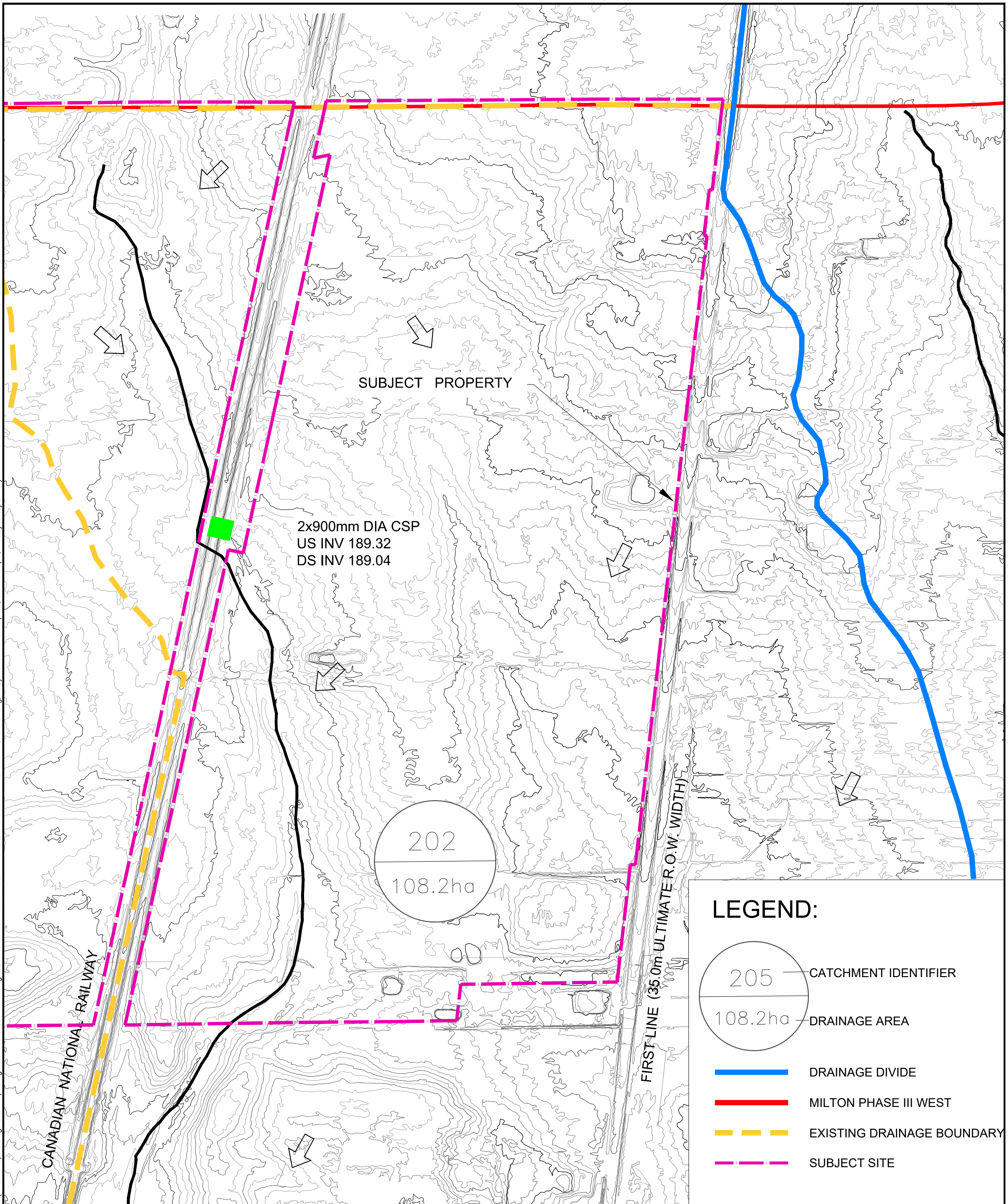
Tributary I-NE-1B traverses the south-west portion of the subject site east of the CNR corridor and flows southerly through the lands through to the adjacent southern property. The watercourse is intermittent and thus only flows following large rain events and/or during the spring melt, it is considered a first order headwater feature that has been historically altered and realigned for agricultural purposes.

The existing drainage patterns are shown on **Figure 1.2.**

1.4 Proposed Conditions

The Fieldgate East lands are proposed to be developed as a secondary mixed-use node that includes a mix of commercial and residential uses (high rise), medium density residential, a District Park, an active transportation link (ATL), a channel block and buffer, a servicing block, a stormwater management (SWM) pond and buffer, and a series of public right of ways, including the extension of Whitlock Avenue. The proposed development plan is illustrated on **Figure 1.3**. The Fieldgate East lands are tributary to the stormwater SWM facility identified as SWM Pond 'D' in the Boyne Survey Block 1 Subwatershed Impact Study (SIS) (TMIG, June 2019).

The proposed SWM pond block for Pond 'D' is located east of the realigned channel at the southern end of the development limit. The SWM Pond is proposed to discharge into the realigned channel, Tributary I-NE-1B, which will run along the western edge of the subject site, east of the existing CNR corridor.



FIELDGATE SUBDIVISION - EAST

EXISTING CONDITIONS DRAINAGE PLAN

8800 Dufferin Street, Suite 200, Vaughan, ON, L4K 0C5
p: 905.738.5700
f: 905.738.0065

SCALE: 1:5,000

DATE: APRIL 2022

DESIGNED BY: L.K. DRAWN BY: M.M.

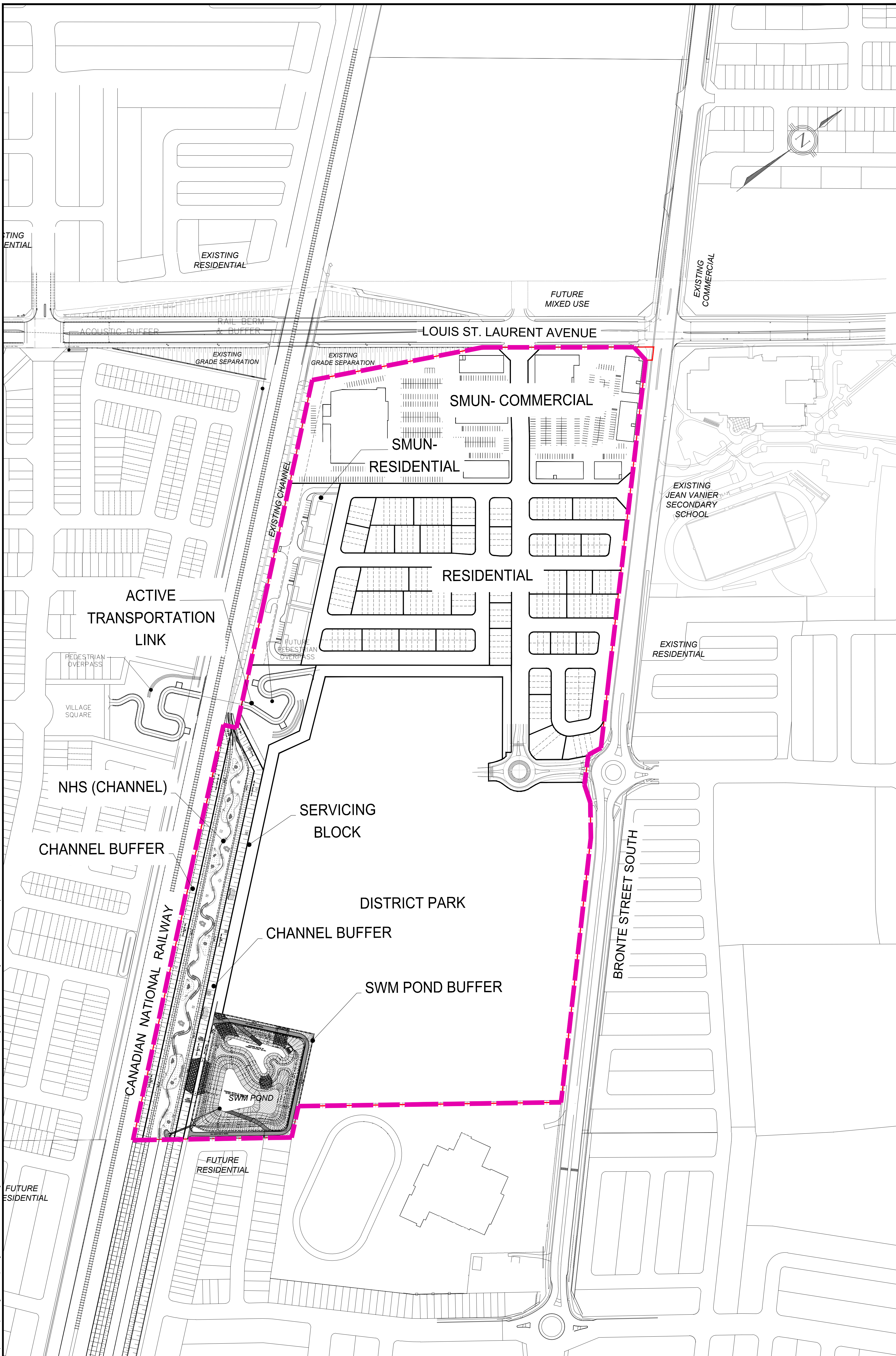
CHECKED BY: L.K. CHECKED BY: S.H.

PROJECT No. 09102

FIGURE No. 1.2

File : G:\Projects\2009\09102 - Fieldgate (Milton Ph 3)\Drawings\SWM Report Figures\EAST OF CNR\SWM Figures - Second Submission\FIGURE 1.2 EXISTING CONDITIONS DRAINAGE PLAN.dwg, Layout : 1.2 Date :Apr 06, 2022 - 4:24pm, Edit By : maryna.moryakina

Reverse side of Fig 1.2



File : G:\Projects\2009\09102 - Fieldgate (Milton Ph 3)\Drawings\SWM Report Figures\EAST OF CNR\SWM Figures-Fourth Submission\FIGURE 1.3 DEVELOPMENT PLAN.dwg, Layout : 1.3 Date :Aug 14, 2025 - 7:45am, Edit By : sean.stok

TYLin

3381 Steeles Avenue East, Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700

FIELDGATE EAST LANDS DEVELOPMENT PLAN

SCALE: 1:4,000	PROJECT No. 09102
DATE: JULY 2025	
DESIGNED BY: L.K.	DRAWN BY: M.M.
CHECKED BY: L.K.	CHECKED BY: L.K.
FIGURE No.	1.3

Reverse side of Fig 1.3

2 OPPORTUNITIES AND CONSTRAINTS

An inventory of existing ecological conditions was completed as part of the Boyne Survey Block 1, Subwatershed Impact Study (SIS) to identify opportunities and constraints related to the proposed development and proposed Natural Heritage System (NHS). These existing condition inventories informed the development of the proposed NHS, which is illustrated on **Figure 2.3**.

Stream Corridors

Tributary I-NE-1B-1 of Indian Creek crosses the Fieldgate East site. The Boyne Survey Block 1 SIS watercourse rankings (**Figure 2.1**) showed that this watercourse was ranked as a medium constraint stream through the subject site. Medium constraint watercourses are to be retained but can be realigned. As such, stream corridor I-NE-1B-1 is to be retained as a realigned watercourse as illustrated on **Figure 2-3**.

Flora and Fauna Salvage

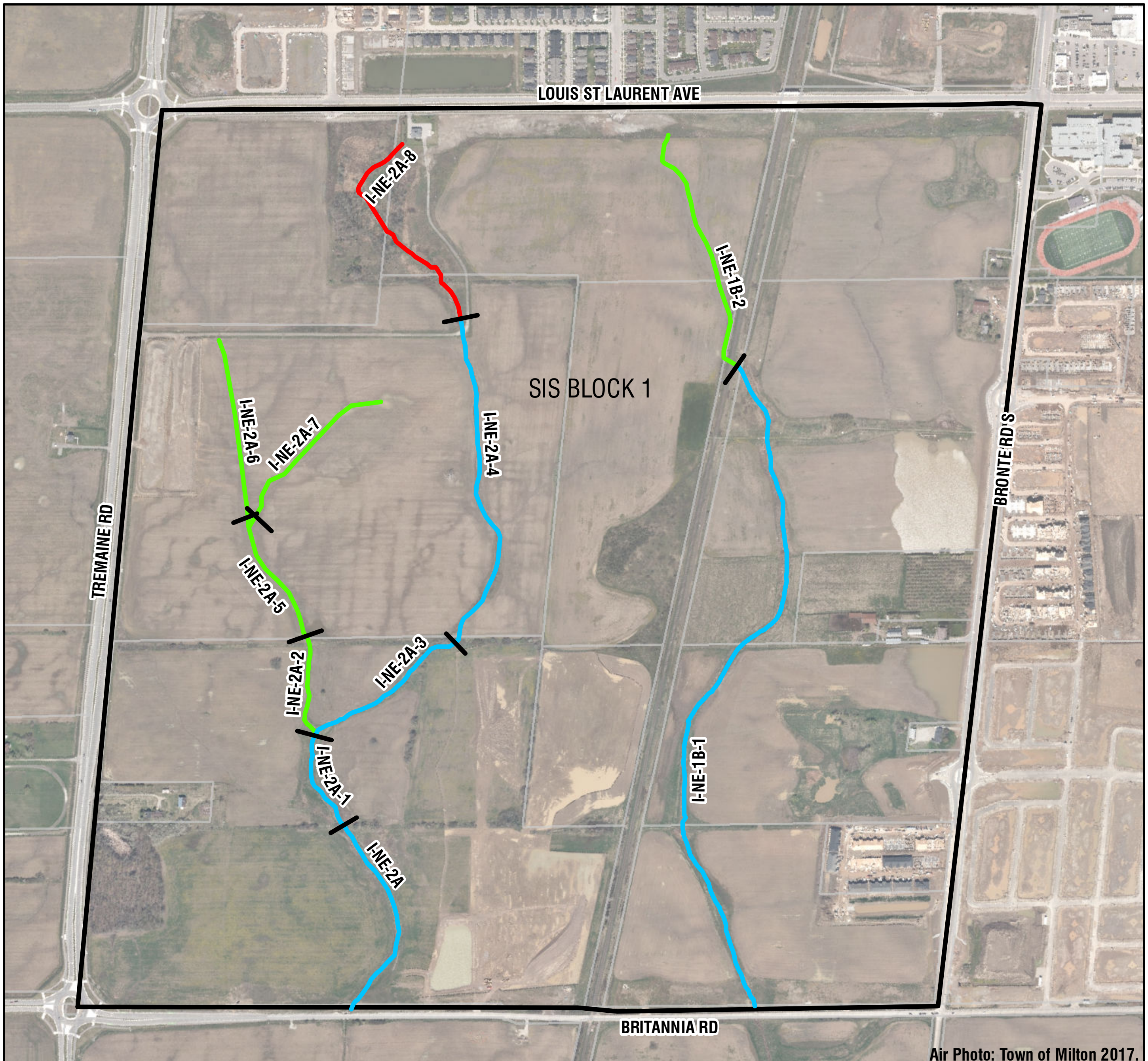
The Boyne Survey Block 1 SIS identified flora and fauna salvage opportunities for the Boyne Survey Block 1 lands. There is one flora/ fauna salvage location within the Fieldgate East site, as shown on **Figure 2.2**. Flora / fauna / soils salvage will occur at Isolated Specialized Habitat Unit BXi before removal of the feature, following methodologies provided in the Boyne Survey Block 1 SIS.

Proposed NHS

The proposed NHS limits for the Boyne Survey Block 1 lands were determined through detailed analysis completed as part of the Boyne Survey Block 1 SIS and is shown on **Figure 2.3**. The NHS on the Fieldgate East site is comprised of:

- A medium constraint watercourse (stream corridor I-NE-1B-1) that will be retained but can be realigned.
- Buffers applied to the stream corridor as per the IP and Secondary Plan policies (10 m setback from stable top of bank and 15 m on the side that contains a trail, and
- Habitat creation and enhancement areas within the stream corridors as outlined in the Boyne Survey Block 1 SIS.

this page has intentionally been left blank for double sided printing



SIS Block 1

Watercourses*

High Constraint Stream (located within provincially significant wetland)

Medium Constraint Stream

Low Constraint Stream

Reach Break

*Watercourse net constraint rankings established by SUS and confirmed/refined by SIS studies (Savanta Inc., 2010 and 2012), except for reaches I-NE-2A-4 and I-NE-2A-8 which were identified as part of the regulated watercourse by Conservation Halton in 2017. As such, I-NE-2A-4 was upgrated from Low Constraint (as shown in the SUS) to Medium Constraint. Reach I-NE-2A-8 was not present during SUS or SIS (2010 and 2012 studies) and is fed by a stormwater management pond outlet north of Louis St. Laurent Avenue. Since I-NE-2A-8 is located within the Northeast Indican Creek PSW it is identified as a High Constraint stream. Within the PSW, the flow path of I-NE-2A-8 is somewhat diffuse and the location shown here is approximate.

MILTON PHASE 3 SIS Block 1 Subwatershed Impact Study

Figure 2-1
Watercourse Rankings

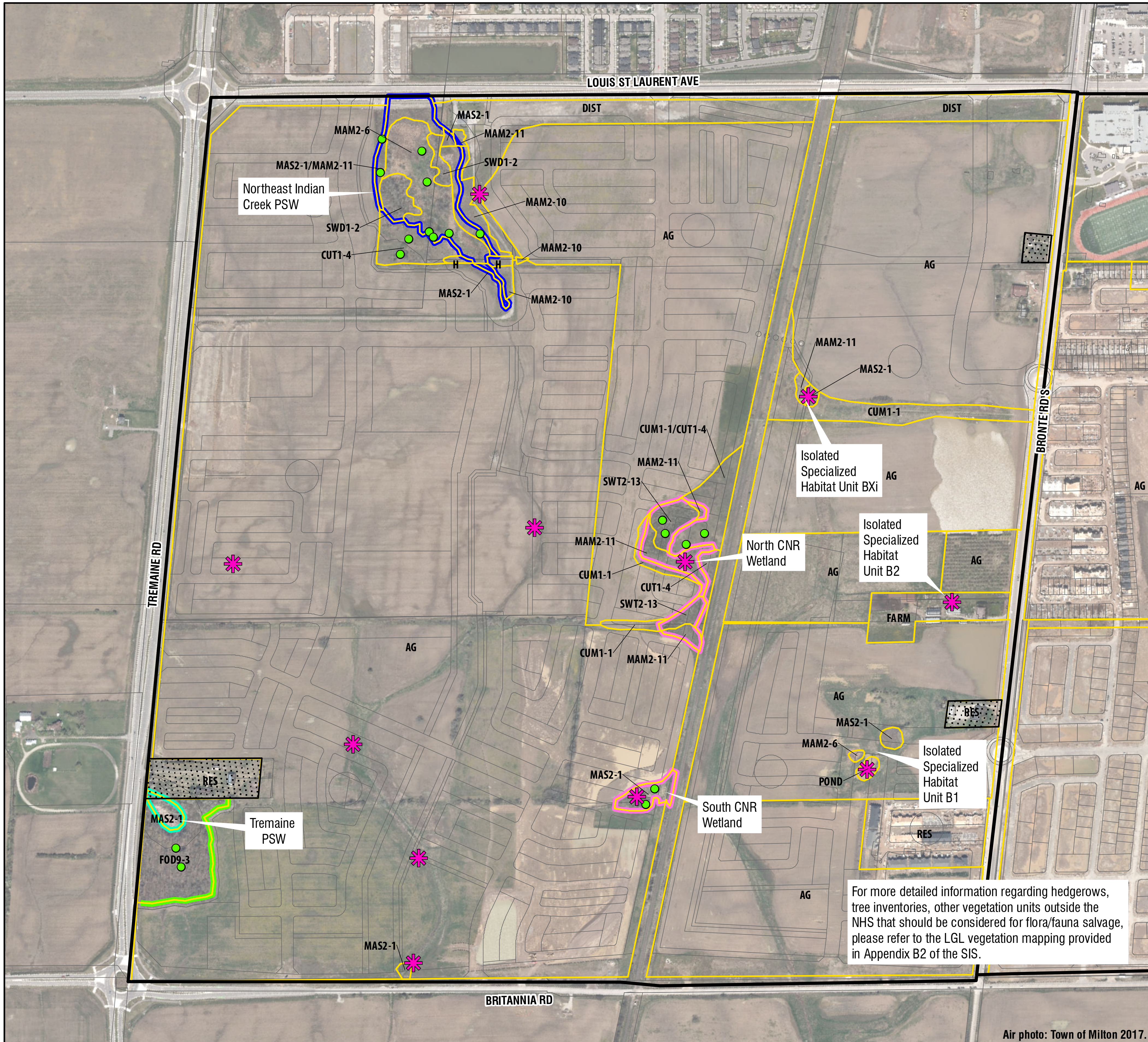
April 2018

0 100 M

N

SAVANTA

Path: S:\8321 - SAV 7084 Milton Phase 3 West Block 1\gis\mxd\2018 02 26 report figures\Figure 2-1 Watercourse Rankings.mxd Date Saved: April 6, 2018



ELC LEGEND

CULTURAL
CUT1-4 Grey Dogwood Cultural Thicket
CUM1-1 Fresh-Moist Old Field Meadow

FOREST
FOD9-3 Fresh-Moist Bur Oak Deciduous Forest

SWAMP
SWD1-2 Bur Oak Mineral Deciduous Swamp
SWT2-13* Dogwood-Willow Mineral Thicket Swamp

MARSH
MAM2-6 Broad-leaved Sedge Mineral Meadow Marsh
MAM2-10 Forb Mineral Meadow Marsh
MAM2-11* Mixed Mineral Meadow Marsh
MAS2-1 Cattail Mineral Shallow Marsh

AG Agricultural
DIST Disturbed
POND Pond
RES Residential

**not listed in Southern Ontario ELC*

- SIS Block 1
- Non-participating Properties
- Ecological Land Classification (Savanta, 2013)
- Soil Core Location
- Northeast Indian Creek Provincially Significant Wetland (MNRF, 2015)
- Wetland Staked by MNRF (2011)
- Tremaine Provincially Significant Wetland
- Tremaine Woodlot Staked Dripline
- Locations for Flora/Fauna Salvage

For more detailed information regarding hedgerows, tree inventories, other vegetation units outside the NHS that should be considered for flora/fauna salvage, please refer to the LGL vegetation mapping provided in Appendix B2 of the SIS.

MILTON PHASE 3 SIS Block 1 Subwatershed Impact Study

Figure 2-2
Existing NHS and ELC Features

Draft Tertiary Plan November 26, 2018

November 2018

SAVANTA

Path: S:\8321 - SAV 7084 Milton Phase 3 West Block 1\gis\mxd\2018 11 30 report figures\Figure 2-2 Existing NHS and ELC Features.mxd Date Saved: November 30, 2018

SIS Block 1

Proposed Park

Proposed NHS

Proposed SWM Pond

Wetlands staked by MNRF (2011) - proposed for removal and re-creation within the NHS

Tremaine Provincially Significant Wetland

Tremaine PSW 30m buffer

Enhanced Wildlife Crossing

Northeast Indian Creek Provincially Significant Wetland (MNRF, 2015)

PSW 30m buffer (except where determined through approved OMB minutes of settlement on the east side of the PSW)

Thicket Swamp Wetland Compensation Area

Re-created Thicket Swamp 15m buffer

MILTON PHASE 3 SIS Block 1 Subwatershed Impact Study

Figure 2-3
Proposed Natural Heritage System

Draft Tertiary Plan November 26, 2018 (GSAI)

November 2018

SAVANTA

3 STORMWATER MANAGEMENT STRATEGY

The proposed stormwater management plan for the study area was set out in the Boyne Survey Block 1, Subwatershed Impact Study (SIS). Stormwater management (SWM) Pond 'D', located in the Boyne Survey Area, south of Louis St Laurent Avenue and west of Bronte Street, is to be designed to accommodate storms up to and including the 100-year and Regional storm. The proposed drainage plan is illustrated on **Figure 3.1**.

3.1 Proposed Minor and Major System Drainage

The Fieldgate East site drains to the stormwater SWM facility identified as SWM Pond 'D' in the Boyne Survey Block 1 Subwatershed Impact Study (SIS) (TMIG, June 2019). The proposed SWM pond block for Pond 'D' is located east of the realigned channel at the southern end of the development limit. The SWM Pond is proposed to discharge into the realigned channel, Tributary I-NE-1B, which will run along the western edge of the subject site, east of the existing CNR corridor.

- The commercial and residential lands in the northern area have a drainage strategy based on a typical minor and major system. The minor system will be collected in a storm sewer and the major system will be conveyed via overland flow through the ROWs. The minor system from these lands is conveyed via storm sewer through the District Park to SWM Pond D. The major system from these lands will be discharged to the Servicing Block and will be conveyed to SWM Pond D via a trapezoidal channel within the easement.
- The drainage design for the District Park is not yet finalized, however treatment of runoff generated within the park is accounted for in the design of SWM Pond D. A majority of the District Park will drain to SWM Pond D through an internal storm sewer network conveying flows to an inlet located at the northern end of the pond. and a 3.97ha portion of the Park will sheet flow to the conveyance within the Servicing Block. Minor flows from the commercial and residential lands north of the District Park are included in the storm sewer. The location of the park inlet is to be refined during the detailed design of the SWM Pond, and once the park detailed design is available. See the storm sewer design sheet provided in **Appendix A**.
- Drainage from the ATL is accounted for in the design of SWM Pond D. The drainage design proposes that drainage from the pathway area of the ATL will drain to the trapezoidal channel within the Servicing Block and the remaining pervious area will drain uncontrolled and untreated to the channel.
- Tributary I-NE-1B is proposed for realignment along the western limit of the draft plan. The total corridor width is 60m and consists of: 35m channel block, 10m buffers on each side. The channel and buffer lands drain off site southerly through the adjacent property and do

not require treatment in the SWM Pond.

- Treatment of runoff generated within the Servicing Block is accounted for in the design of SWM Pond D and drains to the Pond via a trapezoidal channel within the block.
- The minor and major system drainage for the extension of Whitlock Ave. is accounted for in the design of SWM Pond D. It is anticipated that the ROW minor and major system flows will drain to the storm sewer through the District Park. The location where ROW runoff inlets into the sewer is to be refined during the detailed design stages of the sewer, ROW and SWM Pond.
- Bronte Street is not part of the draft plan, however major system runoff from a portion of the ROW is proposed to drain to SWM Pond D, via the Fieldgate East site. Bronte Street major system flows will enter into the Whitlock extension and be captured into the storm sewer and conveyed to the SWM pond through the District Park.

Imperviousness of the District Park is not available as the design is not yet finalized. However, based on the Boyne District Park West Park/ Open Space Concept Plan – Facility Fit plan, completed by the MBTW group (revised April 2025), the imperviousness of the park is estimated to be approximately 45%. To be conservative, and anticipating the potential for future changes, an imperviousness of 50% has been selected. **Table 3.1** summarizes the drainage areas contributing to SWM Pond 'D' and their corresponding runoff coefficient and imperviousness.

Table 3.1: Drainage Areas to SWM Pond 'D'

Area Breakdown / Proposed Land Use	Drainage Area	Runoff Coefficient	Imperviousness
	(ha)		*(%)*
Secondary Mixed-Use Node (Commercial)	5.15	0.90	100
Secondary Mixed-Use Node (Residential)	1.18	0.90	100
Street Townhomes	2.34	0.75	79
Dual Frontage Townhomes	1.11	0.90	100
Back-to-Back Townhomes	1.04	0.90	100
District Park	15.68	0.55	50
Active Transportation Link*	0.20	0.90	100
Servicing Block	1.00	0.45	36
SWM Pond	1.34	0.50	43

SWM Pond Buffer	0.19	0.50	43
Rights of Way / Roads	4.27	0.90	100
Road Widening	0.02	0.90	100
External Roads	1.40	0.90	100
Total Drainage Area (ha)	34.92		
Weighted Imperviousness (%)	72%		

*Additional 0.04 ha area due to ATL pathway over tracks

3.2 Stormwater Management Facility Design

The information presented in this report reflects the detailed design of the SWM Pond which was based on previous detailed design submissions. The proposed SWM facility has been designed as an enhanced quality wet pond, servicing post-development flows from the subject site and the external area. The total drainage area and average imperviousness for the contributing area to SWM Pond ‘D’ is 34.92 ha and 72% respectively.

SWM Pond ‘D’ will provide water quality treatment, erosion control and water quantity attenuation in accordance with the criteria set out in the Town of Milton design manual, the MOE Stormwater Management Planning and Design Manual (SWMP&DM) and the Boyne Survey Block 1 SIS.

The SWM Pond outlet will be designed as a bottom draw outlet to ensure the flows out of the facilities to the receiving watercourse are drawn from the cooler and deeper depths of the permanent pool.

Landscaping plans will be prepared to incorporate a riparian planting strategy to provide shading of the pond embankments, enhancing the reduction to temperatures of the runoff leaving the SWM pond. A wetland pool will also be provided within the proposed realigned channel I-NE-1B at the pond outlets, this along with shading from the plantings will help mitigate the water temperature.

Figure 3.4 illustrates the conceptual design of SWM Pond ‘D’.

3.2.1 Facility Sizing

The proposed SWM facility has been designed as an enhanced quality wet pond, servicing post-development flows from the subject site and the external area. The total drainage area and average imperviousness for the contributing area to SWM Pond ‘D’ is 34.92ha and 72% respectively. SWM Pond ‘D’ will provide water quality treatment, erosion control and water quantity attenuation in accordance with the criteria set out in the Town of Milton design criteria, the MOE Stormwater Management Planning and Design Manual (SWMP&DM) and the Boyne Survey Block 1 SIS. The following sections detail the specific criteria that apply to each requirement.

3.2.2 Water Quality

Water quality treatment has been provided in accordance with the MOE SWM Planning & Design Manual. SWM Pond 'D' has been designed to an Enhanced level of protection, which is consistent with the SWM design criteria. With a total tributary area of 34.92 ha and average imperviousness of 72%, the SWM Pond 'D' facility requires a permanent pool volume of 6,488 m^3. The total permanent pool volume provided within SWM Pond 'D' is 7,842 m^3, which exceeds the volumes required. Detailed calculations are provided in **Appendix A.**

3.2.3 Erosion Control / Extended Detention

The erosion control criteria established in the FSEMS and the Boyne Survey Block 1 SIS stipulates targets of 150 m^3/impervious-ha of storage volume and an outflow control of 0.0009 m^3/s/ha to Tributary I-NE-1B. The required storage volumes and target release rates were calculated based on a total contributing drainage area of 34.92 ha and average imperviousness of 72% for SWM Pond 'D'. The findings are summarized below in **Table 3-2.**

Table 3-2: Summary of Required and Provided Erosion Control Storage Volumes and Release Rates

SWM Pond	Required Erosion Control Storage Volume (m^3)	Target Release Rate (L/s)	Provided Erosion Control Storage Volume (m3)	Provided Release Rate (L/s)
SWM Pond 'D'	3,759	31.4	4,010	30.0

As shown in **Table 3-2**, the provided extended detention storage volume exceeds the required storage volume and is provided within SWM Pond 'D' between the elevations of 186.10 m (normal water level) and 186.60 m.

Detailed calculations are provided in **Appendix A.**

3.2.4 Water Quantity Control

The water quantity attenuation criteria were defined in the FSEMS (November 2015) and the Boyne Survey Block 1 SIS, based on hydrologic modeling completed using the HSP-F hydrologic model. The required storage volumes and target release rates were calculated based on a total contributing drainage area of 34.92 ha and average imperviousness of 72% for SWM Pond 'D'. The requirements are summarized in **Table 3-3.**

Table 3-3: Summary of Required Storage Volumes and Target Release Rates for SWM Pond 'D'

Storage Component	Required		Provided	
	Cumulative Storage (m^3)	Discharge (m^3/s)	Cumulative Storage (m^3)	Discharge (m^3/s)
25 Year	6,892	0.769	7,669	0.662
100 Year	10,025	1.117	10,592	1.131
Regional	16,916	3.317	19,295	3.300

As shown in **Table 3-3**, the provided water quantity control volumes are greater than required and the controlled discharge is less than the required discharge. Detailed calculations are provided in **Appendix A.**

3.2.5 Forebay Sizing

The sediment forebay has been designed as per the MOE SWMP&DM to pre-treat the incoming flows. As per the recommendations of the MOE manual the forebay provided in facility SWM Pond 'D' has been designed with a length to width ratio of 11:1 for the east forebay and 7.7:1 for the west forebay, which is higher than the required 2:1. All other required design targets for settling distance, dispersion length, deep zone bottom width, and maximum average velocity have been met. The sediment forebay design calculations are provided in **Appendix A.**

3.2.6 Facility Outlet Design

Discharge from SWM Pond 'D' will be provided through a multi-stage outlet configuration. The outlet design will ensure that outflows to tributary I-NE-1B are controlled to the target release rates for erosion control; the 25-year and the 100-year return period events; and the Regional Storm event.

A bottom draw reversed sloped pipe, controlled by an orifice plate, is proposed to provide erosion control / extended detention. The submerged end of the pipe will be installed with a Hickenbottom (perforated) pipe surrounded with a gravel jacket to prevent blockage of the perforated pipe.

Design calculations are provided in **Appendix A.**

3.2.7 District Park Major System Overland Inlet to Pond D

As noted in **Section 3.1**, a small portion of the District Park runoff, minor and major system, drains overland to the Servicing Block and is conveyed to the SWM Pond via the trapezoidal channel in the Servicing Block.

This section addresses the major system flows for the balance of the District Park lands and the sizing for the overland inlet into the Pond. The Regional peak flow from the FSEMS was prorated to estimate the flows entering through this inlet, and a spreadsheet calculation was used to confirm the sizing. The overland inlet into the Pond is provided in the form of a typical trapezoidal shaped rip rap inlet. Estimated Regional peak flow is 2.19m^3/s, and the capacity of the overland inlet is 4.37m^3/s. The capacity is greater than the anticipated flow; therefore, the inlet has been sufficiently sized. Calculations are provided in **Appendix A**.

3.2.8 Servicing Block Conveyance and Overland Inlet to Pond D

Conveyance capacity of the channel within the Servicing Block was estimated at an upstream and downstream location.

The anticipated flow to the downstream section A-A′ is 3.0m^3/s which includes the major system flows (100year-5year) as above, and a portion of the District Park. The downstream section is designed with a bottom width of 3.4m, 3:1 side slopes, and a maximum depth of 0.5m. The swale has a maximum capacity of 3.84m^3/s which is greater than the anticipated flow.

The anticipated flow to the upstream section B-B′ is 1.85m^3/s which includes the major system flows (100year-5year). The upstream section is designed with a bottom width of 1.8m, 3:1 side slopes, and a maximum depth of 0.5m. The swale has a capacity of 2.42m3/s which is greater than the anticipated flow.

Figure 3-2, and **Figure 3-3** illustrate the Servicing Block conveyance and trail designs at Section A-A′ and B-B′, respectively.

The overland inlet to the SWM Pond is located at the northwest corner of the SWM Pond. The overland flow inlet conveys the flow from the swale adjacent to the trail. The anticipated flow is 3.00m^3/s which consists of the major system flow (100year -5 year) from SMUN and residential areas, and the 100-year flows from a portion of the District Park.

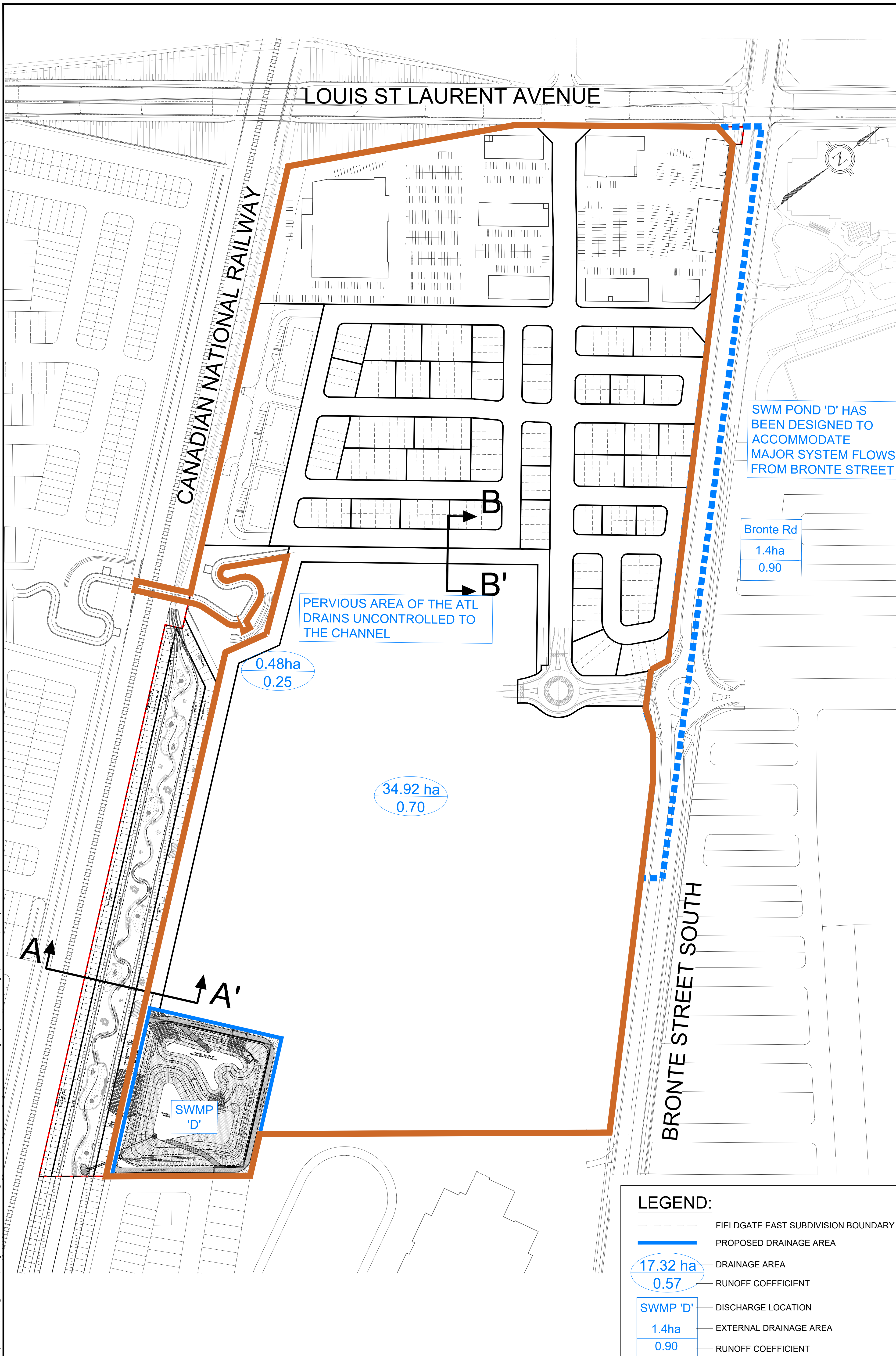
The overland inlet is a trapezoidal weir with a bottom width of 5m with 5% side slopes and a depth of 0.3m. The maximum capacity is 17.86m^3/s. The storm design sheet and storm drainage area plan are provided in **Appendix A** for detailed calculations of the flow and drainage areas.

3.2.9 Emergency Spillway

SWM pond 'D' is designed with an emergency spillway sized as a trapezoidal weir with a bottom width of 35 m and depth of 0.2 m. The weir is set at an invert of 188.20m, equal to 0.1m above the expected Regional Storm water level in the pond. The emergency spillway will discharge into tributary I-NE-1B and has a maximum capacity of 5.30 m^3/s. The uncontrolled Regional peak flow is 4.93m^3/s, and therefore the spillway is sufficiently sized. The peak flow has been estimated by prorating the regional flow at node 9.12 from the proposed land use without SWM frequency flows in the FSEMS dated November 2015. Detailed calculation of the emergency spillway is provided in **Appendix A**.

3.2.10 Pond Liner

Based on the geotechnical report dated March 17, 2023, prepared by DS consultants Ltd, the pond bottom and excavated side slopes will consist of silty clay till and topsoil/fill. A liner (i.e. clay liner) is not required for pond bottom and side slopes in the native silty clay till. However, the existing topsoil and fill material below the regional water level at 188.1 m should be replaced by silty clay soil along the side slopes of the pond. The silty clay soil should consist of low permeability clay soil, containing a minimum of 20% clay content (finer than 0.002 mm) and having a plasticity index (PI) of minimum 8. Any cobbles or boulders greater than 100 mm in size should be excluded from the liner fill. The clay liner should be compacted to a minimum of 100% SPMDD. The thickness of silty clay soil along the side slopes of pond should be at least 1.0 m.



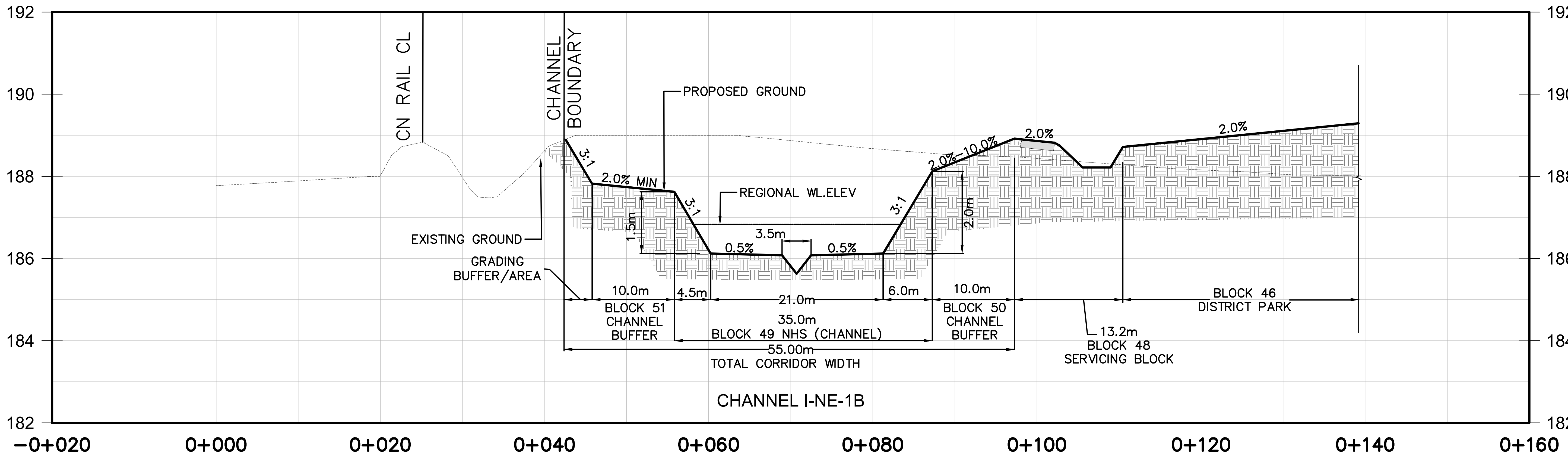
TYLin
3381 Steeles Avenue East, Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700

FIELDGATE EAST LANDS
PROPOSED DRAINAGE AREA

SCALE: 1:3,000		PROJECT No. 09102
DATE: JULY 2025		
DESIGNED BY: L.K.	DRAWN BY: M.M.	FIGURE No. 3.1
CHECKED BY: L.K.	CHECKED BY: L.K.	

File : G:\Projects\2009\09102 - Fieldgate (Milton Ph 3)\Drawings\SWM Report Figures\EAST OF CNR\SWM Figures-Fourth Submission\FIGURE 3.1\DRAINAGE AREA.dwg, Layout : 3.1 Date :Aug 14, 2025 - 7:47am, Edit By : sean.stok *this page has intentionally been left blank for double sided printing*

SECTION A-A'



TYLin

3381 Steeles Avenue East,
Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700

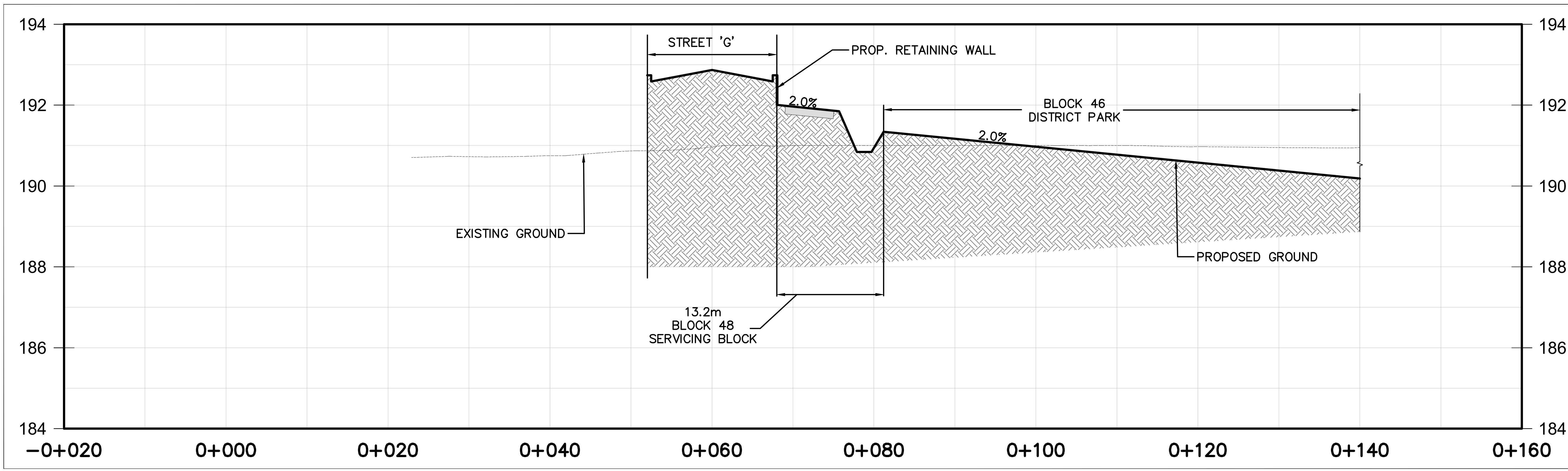
FIELDGATE EAST LANDS

CONVEYANCE SWALE PRELIMINARY DESIGN - SECTION A

SCALE: N.T.S.		PROJECT No. 09102
DATE: JULY 2025		
DESIGNED BY: L.K.	DRAWN BY: M.M.	FIGURE No. 3.2
CHECKED BY: L.K.	CHECKED BY: L.K.	

File : G:\Projects\2009\09102 - Fieldgate (Milton Ph 3)\Drawings\SWM Report Figures\EAST OF CNR\SWM Figures-Fourth Submission\FIGURE 3.1-3.3 PROPOSED DRAINAGE AREA AND DITCH SECTIONS.dwg,   Layout : 3.2   Date :Jul 10, 2025 - 4:01pm,   Edit By : nikita.chiduku

SECTION B-B'



TYLin
3381 Steeles Avenue East,
Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700

FIELDGATE EAST LANDS

CONVEYANCE SWALE PRELIMINARY DESIGN - SECTION B

SCALE: N.T.S.	
DATE: JULY 2025	
DESIGNED BY: L.K.	DRAWN BY: M.M.
CHECKED BY: L.K.	CHECKED BY: L.K.

PROJECT No. 09102

FIGURE No. 3.3

DESCRIPTION	REQUIRED STORAGE	AVAILABLE STORAGE
PERMANENT POOL EL.184.60 - EL.186.10	6,461m^3	7,842m^3
EXTENDED DETENTION EL.186.10 - EL.186.60	3,762m^3	4,113m^3
25-YEAR FLOOD EL.186.10 - EL.187.00	6,896m^3	7,403m^3
100-YEAR FLOOD EL.186.10 - EL.187.30	10,031m^3	10,525m^3
REGIONAL FLOOD EL.186.10 - EL.188.10	16,927m^3	18,964m^3

POND DATA	
DRAINAGE AREA	35.1 HA
POND BLOCK AREA	1.50 HA
ROAD ELEV. AT INLET MH	188.40m
PERMANENT POOL ELEV.	186.10m
BOTTOM OF POND ELEV.	184.60m
HWL (Regional)	188.10m
FREE BOARD ELEV	188.40m
POND SLOPES	5:1
POND INLET INV.	186.10
POND OUTLET INV.	185.95
APPROX. LENGTH/WIDTH RATIO	4:1

TYLin

3381 Steeles Avenue East,
Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700

FIELDGATE EAST LANDS

PRELIMINARY POND 'D' CONCEPT PLAN

SCALE: 1:1,000		PROJECT No.	09102
DATE: JULY 2025			
DESIGNED BY: L.K.	DRAWN BY: M.M.	FIGURE No.	3.2
CHECKED BY: L.K.	CHECKED BY: L.K.		

3.2.11 Thermal Mitigation

Tributary I-NE-1B has been classified as supporting seasonal warm water fish communities within the Boyne Survey Block 1 SIS area and immediately downstream of Britannia Road. Overall, the fish communities supported within the watercourse are considered tolerant of poor water quality and resilient to warmer water temperatures. Considering the current fish communities and the potential for its improvement post development, considerations of thermal impacts from stormwater need to be considered.

Under post development conditions increased surface water temperatures may result from runoff from paved surfaces and from stormwater management (SWM) facility. In order to mitigate these thermal inputs to the receiving watercourse the detailed design of SWM Pond 'D' will need to incorporate measures to mitigate thermal impacts to the receiving watercourses.

The Boyne Survey Block 1 SIS outlined a number of recommended measures to be considered in the detailed design of the SWM ponds. These measures, intended to provide the conditions within the watercourses to support healthy warm water fish communities, are summarized below:

- Increase the pool depth to approximately 3.0m from the permanent pool elevation in the vicinity of the outlet pipe. This will provide a reservoir of cool water, which will be discharged from the pond during the first approximate 10mm of an event. The MNRF has found this approach has been successful in reducing water temperatures.
- Increasing canopy cover within the SWM facility (particularly along the west and south sides).
- Outlet structures incorporating bottom draws/reverse sloped pipes; and
- Enhancement of riparian vegetation along the drainage path between the SWM facility outlet and the receiving watercourse.

Increased Pool Depth at Outlet

Within SWM Pond 'D' the wet cell has been designed with a 1.5 m deep permanent pool that deepens to 3 m at the outlet structure. The SWM facility deep pools will accommodate the equivalent volume associated with runoff from the 10mm rainfall event.

Canopy Cover

The landscape plans for SWM Pond 'D' require a riparian planting strategy to provide shading of the pond embankments and outlet structure, enhancing the reduction to temperatures of the runoff leaving the SWM pond.

Outlet Structures

The SWM Pond outlet will be designed as a reverse graded pipe that draws from the deep pool to ensure the flows out of the SWM pond to the receiving watercourse are drawn from the cooler and deeper depths of the permanent pool.

Drainage Path

The drainage path through SWM Pond 'D' will be maximized to the extent possible. Berm(s) have been introduced in the SWM Pond to ensure all length to width ratios are greater than 3:1. The berm(s) will be landscaped to allow for increased shading throughout the SWM Pond. Wetland pools will also be provided within the proposed realigned channel I-NE-1B at the pond outlet, this along with shading from the plantings will help mitigate the water temperature.

3.3 Site Water Balance

The FSEMS requires that surface water recharge to groundwater be maintained at pre-development conditions. In order to mitigate the decrease in infiltration under post development conditions, the Fieldgate East site will include the implementation of Low Impact Development (LID) measures.

A Water Balance Update has been completed for the Fieldgate Lands East of the CNR by R.J. Burnside & Associates Limited (Burnside, 2025), which included a pre and post development water budget for the Fieldgate East site. The subject lands are underlain by fine grained and relatively low permeability overburden sediments and shale bedrock. The hydraulic conductivity for the subject lands was found to be moderate to low and typical of sandy till sediments.

The pre-development infiltration volume was calculated to be approximately 48,100 m^3/year. The post development infiltration volume (without mitigation) was calculated to be approximately 19,200 m^3/year. Therefore, the LID measures will need to provide sufficient infiltration to minimize the overall deficit in groundwater infiltration of approximately 28,900 m^3/year.

Subsurface methods should only be considered in areas where there is sufficient depth to the water table to accommodate the systems within the unsaturated zone, and sufficient soil hydraulic conductivity to effectively function. In-situ hydraulic conductivity testing should be undertaken at the elevation of the proposed subsurface system, to assess the feasibility. Subsurface infiltration type LIDs are not generally recommended for this area given their expense and potential ineffectiveness due to the low permeability of the soils. Site based, landscape level LIDs to promote retention of runoff, such as bioretention features, vegetated filter strips, permeable pavement, dry swales, downspout disconnection and silva cells are most suitable for this site.

No specific LIDs are proposed for the Channel or Channel buffer: these areas will be naturalized through restoration plantings and providing access for future maintenance of an LID would not be feasible. Similarly, for the SWM Pond, SWM Pond Buffer and Servicing Block, which are largely pervious areas: no LID features are proposed.

To make up for the above noted deficit in the site infiltration, the SMUN Commercial and Residential and the District Park will need to implement some measure of LID to reduce runoff, provide site retention and promote localized infiltration.

Within the District Park, LID measures should be designed to capture runoff from the 3mm storm and LIDs in the SMUN lands should be designed to capture the 2mm storm event. The difference is based on the overall imperviousness of the respective land uses.

The post development water balance including LID implementation will result in a total estimated annual recharge of 47,770m^3. In comparison to the predevelopment annual infiltration of 48,100m^3, the change in infiltration under post development conditions is within 1% of the predevelopment volume and is considered to be sufficient based on the factor of error associated with these calculations.

4 OPERATIONS AND MAINTENANCE

4.1 Inspections

As recommended in the MOE SWMP&DM, inspections should be made after significant storms (>10 mm) during the first two years of operation to ensure that the facilities are functioning as per the design. It is anticipated that four inspections will be required per year. After the initial period and after proper operation has been confirmed, an inspection schedule can be established based on the observed operation of the pond. As a minimum requirement, the ponds should be inspected annually.

4.2 Regular Operation and Maintenance Activities

Grass Cutting

Grass cutting is not recommended for the ponds. Allowing grass to grow enhances the water quality and provides other benefits.

Weed Control

If weed control is required in order to remove a specific species, the weeds should be removed by hand.

Plantings

A vegetative community is required in three different locations – upland / flood, shoreline, and aquatic fringes. Planting methods and any replanting should be carried out in accordance with the approved Landscape Design and the recommendations of the MOE SWMP&DM, or as modified by the operating authority.

Trash Removal

Trash and debris should be removed by hand, performed as required based on inspections.

Sediment Removal

To ensure long-term effectiveness, the sediment that accumulates in the SWM facilities should be periodically removed. The required frequency of sediment removal is dependent on two (2) factors:

The first is that the efficiency of total suspended solid (TSS) removal within the sediment forebay should not decrease below 5% of the MOE target removal efficiency for the specified pond type. As sediment accumulates in the SWM facilities the removal efficiency decreases due to loss in storage volume. The SWM Pond 'D' will be designed to provide enhanced level of protection in terms of water quality. As a result, the required TSS removal efficiency for the SWM facilities is 80% and clean-out of the facilities should be completed when the removal efficiency drops to 75%.

The second requirement is that SWM pond forebay should be cleaned out once one half of the starting storage volume has been taken up by accumulated sediment. The forebay Sediment Removal Frequency is generally much shorter than the overall clean out frequency for SWM facilities. The forebay is designed to trap the majority of the large sediment and debris, and typically requires clean out on a more frequent basis than the entire SWM facility.

To maintain proper hydraulic operation of the SWM facility, clean out should be completed when the accumulated sediments occupy approximately half the volume of the permanent pool within the forebay. It should be noted that the decision to undertake a forebay clean out should be based on the yearly inspection results for both the forebay and main cell. If the majority of accumulated sediments are found to be within the forebay and the main cell, then an entire SWM facility clean out may be required.

The following methodology is proposed for the sediment removal from SWM Pond ‘D’:

- **Dewatering the Ponds for Sediment Removal:** Dewatering the SWM facilities for maintenance purposes should occur on a dry day when the ponds contain only the permanent pool volume of water (i.e., max. elevation 186.10m for Pond ‘D’). Dewatering of the SWM facilities can be accomplished by pumping water from the permanent pool directly to downstream of the outlet structures. A standard 6-inch pump will convey a minimum flow of 1000 m^3/day (i.e., 12 l/s). Depending on the permanent pool volume, use of several pumps concurrently may reduce the time required to empty the pond.
- **Equipment:** A rubber tire backhoe or a track machine with wide tracks for mud would be required due to the wet, soft soil conditions which may be encountered within the SWM facilities. The work should be done in the summertime on a dry day when the ponds contain only the permanent pool volume.
- **Sediment Disposal:** As per the MOE SWM Manual (2003), all sediments removed from the ponds should be tested to determine alternatives for disposal including depositing the material on land; landfill disposal; and hazardous waste disposal as per Ontario Regulation 347. A sample of the sediments removed is to be taken to a laboratory familiar with MOE’s disposal guidelines and tested accordingly.

Safety

The pond should be provided with appropriate signage, as per the Town of Milton standard E-26, that warns the public of the presence of deep water and slopes. A warning sign will be provided within the SWM Pond 'D' block.

Fencing will be provided along SWM pond boundaries adjacent to residential lots.

Landscape drawings will be prepared with strategic plantings around the perimeter of the ponds in order to discourage direct access to the facility.

All inlets, outlets, structures, and headwalls will be provided with the appropriate grates, covers, and safety features in order to prevent public entry or tampering.

5 NATURAL CHANNEL DESIGN

The proposed development plan includes the realignment of Tributary I-NE-1B through the Fieldgate Boyne West Subdivision lands east of the CNR tracks. The proposed natural channel design was established in the Boyne Survey Block 1 SIS and addresses the various watercourse sizing criteria (i.e., meander belt widths plus safety factors, flood conveyance, riparian storage and site grading requirements) and associated setbacks.

6 CONCLUSIONS

In summary, the proposed stormwater management strategy ensures that the required water quality treatment, erosion control and water quantity attenuation are provided for the Fieldgate Boyne East Subdivision tributary to SWM Pond 'D' such that the requirements outlined within the Town of Milton standards, the MOE SWMP design guidelines, the FSEMS and the SIS report are met.

It is our opinion that the information and level of detail contained in this report is adequate to obtain the required approvals for the stormwater management component of the proposed development. We trust you will find the contents of this report satisfactory. Please contact the undersigned if you have any questions or concerns.

Sincerely,
TYLin International Canada Ltd.

Prepared by

Laura Koyanagi
Water Resources Analyst

Abdul Ahmadzai P.Eng
Director of Land Development

APPENDIX A: STORMWATER MANAGEMENT CALCULATIONS

Fieldgate Subdivision - East of CNR

Town of Milton
Project No: 09102
Date: June 2025

Drainage Areas and Imperviousness Calculation- Total Area to Pond

SWM Pond D

Area Breakdown / Proposed landuse	Drainage Area	Runoff Coefficient	A x C	Imperviousness
	(ha)			(%)
Secondary Mixed-Use Node (Commercial)	5.15	0.90	4.64	100%
Secondary Mixed-Use Node (Residential)	1.18	0.90	1.06	100%
Street Townhomes	2.34	0.75	1.76	79%
Dual Frontage Townhomes	1.11	0.90	1.00	100%
Back-to-Back Townhomes	1.04	0.90	0.94	100%
District Park	15.68	0.55	8.62	50%
Active Transportation Link*	0.20	0.90	0.18	100%
Servicing Block	1.00	0.45	0.45	36%
SWM Pond	1.34	0.50	0.67	43%
SWM Pond Buffer	0.19	0.50	0.10	43%
Rights of Way / Roads	4.27	0.90	3.84	100%
Road Widening	0.02	0.90	0.02	100%

*Additional 0.04ha area due to pathway over tracks

Development Drainage Area (ha)	**33.52**
Composite Runoff Coeficient	**0.69**
Composite Imperviousness (%)	**71%**

External Road Drainage Area (ha)	**1.40**
Runoff Coeficient	**0.90**
Composite Imperviousness (%)	**100%**

TOTAL TO SWM POND D (ha)	**34.92**
Composite Runoff Coeficient	**0.70**
Composite Imperviousness (%)	**72%**

Servicing Block Sample Calculation

Area Breakdown / Proposed landuse	Area	Runoff Coefficient	A x C	Imperviousness
	(ha)			(%)
Swale and Pervious Width	0.70	0.25	0.18	7%
Trail width	0.30	0.90	0.27	100%

Total Drainage Area (ha)	**1.00**
Weighted Runoff Coeficient	**0.45**
Weighted	**35%**

ATL Block Calculation- Drainage to STM system

Area Breakdown / Proposed landuse	Area	Runoff Coefficient	A x C	Imperviousness
	(ha)			(%)
Walkway	0.20	0.90	0.18	100%

Total Drainage Area (ha)	**0.20**
Weighted Runoff Coeficient	**0.90**
Weighted	**100%**

District Park Block Calculation

Area Breakdown / Proposed landuse	Area	Runoff Coefficient	A x C	Imperviousness
	(ha)			(%)
Courts	1.11	0.9	0.999	100%
Cricket field	3.99	0.25	0.9975	7%
Driveways	3.18	0.9	2.862	100%
Topsoil	4.87	0.25	1.2175	7%
Building	1.1	0.9	0.99	100%
Walkways	1.43	0.9	1.287	100%
TOTAL	**15.68**		**8.35**	**39%**

Total Drainage Area (ha)	**15.68**
Weighted Runoff Coeficient	**0.53**
Weighted	**48%**

Fieldgate Subdivision - East of CNR

Town of Milton
Project No: 09102
Date: June 2025

Storage - Discharge Reqirements for Ponds Discharging to Channel 1B

CRITERIA:

EROSION AND FLOOD REQUIREMENT

EROSION AND FLOOD CONTROL

SUMMARY OF STORMWATER QUANTITY MANGEMENT PEAK FLOW AND STORAGE REQUIREMENTS
(AMEC Correspondence dated November 24, 2015)

Storage Component	Cumulative Storage Required (m^3/impervious ha)	Discharge (m^3/s/ha)
Erosion Control / Extended Detention	150	0.0009
25 Year	275	0.022
100 Year	400	0.032
Regional (Stored in Pond Only)	675	0.095

WATER QUALITY REQUIREMENTS

WATER QUALITY CONTROL

WATER QUALITY REQUIREMENTS MOE 2003					
Protection Level	SWMP Type	WATER QUALITY REQUIREMENTS			
		35%	55%	70%	85%
Enhanced Protection (Formerly Level 1)	Wetlands	80	105	120	140
	Wet Ponds*	140	190	225	250
	Hybrid Wetponds /Wetland	110	150	175	195

*NOTE: Of the specified storage volume, 40m^3 is extended detention

ESTIMATION OF QUANTITY AND QUALITY CONTROL STORAGE VOLUME AND FLOW RATE REQUIREMENT

Facility Location Reference	Facility Type	Estimated Developed Area (ha)	Assumed Imp (%)	Quality Control			Flood Control					
				Permanent Pool	Extended Detention		25 Year		100 Year		Regional Pond	
				Storage (m3)	Storage (m^3)	Flow rate (m^3/s)	Storage (m^3)	Flow rate (m^3/s)	Storage (m^3)	Flow rate (m^3/s)	Storage (m^3)	Flow rate (m^3/s)
SWM Pond D (with Bronte)	Wet Pond	34.92	72%	6,448	3,759	0.0314	6,892	0.768	10,025	1.117	16,916	3.317

Fieldgate Subdivision - East of CNR
Town of Milton
Project No: 09102
Date: June 2025

Deep Pool Volume Requirements

SWM Pond D

Area Breakdown / Proposed landuse	Drainage Area	Runoff Coefficient	Imperviousness
	(ha)		*(%)*

Total Drainage Area (ha)	**34.92**
Weighted Runoff Coefficient	**0.70**
Weighted Imperviousness (%)	**72%**

Target rain depth = 10 mm	10.00	**mm**
Minimum volume required for the deep pool (AREA x Rain Depth x Imperviousness)	2,506	**cum**

Deep Pool data:

elevation (m)	area (sqm)	depth (m)
184.60	2,138	1.5
183.10	1,213	

Provided volume within deep pool	2,513	**cum**
Equivalent captured rain depth	10.0	**mm**

STORMWATER POND "D"
SWM Pond Storage Calculations

Project#: 09102
Date: June 2024

POND CHARACTERISTICS

Base of Pond:	184.60	
N.W.L.:	186.10	masl
Increment for Volume:	0.1	m
Required Permanent Pool Volume:	6,448	m^3
Provided Permanent Pool Volume:	7,842	m^3

VOLUME

	INCL. P.P.	ACTIVE ONLY
Known Water Level:	187.90	
Lower Known Elevation:	187.30	
Lower Known Volume:	18,434.12	
Upper Known Elevation:	188.10	
Upper Known Volume:	27,137.13	
Volume of Known W.L. Elevation:	**24,961**	**17,120**

Water Level of Known Volume

	INCL. P.P.	ACTIVE ONLY
Known Volume:	0	16,916
Lower Known Elevation:	184.60	187.30
Lower Known Volume:	0.00	10,592.29
Upper Known Elevation:	185.35	188.10
Upper Known Volume:	3,241.39	19,295.30
W.L. Elevation of Known Volume:	**184.60**	**187.88**

Required Active Pool Volume:	16,916	m^3
Active Pool Volume Provided:	19,295	m^3

STAGE / STORAGE INFORMATION

	Elevation (m)	Stage (m)	Area 1 (m^2)	Area 2 (m^2)	Total Area (m^2)	Avg. Area (m^2)	Incremental Storage (m^3)	Cumulative Storage (m^3)	Cumulative Storage (m^3)
Pond Base:	184.60	0.00	760.6	2,810.0	3,570.5		0.0		
	185.35	0.75	1,411.9	3,661.3	5,073.2	4,321.9	3,241.4	**3,241**	**0**
NWL	186.10	1.50	2,295.1	4,899.6	7,194.7	6,133.9	4,600.4	**7,842**	**0**
	186.45	1.85	2,688.8	5,495.6	8,184.4	7,689.5	2,691.3	**10,533**	**2,691**
	186.85	2.25	9,392.4		9,392.4	8,788.4	3,515.4	**14,049**	**6,207**
	187.30	2.70	10,099.1		10,099.1	9,745.8	4,385.6	**18,434**	**10,592**
HWL/Regional	188.10	3.50	11,658.4		11,658.4	10,878.8	8,703.0	**27,137**	**19,295**
Freeboard	188.40	3.80	12,176.8		12,176.8	11,917.6	3,575.3	**30,712**	**22,871**

Fieldgate SMUN

Town of Milton

Project # : 09102

Date: June 2024

Stage-Discharge-Storage Operation - SWMP D

Input:

Control used	Control	Inv. Elev. (m)	D or L (mm or m)	Lip Elev. (m)	Description
y	Orifice 1	186.10	145	186.10	Erosion
y	Orifice 2	186.60	640	186.60	2 to 100 yr
y	Orifice 3	186.60	635	186.60	2 to 100yr
n	Orifice 4	200.00	0	200.00	
n	Weir "A"	187.30	0.8	187.30	100yr to Regional
n	Weir "B"	187.50	0.7	187.50	100yr to Regional

Orifice: $Q=CA(2gH)^{0.5}$

Q=Cd*L*H^3/2 (broad crested) (considers end contractions)

Pond WS Elev (m)	Orifice 1 Head (m)	Orifice 1 Outflow (m^3/s)	Orifice 2 Head (m)	Orifice 2 Outflow (m^3/s)	Orifice 3 Head (m)	Orifice 3 Outflow (m^3/s)	Orifice 4 Head (m)	Orifice 4 Outflow (m^3/s)	Weir "A" Head (m)	Weir "A" Discharge Coefficient	Weir "A" Outflow (m^3/s)	Weir "B" Head (m)	Weir "B" Discharge Coefficient	Weir "B" Outflow (m^3/s)	Total Outflow (m^3/s)	Pond Storage (m^3)	Tailwater Elev (m)	Design Storm	Stage Storage (m^3)	Stage Drawdown Time (hr)	Total Drawdown Time (hr)
186.10	na	0.000	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.000	-	0.00				
186.15	na	0.004	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.004	384.48	0.00		384.48	25.36	25.36
186.20	na	0.008	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.008	768.95	0.00		384.48	12.68	38.05
186.25	0.08	0.013	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.013	1,153.43	0.00		384.48	8.46	46.51
186.30	0.13	0.016	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.016	1,537.91	0.00		384.48	6.60	53.10
186.35	0.18	0.019	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.019	1,922.38	0.00		384.48	5.59	58.69
186.40	0.23	0.022	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.022	2,306.86	0.00		384.48	4.94	63.63
186.45	0.28	0.024	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.024	2,691.34	0.00		384.48	4.47	68.10
186.50	0.33	0.026	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.026	3,130.76	0.00		439.42	4.70	72.80
186.55	0.38	0.028	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.028	3,570.18	0.00		439.42	4.38	77.18
186.60	0.43	0.030	na	0.000	na	0.000	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.030	4,009.60	0.00	**Ext Detention**	439.42	4.12	81.30
186.65	0.48	0.031	na	0.039	na	0.039	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.109	4,449.02	0.00		439.42	1.12	82.42
186.70	0.53	0.033	na	0.078	na	0.077	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.188	4,888.44	0.00		439.42	0.65	83.07
186.75	0.58	0.034	na	0.117	na	0.116	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.267	5,327.86	0.00		439.42	0.46	83.53
186.80	0.63	0.036	na	0.156	na	0.154	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.346	5,767.28	0.00		439.42	0.35	83.88
186.85	0.68	0.037	na	0.195	na	0.193	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.425	6,206.70	0.00		439.42	0.29	84.17
186.90	0.73	0.039	na	0.234	na	0.232	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.504	6,693.99	0.00		487.29	0.27	84.43
186.95	0.78	0.040	na	0.273	na	0.270	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.583	7,181.27	0.00		487.29	0.23	84.67
187.00	0.83	0.041	na	0.312	na	0.309	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.662	7,668.56	0.00	**25 yr**	487.29	0.20	84.87
187.05	0.88	0.042	na	0.351	na	0.347	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.741	8,155.85	0.00		487.29	0.18	85.05
187.10	0.93	0.044	na	0.390	na	0.386	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.820	8,643.14	0.00		487.29	0.17	85.22
187.15	0.98	0.045	na	0.429	na	0.424	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.899	9,130.43	0.00		487.29	0.15	85.37
187.20	1.03	0.046	na	0.469	na	0.463	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	0.978	9,617.71	0.00		487.29	0.14	85.51
187.25	1.08	0.047	0.33	0.508	0.33	0.502	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	1.056	10,105.00	0.00		487.29	0.13	85.63
187.30	1.13	0.048	0.38	0.545	0.38	0.538	na	0.000	0.00	1.83	0.000	0.00	1.83	0.00	1.131	10,592.29	0.00	**100yr**	487.29	0.12	85.75
187.35	1.18	0.049	0.43	0.579	0.43	0.572	na	0.000	0.05	1.83	0.016	0.00	1.83	0.00	1.217	11,136.23	0.00		543.94	0.12	85.88
187.40	1.23	0.050	0.48	0.612	0.48	0.604	na	0.000	0.10	1.83	0.045	0.00	1.83	0.00	1.312	11,680.17	0.00		543.94	0.12	85.99
187.45	1.28	0.051	0.53	0.643	0.53	0.635	na	0.000	0.15	1.83	0.082	0.00	1.83	0.00	1.411	12,224.11	0.00		543.94	0.11	86.10
187.50	1.33	0.052	0.58	0.673	0.58	0.664	na	0.000	0.20	1.83	0.124	0.00	1.83	0.00	1.513	12,768.04	0.00		543.94	0.10	86.20
187.55	1.38	0.053	0.63	0.701	0.63	0.692	na	0.000	0.25	1.83	0.172	0.05	1.83	0.01	1.632	13,311.98	0.00		543.94	0.09	86.29
187.60	1.43	0.054	0.68	0.729	0.68	0.719	na	0.000	0.30	1.83	0.223	0.10	1.83	0.04	1.763	13,855.92	0.00		543.94	0.09	86.38
187.65	1.48	0.055	0.73	0.755	0.73	0.744	na	0.000	0.35	1.83	0.277	0.15	1.83	0.07	1.902	14,399.86	0.00		543.94	0.08	86.46
187.70	1.53	0.056	0.78	0.780	0.78	0.769	na	0.000	0.40	1.83	0.333	0.20	1.83	0.11	2.047	14,943.80	0.00		543.94	0.07	86.53
187.75	1.58	0.057	0.83	0.805	0.83	0.794	na	0.000	0.45	1.83	0.392	0.25	1.83	0.15	2.196	15,487.73	0.00		543.94	0.07	86.60
187.80	1.63	0.058	0.88	0.829	0.88	0.817	na	0.000	0.50	1.83	0.453	0.30	1.83	0.19	2.349	16,031.67	0.00		543.94	0.06	86.67
187.85	1.68	0.059	0.93	0.852	0.93	0.840	na	0.000	0.55	1.83	0.515	0.35	1.83	0.24	2.504	16,575.61	0.00		543.94	0.06	86.73
187.90	1.73	0.060	0.98	0.875	0.98	0.862	na	0.000	0.60	1.83	0.578	0.40	1.83	0.29	2.662	17,119.55	0.00		543.94	0.06	86.78
187.95	1.78	0.060	1.03	0.897	1.03	0.884	na	0.000	0.65	1.83	0.643	0.45	1.83	0.34	2.820	17,663.49	0.00		543.94	0.05	86.84
188.00	1.83	0.061	1.08	0.918	1.08	0.905	na	0.000	0.70	1.83	0.707	0.50	1.83	0.39	2.980	18,207.43	0.00		543.94	0.05	86.89
188.05	1.88	0.062	1.13	0.939	1.13	0.926	na	0.000	0.75	1.83	0.773	0.55	1.83	0.44	3.140	18,751.36	0.00		543.94	0.05	86.94
188.10	1.93	0.063	1.18	0.960	1.18	0.946	na	0.000	0.80	1.83	0.838	0.60	1.83	0.49	3.300	19,295.30	0.00	**Regional**	543.94	0.05	86.98

Fieldgate Subdivision - East of CNR
Town of Milton
Project No: 09102
Date: July 2025

Sediment Forebay Design

Pond Information	West	East	
Sediment Forebay Depth, d (m)	1.5	1.5	Permanent pool depth
Sediment Forebay Length to Width Ratio, r	7.7	11.0	Minimum 2:1
Sediment Forebay Design Base Width (m)	8.0	4.5	
Sediment Forebay Design Length (m)	61.7	49.5	
Sediment Forebay Side Slopes (Z horizontal : 1 vertical)	4.0	4.0	
Peak Discharge from the SWM Pond, during design peak quality storm, Qp (m^3/s)	0.030	0.030	m^3/s (Extended Detention release rate
Drainage area to Forebay	34.92	34.92	ha
Runoff coefficient	0.70	0.70	
25mm storm intensity (I = 43C +5.9)	36.00	36.00	mm/hr
Peak Inflow Rate to Pond, quality flow (25mm storm event), Q (m^3/s)	2.44	2.44	
Settling Velocity for Target Particle Size, Vs (m/s)	0.0003		MOE Recommended Value = 0.0003 m/s
Target Jet Discharge Flow Velocity in Forebay, Vf (m/s)	0.50		MOE Recommended Value = 0.50 m/s
Target Average Flow Velocity in Forebay (m/s)	0.15		MOE Recommended Value = 0.15 m/s

	West Target	West Provided	East Target	East Provided
Equation 4.5: Minimum Required Settling Distance (m)	27.8	61.7	33.2	49.5
Equation 4.6: Minimum Required Dispersion Length (m)	26.1	61.7	26.1	49.5
Equation 4.7: Minimum Deep Zone Bottom Width (m)	3.5	8.0	4.1	4.5
Check: Maximum Sediment Forebay Average Velocity (m/s)	0.15	0.12	0.15	0.16

Fieldgate Subdivision - East of CNR

Town of Milton
Project No: 09102
Date: June 2024

Emergency Spillway

Weir Parameters

Weir Length (L)	4	m	
Weir Top Width (Bt)	43	m	Assuming 5% side slopes
Weir Bottom Width (Bb)	35	m	
Median Width (B)	39	m	
MAX Qinlet (peak flow)	4.93	m^3/s	Prorated regional uncontrolled flow
Crest Elevation	188.20	m	
Top of Weir Elevation	188.40	m	
Depth of Weir	0.20	m	

Weir Calculations ($Q = Cd * b * H^{3/2}$)

Water Level (H)	H/L	Cd	Q (m^3/s)	Flow Area (m^2)	Velocity (m/s)
0.05	0.013	1.40	0.61	1.80	0.34
0.10	0.025	1.40	1.73	3.70	0.47
0.15	0.038	1.48	3.35	5.70	0.59
0.20	0.050	1.52	5.30	7.80	0.68

Therefore, maximum capacity of spillway is 5.3m3/s. (> Regional uncontrolled inflow of 4.93 m3/s)
Maximum expected velocity in the Emergency Spillway is 0.68m/s therefore the proposed erosion protection in both Emergency Spillway spillway of nominal stone sizing of 200mm-400mm Rip-Rap stone is sufficient based MTO standard WC-3 (Drainage Design Standards)

District Park Overland Flow Route Capacity to SWMP 'D'

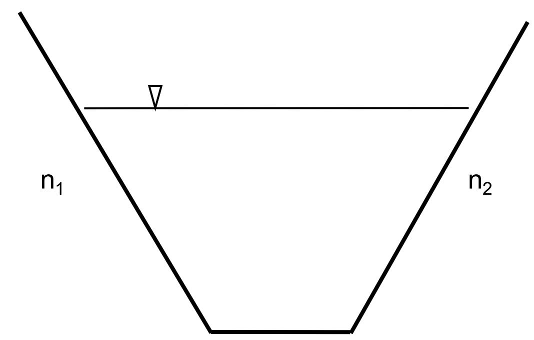
PROJECT: Fieldgate Subdivision - East of CNR
PROJECT #: 09102
DATE: June 2024
MUNICIPALITY: Town of Milton

Invert at Upstream End =	188.1	m
Invert at Downstream End =	185.35	m
Length of Diversion Swale =	21.146	m
Long. Slope =	0.1300	m/m

Overflow Design Base Flow = 2.19 m3/s Overland Peak Flow (Prorated Regional uncontrolled flows)

Input:

Bottom Width =	10.60	m
Bottom 'n_1' =	0.025	
Side Slope =	20	:1
Side 'n_2' =	0.025	
Long. Slope =	0.130	m/m
Depth =	0.11	m



Output:

Flow (Weir Capacity) =	4.366	m^3/s
Velocity =	3.101	m/s

Top Width of wate 15.00 m

Trail Flow Overland Flow Route Capacity to SWMP 'D'

PROJECT: Fieldgate Subdivision - East of CNR
PROJECT #: 09102
DATE: June 2024
MUNICIPALITY: Town of Milton

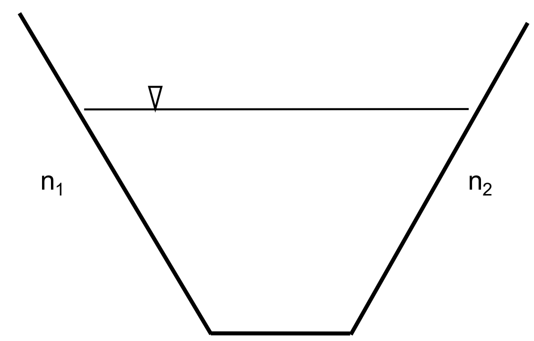
Invert at Upstream End =	188.12	m
Invert at Downstream End =	185.35	m
Length of Diversion Swale =	19.34	m
Long. Slope =	0.1432	m/m

Overflow Design Base Flow = 3.00 m3/s

< 100YR-5YR flows from ext. Blocks 1-4, plus 100YR flows from portion of park, see STM design sheet and drainage area plan

Input:

Bottom Width =	5.00	m
Bottom 'n_1' =	0.025	
Side Slope =	20	:1
Side 'n_2' =	0.025	
Long. Slope =	0.143	m/m
Depth =	0.30	m



Output:

Flow (Weir Capacity) =	17.862	m^3/s
Velocity =	5.413	m/s

Top Width of wate 17.00 m

APPENDIX B: WATER BALANCE MEMO

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (226) 526-9660 **web** www.rjburnside.com

[THE DIFFERENCE IS OUR PEOPLE]

June 18, 2025

Via: Email

Mr. Luca Tatangelo
Development Coordinator
Fieldgate Developments
5400 Yonge Street
Toronto ON M2N 5R5

Dear Mr. Tatangelo:

Re: 1000118982 Ontario Limited - Water Balance and LID Update
Project No.: 300035200.0006

R.J. Burnside & Associates Limited (Burnside) has undertaken a review and update of the water balance for the Fieldgate Boyne East Subdivision – East of CNR submitted for draft plan approval. Burnside completed a hydrogeological report for the development in July 2021 which included a water balance assessment. This water balance update has been completed due to a change in land uses in the draft plan/zoning and OPA submission from 100011892 Ontario Limited. The discussion below should be used to provide details of the updated calculations performed by Burnside.

1.0 Water Balance

In order to assess potential land development impacts on the local groundwater conditions, a detailed water balance analysis has been completed to determine the pre-development recharge volumes (based on existing land use conditions) and the post-development recharge volumes that would be expected based on the proposed land use plan. The detailed water balance calculations are provided in attached Tables G-1 to G-5.

1.1 Water Balance Component Values

The detailed monthly calculations of the water balance components are provided in Tables G-1, G-2 and G-3. For these calculations, it has been assumed that silty clay soils are representative for the subject lands for estimating the soil infiltration factor. The calculations show that a water surplus is generally available from November to May. The monthly water balance calculations illustrate how infiltration occurs during periods when there is sufficient water available to overcome the soil moisture storage requirements. The monthly calculations are summed to provide estimates of the annual water balance component values (Tables G-1, G-2 and G-3). A summary of these values is provided in Table 1.

Table 1: Water Balance Component Values

Water Balance Component	Agricultural Lands	Wooded Areas	Urban Lawn
Average Precipitation	877 mm/year	877 mm/year	877 mm/year
Actual Evapotranspiration	584 mm/year	584 mm/year	583 mm/year
Water Surplus	293 mm/year	293 mm/year	294 mm/year
Infiltration	132 mm/year	161 mm/year	147 mm/year
Runoff	161 mm/year	132 mm/year	147 mm/year

1.2 Pre-Development Water Balance (Existing Conditions)

Based on the water balance component values calculated in Tables G-1, G-2 and G-3 (attached), an estimate of the total pre-development groundwater infiltration volume for the subject lands was calculated (Tables G-4). The pre-development groundwater infiltration value is approximately 48,100 m^3/year.

1.3 Potential Urban Development Impacts to Water Balance

Development of an area affects the natural water balance. The most significant difference is the addition of impervious surfaces as a type of surface cover (i.e., roads, parking lots, driveways, and rooftops). Impervious surfaces prevent infiltration of water into the soils and the removal of the vegetation removes the evapotranspiration component of the natural water balance. Evaporation from impervious surfaces remains under post-development conditions and evaporation from impervious surfaces is relatively minor (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component that occurs with vegetation in this area (about 64% of precipitation in the study area). So, the net effect of the construction of impervious surfaces is that most of the precipitation that falls onto impervious surfaces becomes surplus water and direct runoff. The natural infiltration components (interflow and deep recharge) are reduced.

A water balance calculation of the potential water surplus for impervious areas is shown at the bottom of Table G-1, attached. For the purposes of the calculations in this study, the evaporation has been estimated to be 15% of precipitation. The remaining 85% of the precipitation that falls on impervious surfaces is assumed to become runoff. Therefore, assuming an evaporation/loss from impervious surfaces of 15% of the precipitation, there is a potential water surplus from impervious areas of 746 mm/year.

1.4 Post-Development Water Balance with No Mitigation

To assess potential development impacts on infiltration, the post-development infiltration volumes have been calculated based on the proposed post-development land uses (Table G-4). These calculations assume no low impact development (LID) measures for stormwater management are in place.

The infiltration and runoff components for the post-development land uses have been calculated using the MECP SWM Planning and Design Manual (2003) methodology based on topography, soil type and land cover as shown on Tables G-1, G-2 and G-3.

From these tables, the total calculated post-development infiltration volume (without LID measures) for the subject lands is approximately 19,200 m^3/year.

The water balance calculations suggest that, without mitigation, the subject lands will receive about 40% of the current amount of average annual groundwater infiltration after development. The deficit in groundwater infiltration has been estimated to be about 28,900 m^3/year (Table G-4).

1.5 Proposed LID Measures

It is our understanding that low impact development (LID) measures are proposed to be included in the design of the development to reduce the loss of recharge. Within the park district LIDs will be designed to capture the 3 mm storm and LIDs in the Secondary Mixed-Use Node will be designed to capture the 2 mm storm event. Specific LID measures will be determined at detailed design. Based on the soils on the site, landscape levels LIDs to promote retention of runoff, such as bioretention features, vegetated filter strips, permeable pavers, dry swales, downspout disconnection and silva cells are most suitable for the site.

1.6 Mitigation Impact Analysis

The following discussion is provided as part of an analysis to demonstrate the impact of LID measures in reducing the deficit. It should be noted that the quantification of the impact of LID measures is challenging as there are no widely accepted methods or standards, however, to provide an illustration of the impact of these LID measures we have provided Table G-5 which shows the potential additional infiltration from proposed LIDs.

The calculations in Table G-5 indicate that the post-development recharge can be increased by approximately 34,780 m^3/year with the implementation of LIDs.

Table 2: Summary of Post-Development Recharge after LID

Pre-Development Infiltration (m^3/year)	Post-Development Infiltration (m^3/year)	Post-Development Deficit (m^3/year)	Potential Recharge from LIDs (m^3/year)
48,100	19,200	28,900	28,500

Based on the assumptions required for these calculations, the change in infiltration in post-development is within 1% of the pre-development infiltration. This is considered to be a match based on the factor of error associated with these calculations.

Yours truly,

R.J. Burnside & Associates Limited

Stephanie Charity, P.Geo.
Hydrogeologist
DS/SC:cl

PROFESSIONAL GEOSCIENTIST
18/June/2025
STEPHANIE L. CHARITY
PRACTISING MEMBER
1796
ONTARIO

Dwight Smikle, P.Geo.
Vice President, Hydrogeology

PROFESSIONAL GEOSCIENTIST
18/June/2025
DWIGHT J. SMIKLE
PRACTISING MEMBER
1293
ONTARIO

Enclosure(s) Tables G-1 to G-5

cc: Laura Koyangi, TYLin (enc.) (Via: Email)

250612_2025 Water Balance Update Letter
18/06/2025 10:46 AM

WATER BALANCE CALCULATIONS
1000118982 Ontario Limited
Lands East of CNR
Milton, ON
PROJECT No.300035200

BURNSIDE

TABLE G-1

Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 200 mm (moderately-rooted vegetation in silty soils)

Precipitation data from Georgetown WWTP Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-6.3	-5.2	-0.9	6.0	12.3	17.4	20.0	19.0	14.8	8.4	2.8	-2.9	**7.1**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.30	3.89	6.59	8.16	7.52	5.16	2.18	0.42	0.00	**35.2**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	27.81	59.58	86.07	99.80	94.34	72.56	39.80	12.56	0.00	**493**
Adjusting Factor for U (Latitude 43^{o} 38' N)	0.81	0.82	1.02	1.13	1.27	1.29	1.3	1.2	1.04	0.95	0.8	0.76	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
WATER BALANCE COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	60	57	76	79	75	74	79	86	68	88	66	**877**
Potential Evapotranspiration (PET)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
P - PET	68	60	57	45	4	-36	-56	-34	11	30	78	66	**293**
Change in Soil Moisture Storage	0	0	0	0	0	-36	-56	-34	11	30	78	7	**0**
Soil Moisture Storage max 200 mm	200	200	200	200	200	164	108	74	84	115	193	200	
Actual Evapotranspiration (AET)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
Soil Moisture Deficit max 200 mm	0	0	0	0	0	36	92	126	116	85	7	0	
Water Surplus - available for infiltration or runoff	68	60	57	45	4	0	0	0	0	0	0	59	**293**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	31	27	26	20	2	0	0	0	0	0	0	27	**132**
Potential Direct Surface Water Runoff (independent of temperature)	37	33	31	25	2	0	0	0	0	0	0	33	**161**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	877	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	132	mm/year											
P-PE (surplus available for runoff from impervious areas)	746	mm/year											

Assume January storage is 100% of Soil Moisture Storage		
Soil Moisture Storage	200 mm	<-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003
*MOE SWM infiltration calculations		
topography - rolling land	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - relatively tight silty clay materials	0.15	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - predominantly cultivated land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.45**	
Latitude of site (or climate station)	43 ^{O} N.	

WATER BALANCE CALCULATIONS
1000118982 Ontario Limited
Lands East of CNR
Milton, ON
PROJECT No.300035200

BURNSIDE

TABLE G-2

Post-Development Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 125 mm (urban lawn in silty soils)

Precipitation data from Georgetown WWTP Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-6.3	-5.2	-0.9	6.0	12.3	17.4	20.0	19.0	14.8	8.4	2.8	-2.9	**7.1**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.30	3.89	6.59	8.16	7.52	5.16	2.18	0.42	0.00	**35.2**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	27.81	59.58	86.07	99.80	94.34	72.56	39.80	12.56	0.00	**493**
Adjusting Factor for U (Latitude 43^{o} 38' N)	0.81	0.82	1.02	1.13	1.27	1.29	1.3	1.2	1.04	0.95	0.8	0.76	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
WATER BALANCE COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	60	57	76	79	75	74	79	86	68	88	66	**877**
Potential Evapotranspiration (PET)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
P - PET	68	60	57	45	4	-36	-56	-34	11	30	78	66	**293**
Change in Soil Moisture Storage	0	0	0	0	0	-36	-56	-33	11	30	78	5	**0**
Soil Moisture Storage max 125 mm	125	125	125	125	125	89	33	0	11	41	120	125	
Actual Evapotranspiration (AET)	0	0	0	31	76	111	130	112	75	38	10	0	**583**
Soil Moisture Deficit max 125 mm	0	0	0	0	0	36	92	125	114	84	5	0	
Water Surplus - available for infiltration or runoff	68	60	57	45	4	0	0	0	0	0	0	61	**294**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	34	30	29	23	2	0	0	0	0	0	0	30	**147**
Potential Direct Surface Water Runoff (independent of temperature)	34	30	29	23	2	0	0	0	0	0	0	30	**147**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	877	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	132	mm/year											
P-PE (surplus available for runoff from impervious areas)	746	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage 125 mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - rolling land	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - relatively tight silty clay materials	0.15	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - urban lawn	0.15	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.5**	

Latitude of site (or climate station) 43^{O} N.

WATER BALANCE CALCULATIONS
1000118982 Ontario Limited
Lands East of CNR
Milton, ON
PROJECT No.300035200

BURNSIDE

TABLE G-3

Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 250 mm (long rooted vegetation in silty soils)

Precipitation data from Georgetown WWTP Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-6.3	-5.2	-0.9	6.0	12.3	17.4	20.0	19.0	14.8	8.4	2.8	-2.9	**7.1**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.30	3.89	6.59	8.16	7.52	5.16	2.18	0.42	0.00	**35.2**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	27.81	59.58	86.07	99.80	94.34	72.56	39.80	12.56	0.00	**493**
Adjusting Factor for U (Latitude 43^{o} 38' N)	0.81	0.82	1.02	1.13	1.27	1.29	1.3	1.2	1.04	0.95	0.8	0.76	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
WATER BALANCE COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	60	57	76	79	75	74	79	86	68	88	66	**877**
Potential Evapotranspiration (PET)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
P - PET	68	60	57	45	4	-36	-56	-34	11	30	78	66	**293**
Change in Soil Moisture Storage	0	0	0	0	0	-36	-56	-34	11	30	78	7	**0**
Soil Moisture Storage max 250 mm	250	250	250	250	250	214	158	124	134	165	243	250	
Actual Evapotranspiration (AET)	0	0	0	31	76	111	130	113	75	38	10	0	**584**
Soil Moisture Deficit max 250 mm	0	0	0	0	0	36	92	126	116	85	7	0	
Water Surplus - available for infiltration or runoff	68	60	57	45	4	0	0	0	0	0	0	59	**293**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	37	33	31	25	2	0	0	0	0	0	0	33	**161**
Potential Direct Surface Water Runoff (independent of temperature)	31	27	26	20	2	0	0	0	0	0	0	27	**132**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	877	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	132	mm/year											
P-PE (surplus available for runoff from impervious areas)	746	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage 250 mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - rolling land	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - relatively tight silty clay materials	0.15	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - woodlands	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.55**	

Latitude of site (or climate station) 43 ^{O} N.

WATER BALANCE CALCULATIONS
1000118982 Ontario Limited
Lands East of CNR
Milton, ON
PROJECT No.300035200

BURNSIDE

TABLE G-4

Water Balance for Pre- and Post-Development Land Use Conditions (with no SWM/LID measures in place)
East Lands (East of CNR)

Land Use Description	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)	Total Infiltration Volume (m^3/a)
Pre-Development Land Use												
Open Space/Agricultural	365,000	0.00	0	0.746	0	365,000	0.161	58,810	0.132	48,118	58,810	48,118
TOTAL PRE-DEVELOPMENT	**365,000**		**0**		**0**	**365,000**		**58,810**		**48,118**	**58,810**	**48,118**
Post-Development Land Use (with no LID measures in place)												
Residential (Street Townhomes)	23,400	0.79	18,486	0.746	13,786	4,914	0.147	723	0.147	723	14,509	723
Residential (Back to Back/Dual Frontage Townhomes)	21,500	1.00	21,500	0.746	16,034	0	0.147	0	0.147	0	16,034	0
Active Transportation Link	6,400	0.30	1,920	0.746	1,432	4,480	0.147	659	0.147	659	2,091	659
District Park	156,800	0.50	78,400	0.746	58,467	78,400	0.147	11,536	0.147	11,536	70,003	11,536
Secondary Mixed Use Node	63,300	1.00	63,300	0.746	47,206	0	0.147	0	0.147	0	47,206	0
SWM Pond	15,300	0.43	6,579	0.746	4,906	8,721	0.147	1,283	0.147	1,283	6,190	1,283
Servicing Block	10,000	0.36	3,600	0.746	2,685	6,400	0.147	942	0.147	942	3,626	942
Natural Heritage System Channel	25,400	0.00	0	0.746	0	25,400	0.132	3,348	0.161	4,093	3,348	4,093
Roads	42,900	1.00	42,900	0.746	31,993	0	0.147	0	0.147	0	31,993	0
TOTAL POST-DEVELOPMENT	**365,000**		**236,685**		**136,925**	**128,315**		**18,491**		**19,235**	**195,000**	**19,235**
% Change from Pre to Post											332	60
Effect of development (with no mitigation)											3.3 times increase in runoff	60% reduction of infiltration

* data provided by TyLyn, June 2025

** figures from Tables G-1, G-2 and G-3.

To balance pre- to post-, the infiltration target (m^3/a)= **28,882**

6/19/2025

WATER BALANCE CALCULATIONS
1000118982 Ontario Limited
Lands East of CNR
Milton, ON
PROJECT No.300035200

BURNSIDE

TABLE G-5

Water Balance for Pre- and Post-Development Land Use Conditions (with SWM/LID measures)
East Lands (East of CNR)

Land Use Description	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)	Total Infiltration Volume (m^3/a)
Pre-Development Land Use												
Open Space/Agricultural	365,000	0.00	0	0.746	0	365,000	0.161	58,810	0.132	48,118	58,810	48,118
TOTAL PRE-DEVELOPMENT	**365,000**		**0**		**0**	**365,000**		**58,810**		**48,118**	**58,810**	**48,118**
Post-Development Land Use (with LID measures)												
Residential (Street Townhomes)	23,400	0.79	18,486	0.746	13,786	4,914	0.147	723	0.147	723	14,509	723
Residential (Back to Back/Dual Frontage Townhomes)	21,500	1.00	21,500	0.746	16,034	0	0.147	0	0.147	0	16,034	0
Active Transportation Link	6,400	0.30	1,920	0.746	1,432	4,480	0.147	659	0.147	659	2,091	659
District Park	156,800	0.50	78,400	0.746	58,467	78,400	0.147	11,536	0.147	11,536	46,202	11,536
LIDs in Park - assume designed to capture and infiltrate the 3 mm storm; 3 mm storms account for approximately 40% of total rainfall[a] (34% of total precipitation); so assume 34% of runoff total from park directed to LIDs will infiltrate)											-	23,801
Secondary Mixed Use Node	63,300	1.00	63,300	0.746	47,206	0	0.147	0	0.147	0	42,486	0
LIDs - assume designed to capture and infiltrate the 2 mm storm; 2 mm storms account for approximately 12% of total rainfall[a] (10% of total precipitation); so assume 10% of runoff total will infiltrate)											-	4,721
SWM Pond	15,300	0.43	6,579	0.746	4,906	8,721	0.147	1,283	0.147	1,283	6,190	1,283
Servicing Block	10,000	0.36	3,600	0.746	2,685	6,400	0.147	942	0.147	942	3,626	942
Natural Heritage System Channel	25,400	0.00	0	0.746	0	25,400	0.132	3,348	0.161	4,093	3,348	4,093
Roads	42,900	1.00	42,900	0.746	31,993	0	0.147	0	0.147	0	31,993	0
TOTAL POST-DEVELOPMENT	**365,000**		**236,685**		**136,925**	**128,315**		**18,491**		**19,235**	**166,479**	**47,757**
% Change from Pre to Post											283	1
Effect of development (with mitigation)											2.8 times increase in runoff	1% reduction of infiltration

* data provided by TyLyn, June 2025

** figures from Tables G-1, G-2 and G-3.

[a] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Decrease in infiltration with LIDs (m^3/a)= **361**