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MILL RUN EXTENSION – PHASES 7 & 8

Servicing and Stormwater Management Report

Prepared for: Menzie Almonte 2 Inc.

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MILL RUN EXTENSION
PHASES 7 & 8

Municipality of Mississippi Mills

SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

Submitted: February 10, 2023
Revised: December 15, 2023

Novatech File: 121125
Ref: R-2023-013

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December 15, 2023

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Municipality of Mississippi Mills
P.O. Box 400, 3131 Old Perth Road, R.R. #2
Almonte, Ontario K0A 1A0

Attention: Koren Lam, Senior Planner
Melanie Knight, Senior Planner

Reference: Mill Run Extension Phases 7 & 8
Servicing and Stormwater Management Report
Our File No.: 121125

Please find enclosed the report entitled "Servicing and Stormwater Management Report" revised December 15, 2023, prepared on behalf of Menzie Almonte 2 Inc. for the Mill Run Extension residential development. This report has been revised to address comments received from the Mississippi Valley Conservation Authority dated April 4, 2023, and June 5, 2023, and the Municipality of Mississippi Mills and Lanark County dated June 9, 2023.

The report outlines the preliminary servicing design for the proposed development with respect to water distribution, sanitary servicing, and storm drainage, as well as a preliminary approach to stormwater management. This report is submitted in support of a Draft Plan of Subdivision application.

If you require any additional information, please contact the undersigned.

Yours truly,

NOVATECH

Drew Blair

Drew Blair, P.Eng.
Sr. Project Manager | Land Development

Cc: Stefanie Kaminski, Regional Group

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Appendices

Tables

Figures

1.0 INTRODUCTION

Novatech has been retained by Menzie Almonte 2 Inc. (managed by Regional Group) to prepare a servicing and conceptual stormwater management report in support of an application for Draft Plan of Subdivision for Phases 7 & 8 of the proposed Mill Run Extension (the “Subject Lands”).

1.1 Purpose

This report outlines the conceptual servicing design for the Subject Lands with respect to water distribution, sanitary servicing, and storm drainage, as well as the approach to stormwater management.

1.2 Site Location and Description

The proposed Mill Run Extension is approximately 7.23 hectares in size and located in Almonte, within the Municipality of Mississippi Mills. The Subject Lands are bounded by the existing Mill Run Subdivision and stormwater management (SWM) pond to the south, the Hannan Hills residential development and undeveloped land to the west, and undeveloped land to the north. To the east, there are two existing residential dwellings. Additionally, the Almonte Municipal Drain runs adjacent to the western property boundary.

Refer to **Figure 1** – Mill Run Extension Phases 7 & 8 Location Plan.

1.3 Existing Conditions and Topography

The Subject Lands are currently undeveloped, consisting of a portion of a larger local wetland that extends to the northwest, coniferous forest, as well as areas sparsely vegetated with small trees and shrubs. Note that based on site investigations and mapping, the on-site portion of the local wetland may be transitioning to a terrestrial environment, as described in the Environmental Impact Statement listed in **Section 1.6**.

The topography of the Subject Lands is relatively flat but moderately sloping east to west. There is roughly a 1.5 m existing grade elevation change from the west to the east of the proposed development.

Refer to **Figure 2** – Mill Run Extension Phases 7 & 8 Existing Conditions.

1.4 Proposed Development

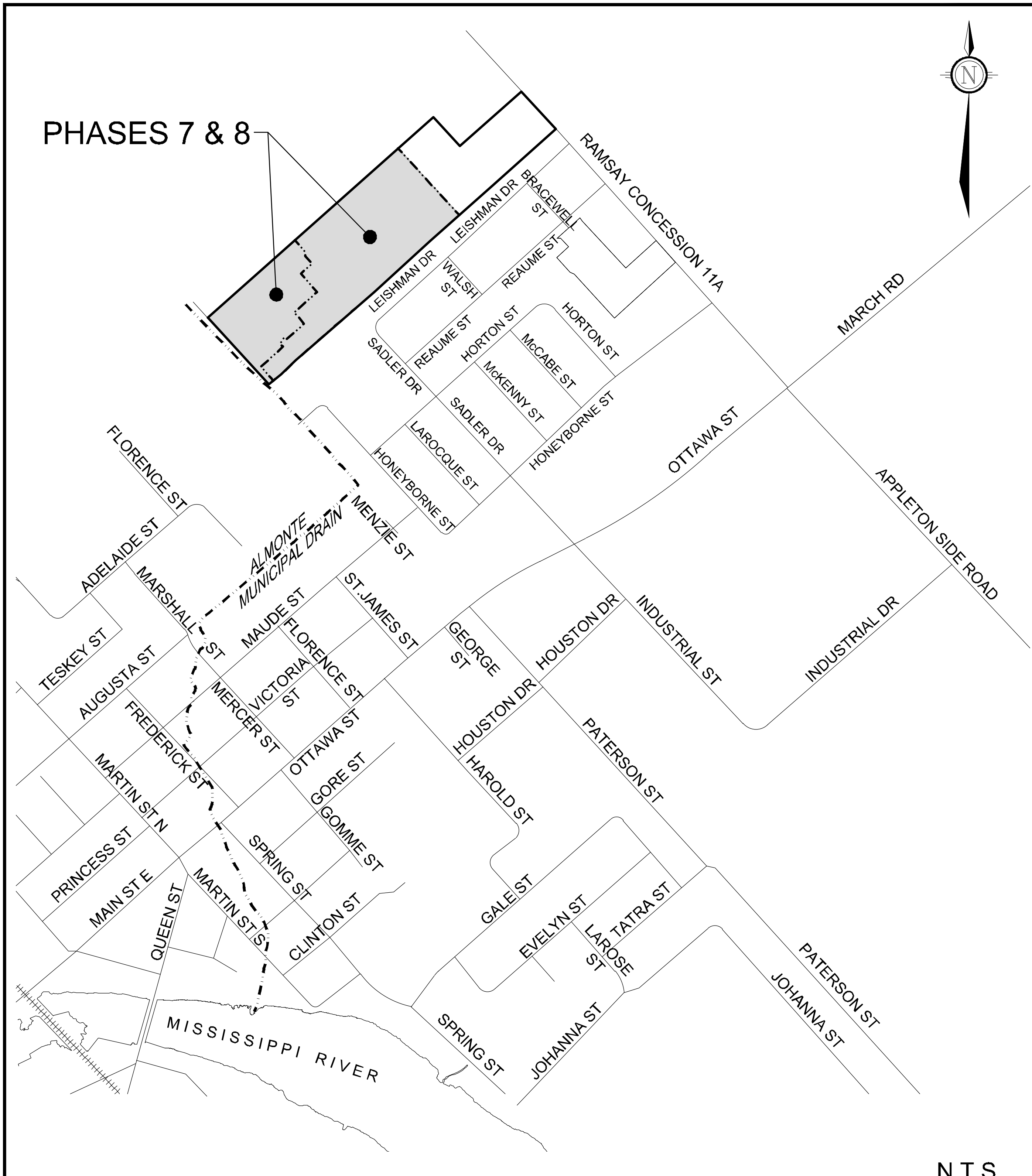
The proposed development of the Subject Lands consists of a residential subdivision with 25 single units, 18 semi-detached units, and 48 townhomes in Phase 7. Phase 8 will be comprised of 22 single units and 12 townhomes. The development will include three (3) new roadways and an extension of the existing Sadler Drive into the Subject Lands.

For the conceptual layout of the Subject Lands, refer to the **Figure 3** – Mill Run Extension Phases 7 & 8 Concept Plan.

The Subject Lands will be serviced from the existing Mill Run Subdivision. Water distribution will be provided from the existing 250mm dia. watermain within Sadler Drive and 250mm dia. watermain within Leishman Drive. The sanitary sewer connection will be made to the existing 250mm sanitary pipe infrastructure within Sadler Drive.

Storm runoff from the Subject Lands will be conveyed with gravity sewers to the existing Mill Run SWM facility west of Sadler Drive and north of Honeyborne Street. An expansion of the existing SWM facility is proposed in order to service the additional area from the Subject Lands.

Refer to **Figure 4** – Mill Run Extension Lands Phases 7 & 8 Conceptual Servicing.



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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PHASES 7 and 8

LOCATION PLAN

DEC 2023 121125 FIGURE 1

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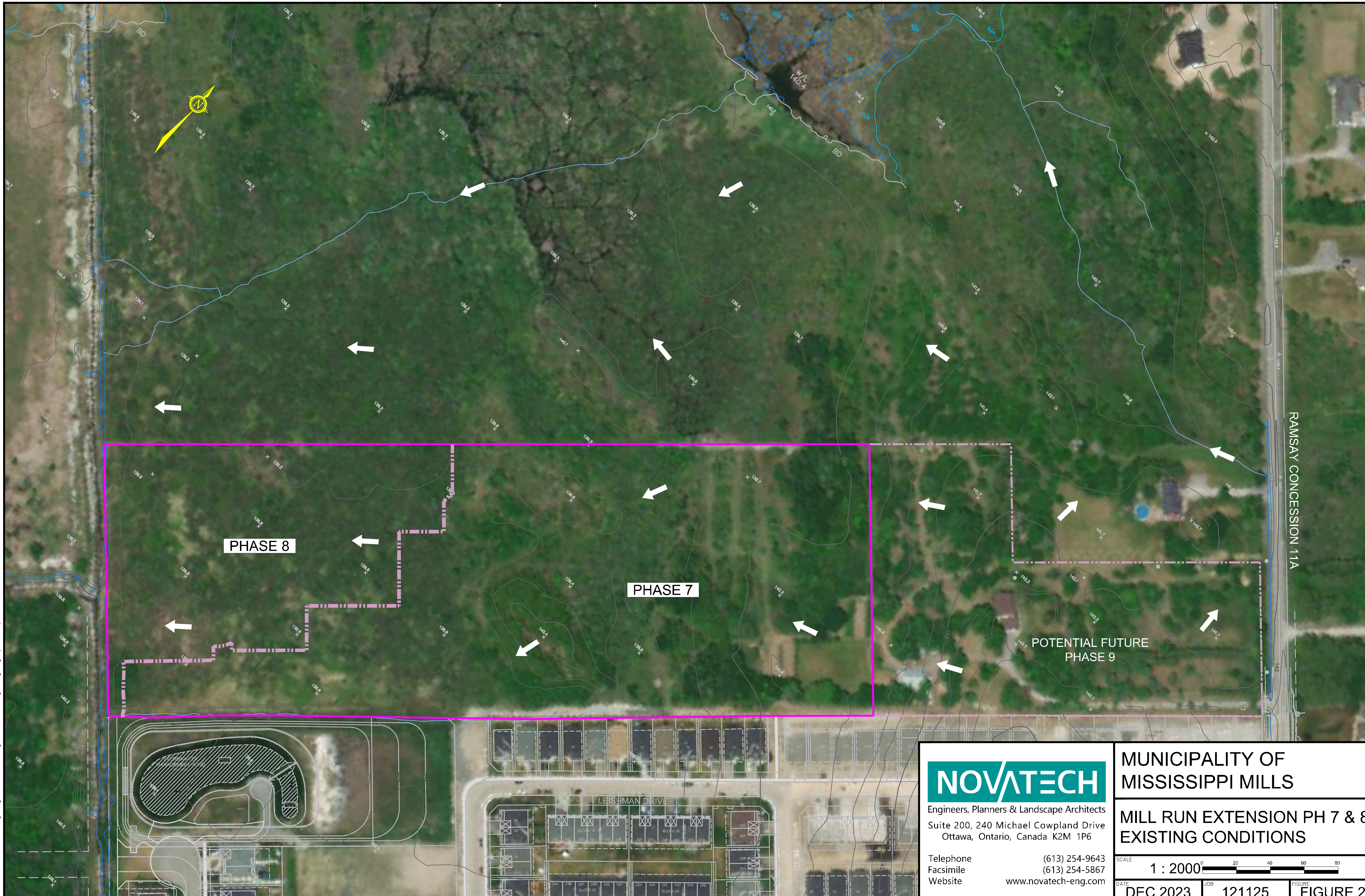

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
EXISTING CONDITIONS

SCALE 1 : 2000 (0 20 40 60 80)

DATE DEC 2023 | JOB 121125 | FIGURE FIGURE 2

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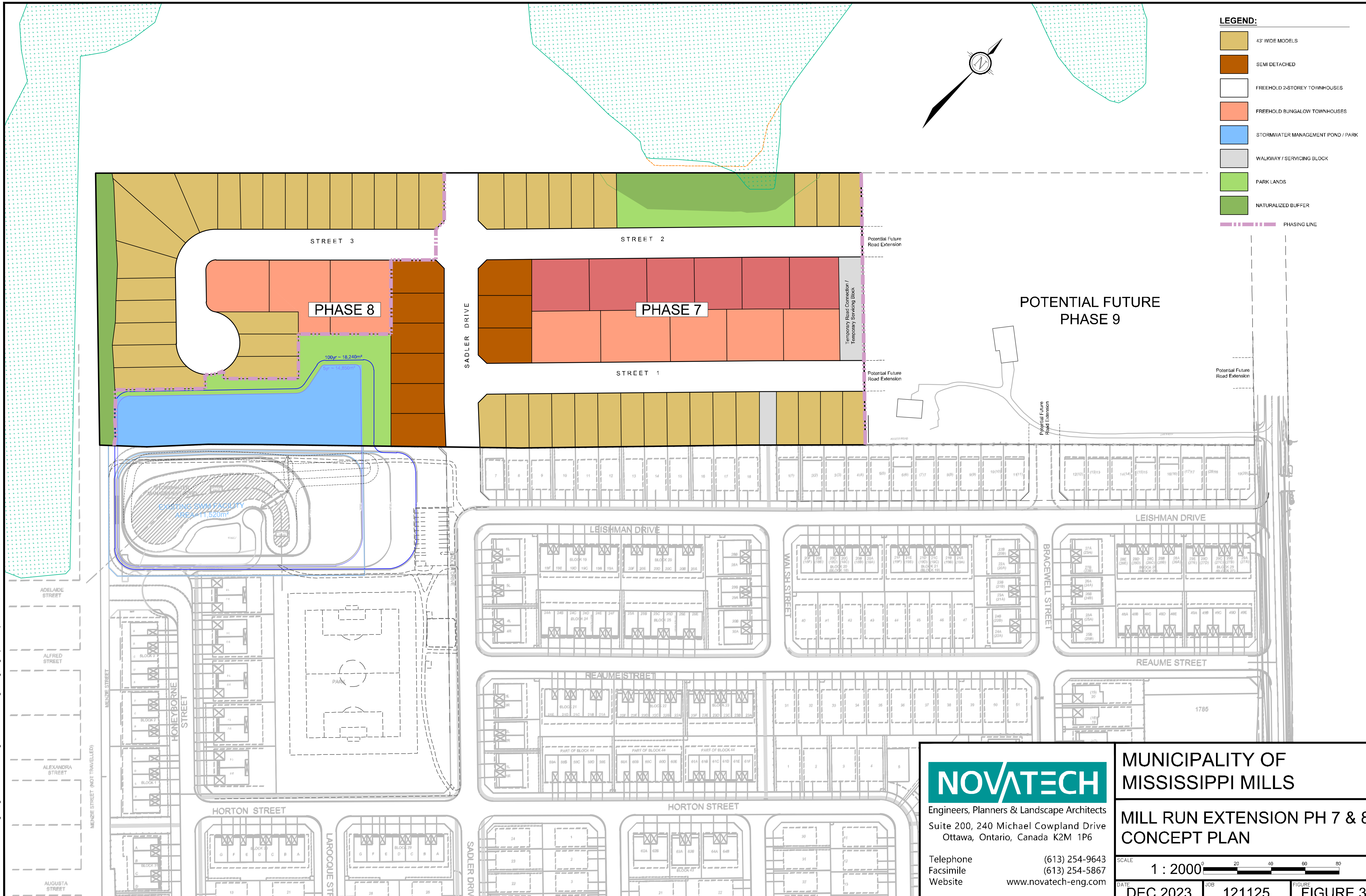

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
CONCEPT PLAN

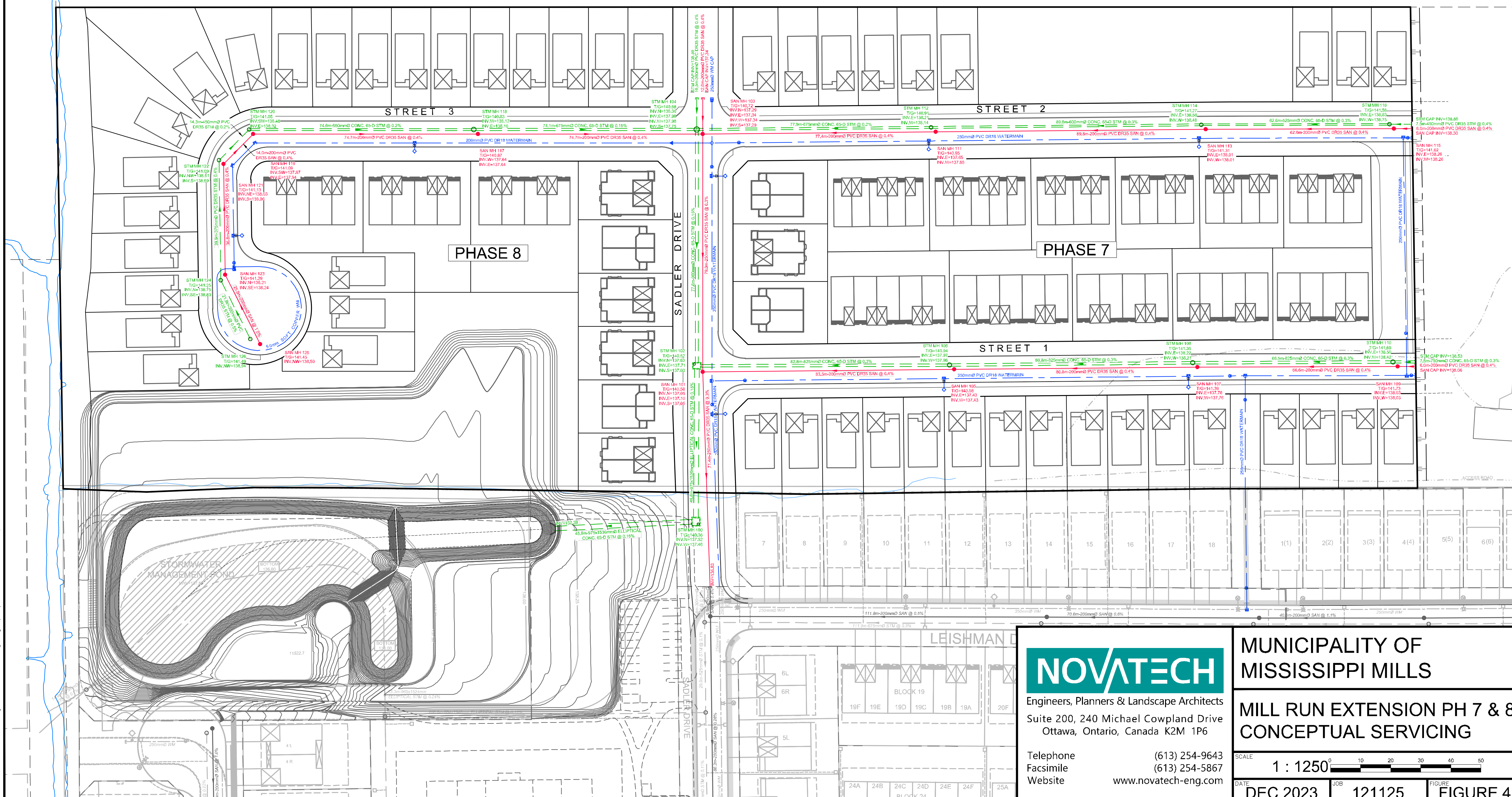
SCALE 1 : 2000 (0 20 40 60 80)

DATE	JOB	FIGURE
DEC 2023	121125	FIGURE 3

SHT11X17.DWG - 279mmX432mm

LEGEND

- CONCEPTUAL ON-SITE WATERMAIN
- HYD — CONCEPTUAL FIRE HYDRANT AND VALVE BOX
- CONCEPTUAL ON-SITE STORM SEWER
- STM MH — CONCEPTUAL STM MH / CBMH STRUCTURE
- CONCEPTUAL ON-SITE SANITARY SEWER
- SAN MH — CONCEPTUAL SAN MH STRUCTURE



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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
CONCEPTUAL SERVICING

SCALE	DATE	JOB	FIGURE
1 : 1250	DEC 2023	121125	FIGURE 4

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1.5 Geotechnical Investigation

Paterson Group conducted a geotechnical investigation in support of the Mill Run Extension residential development. To perform this investigation, six (6) test pits were advanced to a maximum depth of 2.6 m below existing ground surface in June 2021. In addition, one (1) test pit and fifteen (15) hand augered test holes were advanced to a maximum depth of 2.2 m below existing ground surface in November 2021. The principal findings of Paterson Group's geotechnical investigation are as follows:

- The site's existing ground surface level is relatively flat and approximately 1.5 m lower than the neighbouring roadways in the Mill Run Subdivision.
- Subsurface conditions on the eastern portion of the site consist of topsoil with high organic content overlying very stiff brown glacial till.
- Subsurface conditions on the western portion of the site consist of an organic peat overlying a firm to soft grey silty clay deposit. Additionally, a layer of marl was encountered below the peat at an approximate depth of 0.75 m to 1.6 m.
- Practical refusal to excavation on bedrock was encountered in all test pits at approximate depths ranging between 2.2 m and 2.6 m.
- The site is subjected to grade raise restrictions due to the presence of a sensitive silty clay layer. The recommended permissible grade raise varies from 0.8 m along the west edge, to 1.3 m in the area of the Sadler Drive extension.
- Groundwater was observed at shallow depths of 0.1 m to 0.3 m, however the long-term groundwater table can be expected at approximately 1.5 m to 2.0 m below ground surface.
- Refer to the Paterson Group report listed in **Section 1.6** for complete details and recommendations.

1.6 Additional Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing for the Mill Run Extension residential development. This report should be read in conjunction with the following:

- Geotechnical Investigation, Proposed Residential Development, 1825 Ramsay Concession 11A, Mississippi Mills, Ontario, Report: PG5860-1 Revision 2 dated February 7, 2023, prepared by Paterson Group.
- Design Services and Stormwater Management Report, Mill Run Subdivision Phase 2-5, Mississippi Mills, Ontario, Report: R-2015-066 dated May 8, 2015, prepared by Novatech.
- Master Plan Update Report - FINAL, Municipality of Mississippi Mills Almonte Ward, Mississippi Mills, Ontario, Report: 27456-01 dated February 2018, prepared by J.L. Richards & Associates Limited.
- Environmental Impact Statement, Proposed Subdivision Development, Part of Lot 17, Concession 10 (Ramsey), Almonte, Ontario, dated December 14, 2023, prepared by Gemtec.
- Hydraulic Impact Statement, Proposed Subdivision Development, Part of Lot 17, Concession 10 (Ramsey), Almonte, Ontario, dated November 28, 2023, prepared by Gemtec.
- Revised Transportation Impact Statement, Mill Run Extension – Phases 7 and 8, Almonte, Ontario, dated November 6, 2023, prepared by Novatech.

2.0 STORMWATER MANAGEMENT

The proposed storm servicing and stormwater management strategy for Phases 7 & 8 of the Mill Run Extension development has been conceptually designed to adhere to the criteria established for the adjacent Mill Run Subdivision and in consultation with the Municipality of Mississippi Mills and the Mississippi Valley Conservation Authority (MVCA). Refer to correspondence in **Appendix A**.

2.1 Existing Drainage Conditions

Under existing conditions, storm runoff from the proposed development lands generally flows from east to west towards the Almonte Municipal Drain at the western boundary of the site. Refer to **Figure 2** – Mill Run Extension Phases 7 & 8 Existing Conditions.

Located to the south of the site is the existing Mill Run Subdivision (Phases 1-6). Stormwater quality and quantity control for the Mill Run Subdivision are provided by a stormwater management wet pond located at the northwest corner of the subdivision, which outlets to the Almonte Municipal Drain.

2.2 Stormwater Management Criteria

The Mill Run Extension lands are located within the jurisdiction of the MVCA. The stormwater management criteria for the Mill Run Extension have been developed based on the criteria from the Mill Run Subdivision, requirements of the MVCA, and the *City of Ottawa Sewer Design Guidelines* (October 2012) and associated Technical Bulletins.

2.2.1 Storm Sewers (Minor System)

- Storm sewers are to be designed using the Rational Method and sized for the 5-year storm event;
- Inlet control devices (ICDs) are to be installed in road and rear yard catchbasins to control inflows to the storm sewers;
- Ensure that the 100-year hydraulic grade line (HGL) in the storm sewer is at least 0.30 m below the underside of footing (USF) elevations for the proposed development.

2.2.2 Overland Flow (Major System)

- Overland flows are to be confined within the right-of-way and/or defined drainage easements for all storms up to and including the 100-year event;
- Maximum depth of flow (static + dynamic) on local and collector streets shall not exceed 0.35 m during the 100-year event. The depth of flow may extend adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event;
- Runoff that exceeds the available storage in the right-of-way will be conveyed overland along defined major system flow routes towards the proposed major system outlet to the SWM facility. There must be at least 15 cm of vertical clearance between the spill elevation on the street and the ground elevation at the front of the building envelope that is in the proximity of the flow route or ponding area;
- The product of the 100-year flow depth (m) and flow velocity (m/s) within the right-of-way shall not exceed 0.60;

- There must be 30 cm of vertical clearance between the spill elevation and the ground elevation at the rear of the building envelope.

2.2.3 Stormwater Quality & Quantity Control

- Provide an *Enhanced* (80% long-term TSS removal) level of quality control;
- Post-development peak flows from the site are to be controlled to pre-development levels;
- Implement lot level and conveyance Best Management Practices to promote infiltration and treatment of storm runoff.

Note that while the existing Mill Run SWM facility was originally designed to achieve a *Normal* level of quality control (70% long-term TSS removal), the expanded SWM facility will be designed to achieve an *Enhanced* level of quality control (80% long-term TSS removal) for both the Mill Run and Mill Run Extension lands as requested by the Municipality of Mississippi Mills.

2.3 Proposed Storm Servicing Design

Storm servicing for the proposed subdivision will be provided using a dual drainage system. Runoff from frequent storm events will be conveyed by storm sewers (minor system), while flows from larger storm events which exceed the capacity of the storm sewers will be conveyed overland along defined overland flow routes (major system) to the Mill Run SWM facility and ultimately the Almonte Municipal Drain.

2.3.1 Storm Sewers (Minor System)

The storm sewers comprising the minor system have been designed in accordance with the *City of Ottawa Sewer Design Guidelines* (October 2012) and Technical Bulletins PIEDTB-2016-01 (September 2016), ISTB-2018-01 (March 2018), and ISTB-2018-04 (June 2018). The criteria used to design the storm sewers are summarized in **Table 2.1**.

Table 2.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	5-year Return Period
Storm Sewer Design	Rational Method / PCSWMM
IDF Rainfall Data	City of Ottawa Sewer Design Guidelines
Initial Time of Concentration (T_c)	10 min*
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm
Minimum Pipe Cover	2.0 m (Unless frost protection provided)

**Refer to Section 5.4.5.2 of the City of Ottawa Sewer Design Guidelines* (October 2012).

Inlet Control Devices

Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system capacity (5-year storm event). Exact ICD sizes and catchbasin locations will be determined during the detailed design stage.

2.3.2 Overland Flow (Major System)

The major system design will conform to the design standards outlined in the *City of Ottawa Sewer Design Guidelines* (October 2012) and Technical Bulletins PIEDTB-2016-01 (September 2016), ISTB-2018-01 (March 2018), and ISTB-2018-04 (June 2018). During detailed design, the right-of-way will be graded to contain the major system runoff from storm events exceeding the minor system capacity for all storms up to and including the 100-year design event. The site will be graded to provide an engineered overland flow route for large, infrequent storms, or in the event that the storm sewer system becomes obstructed, with the majority of major system flows routed to the SWM facility.

Major System Flow Depths

For storm events exceeding the minor system design storm up to and including the 100-year event, flow depths in the right-of-way are to be limited to a maximum of 0.35 m at the edge of pavement.

2.3.3 Infiltration Best Management Practices

Infiltration of surface runoff will be accomplished using lot level and conveyance controls. The most suitable practices for groundwater infiltration include:

- Infiltration of runoff captured by rear yard catchbasins;
- Direct roof leaders to rear yard areas;
- Infiltration trenches underlying drainage swales in park areas;
- The use of fine sandy loam topsoil in parks and on residential lawns.

By implementing infiltration Best Management Practices as part of the storm drainage design for the Mill Run Extension, the impacts of development on the hydrologic cycle can be considerably reduced. Infiltration of clean runoff will also have additional benefits for stormwater management; by reducing the volume of “clean” water conveyed to the stormwater management pond, the performance of the pond will be increased.

2.3.4 Stormwater Management Facility

Water quantity and quality control for the site will be provided by the existing SWM facility. The existing facility was designed to provide a *Normal* level of water quality control (70% long-term TSS removal) and to control post-development peak flows to pre-development levels for the 5-year and 100-year storm events for the Mill Run Subdivision (Phases 1-6). The existing pond is to be expanded as required to accommodate the additional drainage area and peak flows from the proposed Mill Run Extension, including Phases 7 & 8 as well as the future development lands to the east (Phase 9). A second pond inlet and forebay are to be constructed to receive flows from the Mill Run Extension, and the existing pond outlet structure will be modified to meet the new allowable release rates.

2.4 Preliminary SWM Modeling

The *City of Ottawa Sewer Design Guidelines* (October 2012) requires hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the Mill Run Extension was evaluated using the PCSWMM hydrologic/hydraulic model. Note that while this report focuses on the development of Phases 7 & 8 as Phase 9 is to be developed at a later date, storm runoff from Phase 9 will be routed through Phases 7 & 8 to the expanded SWM facility. As such, the future Phase 9 lands have been included in both the pre-development and post-development PCSWMM models.

Pre-Development Modeling

A pre-development model of the Mill Run Extension (Phases 7-9) was completed using PCSWMM and is based on the existing conditions of the site. The purpose of this model was to determine the pre-development runoff from the site to the Almonte Municipal Drain and determine the allowable release rate from the site.

Post-Development Modeling

A post-development model of the proposed subdivision storm sewers and outlet to the existing SWM facility was also developed using PCSWMM. The modeling for the Mill Run Subdivision was originally completed using Autodesk Storm and Sanity Analysis (SSA), but has been imported to PCSWMM to allow the Mill Run Extension model to be built into the existing model and ensure runoff from both developments is accounted for in the design of the expanded SWM facility.

The post-development PCSWMM model represents both the minor and major system flows from the development. The results of the analysis were used to:

- Simulate major and minor system runoff from the site;
- Determine the storm sewer HGL for the 100-year storm event;
- Ensure the expanded SWM facility is sufficiently sized to control runoff from the existing and proposed developments and provide an *Enhanced* level of water quality control.

Model parameters and schematics for both pre-development and post-development models are provided in **Appendix B**.

2.4.1 Design Storms

The pre-development and post-development models for the existing Mill Run Subdivision were run using the 6-hour Chicago distribution (design storms listed below) as it generated the highest peak flows and HGL elevations. The IDF parameters used to generate the Chicago design storms were taken from the *City of Ottawa Sewer Design Guidelines* (October 2012).

Chicago Distribution:
25mm 4-hour Event (Water Quality)
5-year 6-hour Event
100-year 6-hour Event

Since the Mill Run Extension model was built into the existing Mill Run Subdivision model, the same design storms were used for the hydrologic/hydraulic analysis of the Mill Run Extension and the sizing of the expanded SWM facility.

2.4.2 Model Parameters

Storm Drainage Areas

For the pre-development model, the hydrologic parameters for each subcatchment were developed based on **Figure 2** – Mill Run Extension Phases 7 & 8 Existing Conditions. The subcatchments have been divided based on the phase boundaries for the development, including the future Phase 9 lands. **Table 2.2** provides a summary of the pre-development model parameters, with further detail provided in **Appendix B**.

Table 2.2: Pre-Development Model Parameters

Area ID	Catchment Area (ha)	Runoff Coeff. (C)	Percent Imp. (%)	Flow Length (m)	Time of Concentration (min)	Weighted Curve Number*	Weighted IA	Average Slope (%)
PRE-PH7	3.97	0.20	0	250	15	57	10	1.0%
PRE-PH8	3.27	0.20	0	200	23	57	10	0.5%
PRE-PH9	2.65	0.24	5	150	15	59	9	1.5%
TOTAL:	**9.89**							

**For the pervious areas only.*

For the post-development model, the site has been divided into subcatchments based on both the proposed land use and on a manhole-to-manhole basis. The subcatchments correspond to the areas used in the Storm Sewer Design Sheet provided in **Appendix B**. The hydrologic parameters for each subcatchment were developed based on **Figure 3** – Mill Run Extension Phases 7 & 8 Concept Plan. An overview of the modeling parameters is provided in **Table 2.3**.

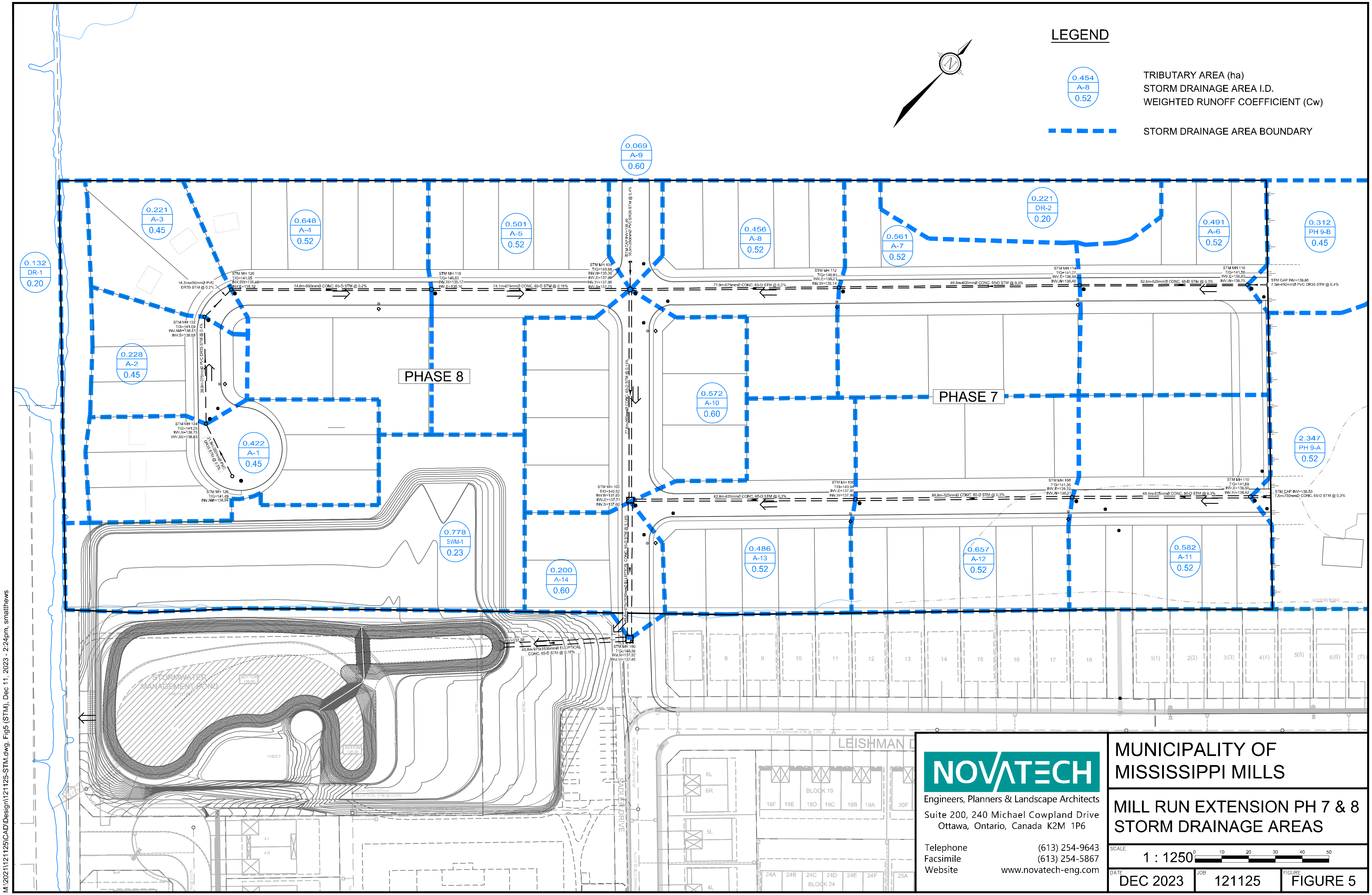
Table 2.3: Post-Development Model Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A-01	0.42	0.45	36	40	66	64	0.5
A-02	0.23	0.45	36	40	62	37	0.5
A-03	0.22	0.45	36	40	158	14	0.5
A-04	0.65	0.52	46	40	44	146	0.5
A-05	0.50	0.52	46	40	46	108	0.5
A-06	0.49	0.52	46	40	49	100	0.5
A-07	0.56	0.52	46	40	56	100	0.5
A-08	0.46	0.52	46	40	46	100	0.5
A-09	0.07	0.60	57	0	9	76	0.5
A-10	0.57	0.60	57	40	37	154	0.5
A-11	0.58	0.52	46	40	40	145	0.5
A-12	0.66	0.52	46	40	41	160	0.5
A-13	0.49	0.52	46	40	44	110	0.5
A-14	0.20	0.60	57	40	44	45	0.5
PH9-A	2.35	0.52	46	40	44	528	0.5
PH9-B	0.31	0.45	36	40	78	40	0.5
DR-01*	0.13	0.20	0	0	10	132	0.5
DR-02*	0.22	0.20	0	0	100	22	0.5
PNDBLK	2.29 (0.78**)	0.69	70	100	115	199	5.0
TOTAL:	**9.89**						

**Naturalized buffer areas considered as direct runoff.*
***The portion of the expanded pond block within the proposed Mill Run Extension Phase 8 lands.*

Runoff Coefficients / Impervious Values

Percent impervious (%IMP) values for each subcatchment area were calculated based on the runoff coefficients noted on **Figure 5** – Mill Run Extension Phases 7 & 8 Storm Drainage Areas using the following equation:


LEGEND
0.454
A-8
0.52
TRIBUTARY AREA (ha)
STORM DRAINAGE AREA I.D.
WEIGHTED RUNOFF COEFFICIENT (Cw)
STORM DRAINAGE AREA BOUNDARY
PHASE 8
PHASE 7
0.069 A-9 0.60
0.221 A-3 0.45
0.648 A-4 0.52
0.501 A-5 0.52
0.456 A-8 0.52
0.561 A-7 0.52
0.221 DR-2 0.20
0.491 A-6 0.52
0.312 PH 9-B 0.45
0.132 DR-1 0.20
0.228 A-2 0.45
0.422 A-1 0.45
0.572 A-10 0.60
2.347 PH 9-A 0.52
0.778 SWM-1 0.23
0.200 A-14 0.60
0.486 A-13 0.52
0.657 A-12 0.52
0.582 A-11 0.52
STORMWATER MANAGEMENT POND
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SADLER DRIVE
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MUNICIPALITY OF MISSISSIPPI MILLS
MILL RUN EXTENSION PH 7 & 8
STORM DRAINAGE AREAS
SCALE 1 : 1250
DATE DEC 2023
JOB 121125
FIGURE FIGURE 5
SHT11X17.DWG - 279mmX432mm
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$$\%IMP = \frac{(C - 0.2)}{0.7}$$

This equation is based on the "blended runoff coefficient" equation from Section 5.4.5.2 of the *City of Ottawa Sewer Design Guidelines* (October 2012), reproduced below.

$$C = [imp\ x\ (C\ impervious)] + [(1.0 - imp)\ x\ (C\ pervious)]$$

$$Where: imp = \frac{impervious\ area}{total\ area}$$

Applying the values 0.2 and 0.9 for the pervious and impervious runoff coefficients respectively, the "blended runoff coefficient" equation can be rearranged to the %IMP equation above.

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Residential rooftops are assumed to provide no depression storage and all rainfall is converted to runoff. The percentage of rooftop area to total impervious area is represented by the 'No Depression' column in **Table 2.3**.

Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the *City of Ottawa Sewer Design Guidelines* (October 2012).

Major System

Since the major system has not yet been designed, the subcatchment areas are not based on a detailed grading plan. It is anticipated that major system storage can be provided by saw-toothing the roadways and placing catchbasins at low points. As such, approximately 50 m^3/ha of storage within the rights-of-way has been provided in the post-development model for larger storm events. During events up to and including the 5-year, storm runoff will flow uncontrolled into the minor system. The major system connections to the minor system have been determined based on a pair of City standard sized inlet control devices (ICDs) and sized based on the 5-year approach flow.

As the project is only at the Draft Plan stage, the detailed lot-level grading information is not yet available.

Modeling Files / Schematic

The PCSWMM model schematics are provided in **Appendix B**. Digital copies of the modeling files and model outputs for all storm events are provided with the digital report submission.

2.4.3 Model Results

The results of the PCSWMM model are summarized in the following sections.

Peak Flows

Under existing conditions, storm runoff from the site flows overland towards the Almonte Municipal Drain. The new allowable release rates for the expanded SWM facility were determined by adding the pre-development peak flows from the Mill Run Extension lands to the release rates from the existing Mill Run SWM facility and subtracting uncontrolled peak flows (direct runoff) from the naturalized buffer areas. Details are outlined in **Table 2.4**.

Table 2.4: Allowable Release Rates

Return Period	Phases 1-6 Pond Release Rate (L/s)	Phases 7-9 Pre-Dev. Peak Flow (L/s)	Phases 7-9 Post-Dev. Direct Runoff* (L/s)	Allowable Release Rate** (L/s)
5-year	430	182	10	602
100-year	1,543	587	49	2,081

**Uncontrolled/direct runoff from naturalized buffer areas.*
***Allowable release rate for the expanded SWM facility.*

The proposed expansion of the existing SWM Facility will provide sufficient storage to accommodate the additional runoff from Mill Run Extension Phases 7-9. The controlled outflows from the expanded SWM facility will increase with the addition of the Mill Run Extension lands, but the total post-development peak flow to the Almonte Drain will be below the new allowable release rates. Post-development peak flows are outlined in **Table 2.5**. Refer to **Section 2.5** for details on the pond expansion and modifications to the outlet structure.

Table 2.5: Updated Pond Outflows

Return Period	Allowable Release Rate (L/s)	Total Pond Outflow (L/s)
5-year	602	596
100-year	2,081	1,583

Hydraulic Grade Line

The PCSWMM model was used to evaluate the 100-year HGL elevations within the proposed storm sewers. As the design is only at the draft plan stage, the underside of footing (USF) elevations have not yet been determined. The HGL analysis will be revised at the detailed design stage to reflect the controlled inflows at each inlet to the storm sewers. As such, the HGL within the sewers during the 100-year event has been compared against the obvert of the outlet pipe and the top of grate elevation for each manhole to ensure any surcharging is at an acceptable level.

The 100-year HGL elevation at each manhole based on the 6-hour Chicago storm distribution is provided in **Table 2.6**. A storm manhole information table is provided in **Appendix B.**

Table 2.6: 100-year HGL Elevations

Manhole ID	T/G Elevation (m)	Pipe Obvert Elevation (m)	100-year HGL Elevation (m)	Clearance from T/G (m)	Surcharge Depth (m)	Min. USF Elevation (m)
MH100	140.36	138.43	138.46	1.90	0.03	138.76
MH102	140.52	138.57	138.52	2.00	0.00	138.82
MH104	140.68	138.66	138.59	2.09	0.00	138.89
MH106	140.94	138.80	138.71	2.23	0.00	139.01
MH108	141.35	139.05	138.80	2.55	0.00	139.10
MH110	141.69	139.26	138.88	2.81	0.00	139.18
MH112	140.91	138.83	138.66	2.25	0.00	138.96
MH114	141.27	139.09	138.74	2.53	0.00	139.04
MH116	141.58	139.28	138.89	2.69	0.00	139.19
MH118	140.83	138.79	138.66	2.17	0.00	138.96
MH120	141.05	138.93	138.69	2.36	0.00	138.99
MH122	141.09	138.97	138.76	2.33	0.00	139.06
MH124	141.25	139.13	138.94	2.31	0.00	139.24
MH126	141.49	139.25	138.94	2.55	0.00	139.24

As shown in the above table, the HGL elevations are generally within the pipes at all manhole locations, with the exception of MH100 where there is minor surcharging. Minimum USF elevations have also been determined to aid in the design of individual lots at the detailed design stage.

2.5 Stormwater Management Facility Updates

As noted above, stormwater quantity and quality control for the new Mill Run Extension will be provided through the expansion of the existing Mill Run SWM facility. The existing facility is a wet pond, originally designed to control post-development peak flows to pre-development levels for the 5-year and 100-year storm events and to provide a *Normal* level of water quality control (70% long-term TSS removal). Refer to the existing Mill Run SWM Facility drawing provided in **Appendix B**.

The pond is to be expanded along it's northern boundary into the Mill Run Extension lands, with a new forebay and pond inlet structure to be constructed for the proposed development. The existing pond outlet structure will require modifications to meet the new allowable release rates.

2.5.1 Design Criteria

The expanded SWM facility has been designed to meet the following criteria:

- Provide an *Enhanced* level of water quality control (80% long-term TSS removal);
- Provide quantity control storage to ensure post-development peak flows for the 5-year and 100-year storm events do not exceed pre-development levels;
- The SWM facility shall have side slopes of 3:1 (H:V) or shallower (refer to Section 2.5.9 for further details);
- The sediment forebay shall be sized to provide sufficient storage for 10 years of sediment accumulation;
- A sediment storage area has been provided within the SWM block to allow for storage and drying of material removed during maintenance / cleanout.

2.5.2 Pathways / SWM Facility Access

Access to the existing pond inlet and outlet structures and the sediment management area is provided from Honeyborne Street by pathways constructed of 300mm granular 'B' overlaid with 100mm of granular limestone screenings (stone dust). Access to the newly constructed pond inlet will be provided via Sadler Drive with a similar pathway construction.

2.5.3 Inlet Structures

The existing inlet to the SWM facility consists of a 975mm x 1536mm elliptical storm sewer discharging to the forebay through a concrete headwall constructed to ODSP 804.040 standards.

The new inlet to the SWM facility for the Mill Run Extension will be constructed in a similar manner, with an inlet pipe consisting of a 975mm x 1536mm elliptical storm sewer. Exact sizing and design details will be provided at the detailed design stage.

2.5.4 Sediment Forebays

The existing sediment forebay has a length of approximately 32 m and is separated from the main cell by a submerged riprap berm set 0.10m below the normal water level. The forebay berm is constructed from crushed rock / riprap.

The new sediment forebay will be constructed in a similar manner, with a length of approximately 52 m (minimum of 24 m) and top width of approximately 18 m (6 m minimum).

2.5.5 Permanent Pool

The facility was originally designed with a permanent pool volume of approximately 4,214 m^3 at an elevation of 137.50 m and was designed to provide a *Normal* level of protection (70% long-term TSS removal) for a tributary drainage area of 29.75 ha with an average imperviousness of 52%.

Through the development of the six (6) phases of the Mill Run Subdivision, the total tributary area has increased slightly to 30.42 ha with an average imperviousness of 52%. The addition of the Mill Run Extension lands will result in an additional 8.75 ha with an average imperviousness of 46%, for a total of 39.17 ha with an average imperviousness of 49%.

The expanded SWM facility will require a minimum permanent pool volume of 5,288 m^3 to provide an *Enhanced* level of water quality control. The expanded pond design is anticipated to provide a permanent pool with a volume of 6,786 m^3, which is sufficient to provide water quality protection at the *Enhanced* level (80% long-term TSS removal).

2.5.6 Extended Detention

Extended detention storage is provided by the first 0.25 m of active storage within the pond at an elevation of 137.75m to allow for settling of suspended sediment and will release over a period of approximately 24 hours. The total volume provided by the original design was approximately 1,297 m^3, with the expanded pond design providing approximately 1,547 m^3, which is in accordance with the Ministry of the Environment requirements of 40 m^3/ha for the area to be treated by the pond.

2.5.7 Active Storage

The facility was originally designed with a 100-year active storage volume of approximately 8,620 m^3 at an elevation of 138.52 m. The expanded facility will provide a volume of 11,259 m^3 at an elevation of 138.45 m, which is sufficient to control the additional storm runoff from the Mill Run Extension, including Phases 7 & 8 and the future development lands to the east (Phase 9).

The stage-storage-discharge table for the expanded SWM facility is provided in **Table 2.7**. The outflows provided in the table are based on the modified outlet structure. Refer to **Section 2.5.8** for further details.

Table 2.7: Stage-Storage-Discharge

Stage	Elevation	Volume		Outflow			
		Active	Total	ED Orifice	Weir	Spillway	Total
	(m)	(m^3)	(m^3)	(L/s)	(L/s)	(L/s)	(L/s)
Pond Bottom	136.00	0	0	0	0	0	0
Permanent Pool	137.50	0	6,786	0	0	0	0
Extended Detention	137.75	1,547	8,333	37	0	0	37
5-year	138.11	5,855	12,641	65	531	0	596
100-year	138.45	11,259	18,045	75	1,138	370	1,583

2.5.8 Outlet Structure

The existing outlet structure consists of a concrete box maintenance hole (structure ‘1500’). The maintenance hole has two pipes entering it. The lower pipe draws water from the nearby ditch inlet catchbasin and the higher pipe draws water from the bottom of the pond using a reverse sloped pipe. In the middle of the maintenance hole is the concrete control structure. The concrete control structure within the maintenance hole will require modifications to provide the requisite water quantity control for both the Mill Run Phases 1-6 and Mill Run Extension Phases 7-9 developments.

Extended Detention

As noted above, the expanded SWM facility provides extended detention for the first 1,547 m^3 of active storage to allow for settling of suspended sediment in the pond. Extended detention outflows are conveyed via the 300mm reverse sloped pipe and released over a period of 24 hours through two 144mm orifices cast into the SWM facility outlet structure using PVC liners.

Quantity Control

Runoff volumes exceeding the extended detention storage volume in the existing SWM facility are conveyed via a 0.72 m wide rectangular weir formed into the concrete control structure. The invert of this weir is set at the extended detention water level of 137.75 m. Due to the additional lands from the Mill Run Extension outletting to the SWM facility and increased allowable release rates, the existing weir is proposed to be widened from 0.72 m to 1.40 m wide. This modification will allow more flow to leave the pond while maintaining the approximate 5-year and 100-year water levels as per the original pond design. The proposed manhole modification will be completed internally and no in-water works are required.

Overflow Spillway

Outside of the control structure, 20 m to the north, is the major system outlet. This outlet is a 16 m overflow weir with an invert elevation of 138.40 m. It is formed into the pond berm structure and is constructed from earth, is vegetated, and is generally trapezoidal in shape. This structure also forms the overflow spillway during larger storm events. This structure conveys water directly into the Almonte Municipal Drain.

2.5.9 SWM Facility Planting Design

As the proposed development is anticipated to result in the loss of some of the local wetlands and significant wildlife habitat for breeding wetland amphibians, the proposed naturalized stormwater management pond should be designed and constructed following natural design principles. To meet this objective, the following natural design features and planting strategies are recommended to be included within a landscape plan at the detailed design stage:

- The permanent pool area should be designed and constructed to have relatively flat slopes of 7:1 and irregular shape shorelines and depths within the nearshore areas, while still maintaining a geometry required for hydraulic efficiency;

- Within the 100-year ponding limits, but outside of the permanent pool area, numerous shallow pans of approximately 25 m^2 (5 m x 5 m x 0.5 m deep) should be created to allow for establishment of hydrophilic plant species and high moisture micro habitats required for amphibians;

- Similarly, within the 100-year ponding limits and surrounding the above noted shallow pans, woody bundles and basking logs should be incorporated into the design to increase habitat structure and complexity;

- Within the permanent pool area, shorelines should include hard substrates features such as boulders, woody bundles and basking logs;

- Within the permanent pool, aquatic plantings including a mix of emergent aquatic vegetation and wet meadow species, including shrub species, should be incorporated to ensure colonization shorelines under various water levels and to provide sufficient cover to offer amphibians protection from predators;

- During preliminary construction, organic soils from with the wetland portions of the site to be developed should be stripped and retained for top dressing the shoreline of the permanent pool and the surrounding 100-year ponding extents to provide adequate seed bank for germination of wet meadow herbaceous plants;

- The surrounding green space should be well planted with native coniferous and deciduous tree species to provide adequate shade and thermal buffering;

- Similarly, topsoil within the green space should be overseeded with a native pollinator wildflower mix;

- Plantings of vigorous and robust hydrophilic shrub species such as red osier dogwood and slender willow should be included within the 100-year ponding extents; and,

- Undertake annual vegetation and amphibian monitoring for a period of three years to document performance against existing breeding amphibian community assemblage and relative abundance.

3.0 SANITARY SERVICING

3.1 Proposed Sanitary Sewer

The proposed sanitary sewer system for Phases 7 & 8 of the Mill Run Extension are to be serviced with a combination of 200mm and 250mm dia. sanitary sewers. The sanitary system for the Subject Lands will be directed by gravity sewers and connect to the existing Mill Run Subdivision 250mm dia. sanitary stub within Sadler Drive. This existing Mill Run sanitary sewer outlets to Ottawa Street and then ultimately outlets to the Gemmill's Bay Pumping Station, which pumps the sewage to the Mississippi Mills Wastewater Treatment Plant.

Within the Subject Lands, it is proposed to extend a 250mm dia. sanitary sewer north on Sadler Drive to service the proposed development. Additionally, 200mm dia. sanitary sewers will extend off Sadler Drive into Streets 1, 2 and 3.

To account for future developments to the east, 200mm dia. sanitary stubs will be installed at the ends of both Street 1 and Street 2. Similarly, a 200mm dia. sanitary stub will be installed north of the Street 1 and Sadler Drive intersection for any potential future development north of the Subject Lands.

Refer to **Figure 4** – Mill Run Extension Phases 7 & 8 Conceptual Servicing for more details.

3.2 Design Criteria

Population and sanitary flow estimates for the proposed development are calculated using design criteria from the *J.L. Richards Master Plan Update Report* (February 2018) and the *City of Ottawa Sewer Design Guidelines* (October 2012). Based on correspondence with the Municipality, some design criteria from the 2018 City of Ottawa guidelines have been followed. Preliminary sanitary flow analysis of the Mill Run Extension has been completed based on the following design criteria:

Demand Values

- Residential Demand = 350 L/cap/day
- Population Density
  - Single Unit = 3.4 persons/unit
  - Semi-detached Unit = 2.7 persons/unit
  - Townhouse Unit = 2.7 persons/unit
- Park Demand = 3700 L/ha/day

Design Parameters

- Max. Residential Peak Factor 'P.F.' = 4.0 (based on Harmon Equation)
- Harmon Correction Factor 'K' = 1.0
- Infiltration Flow Rate = 0.33 L/sec/ha
- Min. Sanitary Flow Velocity = 0.6 m/s
- Manning's Roughness Coefficient 'n' = 0.013

3.3 Sanitary Flow Analysis

The peak sanitary flow for the Mill Run Extension Phases 7 & 8 and future lands (Phase 9) to the east is **11.56 L/s**. Calculated peak flows for the proposed development are summarized in **Table 3.1**.

Table 3.1: Peak Sanitary Flows Summary

Phase	Development Condition	Population	Area (ha)	Peak Res. / Park Flow (L/s)	Peak Extran. Flow (L/s)	Peak Design Flow (L/s)
Phases 7 & 8	Residential	370	6.79	5.93	2.24	8.17
	Park	-	0.42	0.02	0.14	0.16
Future Phase 9	Residential	145	2.66	2.35	0.88	3.23
	Park	-	-	-	-	-
Totals		515	9.87	8.28	3.26	11.56

Based on the proposed sanitary drainage areas pipe network layout, an estimated peak sanitary design flow has been calculated for the proposed development. Phases 7, 8 and future lands to the east are estimated to produce a total peak design flow of **11.56 L/s**. As the layout for future lands to the east of the Mill Run Extension has yet to be determined, the corresponding population and drainage areas have been estimated based on the population density of Phases 7 & 8.

The existing Mill Run Subdivision had not accounted for the Subject Lands' sanitary flows in its design process. To analyze the downstream flow capacity, flow rates from proposed Mill Run Extension Phases 7, 8 and future lands to the east were inputted into the Mill Run Sanitary Design Sheet. This analysis determined a small surcharge occurs downstream within the Mill Run Subdivision. Further investigation of the downstream surcharge and the associated HGL is elaborated on in the following section.

Refer to **Figure 6** - Mill Run Extension Phases 7 & 8 Sanitary Drainage Areas for details on the proposed sanitary drainage areas. Sanitary Design Sheets and a Sanitary Manhole Information table for the Subject Lands and the Mill Run Subdivision can be found in **Appendix C**.

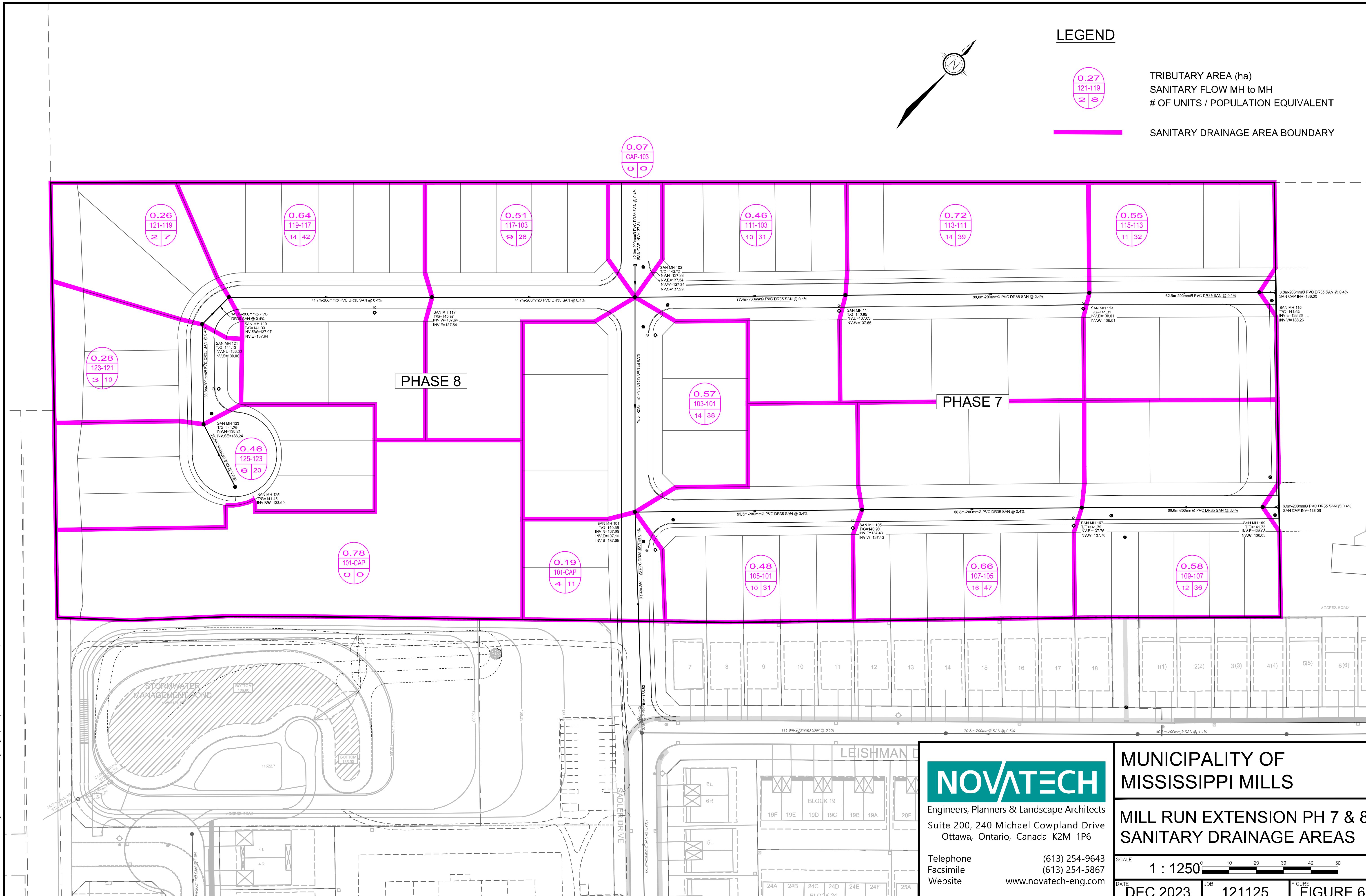
3.4 Downstream Hydraulic Grade Line Analysis

As a result of the added sanitary peak flows from the proposed Mill Run Extension development, a surcharge downstream within the Mill Run Subdivision occurs. To analyse the surcharge, a manual HGL analysis has been completed. Results from the HGL analysis indicate that surcharge only exists downstream within the Mill Run Subdivision and flows remain within the sanitary pipes for the Subject Lands.

HGL analysis determined that the greatest amount of surcharge is within manhole SAN303 of the Mill Run Subdivision and is roughly 0.17m above the existing sanitary sewer's obvert at an elevation of 136.66m. Using the Mill Run Phase 1 as-built drawings, the lowest underside of footing (USF) elevation closest to manhole SAN303 is 137.82m. The HGL elevation complies with the municipality's minimum 1.8m clearance from ground elevation. With over 1.0m of clearance between the surrounding buildings' USF and the sanitary surcharge elevations, there is limited potential for negative impacts to the existing downstream units in the Mill Run Subdivision. HGL analysis and Mill Rub Subdivision as-built drawings can be found in **Appendix C**.

Flow monitoring of the Mill Run Subdivision could be performed. From experience on other projects, it is expected that the actual flows are less than the design flows. Based on the results of the flow monitoring, there may be no surcharge flows produced within the downstream system due to additional flows from the proposed Mill Run Extension. Further analysis of the downstream sanitary flows will be investigated during the detailed design stage.

J.L. Richards provided downstream analysis of the sanitary trunk sewer. The analysis concluded that there were no capacity concerns in the downstream sanitary trunk sewer from the additional Mill Run Extension Phases 7 & 8 and future lands. The J.L. Richards sanitary analysis can be found in **Appendix C**.



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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
SANITARY DRAINAGE AREAS

SCALE		
1 : 1250		
DATE DEC 2023	JOB 121125	FIGURE FIGURE 6

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4.0 WATER SERVICING

4.1 Proposed Watermain System

The proposed watermain system for Phases 7 & 8 of the Mill Run Extension is to be serviced with 50mm, 200mm and 250mm dia. watermains complete with two (2) connections to the existing Mill Run Subdivision watermain infrastructure. The first connection will be to the existing 250mm dia. watermain stub on Sadler Drive. The second connection, through a 10 m servicing block, will be to the existing 250mm dia. watermain on Leishman Street. Together the connections provide looping for the proposed development.

The Sadler Drive and Leishman Street connections will extend north with 250mm dia. watermain into the subject lands. Within the subject lands, a 250mm dia. watermain will be installed on Street 1 and Street 2 with 200mm dia. watermain installed on Street 3. The Street 3 cul-de-sac will also include a 50mm dia. watermain loop.

For future development considerations, 250mm dia. watermain stubs will be installed, east from the end of Street 1, east from the end of Street 2, and north from the Street 2/Street 3/Sadler Drive intersection.

Refer to **Figure 4** – Mill Run Extension Phases 7 & 8 Conceptual Servicing for the locations of the connection points and future watermain servicing stubs.

4.2 Design Criteria

Design criteria for the Subject Lands is based on the *Master Plan Update Report* for Mississippi Mills by J.L. Richards (February 2018) and Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Watermain Design Guidelines for Water Distribution. Design criteria including population density has been assumed from the City of Ottawa Water Design Guidelines for Water Distribution. Preliminary watermain analysis of the proposed development was completed based on the following criteria:

<u>*Demand Values*</u>

- Residential Demand = 350 L/cap/day
- Residential Max. Day = 2.5 x Avg. Day
- Residential Peak Hour = 2.2 x Max. Day
- Population Density (From Table 4.1, City of Ottawa)
    - Single Unit = 3.4 persons/unit
    - Semi-detached Unit = 2.7 persons/unit
    - Townhouse Unit = 2.7 persons/unit

<u>*System Pressure Requirements*</u>

- Normal Operating Pressure (Avg. Day) 345 kPa (50 psi) – 483 kPa (70 psi)
- Minimum Pressure (Peak Hour) > 276 kPa (40 psi)
- Minimum Pressure (Max. Day + Fire Flow) > 140 kPa (20 psi)

<u>*Friction Factors*</u>

Watermain Size	C-Factor
50 mm	100
200-250 mm	110
300-400 mm	120

Prior development of the Mill Run subdivision, Phase 1-6, used the OBC method to calculate fire flows. This is consistent with existing and new local development in the area. However, the municipality has agreed to follow the fire flow recommendations of the simplified Fire Underwriters Survey (FUS). The site has been revised to limit the simplified FUS fire flow to 133L/s (8,000LPM). This was accomplished by reducing distances to the setback limits for lots and blocks. The number of units remains the same. The simplified FUS fire flow demands are similar, but greater, to Table 10 of the 2018 Master Pan Update Report by J.L. Richards, which noted the design criteria for residential unit fire flows with less than 3m separation be 100 L/s.

The watermain model for the high pressure, peak hour, and max. daily demand and fire flow conditions utilized boundary conditions provided by the municipality. The boundary conditions should be confirmed again during detailed design of the Mill Run Extension Phases 7 & 8.

Refer to **Appendix D** for confirmation of the simplified FUS fire flow demands and boundary conditions. A summary of the simplified FUS method required fire flows for various exposure distances is presented in **Table 4.1**.

Table 4.1 Required Fire Flows (Simplified FUS Method)

Exposure Distance	Wood Frame – Required Minimum Water Supply Flow Rate (L/s)
Less than 3m	133 L/s
3m – 10m	67 L/s
10.1m – 30m	50 L/s
Greater than 30m	33 L/s

4.3 Hydraulic Analysis

The hydraulic model EPANET was used to analyze the performance of the proposed watermain configuration for three (3) theoretical conditions:

- Maximum HGL (Avg. Day)
- Peak Hour
- Maximum Day + Fire Flow Demand

For a schematic representation of the hydraulic model used to confirm the proposed Mill Run Extension's watermain operating pressures, refer to Watermain Layout figure located in **Appendix D.** The figure includes nodes (residential and fire flow demand locations), reservoirs (water supply locations), and pipes used in the model.

Results from the hydraulic model indicate adequate pressures exist throughout the proposed watermain system, satisfying each specified design condition. The hydraulic requirements and hydraulic model results are summarized in **Table 4.2** below.

Table 4.2: Hydraulic Analysis Summary

Condition	Mill Run Extension Phases 7 & 8 Demand (L/s)	Min/Max Allowable Pressure (kPa/psi)	Min/Max Operating Pressure (kPa/psi)	Max. Age (hrs)
Maximum HGL (Avg. Day)	1.55	689.5/100 (Max)	400/58.1 (Max)	9.9
Peak Hour	8.51	275.8/40.0 (Min)	370/53.7 (Min)	N/A
Max. Day Demand (& 133L/s Fire Flow at Node 711)	136.87	137.9/20.0 (Min)	140/20.4 (Min)	N/A

Table 4.2 confirms the proposed watermain system can service the Mill Run Extension Phases 7 & 8 under all operating conditions using a series of 50mm, 200mm and 250mm dia. pipes.

Refer to **Appendix D** for the Watermain Layout figure, boundary conditions, simplified FUS fire flow requirements, and hydraulic modeling results.

5.0 UTILITY INFRASTRUCTURE

The development will be serviced by hydro, phone, gas, and cable, as per the Municipality of Mississippi Mills approved utility standard right-of-way cross-sections.

6.0 PHASING

The Mill Run Extension development will be completed in two (2) phases.

7.0 ROADWAYS

The internal subdivision roads will be constructed in accordance with the typical road cross-sections as shown in **Figure 7** – Typical Road Cross Section for 20m R.O.W. and **Figure 8** – Typical Road Cross Section for 18m R.O.W. The existing Sadler Drive within the Mill Run Subdivision has a 20.0m right-of-way and will continue the same cross-section with barrier curbs and sidewalks on both sides of the roadway in the Subject Lands. For the Mill Run Extension Phases 7 & 8, Streets 1, 2 and 3, will be an 18-metre right-of-way with an 8.5-metre asphalt width and barrier curbs with sidewalks on one side of the roadway.

A temporary roadway will be installed in a 14m easement adjacent to the east property boundary of the proposed development which connects Street 1 to Street 2. Refer to **Figure 9** – Typical Cross Section for 14m Easement which includes barrier curbs with sidewalks on one side of the roadway.

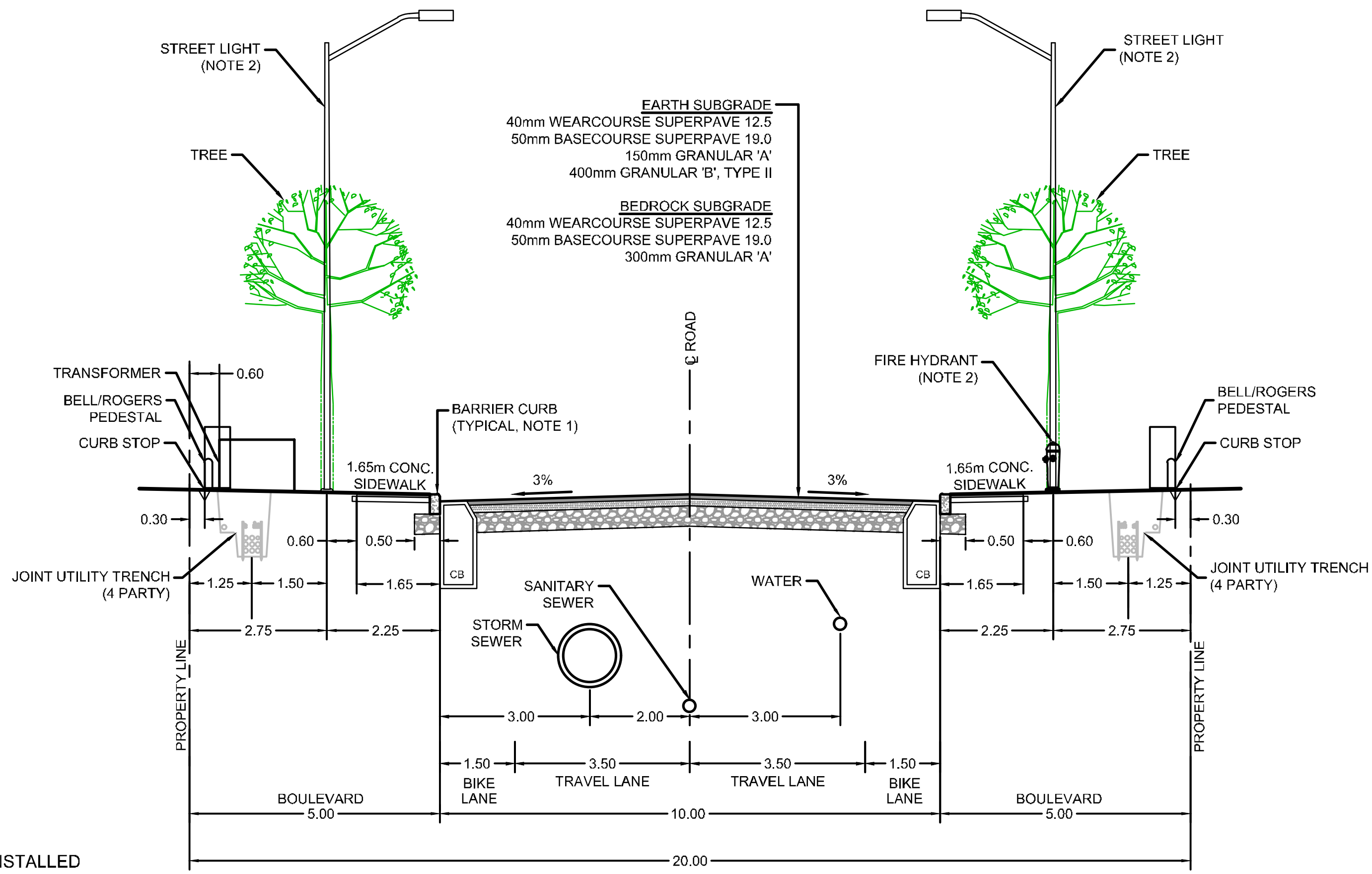
Preliminary grading and the erosion and sediment control plan for the Subject Lands is shown in **Figure 10** – Mill Run Extension Phases 7 & 8 Conceptual Grading and ESC.

8.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987).

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), catch-basin inserts under catch-basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent Lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. A copy of the City of



NOTES:

1. MOUNTABLE CURB TO BE INSTALLED IN FRONT OF TOWNS. TRANSITION LOCATIONS TO BE NOTED ON GRADING PLANS.
2. FIRE HYDRANTS TO BE LOCATED ON WATERMAIN SIDE OF STREET. STREET LIGHTS TO BE ON OPPOSITE SIDE.

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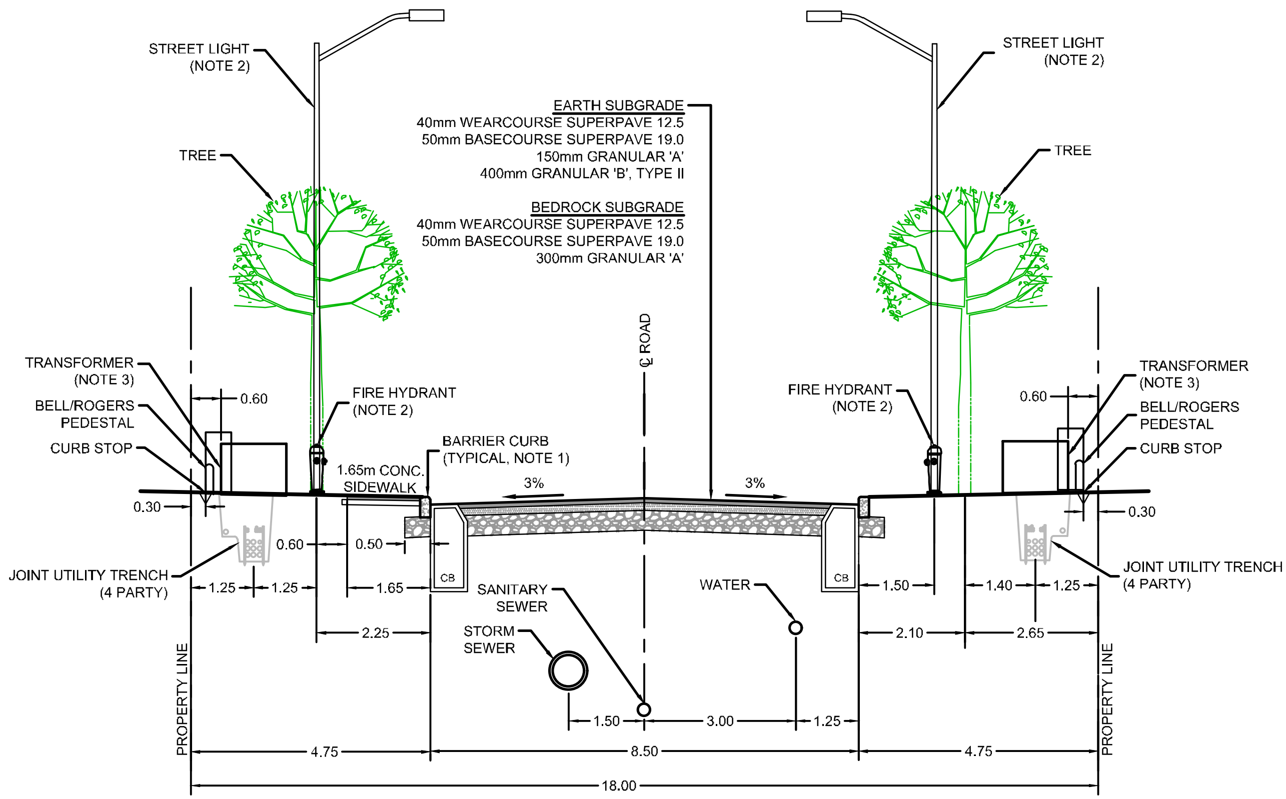
MUNICIPALITY of MISSISSIPPI MILLS
MILL RUN EXTENSION PHASES 7 & 8

TYPICAL ROAD CROSS SECTION FOR 20m R.O.W.

SCALE 1 : 150 (0 2 4 6)		
DATE DEC 2023	JOB 121125	FIGURE FIGURE 7



NOTES:

1. MOUNTABLE CURB TO BE INSTALLED IN FRONT OF TOWNS. TRANSITION LOCATIONS TO BE NOTED ON GRADING PLANS.
2. FIRE HYDRANTS TO BE LOCATED ON WATERMAIN SIDE OF STREET. STREET LIGHTS TO BE ON OPPOSITE SIDE.
3. TRANSFORMERS TO BE LOCATED ON THE OPPOSITE SIDE OF THE SIDEWALK WHEREVER POSSIBLE.

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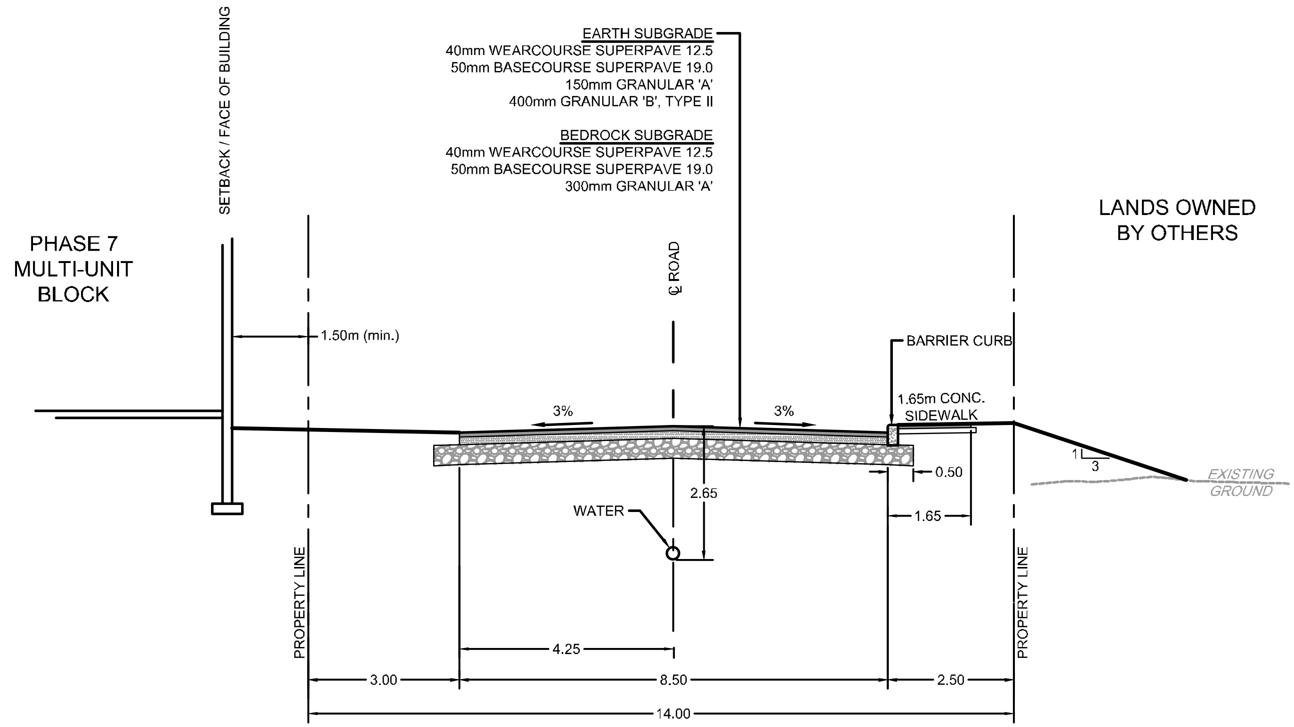
MUNICIPALITY of MISSISSIPPI MILLS
MILL RUN EXTENSION PHASES 7 & 8

TYPICAL ROAD CROSS SECTION FOR 18m R.O.W.

SCALE	1 : 150 (0 2 4 6)
DATE	DEC 2023
JOB	121125
FIGURE	FIGURE 8

SHT8X11.DWG - 216mmx279mm



NOVATECH
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Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

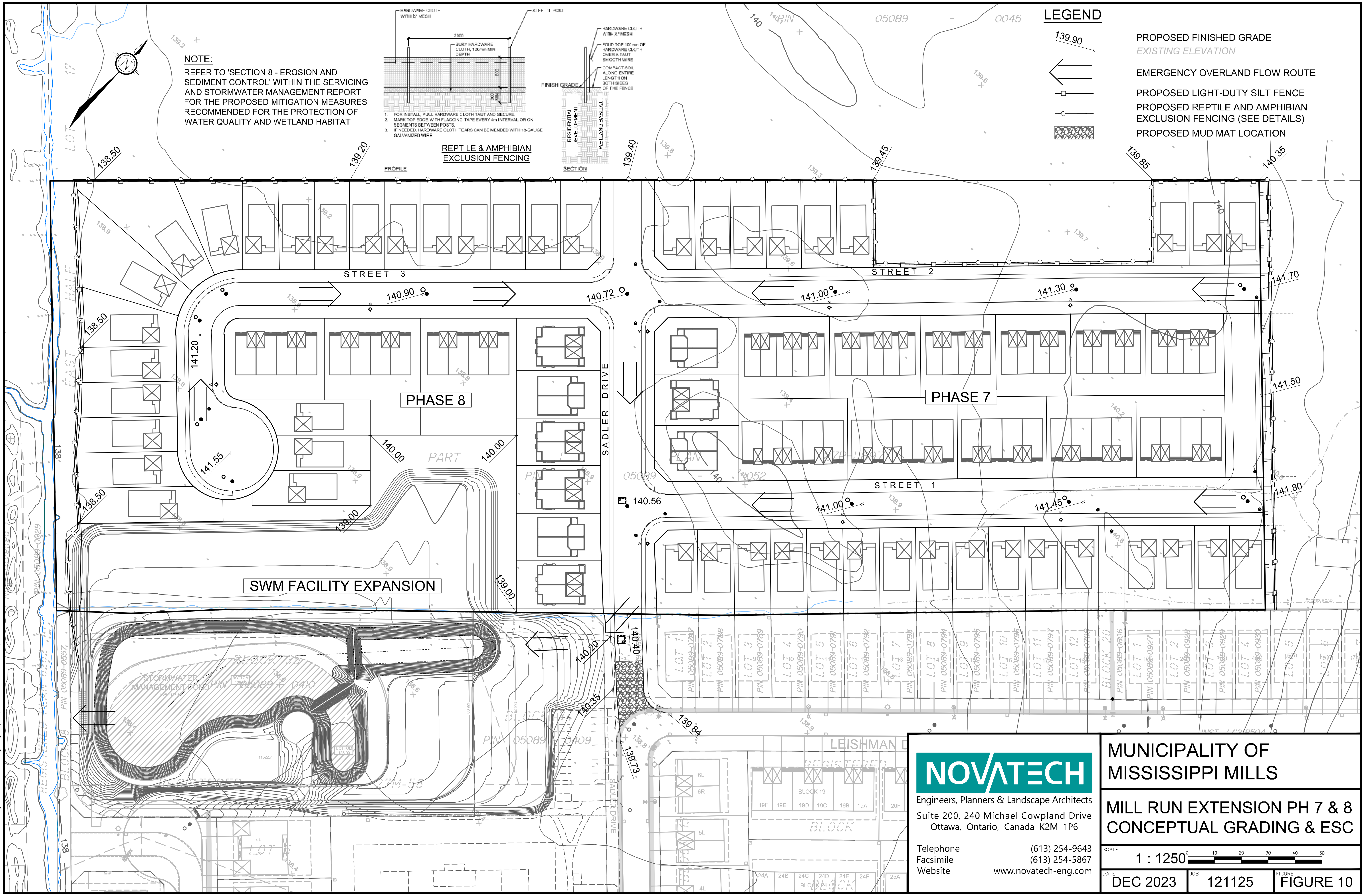
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

MUNICIPALITY of MISSISSIPPI MILLS
MILL RUN EXTENSION PHASES 7 & 8

TYPICAL CROSS SECTION FOR 14m EASEMENT

SCALE 1 : 150 (0 2 4 6)

DATE DEC 2023 | JOB 121125 | FIGURE FIGURE 9


NOTE:
REFER TO 'SECTION 8 - EROSION AND SEDIMENT CONTROL' WITHIN THE SERVICING AND STORMWATER MANAGEMENT REPORT FOR THE PROPOSED MITIGATION MEASURES RECOMMENDED FOR THE PROTECTION OF WATER QUALITY AND WETLAND HABITAT
REPTILE & AMPHIBIAN EXCLUSION FENCING
PROFILE
SECTION
LEGEND
PROPOSED FINISHED GRADE
EXISTING ELEVATION
EMERGENCY OVERLAND FLOW ROUTE
PROPOSED LIGHT-DUTY SILT FENCE
PROPOSED REPTILE AND AMPHIBIAN EXCLUSION FENCING (SEE DETAILS)
PROPOSED MUD MAT LOCATION
STREET 3
STREET 2
STREET 1
SADLER DRIVE
PHASE 8
PHASE 7
SWM FACILITY EXPANSION
LEISHMAN
MUNICIPALITY OF MISSISSIPPI MILLS
MILL RUN EXTENSION PH 7 & 8 CONCEPTUAL GRADING & ESC
NOVATECH
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Website www.novatech-eng.com
SCALE 1 : 1250
DATE DEC 2023
JOB 121125
FIGURE FIGURE 10
M:\2021\121125\CAD\Design\121125-GR.dwg, Fig10(GR), Nov 21, 2023 - 1:41pm, smatthews
SHT11X17.DWG - 279mmX432mm

Ottawa Special Provision F-1004 will become part of any contract and which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the Municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
  - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
  - Straw bale barriers are to be installed in drainage ditches.
  - Catch-basin inserts are to be placed under the grates of all proposed and existing catch-basins and structures.
  - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.

The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

Site Specific Details

Mitigation measures recommended for the protection of water quality and wetland habitat include:

- To offset the loss of wetland and wetland buffer, compensation of wetland function should be considered through naturalized stormwater design completed in conjunction with progressive rehabilitation of the buffer to the Spring Creek Municipal Drain.
  - Progressive rehabilitation should include re-establishing tree and shrub vegetation and herbaceous wet meadow vegetation enhanced through retention of seed bank material excavated as part of the development.
- All future development and construction activities within the study area, including ditching, culvert installation, erosion and sediment control and storm water management should be completed in accordance with Ontario Provincial Standard Specification 182 and OPSS 805.
- No in-water work should occur between March 15 and June 30 of any year to protect spawning fish habitat adjacent to the development area. All in-water habitat features, including aquatic vegetation, natural woody debris and boulders should be left in their current locations.

- Silt fencing should be installed along all setbacks to provide visual demarcation of the setbacks to prevent machinery encroachment and sediment transport.
- When native soil is exposed, sediment and erosion control work in the form of heavy-duty sediment fencing shall be positioned along the down gradient edge of any construction envelopes adjacent to waterbodies.
- In order to protect fish and Blanding's turtles aquatic habitat from contamination, it is recommended that all machinery be maintained in good working condition and that all machinery be fueled a minimum of 30 m from the high water mark.
- Any temporary storage of aggregate material shall be set back from the water's edge by no less than 40 m and be contained by heavy-duty silt fencing.
- Schedule work to avoid wet, windy and rainy periods.

The following mitigation measures are expected to be implemented to avoid contravention of the Endangered Species Act (ESA):

- To protect migratory Blanding's turtles, vegetation clearing should be undertaken outside of the MECP identified turtle active season (April 1 – October 31).
- To provide protection to eastern ribbonsnake during construction, installation of silt fence barriers along the proposed 15 m and 30 m setbacks, including completion of daily sweeps of the construction areas, is recommended.
- Prior to any site work, reptile and amphibian exclusion fencing should be installed around the entire perimeter of the property to prevent the migration of Blanding's Turtles and other wildlife into the construction zone. The temporary exclusion fencing will also provide a visual demarcation of the property for workers during construction. Exclusion fencing should follow the protocols outlined in the Species at Risk Branch: Best Practices Technical Note: Reptile and Amphibian Exclusion Fencing Version 1.1 (MNRF, July 2013).
- Installation of silt fence barriers around the entire construction envelope of each future residential dwelling is recommended to prohibit the migration of snapping turtles into the construction area.
- Each day of construction a daily pre-work sweep of the construction area should occur to ensure no SAR are present and to remove any wildlife from inside the construction area.
- All staff working on-site should be provided Species at Risk training to identify species at risk which a potential to occur on-site including: Blanding's turtle. Training will also outline the stop work procedures and MECP reporting/consultation prior to resuming work.
- During construction if any SAR is identified on-site all work should stop and a qualified professional and the MECP should be contacted for next steps. SAR sightings should be reported to the MECP and the NHIC.
- Heavy-duty silt fencing should be installed and maintained during construction and whenever soil is exposed; the incorporation of lot-side swales and gravel laneways are intended to promote infiltration and direct stormwater runoff to road side ditches instead of towards adjacent waterbodies.
- Cover all stockpiled material with a geotextile to prevent turtles from nesting in the material between May 1 and August 1 of any year.

9.0 CONCLUSIONS

This Servicing and Stormwater Management Report has evaluated the servicing (storm, sanitary and water) for the Mill Run Extension Phases 7 & 8. The principal findings and conclusions of this study are as follows:

General

- The Mill Run Extension Phases 7 & 8 reflected in this Servicing and Stormwater Management Report can be adequately serviced by extending existing Mill Run Subdivision water and sanitary infrastructure. Stormwater will be conveyed to the existing Mill Run SWM facility.

Storm Drainage and Stormwater Management

- To service the Subject Lands, a series of gravity storm sewers will be constructed. Storm runoff will be conveyed to the existing Mill Run SWM facility southwest of the proposed development.
- An expansion of the existing SWM facility and modification to the outlet structure are proposed to account for additional runoff from the Subject Lands.
- PCSWMM modeling results indicate that the proposed SWM facility expansion and modifications to the outlet structure are sufficient to control post-development peak flows to the allowable release rates.
- The expanded SWM facility will provide *Enhanced* (80% long term TSS removal) level of water quality control.

Sanitary Collection

- Sanitary flows will be conveyed through the Mill Run Subdivision to Ottawa Street which connects to the Gemmill's Bay Pumping Station.
- Servicing for the Subject Lands will consist of 200mm and 250mm gravity sewers. The total sanitary flow from the Mill Run Extension Phases 7, 8 and future developments to the east is calculated to be 11.56 L/s.
- The sanitary flows from the proposed development have produced a small surcharge within the existing Mill Run Subdivision. After hydraulic grade line analysis, it is determined that the surcharge remains a minimum 1.0m below the existing USF elevations of buildings in the area and a minimum 1.8m below the ground surface elevation.
- J.L. Richards downstream analysis of the sanitary trunk sewer had no capacity concerns with the additional flows from the Mill Run Extension Phase 7 & 8 and future lands.
- No further upgrades to the existing sanitary system are anticipated to accommodate the Subject Lands.

Water Distribution

- The existing Mill Run Subdivision 250mm dia. watermain within Sadler Drive will be extended north to service the Subject Lands. A secondary 250mm dia. watermain connection through a 10m servicing block in the existing Mill Run Subdivision will connect to Leishman Street providing a looped system for the proposed development.
- Hydraulic Analysis has shown that the proposed development can be serviced with a combination of 50mm, 200mm and 250mm dia. watermains. The network will function

normally under all operating conditions including fire flows based off the simplified Fire Underwriters Survey (FUS).

Utility Infrastructure

- The development will be serviced by hydro, phone, gas and cable, as per Municipality of Mississippi Mills approved utility standard right-of-way cross-sections.

Roadways

- The roadways will conform to Typical 18.0m and 20.0m cross sections developed for the Mill Run Extension Phases 7 & 8.
- Site grading will match existing grades at the perimeter of the site.

10.0 CLOSURE

Novatech respectfully requests the Municipality of Mississippi Mills accept the findings of this Servicing and Stormwater Management Report and provide approval for the draft plan of subdivision for the Mill Run Extension – Phases 7 & 8.

NOVATECH

Prepared by:

Billy McEwen, B.A.Sc., EIT
Land Development

Prepared by:

Olivia Renn, B.Eng., EIT
Water Resources

Reviewed by:

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Dec 18 2023
PROVINCE OF ONTARIO

Drew Blair, P.Eng.
Sr. Project Manager | Land Development

Reviewed by:

LICENSED PROFESSIONAL ENGINEER
M. J. PETEPIECE
100079354
Dec 19, 2023
PROVINCE OF ONTARIO

Michael Petepiece, P.Eng.
Sr. Project Manager | Water Resources

Appendix A: Correspondence

Pre-Consultation Meeting Notes
Virtual zoom meeting – November 2, 2022
Prepared By: Julie Stewart

In Attendance
Stefanie Kaminski – Regional Group
Melanie Riddell – Novatech
Greg Winters - Planner, Novatech
James Ireland - Planner, Novatech
Drew Paulusse – Gemtec
Taylor Warrington - Gemtec
Diane Reid – Planner, MVCA
Ken Kelly – CAO, Mississippi Mills
David Shen – Director of Development Services and Engineering
Jeffrey Ren – Planner, Mississippi Mills
Julie Stewart – County Planner, County of Lanark

A brief background was provided, the subject lands were considered as Area 4 as part of OPA 22 and brought into the Settlement Area of Almonte. The proposed subdivision will be an extension to the existing Mill Run subdivision.

129 residential dwelling units are proposed.

There may be a future proposed subdivision on the lands containing the existing home.

Gemtec provided a summary of the EIS. There is an area on adjacent land with Blanding's Turtle Habitat.
The conceptual plan shows the habitat and wetland areas.

MVCA
Diane Reid noted there is a wetland to the North and a wetland to the West. Both of these are on adjacent lands but the regulation limits are on the subject lands.

We note that (2) MVCA regulated wetlands exist on the adjacent lands, (1) N and (1) W of the subject lands. MVCA regulates these wetlands, including their 30 m adjacent lands (i.e. Regulation Limit). The subject property is within the Regulation Limit. As per MVCA Regulation Policies, a minimum setback of 30 m is generally required for any new development or site alteration in and within the Regulation Limit of these wetlands. Melanie Riddell noted that the setback to the west is proposed at 15m.

Diane Reid reiterated that the wetland is regulated. The minimum setback is 30 m not 15m from the wetland. CA policy does not permit development.

Geotechnical Report required to address organic soils in the west.

Stormwater Management – Diane asked Novatech if this will be tying in the existing.

Jeffrey Ren, asked a few questions related to the Category 2 habitat and the proposed park areas.

LANARK COUNTY

PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist

Report	Comments	Required Yes/No
Planning Rationale	Include justification Must have regard for PPS Lanark County Official Plan compatibility Local Official Plan compatibility	Yes
Hydrogeological Study, Terrain Analysis	Availability and suitability of water and waste water MOE – D-5-4 Guidelines MOE – D-5-5 Guidelines ODWSOG Checklist Summary & Sign-off	
Environment Impact Study	SAR & Significant Habitat Wetlands Organic Soils Natural Heritage Features & Systems Significant Wetlands Significant Woodlands Significant Valleylands Significant Wildlife ANSI Fish Habitat	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
Servicing Options Statement	Guidelines – MOE D-5-3	Yes
Stormwater Drainage Plan	Guidelines - MOE-2003 / MNR-2001 Checklist Summary & Sign-off	Yes
Grading Plan	Sloping land within lot to direct flow of surface water away from foundations & abutting properties.	Yes

LANARK COUNTY

PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist

Report	Comments	Required Yes/No
Sediment and Erosion Control Hazardous Sites	Flooding, erosion hazard Slope and Soil Stability Organic Soils Karst Topography	 Yes
Archeological Investigation	Standards & Guidelines 2011	Yes
Tree Preservation Plan or Tree Conservation Plan	Check with local municipality	
Other	Geotechnical Report	Yes
Draft Plan	To include: Planning Act 50(17) Ont. Reg. 544/06 Lot and block configuration Compatibility with adjacent uses Road access, street layout & Pedestrian amenities Parks & Open Space amenities Easement and right-of-way requirements	

CORPORATION OF THE MUNICIPALITY OF MISSISSIPPI MILLS
3131 OLD PERTH ROAD · PO BOX 400 · RR 2 · ALMONTE ON · K0A 1A0

PHONE: 613-256-2064
FAX:613-256-4887
WEBSITE: www.mississippimills.ca

November 23, 2022

Julie Stewart
County Planner
jstewart@lanarkcounty.ca

Dear Ms. Stewart:

RE: MILL RUN – PHASES 7 AND 8
PRECONSULTATION
FILE: TBD

Please see attached the Planning and Engineering comments regarding the proposed Mill Run Phases 7 and 8 Plan of Subdivision.

Planning

1. Parkland
   a. Staff will consult further with internal departments regarding the proposed 3400 m² of parkland proposed adjacent to the SWM pond. Generally, the Municipality is reluctant to take land such as this that is surrounded on all three sides by private property. Typically, this arrangement creates maintenance issues for the Municipality and generates privacy and other by-law complaints by future landowners.

   b. Staff suggest that this area be reduced in depth (between the SWM and the rear lot lines of proposed lots) and that the area be limited to a multi-use pathway and associated landscaping to provide connectivity between the existing parkland and this expansion area.

2. Midblock Connection
   a. As confirmed in the pre-consultation meeting, the Municipality will require that the completed mid-block connection be sodded, and sidewalks installed.

3. Temporary Road Connection
   a. Please see below further technical comments (engineering) on the temporary road connection in lieu of the turning circles.

   b. Be advised that as a condition of approval, the temporary road connection will need to be appropriately signed for future property owners to be advised that the road connection is temporary in nature only.

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4. Category 2 Habitats

    a. Further internal departmental discussion is required to determine if the Municipality is willing to accept any of the Category 2 Habitat areas as conveyance of land. It is noted that the 15-metre area is deficient in the standard, minimum 30-metre area typically required for this type of habitat protection.

    b. If a pathway is proposed in this area, further review will need to be undertaken to determine if the Municipality is willing to accept a pathway in this area as it would be deemed to be protected habitat and may also present some long-term maintenance issues for the Municipality.

    c. It is also noted that the unopened right-of-way only extends partially along the south easterly lot line and as a result, this may further restrict the ability for a pathway in this area as the pathway will not have any connectivity to the north.

Engineering

1. Site Servicing
    a. A water/wastewater servicing report is required to determine potable water demands, fire flow demands and wastewater discharge, as well as proposed connection/looping points to the municipal system.

2. Stormwater management
    a. A stormwater management report is required to illustrate catchment area, drainage pattern, pre- and post- conditions, hydrologic and hydraulic calculations, quality and quantity treatment. Flow discharge location and requirement will need a consultation with, and obtain approval, from MVCA. For the proposed stormwater management pond expansion, the Municipality will need be involved to discuss operation and maintenance.

    b. A drainage and grading plan is required.

    c. A sediment and erosion control plan is required.

3. Roads and Traffic
    a. A standard urban road design is required. Applicant is expected to contact the Municipality for the requirement of turning circles.

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I trust the above will assist you. If you have any further questions regarding this matter, please feel free to contact me at your convenience.

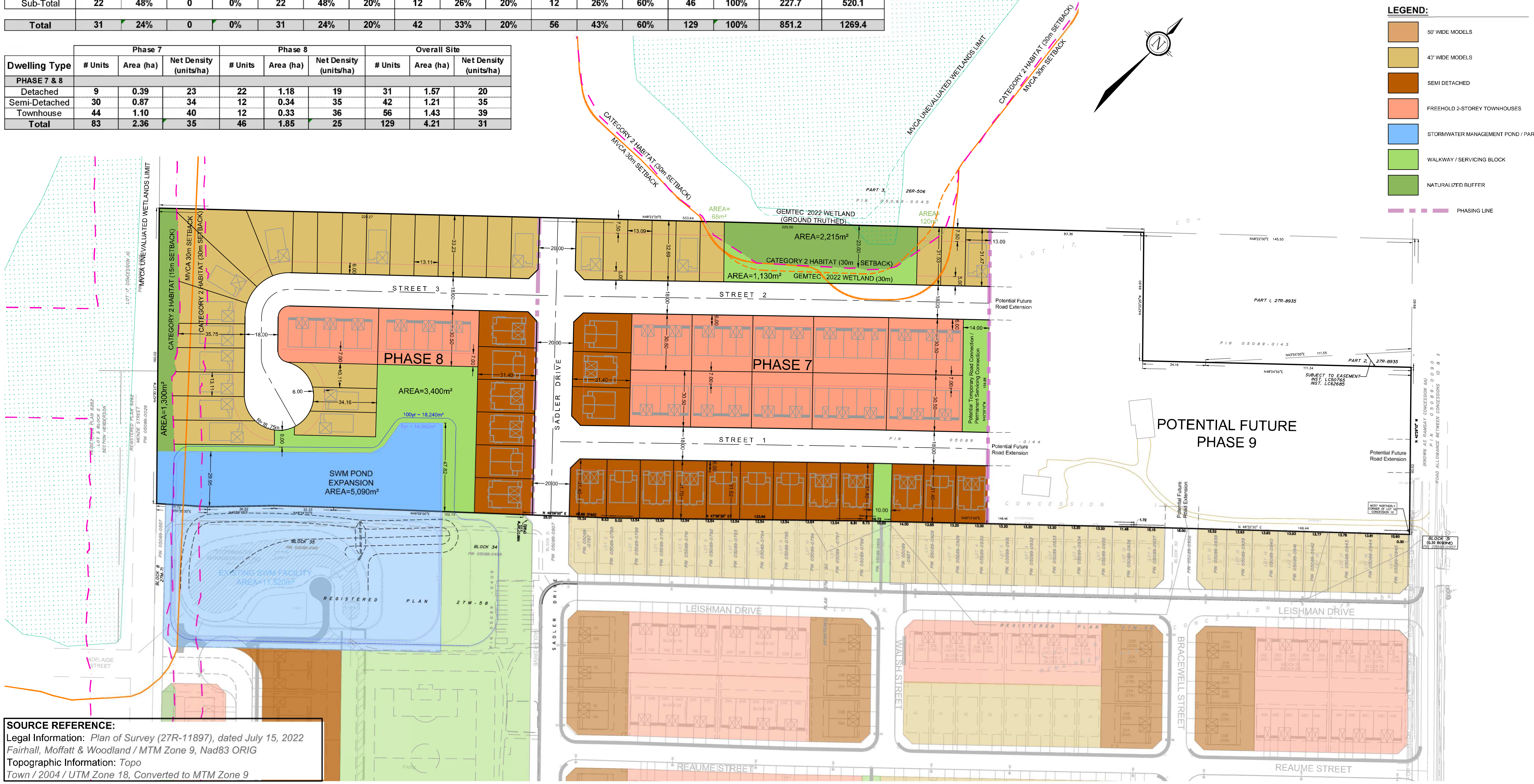
Respectfully yours,

Melanie Knight, MCIP, RPP
Senior Planner
Municipality of Mississippi Mills

Phases	Single Lots							Semi-Detached Lots			2-Storey Townhouse Lots						
	43' Lots		50' Lots		Subtotal		Target Mix	Semi-Detached		Target Mix	Townhouses		Target Mix	Total Units		Road length	Saleable Frontage
	Units	%	Units	%	Units	%	%	Units	%	%	Units	%	%	Units	%	m	m
PHASE 7																	
Sub-Total	9	11%	0	0%	9	11%	20%	30	36%	20%	44	53%	60%	83	100%	623.5	749.3
PHASE 8																	
Sub-Total	22	48%	0	0%	22	48%	20%	12	26%	20%	12	26%	60%	46	100%	227.7	520.1
Total	31	24%	0	0%	31	24%	20%	42	33%	20%	56	43%	60%	129	100%	851.2	1269.4

Dwelling Type	Phase 7			Phase 8			Overall Site		
	# Units	Area (ha)	Net Density (units/ha)	# Units	Area (ha)	Net Density (units/ha)	# Units	Area (ha)	Net Density (units/ha)
PHASE 7 & 8									
Detached	9	0.39	23	22	1.18	19	31	1.57	20
Semi-Detached	30	0.87	34	12	0.34	35	42	1.21	35
Townhouse	44	1.10	40	12	0.33	36	56	1.43	39
Total	83	2.36	35	46	1.85	25	129	4.21	31

Phases	Overall Site				
	# Units	% Mix	OP Target Mix	Net Density (units/ha)	OP Target (units/net ha)
PHASE 7 & 8					
Low Density	73	57%	60%	26	15 - 30
Medium Density	56	43%	40%	39	30 - 40
High Density	-	-	-	-	-



SOURCE REFERENCE:
Legal Information: *Plan of Survey (27R-11897), dated July 15, 2022*
Fairhall, Moffatt & Woodland / MTM Zone 9, Nad83 ORIG
Topographic Information: *Topo*
Town / 2004 / UTM Zone 18, Converted to MTM Zone 9

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

SITE INFORMATION:

Proposed Zoning Setbacks: Typical: 6.0m Front; 7.5m Rear; 1.2m Interior; 3.0m Exterior
Exceptions: [Phase 7 singles - 5.0m Front Yards]
[Phase 7 & 8 Townhouses - 7.0m Rear Yards]

No.	REVISION	DATE	BY
1	ISSUED FOR PRE-CONSULTATION	OCT 31/22	DDB

SCALE
1:1000 (A1) / 1:2000 (11x17)
1:1000
0 10 20 30 40

DESIGN DDB
CHECKED MER
DRAWN SM
CHECKED MER
APPROVED DDB

FOR REVIEW ONLY

NOVATECH
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MISSISSIPPI MILLS
MILLS PROPERTY

DRAWING NAME
CONCEPT PLAN 6

PROJECT No. 121125-00
REV REV # 1
DRAWING No. 121125-CP6

Appendix B: Storm Drainage and Stormwater Management

Mill Run Extension

Project No.: 121125

STORM SEWER DESIGN SHEET
MILL RUN EXTENSION - PHASE 7, 8 and FUTURE LANDS TO EAST
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
MILLS LANDS PHASE 7, 8 & 9 OUTLET TO SWM FACILITY																							
					0.00	0.000	0.000	10.00															
A-1	STM 126	STM 124	0.42	0.45	0.19	0.525	0.525	10.00		104.19			55	55	0.305	300	PVC	0.50	21.8	71.3	0.98	0.37	77%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.37															
A-2	STM 124	STM 122	0.23	0.45	0.10	0.288	0.813	10.37		102.27			83	83	0.381	375	PVC	0.40	39.9	115.6	1.01	0.66	72%
					0.00	0.000	0.000	10.37															
					0.00	0.000	0.000	10.37															
					0.00	0.000	0.000	11.03															
A-3	STM 122	STM 120	0.22	0.45	0.10	0.275	1.088	11.03		99.06			108	108	0.457	450	Conc	0.20	14.3	132.9	0.81	0.29	81%
					0.00	0.000	0.000	11.03															
					0.00	0.000	0.000	11.03															
					0.00	0.000	0.000	11.32															
A-4	STM 120	STM 118	0.65	0.52	0.34	0.940	2.028	11.32		97.69			198	198	0.610	600	Conc	0.20	74.6	286.3	0.98	1.27	69%
					0.00	0.000	0.000	11.32															
					0.00	0.000	0.000	11.32															
					0.00	0.000	0.000	12.59															
A-5	STM 118	STM 104	0.50	0.52	0.26	0.723	2.751	12.59		92.25			254	254	0.686	675	Conc	0.15	74.1	339.4	0.92	1.34	75%
					0.00	0.000	0.000	12.59															
					0.00	0.000	0.000	12.59															
								13.93															
					0.00	0.000	0.000	10.00															
A-9	STM CAP	STM 104	0.07	0.60	0.04	0.117	0.117	10.00		104.19			12.2	12	0.305	300	PVC	0.40	10.5	63.7	0.87	0.20	19%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
								10.20															
					0.00	0.000	0.000	10.00															
PH9-B	PH9-B	STM 116	0.31	0.45	0.14	0.388	0.388	10.00		104.19			40	40	0.457	450	Conc	0.40	20.0	188.0	1.14	0.29	21%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.29															
A-6	STM 116	STM 114	0.49	0.52	0.25	0.708	1.096	10.29		102.68			113	113	0.533	525	Conc	0.30	62.6	245.6	1.10	0.95	46%
					0.00	0.000	0.000	10.29															
					0.00	0.000	0.000	10.29															
					0.00	0.000	0.000	11.24															
A-7	STM 114	STM 112	0.56	0.52	0.29	0.810	1.906	11.24		98.07			187	199	0.610	600	Conc	0.30	89.8	350.6	1.20	1.25	57%
					0.00	0.000	0.000	11.24															
					0.00	0.000	0.000	11.24															
					0.00	0.000	0.000	12.49															
A-8	STM 112	STM 104	0.46	0.52	0.24	0.665	2.571	12.49		92.67			238	238	0.686	675	Conc	0.20	77.9	391.9	1.06	1.22	61%
					0.00	0.000	0.000	12.49															
					0.00	0.000	0.000	12.49															
								13.71															

Mill Run Extension

Project No.: 121125

STORM SEWER DESIGN SHEET
MILL RUN EXTENSION - PHASE 7, 8 and FUTURE LANDS TO EAST
FLOW RATES BASED ON RATIONAL METHOD

Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	13.93															
A-10	STM 104	STM 102	0.57	0.60	0.34	0.951	6.389	13.93		87.17			557	557	0.914	900	Conc	0.15	77.6	731.1	1.11	1.16	76%
					0.00	0.000	0.000	13.93															
					0.00	0.000	0.000	13.93															
								15.10															
					0.00	0.000	0.000	10.00															
PH9-A	PH9-A	STM 110	2.35	0.52	1.22	3.397	3.397	10.00		104.19			354	354	0.762	750	Conc	0.30	200.0	635.8	1.39	2.39	56%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	12.39															
A-11	STM 110	STM 108	0.58	0.52	0.30	0.838	4.236	12.39		93.06			394	394	0.838	825	Conc	0.30	66.5	819.8	1.49	0.75	48%
					0.00	0.000	0.000	12.39															
					0.00	0.000	0.000	12.39															
					0.00	0.000	0.000	13.14															
A-12	STM 108	STM 106	0.66	0.52	0.34	0.954	5.190	13.14		90.10			468	468	0.838	825	Conc	0.30	80.8	819.8	1.49	0.91	57%
					0.00	0.000	0.000	13.14															
					0.00	0.000	0.000	13.14															
					0.00	0.000	0.000	14.04															
A-13	STM 106	STM 102	0.49	0.52	0.25	0.708	5.898	14.04		86.78			512	512	0.838	825	Conc	0.30	82.8	819.8	1.49	0.93	62%
					0.00	0.000	0.000	14.04															
					0.00	0.000	0.000	14.04															
								14.97															
					0.00	0.000	0.000	15.10															
A-14	STM 102	STM 100	0.20	0.60	0.12	0.334	12.621	15.10		83.25			1,051	1,051	1.219	1200	Conc	0.15	49.6	1,574.6	1.35	0.61	67%
					0.00	0.000	0.000	15.10															
					0.00	0.000	0.000	15.10															
					0.00	0.000	0.000	15.71															
SWM FACILITY	STM 100	HEADWALL	0.00	0.00	0.00	0.000	12.621	15.71		81.34			1,027	1,027	1.219	1200	Conc	0.15	45.8	1,574.6	1.35	0.57	65%
					0.00	0.000	0.000	15.71															
					0.00	0.000	0.000	15.71															
								16.27															

Q = 2.78 AIC, where
Q = Peak Flow in Litres per Second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr), 5 year storm
C = Runoff Coefficient

Consultant:	**Novatech**	
Issued Date:	February 3, 2023	
Review Date:	September 18, 2023	
Design By:	BM	
Client:	**Dwg. Reference:**	**Checked By:**
Regional Group	Figure 5	DDB

Legend:
10.00 Storm sewers designed to the 2 year event (without ponding) for local roads
10.00 Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00 Storm sewers designed to the 10 year event (without ponding) for arterial roads
10.00 Storm sewers designed to the 100 year event (without ponding)

Mill Run Extension Phases 7 & 8

Storm Manhole Information

Project No. 121125
Date: 19-Sep-23

NOVATECH
Engineers, Planners & Landscape Architects

Structure ID	Manhole Size	T/G Elevation	Invert Information	
SWM Inlet	n/a	n/a	INV.E	137.39
STM MH 100	3000 mm Box	140.36	INV.N	137.52
			INV.W	137.46
STM MH 102	2400 mm Box	140.52	INV.N	137.63
			INV.E	137.71
			INV.S	137.60
STM MH 104	1800 mm dia.	140.68	INV.N	138.36
			INV.E	137.98
			INV.W	137.98
			INV.S	137.75
STM MH 106	1500 mm dia.	140.94	INV.E	137.97
			INV.W	137.96
STM MH 108	1500 mm dia.	141.35	INV.E	138.22
			INV.W	138.21
STM MH 110	1500 mm dia.	141.69	INV.E	138.50
			INV.W	138.42
STM MH 112	1500 mm dia.	140.91	INV.E	138.21
			INV.W	138.14
STM MH 114	1200 mm dia.	141.27	INV.E	138.56
			INV.W	138.48
STM MH 116	1200 mm dia.	141.58	INV.E	139.83
			INV.W	138.75
STM MH 118	1500 mm dia.	140.83	INV.W	138.17
			INV.E	138.10
STM MH 120	1200 mm	141.05	INV.SW	138.48
			INV.E	138.32
STM MH 122	1200 mm	141.09	INV.NE	138.51
			INV.S	138.59
STM MH 124	1200 mm	141.25	INV.N	138.75
			INV.SE	138.83
STM MH 124	1200 mm	141.49	INV.NW	138.94

Mill Run Extension (121125)
Pre-Development Model Parameters

Time to Peak Calculations
(Uplands Overland Flow Method)

Area ID	Area (ha)	Overland Flow				Concentrated Overland Flow				Overall			
		Length (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Length (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Time of Concentration (min)	Time to Peak (min)	Time to Peak (min)	Time to Peak (hrs)
PRE-PH7	3.97	50	1.0%	0.160	5.21	200	1.0%	0.47	7.09	12	8	10	0.17
PRE-PH8	3.27	50	0.5%	0.055	15.15	150	0.5%	0.33	7.58	23	15	15	0.25
PRE-PH9	2.65	50	1.5%	0.260	3.21	100	1.5%	0.55	3.03	6	4	10	0.17
TOTAL:	**9.89**												

Weighted Curve Number Calculations
(Hydrologic Soil Group 'B')

Area ID	Land Use 1	Area	CN	Land Use 2	Area	CN	Land Use 3	Area	CN	Weighted CN
PRE-PH7	Woods	50%	55	Meadow	25%	58	Open Space	25%	61	57
PRE-PH8	Woods	50%	55	Meadow	50%	58	Open Space	0%	61	57
PRE-PH9	Woods	40%	55	Meadow	0%	58	Open Space	60%	61	59

**Pervious areas only.*

Weighted IA Calculations

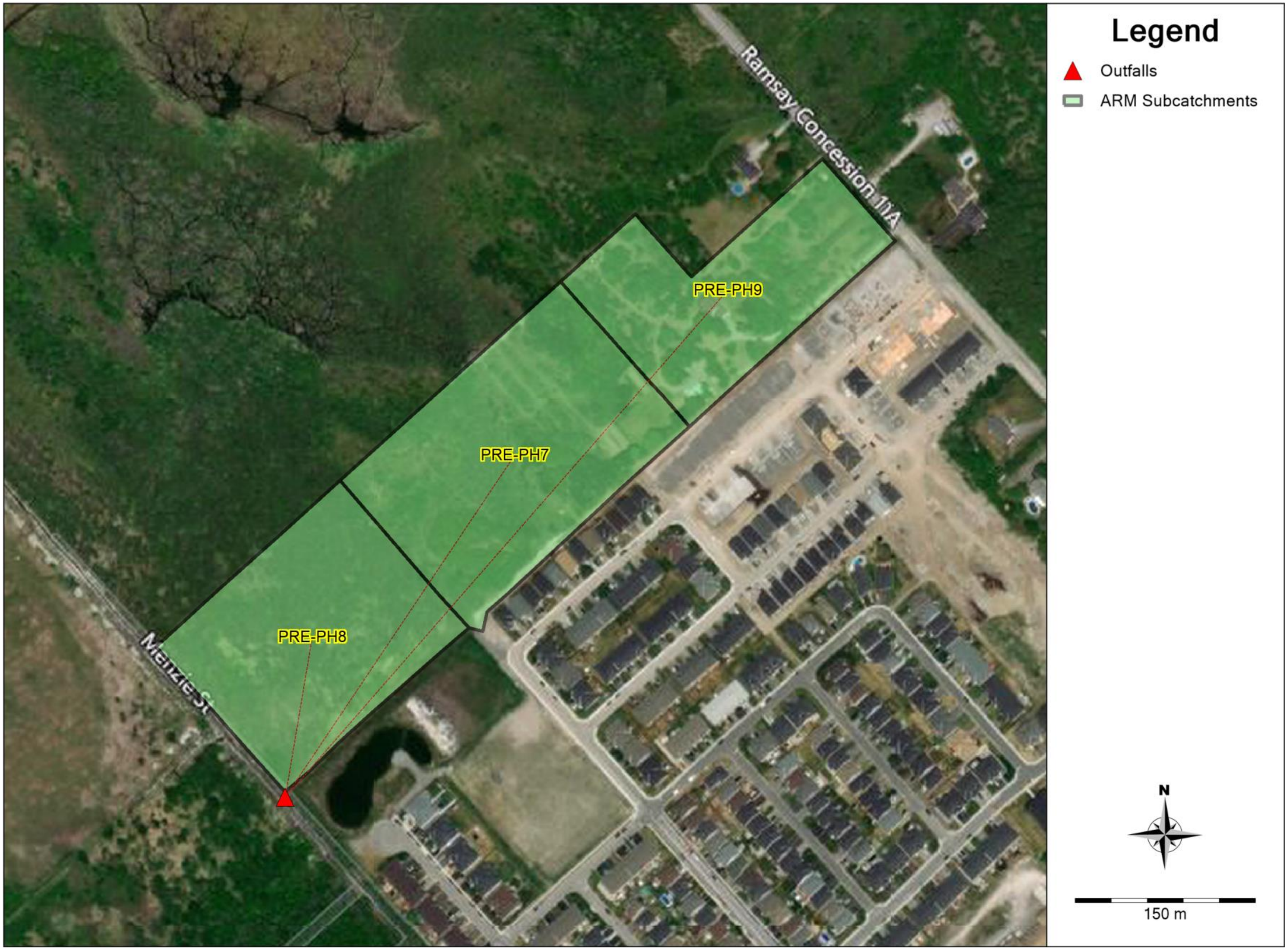
Area ID	Land Use 1	Area	IA	Land Use 2	Area	IA	Land Use 3	Area	IA	Weighted IA
PRE-PH7	Woods	50%	10.2	Meadow	25%	10.2	Open Space	25%	7.6	10
PRE-PH8	Woods	50%	10.2	Meadow	50%	10.2	Open Space	0%	7.6	10
PRE-PH9	Woods	40%	10.2	Meadow	0%	10.2	Open Space	60%	7.6	9

Mill Run Extension (121125)
Post-Development Model Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A-01	0.42	0.45	36	40	66	64	0.5
A-02	0.23	0.45	36	40	62	37	0.5
A-03	0.22	0.45	36	40	158	14	0.5
A-04	0.65	0.52	46	40	44	146	0.5
A-05	0.50	0.52	46	40	46	108	0.5
A-06	0.49	0.52	46	40	49	100	0.5
A-07	0.56	0.52	46	40	56	100	0.5
A-08	0.46	0.52	46	40	46	100	0.5
A-09	0.07	0.60	57	0	9	76	0.5
A-10	0.57	0.60	57	40	37	154	0.5
A-11	0.58	0.52	46	40	40	145	0.5
A-12	0.66	0.52	46	40	41	160	0.5
A-13	0.49	0.52	46	40	44	110	0.5
A-14	0.20	0.60	57	40	44	45	0.5
PH9-A	2.35	0.52	46	40	44	528	0.5
PH9-B	0.31	0.45	36	40	78	40	0.5
DR-01	0.13	0.20	0	0	10	132	0.5
DR-02	0.22	0.20	0	0	100	22	0.5
PNDBLK	0.78	0.69	70	100	115	199	5.0
TOTAL:	**9.89**						

Mill Run Extension (121125)
Pre-Development Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects



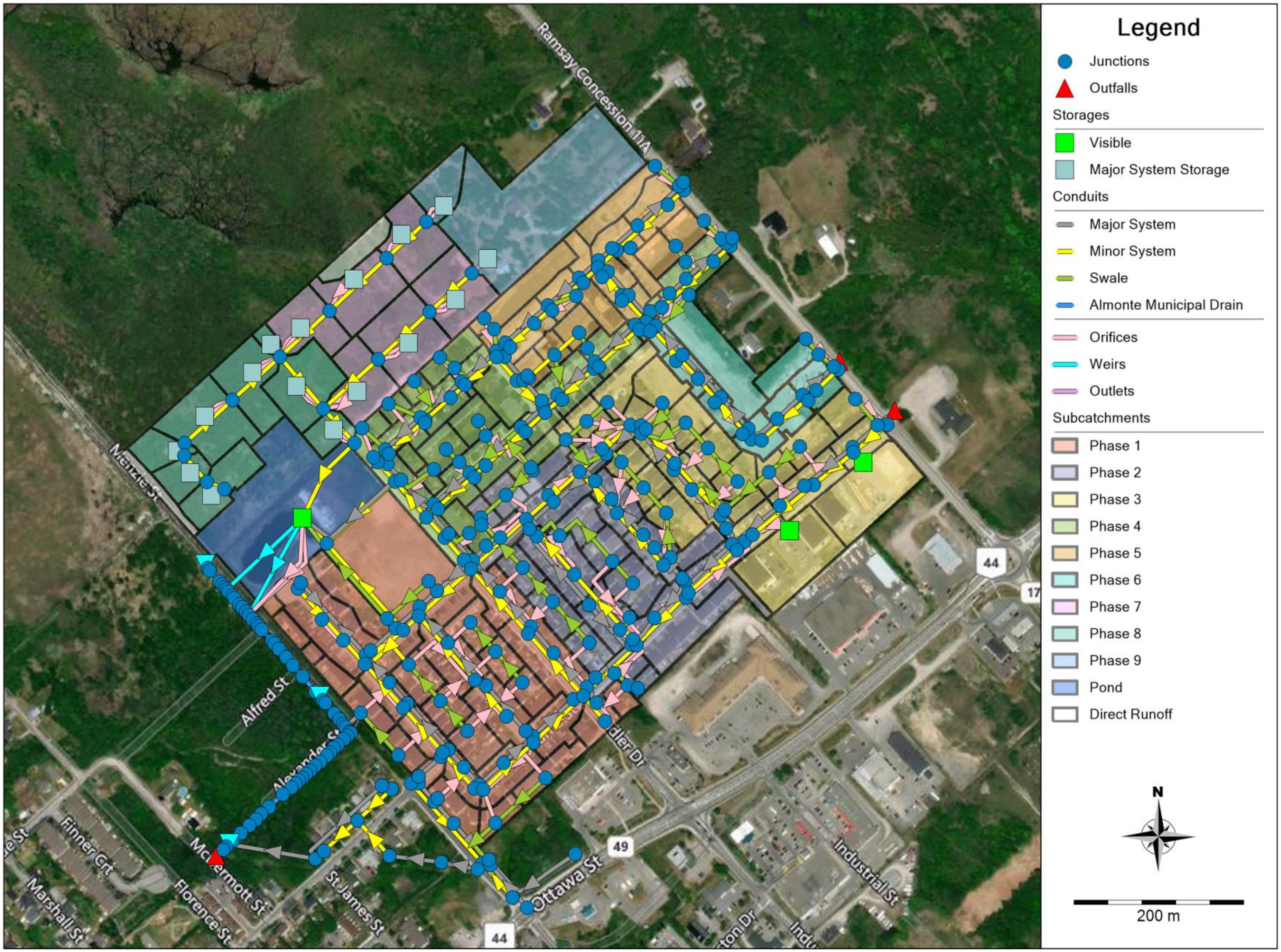
9/28/2023
PREPARED BY: NOVATECH

M:\2021\121125\DATA\Calculations\Sewer Calcs\SWM\Draft Plan\121125-ModelParams(Rev1).xlsx

Mill Run Extension (121125)
Post-Development Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

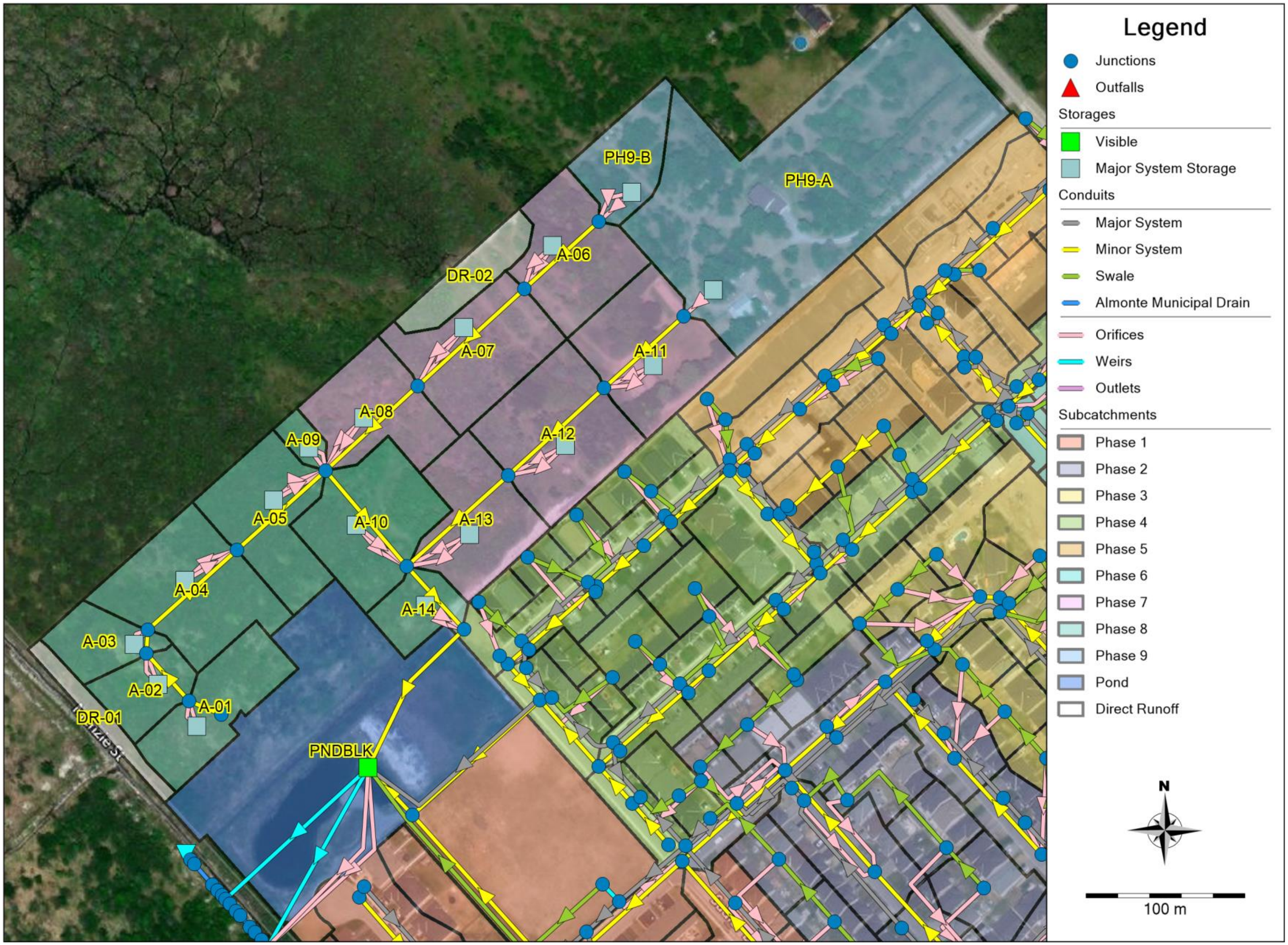
Overall Schematic



Mill Run Extension (121125)
Post-Development Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Catchment IDs



9/28/2023
PREPARED BY: NOVATECH

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Mill Run Extension (121125)
Post-Development Model Schematic

NOVATECH
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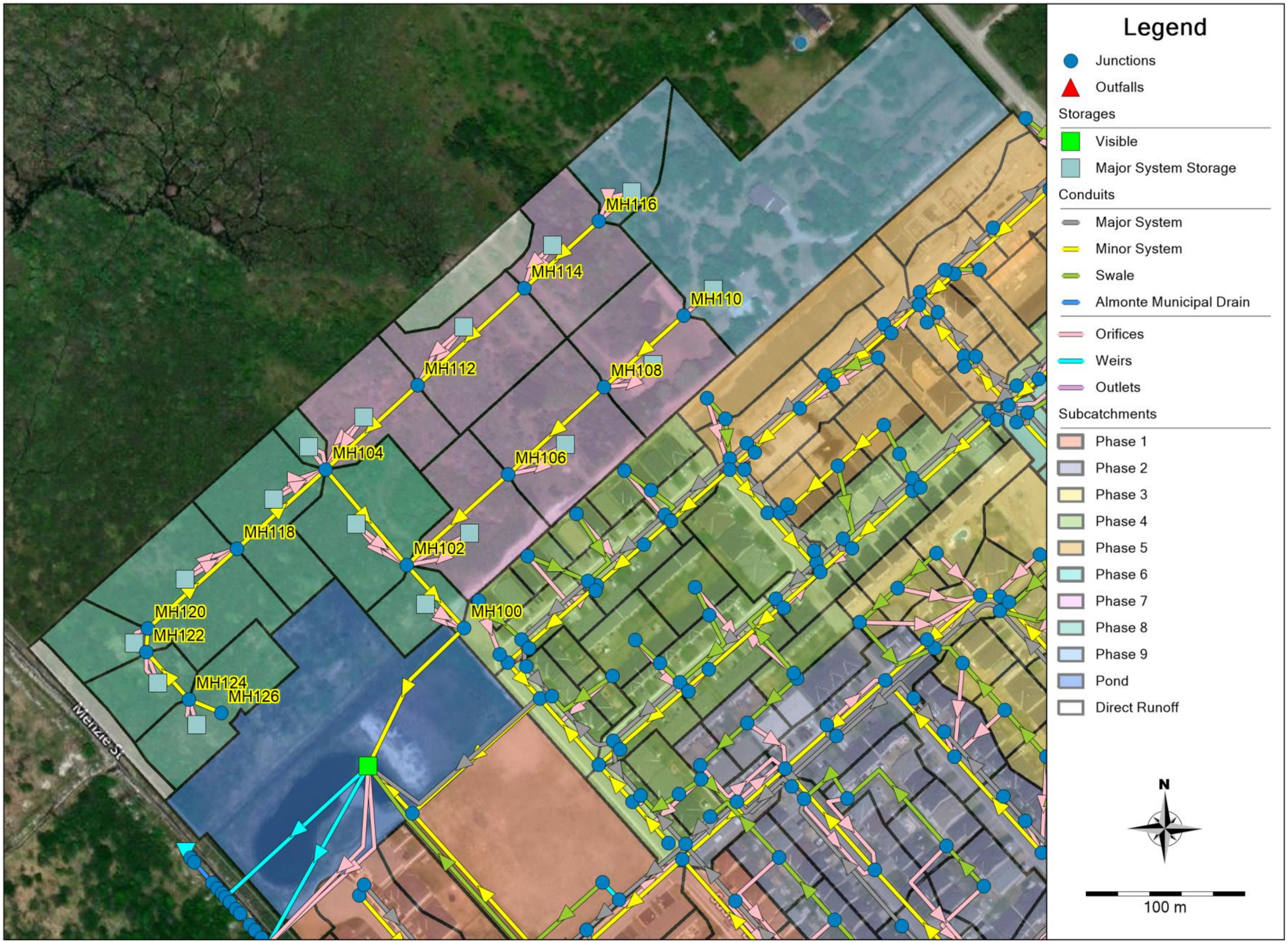
Manhole IDs



9/28/2023
PREPARED BY: NOVATECH

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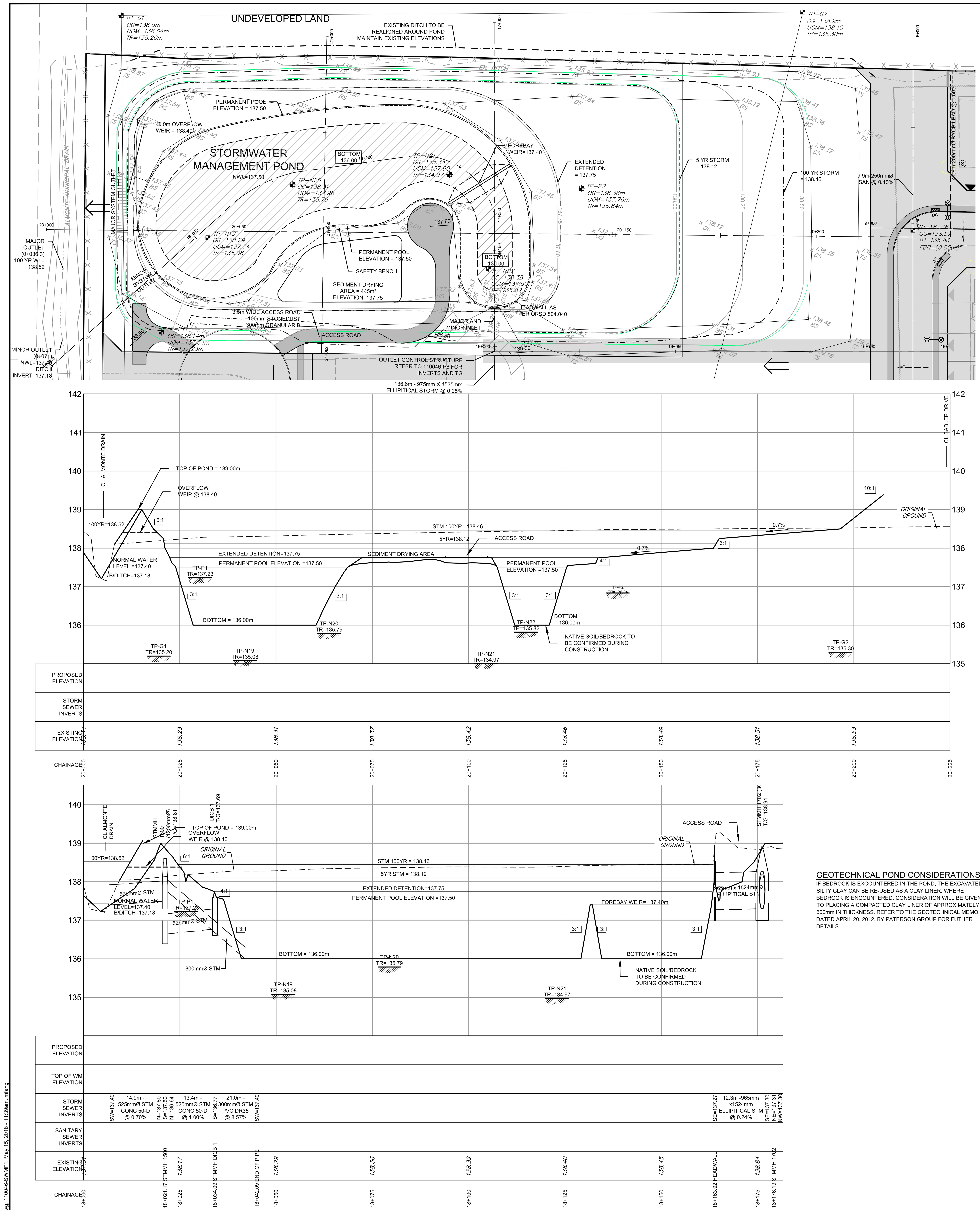
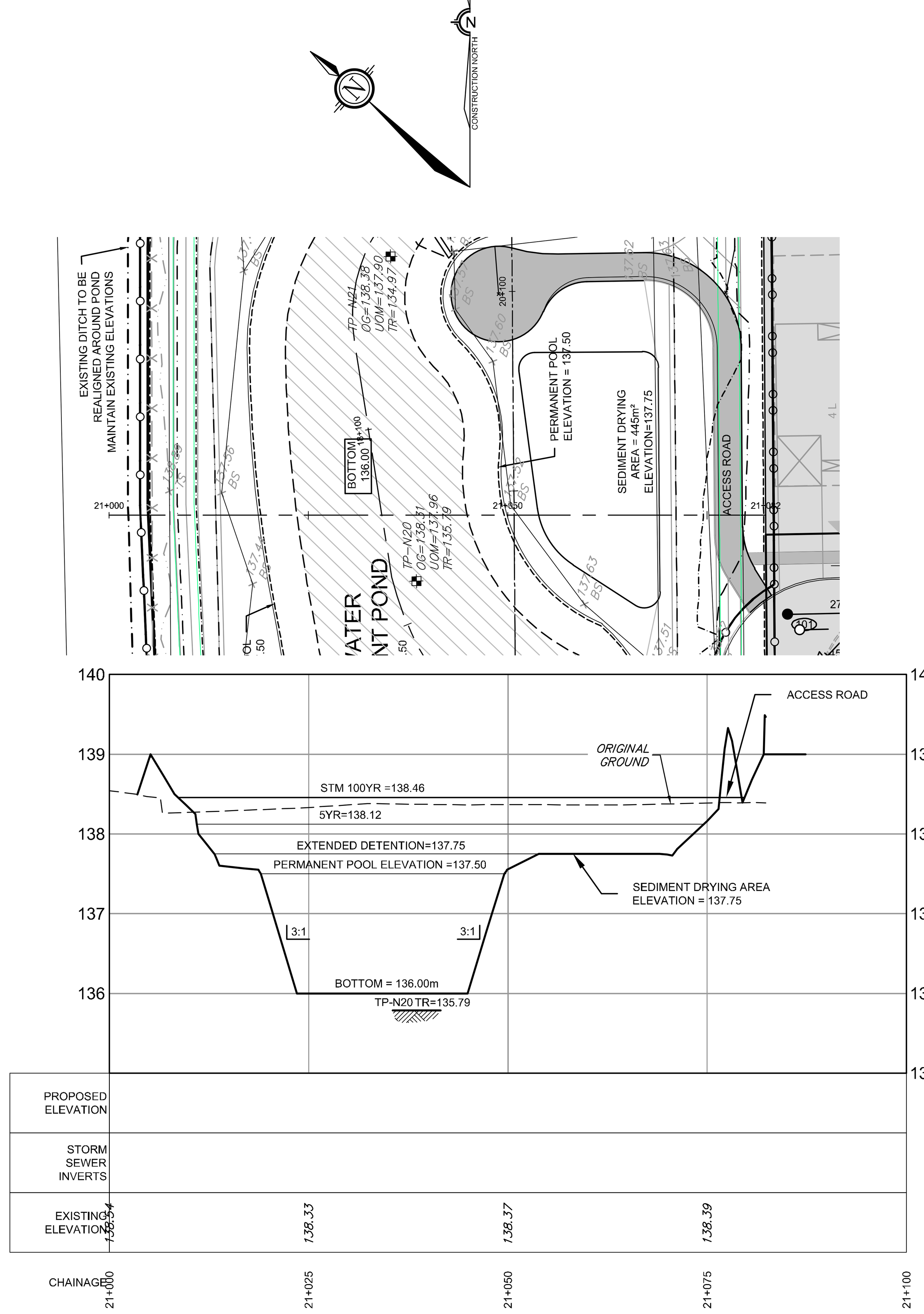
Mill Run Extension (121125)
Design Storm Time Series Data
4-hour Chicago Design Storm

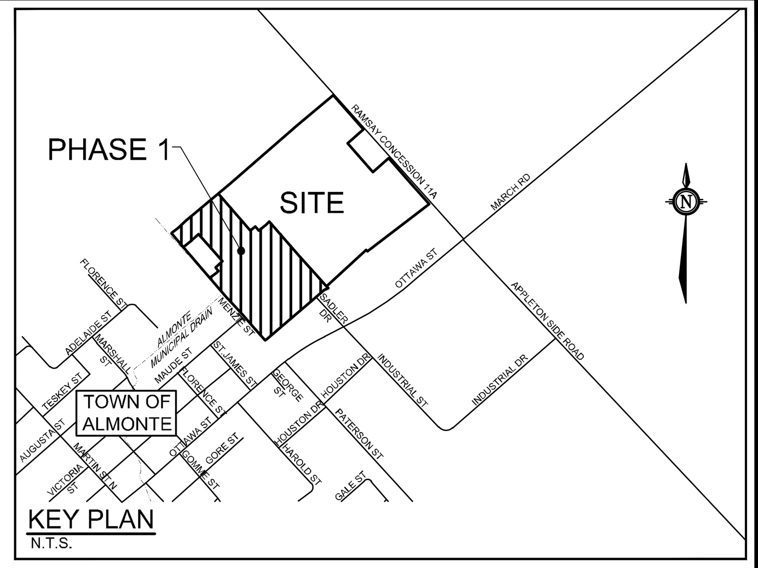
C25mm-4.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	1.51
0:20	1.75
0:30	2.07
0:40	2.58
0:50	3.46
1:00	5.39
1:10	13.44
1:20	56.67
1:30	17.77
1:40	9.12
1:50	6.14
2:00	4.65
2:10	3.76
2:20	3.17
2:30	2.74
2:40	2.43
2:50	2.18
3:00	1.98
3:10	1.81
3:20	1.68
3:30	1.56
3:40	1.47
3:50	1.38
4:00	1.31

Mill Run Extension (121125)
Design Storm Time Series Data
6-hour Chicago Design Storms

C5yr-6hr.stm			C100yr-6hr.stm	
Duration	Intensity		Duration	Intensity
min	mm/hr		min	mm/hr
0:00	0.00		0:00	0.00
0:10	1.78		0:10	2.90
0:20	1.94		0:20	3.16
0:30	2.13		0:30	3.48
0:40	2.37		0:40	3.88
0:50	2.68		0:50	4.39
1:00	3.10		1:00	5.07
1:10	3.68		1:10	6.05
1:20	4.58		1:20	7.54
1:30	6.15		1:30	10.16
1:40	9.61		1:40	15.97
1:50	24.17		1:50	40.65
2:00	104.19		2:00	178.56
2:10	32.04		2:10	54.05
2:20	16.34		2:20	27.32
2:30	10.96		2:30	18.24
2:40	8.29		2:40	13.74
2:50	6.69		2:50	11.06
3:00	5.63		3:00	9.29
3:10	4.87		3:10	8.02
3:20	4.30		3:20	7.08
3:30	3.86		3:30	6.35
3:40	3.51		3:40	5.76
3:50	3.22		3:50	5.28
4:00	2.98		4:00	4.88
4:10	2.77		4:10	4.54
4:20	2.60		4:20	4.25
4:30	2.44		4:30	3.99
4:40	2.31		4:40	3.77
4:50	2.19		4:50	3.57
5:00	2.08		5:00	3.40
5:10	1.99		5:10	3.24
5:20	1.90		5:20	3.10
5:30	1.82		5:30	2.97
5:40	1.75		5:40	2.85
5:50	1.68		5:50	2.74
6:00	1.62		6:00	2.64





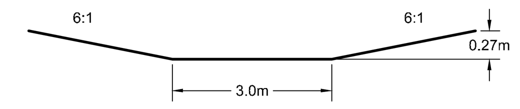


KEY PLAN

N.T.S.

NOTES

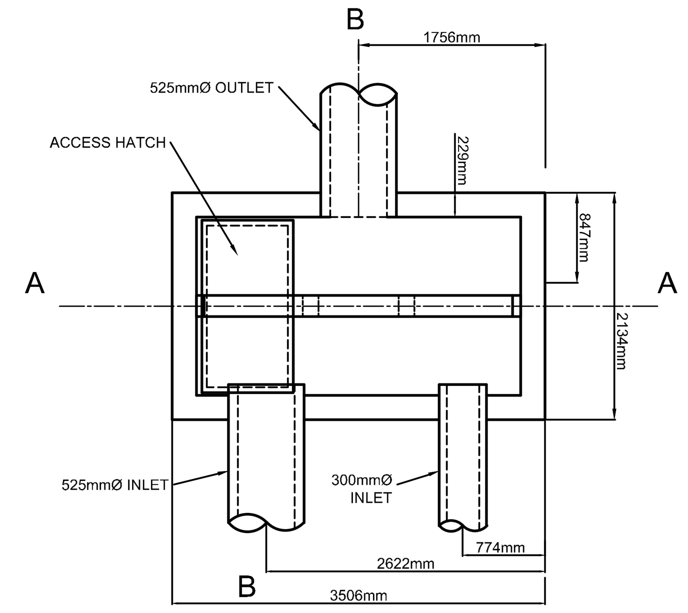
1. RIP RAP TO BE INSTALLED AT ALL OUTLETS & INLETS FOR EROSION PROTECTION. C/W GEOTEXTILE. AS PER OPSD 810.01. THICKNESS AS SPECIFIED.
2. CONCRETE HEADWALLS PER OPSD 804.040. GRATING FOR HEADWALLS PER OPSD 804.050. BAR SPACING PER OPSD 804.050.
3. CONTRACTOR TO CO-ORDINATE CONSTRUCTION OF POND WITH SUBDIVISION CONSTRUCTION.
4. EROSION AND SEDIMENT CONTROL SHALL BE AS PER ONTARIO PROVINCIAL STANDARDS.
5. ACCESS ROAD TO BE 125mm OF TOPSOIL AND SEED ON A 400mm GRANULAR 'B' BASE.



PERMANENT OVERLAND FLOW DITCH

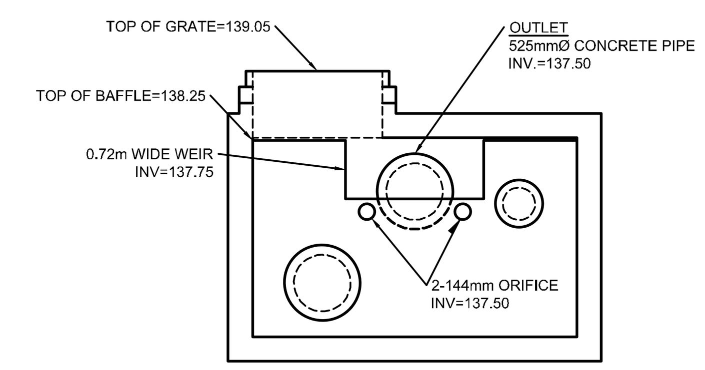
GEOTECHNICAL POND CONSIDERATIONS:

IF BEDROCK IS EXCOUNTERED IN THE POND, THE EXCAVATED SILTY CLAY CAN BE RE-USED AS A CLAY LINER. WHERE BEDROCK IS ENCOUNTERED, CONSIDERATION WILL BE GIVEN TO PLACING A COMPACTED CLAY LINER OF APRROXIMATELY 500mm IN THICKNESS. REFER TO THE GEOTECHNICAL MEMO, DATED APRIL 20, 2012, BY PATERSON GROUP FOR FUTHER DETAILS.



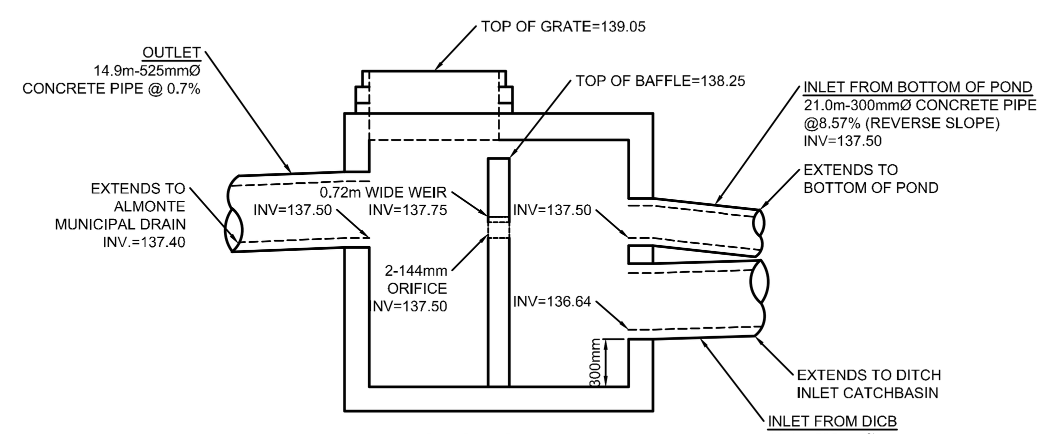
PLAN VIEW OF OUTLET STRUCTURE

SCALE 1:50



SECTION A-A

SCALE 1:50



SECTION B-B

SCALE 1:50

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
8.	ISSUED FOR MVCA APPROVAL - PHASE 1B	DEC 19/13	MER
7.	ISSUED FOR CONSTRUCTION	OCT 11/12	JGR
6.	REISSUED FOR MOE APPROVAL	SEPT 12/12	JGR
5.	ISSUED FOR LIMITED CONSTRUCTION	JULY 11/12	MER
4.	ISSUED FOR MOE APPROVAL	JUNE 26/12	MER
3.	ISSUED FOR TENDER	MAY 14/12	MER
2.	ISSUED FOR TOWN APPROVAL	APR 30/12	MER
1.	ISSUED FOR TOWN REVIEW	JAN 31/12	MER

SCALE
1:500 — 0 5 10 15 20 — HORIZONTAL
1:50 — 0 0.5 1.0 1.5 2.0 — VERTICAL

DESIGN CV
CHECKED MER
DRAWN CV
CHECKED MER
APPROVED JGR

LICENSED PROFESSIONAL ENGINEER
M.J. PETEPIECE
100079354
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
TOWN OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 1 - STORM WATER MANAGEMENT FACILITY

PROJECT No. 110046
REV: REV # 8
DRAWING No. 110046-SWMF

PLANB1.DWG - 1000mmx707mm

Appendix C: Sanitary Collection

SANITARY SEWER DESIGN SHEET
MILL RUN EXTENSION - PHASE 7, 8 and FUTURE LANDS TO EAST

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 121125
DESIGNED BY : BM
CHECKED BY : DDB
DATE PREPARED : 3-Feb-23
DATE REVISED : 21-Sep-23

LOCATION					RESIDENTIAL										COMMERCIAL / INSTITUTIONAL / PARK							INFILTRATION			FLOW	PROPOSED SEWER								
					INDIVIDUAL						CUMULATIVE				COMM		INST		PARK															
STREET	FROM MH	TO MH	Area ID	Total Area (ha.)	Single Units	Semi Units	Townhouse Units	Multi-Unit Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR P.F.	PEAK POPULATION FLOW Qr(p) (L/s)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	PEAK COMM/INST/PARK FLOW Qc(p) (L/s)	Total Area (ha.)	Accu. Total AREA (ha.)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap	d/ D_{full}
SADLER STREET OUTLET																																		
Street 3	125	123		0.46	6	0	0		0.020	0.46	0.020	0.46	4.0	0.33		0.00		0.00		0.00	0.00	0.46	0.46	0.15	0.48	25.8	200	203.20	DR 35	1.00	34.2	1.06	1.4%	
	123	121		0.28	3	0	0		0.010	0.28	0.031	0.74	4.0	0.50		0.00		0.00		0.00	0.00	0.28	0.74	0.24	0.74	36.8	200	203.20	DR 35	0.40	21.6	0.67	3.4%	
	121	119		0.26	2	0	0		0.007	0.26	0.037	1.00	4.0	0.61		0.00		0.00		0.00	0.00	0.26	1.00	0.33	0.94	14.0	200	203.20	DR 35	0.40	21.6	0.67	4.3%	
	119	117		0.64	6	0	8		0.042	0.64	0.079	1.64	4.0	1.29		0.00		0.00		0.00	0.00	0.64	1.64	0.54	1.83	74.7	200	203.20	DR 35	0.40	21.6	0.67	8.4%	
	117	103		0.51	5	0	4		0.028	0.51	0.107	2.15	4.0	1.74		0.00		0.00		0.00	0.00	0.51	2.15	0.71	2.45	74.7	200	203.20	DR 35	0.40	21.6	0.67	11.3%	
Street 2	FUT 9-B *	115		0.31	4	0	0		0.014	0.31	0.014	0.31	4.0	0.22		0.00		0.00		0.00	0.00	0.31	0.31	0.10	0.32	6.0	200	203.20	DR 35	0.40	21.6	0.67	1.5%	
	115	113		0.55	3	0	8		0.032	0.43	0.045	0.74	4.0	0.74		0.00		0.00	0.12	0.12	0.01	0.55	0.86	0.28	1.02	62.6	200	203.20	DR 35	0.40	21.6	0.67	4.7%	
	113	111		0.72	1	0	13		0.039	0.48	0.084	1.22	4.0	1.36		0.00		0.00	0.24	0.36	0.02	0.72	1.58	0.52	1.90	89.8	200	203.20	DR 35	0.40	21.6	0.67	8.8%	
	111	103		0.46	5	0	5		0.031	0.46	0.114	1.68	4.0	1.85		0.00		0.00		0.36	0.02	0.46	2.04	0.67	2.54	77.4	200	203.20	DR 35	0.40	21.6	0.67	11.7%	
Sadler Drive	PROP. SAN CAP	103		0.07	0	0	0		0.000	0.07	0.000	0.07	4.0	0.00		0.00		0.00		0.00	0.00	0.07	0.07	0.02	0.02	12.0	200	203.20	DR 35	0.40	21.6	0.67	0.1%	
Sadler Drive	103	101		0.57	0	14	0		0.038	0.57	0.259	4.47	4.0	4.20		0.00		0.00		0.36	0.02	0.57	4.83	1.59	5.81	79.0	250	254.00	DR 35	0.30	34.0	0.67	17.1%	
Street 1	FUT 9-A **	109		2.35	18	6	20		0.131	2.35	0.131	2.35	4.0	2.13		0.00		0.00		0.00	0.00	2.35	2.35	0.78	2.90	6.0	200	203.20	DR 35	0.40	21.6	0.67	13.4%	
	109	107		0.58	5	0	7		0.036	0.52	0.167	2.87	4.0	2.71		0.00		0.00	0.06	0.06	0.00	0.58	2.93	0.97	3.68	66.6	200	203.20	DR 35	0.40	21.6	0.67	17.0%	
	107	105		0.66	6	0	10		0.047	0.66	0.215	3.53	4.0	3.48		0.00		0.00		0.06	0.00	0.66	3.59	1.18	4.67	80.8	200	203.20	DR 35	0.40	21.6	0.67	21.6%	
	105	101		0.48	5	0	5		0.031	0.48	0.245	4.01	4.0	3.97		0.00		0.00		0.06	0.00	0.48	4.07	1.34	5.32	83.5	200	203.20	DR 35	0.40	21.6	0.67	24.6%	
SWM POND	101	EX SAN CAP		0.78	0	0	0		0.000	0.78	0.000	0.78	4.0	0.00		0.00		0.00		0.00	0.00	0.78	0.78	0.26	0.26	71.4	250	254.00	DR 35	0.30	34.0	0.67	0.8%	
Sadler Drive	101	EX SAN CAP		0.19	0	4	0		0.011	0.19	0.515	9.45	4.0	8.28		0.00		0.00		0.42	0.02	0.19	9.87	3.26	11.56	71.4	250	254.00	DR 35	0.30	34.0	0.67	34.0%	
Total Flows					**69**	**24**	**80**							**8.28**						**0.42**	**0.02**		**9.87**	**3.26**	**11.56**									

		Single	Semi	Townhouse
Phase 7	7.21	25	18	48
Phase 8		22	0	12
Phase 9	2.66	22	6	20

Notes:
1. Q(d) = Qr(p) + Q(i) + Qc(p)
2. Q(i) = 0.33 L/sec/ha
3. Qr(p) = (PxqxM/86,400)
3. Qc(p) = (A*q*Pf)/86,400

*Assumes Phase 9-B to service four (4) single unit dwellings
**Assumes Phase 9-A to service 18 single unit dwellings, 6 semi-detached units, and 20 townhouse units

Definitions:
Q(d) = Design Flow (L/sec)
Qr(p) = Population Flow (L/sec), Residential
Q(i) = Extraneous Flow (L/sec)
Qc(p) = Population Flow (L/sec), Commercial/Institutional/Park

P = Population (3.4 persons per single unit, 2.7 persons per semi-detached unit, 2.7 townhouse unit, 1.8 persons per multi-unit apartment)
q = Average per capita flow = 350 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow = 28000 L/gross ha/day - Commercial/Institutional
q = Average per gross ha. flow = 3700 L/gross ha/day - Park (20L/day/person, 185 persons/ha - as per Appendix 4-A of the City of Ottawa Sewer Design Guidelines)
P.F. = Harmon Equation (maximum of 4.0), K = Correction Factor = 1.0
Min pipe size 200mm @ min. slope 0.32%
Mannings n = 0.013

Mill Run Extension Phases 7 & 8

Sanitary Manhole Information

Project No. 121125
Date: 19-Sep-23

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Structure ID	Manhole Diameter	T/G Elevation	Invert Information	
Ex. SAN CAP	n/a	n/a	INV.N	136.83
SAN MH 101	1200 mm	140.56	INV.N	137.05
			INV.E	137.10
			INV.S	137.05
SAN MH 103	1200 mm	140.72	INV.N	137.29
			INV.E	137.34
			INV.W	137.34
			INV.S	137.29
SAN MH 105	1200 mm	140.98	INV.E	137.43
			INV.W	137.43
SAN MH 107	1200 mm	141.39	INV.E	137.76
			INV.W	137.76
SAN MH 109	1200 mm	141.73	INV.E	138.03
			INV.W	138.03
SAN MH 111	1200 mm	140.95	INV.E	137.65
			INV.W	137.65
SAN MH 113	1200 mm	141.31	INV.E	138.01
			INV.W	138.01
SAN MH 115	1200 mm	141.62	INV.E	138.26
			INV.W	138.26
SAN MH 117	1200 mm	140.87	INV.W	137.64
			INV.E	137.64
SAN MH 119	1200 mm	141.09	INV.SW	137.97
			INV.E	137.94
SAN MH 121	1200 mm	141.13	INV.NE	138.03
			INV.S	138.06
SAN MH 123	1200 mm	141.29	INV.N	138.21
			INV.SE	138.24
SAN MH 125	1200 mm	141.45	INV.NW	138.50

SANITARY SEWER DESIGN SHEET

PROJECT #: 110046
DESIGNED BY: Chris Visser
CHECKED BY: Melanie Riddell
DATE: February 22, 2021
REVISED: May 16, 2022

PROJECT: Mill Run at Almonte - Phase 6
DEVELOPER: Menzie Almonte Inc c/o Regional Group

Proposed changes

MOE Approved Phases
Current Phase
As-Built Information
Not As-built yet -on srvy request to be done
New Manhole 119A added

NOVATECH
Engineers, Planners & Landscape Architects

AREA ID	STREET	MANHOLE		UNITS			INDIVIDUAL		CUMULATIVE		PEAK	POPULATION FLOW	PEAK EXTRAN.	PEAK DESIGN	PROPOSED SEWER								
	NAME	FROM	TO	SINGLES/ SEMI	APARTMENT	TOWNS	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	FACTOR M	Q (p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	% OF CAPACITY (q_{full}/Q_{actual})	% OF VELOCITY (v_{full}/V_{actual})	ACUTAL VELOCITY (m/s)
4-J	LEISHMAN	909	907	2	0	2	0.0	0.2	0.0	0.2	4.0	0.2	0.1	0.3	***20.2***	200	PVC	***1.09***	35.7	1.1	1%	0%	0.00
4-I	LEISHMAN	907	1001	6	0	8	0.1	0.7	0.1	0.9	4.0	1.1	0.3	1.3	***101.3***	200	PVC	***0.51***	24.4	0.8	5%	54%	0.41
4-H	BRACEWELL	FUT	1001	0	0	0	0.0	0.1	0.0	0.1	4.0	0.0	0.0	0.0	***9.9***	200	PVC	***0.40***	21.6	0.7	0%	0%	0.00
5-M	BRACEWELL	1003	1001	12	0	0	0.0	0.6	0.0	0.6	4.0	0.7	0.2	0.9	***86.1***	200	PVC	***0.32***	19.4	0.6	5%	45%	0.27
4-G (4-I+4-H+5-M)	LEISHMAN	1001	905	7	0	7	0.1	0.7	0.2	2.3	4.0	2.6	0.6	3.3	***103.2***	200	PVC	***0.50***	24.2	0.7	13%	70%	0.52
4-F	LEISHMAN	905	903	4	0	5	0.0	0.4	0.2	2.7	4.0	3.2	0.8	3.9	***54.8***	200	PVC	***1.04***	34.9	1.1	11%	67%	0.72
4-E	LEISHMAN	903	901	5	0	3	0.030	0.471	0.224	3.164	4.0	3.63	0.89	**4.52**	***70.6***	200	PVC	***0.68***	**28.22**	0.87	16%	73%	0.64
4-D	LEISHMAN	901	501	7	0	9	0.058	0.758	0.282	3.922	4.0	4.58	1.10	**5.67**	***111.8***	200	PVC	***0.50***	**24.19**	0.75	23%	78%	0.58
4-C	SADLER DR	CAP	501	0	0	0	0.000	0.076	0.000	0.076	4.0	0.00	0.02	**0.02**	***9.90***	250	PVC	***0.81***	**55.83**	1.10	0%	0%	0.00
4-B (4C+4D)	SADLER DR	501	503	6	0	0	0.023	0.391	0.305	4.389	4.0	4.95	1.23	**6.17**	***86.2***	250	PVC	***0.29***	**33.41**	0.66	18%	76%	0.50
5-A	BRACEWELL	1013	1011	2	0	2	0.015	0.218	0.015	0.218	4.0	0.24	0.06	**0.30**	17.8	200	PVC	0.65	**27.59**	0.85	1%	33%	0.28
5-B	BRACEWELL	1011	1009	8	0	12	0.072	0.898	0.087	1.116	4.0	1.41	0.31	**1.72**	93.5	200	PVC	0.32	**19.36**	0.60	9%	60%	0.36
5-C	BRACEWELL	1009	1007	1	0	1	0.007	0.181	0.094	1.297	4.0	1.53	0.36	**1.89**	11.0	200	PVC	0.32	**19.36**	0.60	10%	64%	0.38
5-D	BRACEWELL	1007	1005	10	0	0	0.038	0.710	0.132	2.007	4.0	2.14	0.56	**2.71**	92.8	200	PVC	0.32	**19.36**	0.60	14%	70%	0.42
5-E	BRACEWELL	1005	1003	9	0	0	0.034	0.786	0.129	2.793	4.0	2.08	0.78	**2.86**	92.8	200	PVC	0.32	**19.36**	0.60	15%	73%	0.44
5-F	REAUME	809	807	0	0	2	0.007	0.122	0.007	0.122	4.0	0.11	0.03	**0.15**	***19.3***	200	PVC	***0.73***	**29.23**	0.90	1%	33%	0.30
5-G	REAUME	807	1003	0	0	8	0.028	0.427	0.035	0.549	4.0	0.57	0.15	**0.72**	***102.3***	200	PVC	***0.32***	**19.36**	0.60	4%	45%	0.27
5-H (5-E+5-G)	REAUME	1003	805	8	0	0	0.030	0.492	0.194	3.834	4.0	3.14	1.07	**4.22**	***81.2***	200	PVC	***0.33***	**19.66**	0.61	21%	78%	0.47
5-I	REAUME	805	803	11	0	0	0.042	0.637	0.236	4.471	4.0	3.82	1.25	**5.07**	***62.5***	200	PVC	***2.50***	**54.10**	1.67	9%	60%	1.00
4-K	WALSH	903	803	6	0	0	0.023	0.360	0.023	0.360	4.0	0.37	0.10	**0.47**	***86.1***	200	PVC	***0.65***	**27.59**	0.85	2%	33%	0.28
5-J (5-I +4-K)	REAUME	803	801	0	0	17	0.060	0.603	0.318	5.434	4.0	5.15	1.52	**6.67**	***91.3***	200	PVC	***0.39***	**21.37**	0.66	31%	88%	0.58
5-K	REAUME	801	503	0	0	12	0.042	0.502	0.360	5.936	4.0	5.90	1.66	**7.56**	***91.2***	200	PVC	***0.41***	**21.91**	0.68	35%	92%	0.62
4-A (5-K+4-B)	SADLER DR	503	303	6	0	0	0.023	0.385	0.688	10.710	3.9	10.87	3.00	**13.87**	***86.2***	250	PVC	***0.29***	**33.41**	0.66	42%	96%	0.63
3-G	HONEYBORNE	131	129	0	24	1	0.076	0.342	0.076	0.342	4.0	1.22	0.10	**1.32**	***19.4***	200	PVC	***0.98***	**33.87**	1.04	4%		
3-F	HONEYBORNE	129	127	5	48	8	0.191	1.432	0.267	1.774	4.0	4.32	0.50	**4.82**	***120.0***	200	PVC	***0.48***	**23.71**	0.73	20%		
3-E	HONEYBORNE	127	125	5	0	0	0.019	0.691	0.286	2.465	4.0	4.63	0.69	**5.32**	***66.3***	200	PVC	***0.50***	**24.19**	0.75	22%		
2-I	HONEYBORNE	125	123	6	24	6	0.116	0.854	0.401	3.319	4.0	6.54	0.93	**7.47**	***85.2***	200	PVC	***1.68***	**44.35**	1.37	17%		
2-H	HONEYBORNE	123	121	6	0	10	0.058	0.655	0.459	3.974	4.0	7.43	1.11	**8.54**	***85.2***	200	PVC	***1.00***	**34.22**	1.06	25%		
2-G	HONEYBORNE	121	119A	0	0	5	0.018	0.285	0.477	4.259	4.0	7.69	1.19	**8.89**	***73.0***	200	PVC	***1.00***	**34.22**	1.06	26%		
2-G	HONEYBORNE	119A	119	0	0	0	0.000	1.285	0.477	5.544	4.0	7.69	1.55	**9.25**	***10.0***	200	PVC	***1.00***	**34.22**	1.06	27%		
3-D	HORTON	315	313	6	0	10	0.058	0.706	0.058	0.706	4.0	0.94	0.20	**1.13**	***72.6***	200	PVC	***1.02***	**34.56**	1.07	3%		
3-C	HORTON	313	311	9	0	0	0.034	0.556	0.092	1.262	4.0	1.49	0.35	**1.84**	***59.9***	200	PVC	***1.17***	**37.01**	1.14	5%		
3-B	HORTON	311	309	2	0	0	0.008	0.240	0.100	1.502	4.0	1.61	0.42	**2.03**	***12.2***	200	PVC	***1.64***	**43.82**	1.35	5%		
3-A	HORTON	309	307	4	0	0	0.015	0.379	0.115	1.881	4.0	1.86	0.53	**2.39**	***77.5***	200	PVC	***1.97***	**48.03**	1.48	5%		
2-F	McCABE	703	701	7	0	0	0.027	0.462	0.027	0.462	4.0	0.43	0.13	**0.56**	***38.2***	200	PVC	***0.97***	**33.70**	1.04	2%		
2-D	McCABE	701	307	11	0	0	0.042	0.666	0.068	1.128	4.0	1.11	0.32	**1.42**	***100.7***	200	PVC	***0.50***	**24.19**	0.75	6%		

SANITARY SEWER DESIGN SHEET

PROJECT #: 110046
DESIGNED BY: Chris Visser
CHECKED BY: Melanie Riddell
DATE: February 22, 2021
REVISED: May 16, 2022

PROJECT: Mill Run at Almonte - Phase 6
DEVELOPER: Menzie Almonte Inc c/o Regional Group

MOE Approved Phases
Current Phase
Proposed changes
As-Built Information
Not As-built yet -on srvy request to be done
New Manhole 119A added

NOVATECH
Engineers, Planners & Landscape Architects

AREA ID	STREET	MANHOLE		UNITS			INDIVIDUAL		CUMULATIVE		PEAK	POPULATION FLOW	PEAK EXTRAN.	PEAK DESIGN	PROPOSED SEWER								
	NAME	FROM	TO	SINGLES/ SEMI	APARTMENT	TOWNS	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	FACTOR M	Q (p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	% OF CAPACITY (q_{full}/Q_{actual})	% OF VELOCITY (v_{full}/V_{actual})	ACUTAL VELOCITY (m/s)
2-B (3-A+2-D)	HORTON	307	305	6	0	11	0.061	0.648	0.245	3.657	4.0	3.96	1.02	**4.99**	***85.4***	200	PVC	***1.09***	**35.72**	1.10	14%		
2-E	McKENNY	603	601	7	0	0	0.027	0.437	0.027	0.437	4.0	0.43	0.12	**0.55**	***62.8***	200	PVC	***0.99***	**34.05**	1.05	2%		
2-C	McKENNY	601	305	14	0	0	0.053	0.813	0.080	1.250	4.0	1.29	0.35	**1.64**	***115.8***	200	PVC	***0.52***	**24.67**	0.76	7%		
2-A (2-B+2-C)	HORTON	305	303	0	0	5	0.018	0.276	0.342	5.183	4.0	5.54	1.45	**6.99**	***84.0***	200	PVC	***0.65***	**27.59**	**0.85**	**0.25**		
1-A	SWM POND	101	103	0	0	0	0.000	1.152	0.000	1.152	4.0	0.00	0.32	**0.32**									
1C-A	HONEYBORNE	101	103	0	0	0	0.000	0.078	0.000	0.078	4.0	0.00	0.02	**0.02**									
1C-B	HONEYBORNE	101	103	3	0	1	0.015	0.262	0.015	0.340	4.0	0.24	0.10	**0.34**	***27.6***	200	PVC	***3.50***	**64.01**	1.97	1%		
1C-C	HONEYBORNE	103	107	7	0	13	0.072	1.010	0.087	1.350	4.0	1.41	0.38	**1.79**	***107.1***	200	PVC	***0.44***	**22.70**	0.70	8%		
1-D	HONEYBORNE	111	109	5	0	6	0.040	0.564	0.040	0.564	4.0	0.65	0.16	**0.81**	***68.0***	200	PVC	***0.41***	**21.91**	0.68	4%		
1-C	HONEYBORNE	109	107	2	0	7	0.032	0.418	0.072	0.982	4.0	1.17	0.27	**1.44**	***69.7***	200	PVC	***0.47***	**23.46**	0.72	6%		
1-L (1C-C+1C)	HORTON	107	301	0	0	7	0.025	0.357	0.184	2.689	4.0	2.98	0.75	**3.73**	***83.2***	200	PVC	***0.44***	**22.70**	0.70	16%		
1-J	LAROCQUE	403	401	8	0	0	0.030	0.547	0.030	0.547	4.0	0.49	0.15	**0.65**	***55.7***	200	PVC	***0.52***	**24.67**	0.76	3%		
1-K	LAROCQUE	401	301	7	0	0	0.027	0.487	0.057	1.034	4.0	0.92	0.29	**1.21**	***97.0***	200	PVC	***0.44***	22.70	0.70	5%		
1-B	PARK	CAP	301	0	0	0	0.000	1.686	0.000	1.686	4.0	0.00	0.47	**0.47**									
1-M (1K+1L+1B)	HORTON	301	303	0	0	7	0.025	0.349	0.265	5.758	4.0	4.30	1.61	**5.91**	***84.9***	200	PVC	***0.33***	**19.66**	0.61	30%		
1-F	HONEYBORNE	111	113	5	0	0	0.019	0.350	0.019	0.350	4.0	0.31	0.10	**0.41**	***53.8***	200	PVC	***0.50***	**24.19**	0.75	2%		
1-G	HONEYBORNE	113	115	2	0	0	0.008	0.180	0.027	0.530	4.0	0.43	0.15	**0.58**	***9.3***	200	PVC	***0.22***	**16.05**	0.49	4%		
1-H	HONEYBORNE	115	117	7	0	6	0.048	0.636	0.074	1.166	4.0	1.20	0.33	**1.53**	***76.4***	200	PVC	***0.37***	**20.81**	0.64	7%		
1-I	HONEYBORNE	117	119	3	0	6	0.032	0.489	0.107	1.655	4.0	1.73	0.46	**2.19**	***83.2***	200	PVC	***0.43***	**22.44**	0.69	10%		
1-N (4-A+2A+1-M)	SADLER DR	303	505	10	0	0	0.038	0.648	1.333	22.299	3.7	20.06	6.24	**26.31**	***97.3***	250	PVC	***0.31***	**34.54**	0.68	76%		
1-O	SADLER DR	505	119	10	0	0	0.038	0.640	1.371	22.939	3.7	20.59	6.42	**27.01**	***97.8***	250	PVC	***0.27***	**32.24**	0.64	84%		
1-P (1-I+1-O+2-G)	SADLER DR	119	507	4	0	0	0.015	0.359	1.969	29.212	3.6	28.65	8.18	**36.83**	***40.7***	300	PVC	***0.25***	**50.44**	0.69	73%		
1-Q	SADLER DR	507	EX6	0	0	0	0.000	0.160	1.969	29.372	3.6	28.65	8.22	**36.87**	***55.6***	300	PVC	***0.22***	**47.32**	0.65	78%		

Notes:
1. Residential Average Flow of 350L/cap/day
2. Population Density (People/unit): Singles = 3.8, Semis = 3.8, Towns =3.5, Apartments = 3.0
3. Peaking Factor (M) = Harmon Formula (4.0 max) = 1+(14/4+(Population/1000)^(1/2))
4. Population Flow = Q(p) = (Population X 350L/day/person X Peaking Factor) ÷ 86,400s/day
5. Infiltration Inflow = Q(i) = 0.28 L/sec/ha
6. Peak Flow = Q(d) = Q(p) + Q(i)

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2.	ISSUED FOR ECA APPLICATION	APR 30/21	MER
1.	ISSUED FOR MUNICIPAL REVIEW	DEC 23/20	MER

SCALE 1:1000

DESIGN CV
CHECKED MSP
DRAWN CV
CHECKED MSP
APPROVED MER

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
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Website www.novatech-eng.com

LOCATION
MUNICIPALITY OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 6
SANITARY DRAINAGE AREA PLAN

PROJECT No. 110046-00
REV REV # 2
DRAWING No. 110046-SAN-PH6

SANITARY SEWER DESIGN SHEET

PROJECT #: 110046
DESIGNED BY: Chris Visser
CHECKED BY: Melanie Riddell
DATE: February 22, 2021

PROJECT: Mill Run at Almonte - Phase 6
DEVELOPER: Menzie Almonte Inc c/o Regional Group

MOE Approved Phases
Current Phase
As-Built Information
Not As-built yet -on srvy request to be done
New Manhole 119A added

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AREA ID	STREET	MANHOLE		UNITS			INDIVIDUAL		CUMULATIVE		PEAK	POPULATION FLOW	PEAK EXTRAN.	PEAK DESIGN	PROPOSED SEWER								
	NAME	FROM	TO	SINGLES/ SEMI	APARTMENT	TOWNS	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	FACTOR M	Q (p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	% OF CAPACITY (q_{full}/Q_{actual})	% OF VELOCITY (v_{full}/V_{actual})	ACUTAL VELOCITY (m/s)
4-J	LEISHMAN	909	907	2	0	2	0.0	0.2	0.0	0.2	4.0	0.2	0.1	0.3	***20.2***	200	PVC	***1.09***	35.7	1.1	1%	0%	0.00
4-I	LEISHMAN	907	1001	6	0	8	0.1	0.7	0.1	0.9	4.0	1.1	0.3	1.3	***101.3***	200	PVC	***0.51***	24.4	0.8	5%	54%	0.41
4-H	BRACEWELL	FUT	1001	0	0	0	0.0	0.1	0.0	0.1	4.0	0.0	0.0	0.0	***9.9***	200	PVC	***0.40***	21.6	0.7	0%	0%	0.00
5-M	BRACEWELL	1003	1001	12	0	0	0.0	0.6	0.0	0.6	4.0	0.7	0.2	0.9	***86.1***	200	PVC	***0.40***	21.6	0.7	4%	45%	0.30
4-G (4-I+4-H+5-M)	LEISHMAN	1001	905	7	0	7	0.1	0.7	0.2	2.3	4.0	2.6	0.6	3.3	***103.2***	200	PVC	***0.50***	24.2	0.7	13%	70%	0.52
4-F	LEISHMAN	905	903	4	0	5	0.0	0.4	0.2	2.7	4.0	3.2	0.8	3.9	***54.8***	200	PVC	***1.04***	34.9	1.1	11%	67%	0.72
4-E	LEISHMAN	903	901	5	0	3	0.030	0.471	0.224	3.164	4.0	3.63	0.89	**4.52**	***70.6***	200	PVC	***0.68***	**28.22**	0.87	16%	73%	0.64
4-D	LEISHMAN	901	501	7	0	9	0.058	0.758	0.282	3.922	4.0	4.58	1.10	**5.67**	***111.8***	200	PVC	***0.50***	**24.19**	0.75	23%	78%	0.58
				single	semi																		
FUT PHASE 7, 8 & 9	SADLER DR	CAP	501	69	24	80	0.515	9.870	0.515	9.870	4.0	8.28	3.26	**11.56**	***9.90***	250	PVC	***0.81***	**55.83**	1.10	21%	78%	0.86
4-B (4C+4D)	SADLER DR	501	503	6	0	0	0.023	0.391	0.821	14.183	3.9	12.81	3.97	**16.78**	***86.2***	250	PVC	***0.29***	**33.41**	0.66	50%	100%	0.66
5-A	BRACEWELL	1013	1011	2	0	2	0.015	0.218	0.015	0.218	4.0	0.24	0.06	**0.30**	17.8	200	PVC	1.00	**34.22**	1.06	1%	33%	0.35
5-B	BRACEWELL	1011	1009	8	0	12	0.072	0.898	0.087	1.116	4.0	1.41	0.31	**1.72**	93.5	200	PVC	0.35	**20.24**	0.62	9%	60%	0.37
5-C	BRACEWELL	1009	1007	1	0	1	0.007	0.181	0.094	1.297	4.0	1.53	0.36	**1.89**	11.0	200	PVC	0.50	**24.19**	0.75	8%	60%	0.45
5-D	BRACEWELL	1007	1005	10	0	0	0.038	0.710	0.132	2.007	4.0	2.14	0.56	**2.71**	92.8	200	PVC	0.35	**20.24**	0.62	13%	70%	0.44
5-E	BRACEWELL	1005	1003	9	0	0	0.034	0.786	0.129	2.793	4.0	2.08	0.78	**2.86**	92.8	200	PVC	0.40	**21.64**	0.67	13%	70%	0.47
5-F	REAUME	809	807	0	0	2	0.007	0.122	0.007	0.122	4.0	0.11	0.03	**0.15**	***19.3***	200	PVC	***0.73***	**29.23**	0.90	1%	33%	0.30
5-G	REAUME	807	1003	0	0	8	0.028	0.427	0.035	0.549	4.0	0.57	0.15	**0.72**	***102.3***	200	PVC	***0.32***	**19.36**	0.60	4%	45%	0.27
5-H (5-E+5-G)	REAUME	1003	805	8	0	0	0.030	0.492	0.194	3.834	4.0	3.14	1.07	**4.22**	***81.2***	200	PVC	***0.33***	**19.66**	0.61	21%	78%	0.47
5-I	REAUME	805	803	11	0	0	0.042	0.637	0.236	4.471	4.0	3.82	1.25	**5.07**	***62.5***	200	PVC	***2.50***	**54.10**	1.67	9%	60%	1.00
4-K	WALSH	903	803	6	0	0	0.023	0.360	0.023	0.360	4.0	0.37	0.10	**0.47**	***86.1***	200	PVC	***0.65***	**27.59**	0.85	2%	33%	0.28
5-J (5-I +4-K)	REAUME	803	801	0	0	17	0.060	0.603	0.318	5.434	4.0	5.15	1.52	**6.67**	***91.3***	200	PVC	***0.39***	**21.37**	0.66	31%	88%	0.58
5-K	REAUME	801	503	0	0	12	0.042	0.502	0.360	5.936	4.0	5.90	1.66	**7.56**	***91.2***	200	PVC	***0.41***	**21.91**	0.68	35%	92%	0.62
4-A (5-K+4-B)	SADLER DR	503	303	6	0	0	0.023	0.385	1.203	20.504	3.7	18.26	5.74	**24.01**	***86.2***	250	PVC	***0.29***	**33.41**	0.66	72%	108%	0.71
3-G	HONEYBORNE	131	129	0	24	1	0.076	0.342	0.076	0.342	4.0	1.22	0.10	**1.32**	***19.4***	200	PVC	***0.98***	**33.87**	1.04	4%		
3-F	HONEYBORNE	129	127	5	48	8	0.191	1.432	0.267	1.774	4.0	4.32	0.50	**4.82**	***120.0***	200	PVC	***0.48***	**23.71**	0.73	20%		
3-E	HONEYBORNE	127	125	5	0	0	0.019	0.691	0.286	2.465	4.0	4.63	0.69	**5.32**	***66.3***	200	PVC	***0.50***	**24.19**	0.75	22%		
2-I	HONEYBORNE	125	123	6	24	6	0.116	0.854	0.401	3.319	4.0	6.54	0.93	**7.47**	***85.2***	200	PVC	***1.68***	**44.35**	1.37	17%		
2-H	HONEYBORNE	123	121	6	0	10	0.058	0.655	0.459	3.974	4.0	7.43	1.11	**8.54**	***85.2***	200	PVC	***1.00***	**34.22**	1.06	25%		
2-G	HONEYBORNE	121	119A	0	0	5	0.018	0.285	0.477	4.259	4.0	7.69	1.19	**8.89**	***73.0***	200	PVC	***1.00***	**34.22**	1.06	26%		
2-G	HONEYBORNE	119A	119	0	0	0	0.000	1.285	0.477	5.544	4.0	7.69	1.55	**9.25**	***10.0***	200	PVC	***1.00***	**34.22**	1.06	27%		
3-D	HORTON	315	313	6	0	10	0.058	0.706	0.058	0.706	4.0	0.94	0.20	**1.13**	***72.6***	200	PVC	***1.02***	**34.56**	1.07	3%		
3-C	HORTON	313	311	9	0	0	0.034	0.556	0.092	1.262	4.0	1.49	0.35	**1.84**	***59.9***	200	PVC	***1.17***	**37.01**	1.14	5%		
3-B	HORTON	311	309	2	0	0	0.008	0.240	0.100	1.502	4.0	1.61	0.42	**2.03**	***12.2***	200	PVC	***1.64***	**43.82**	1.35	5%		
3-A	HORTON	309	307	4	0	0	0.015	0.379	0.115	1.881	4.0	1.86	0.53	**2.39**	***77.5***	200	PVC	***1.97***	**48.03**	1.48	5%		
2-F	McCABE	703	701	7	0	0	0.027	0.462	0.027	0.462	4.0	0.43	0.13	**0.56**	***38.2***	200	PVC	***0.97***	**33.70**	1.04	2%		
2-D	McCABE	701	307	11	0	0	0.042	0.666	0.068	1.128	4.0	1.11	0.32	**1.42**	***100.7***	200	PVC	***0.50***	**24.19**	0.75	6%		

SANITARY SEWER DESIGN SHEET

PROJECT #: 110046
DESIGNED BY: Chris Visser
CHECKED BY: Melanie Riddell
DATE: February 22, 2021

PROJECT: Mill Run at Almonte - Phase 6
DEVELOPER: Menzie Almonte Inc c/o Regional Group

MOE Approved Phases
Current Phase
As-Built Information
Not As-built yet -on srvy request to be done
New Manhole 119A added

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Engineers, Planners & Landscape Architects

AREA ID	STREET	MANHOLE		UNITS			INDIVIDUAL		CUMULATIVE		PEAK	POPULATION FLOW	PEAK EXTRAN.	PEAK DESIGN	PROPOSED SEWER								
	NAME	FROM	TO	SINGLES/ SEMI	APARTMENT	TOWNS	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	FACTOR M	Q (p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	% OF CAPACITY (q_{full}/Q_{actual})	% OF VELOCITY (v_{full}/V_{actual})	ACUTAL VELOCITY (m/s)
2-B (3-A+2-D)	HORTON	307	305	6	0	11	0.061	0.648	0.245	3.657	4.0	3.96	1.02	**4.99**	***85.4***	200	PVC	***1.09***	**35.72**	1.10	14%		
2-E	McKENNY	603	601	7	0	0	0.027	0.437	0.027	0.437	4.0	0.43	0.12	**0.55**	***62.8***	200	PVC	***0.99***	**34.05**	1.05	2%		
2-C	McKENNY	601	305	14	0	0	0.053	0.813	0.080	1.250	4.0	1.29	0.35	**1.64**	***115.8***	200	PVC	***0.52***	**24.67**	0.76	7%		
2-A (2-B+2-C)	HORTON	305	303	0	0	5	0.018	0.276	0.342	5.183	4.0	5.54	1.45	**6.99**	***84.0***	200	PVC	***0.65***	**27.59**	**0.85**	**0.25**		
1-A	SWM POND	101	103	0	0	0	0.000	1.152	0.000	1.152	4.0	0.00	0.32	**0.32**									
1C-A	HONEYBORNE	101	103	0	0	0	0.000	0.078	0.000	0.078	4.0	0.00	0.02	**0.02**									
1C-B	HONEYBORNE	101	103	3	0	1	0.015	0.262	0.015	0.340	4.0	0.24	0.10	**0.34**	***27.6***	200	PVC	***3.50***	**64.01**	1.97	1%		
1C-C	HONEYBORNE	103	107	7	0	13	0.072	1.010	0.087	1.350	4.0	1.41	0.38	**1.79**	***107.1***	200	PVC	***0.44***	**22.70**	0.70	8%		
1-D	HONEYBORNE	111	109	5	0	6	0.040	0.564	0.040	0.564	4.0	0.65	0.16	**0.81**	***68.0***	200	PVC	***0.41***	**21.91**	0.68	4%		
1-C	HONEYBORNE	109	107	2	0	7	0.032	0.418	0.072	0.982	4.0	1.17	0.27	**1.44**	***69.7***	200	PVC	***0.47***	**23.46**	0.72	6%		
1-L (1C-C+1C)	HORTON	107	301	0	0	7	0.025	0.357	0.184	2.689	4.0	2.98	0.75	**3.73**	***83.2***	200	PVC	***0.44***	**22.70**	0.70	16%		
1-J	LAROCQUE	403	401	8	0	0	0.030	0.547	0.030	0.547	4.0	0.49	0.15	**0.65**	***55.7***	200	PVC	***0.52***	**24.67**	0.76	3%		
1-K	LAROCQUE	401	301	7	0	0	0.027	0.487	0.057	1.034	4.0	0.92	0.29	**1.21**	***97.0***	200	PVC	***0.44***	22.70	0.70	5%		
1-B	PARK	CAP	301	0	0	0	0.000	1.686	0.000	1.686	4.0	0.00	0.47	**0.47**									
1-M (1K+1L+1B)	HORTON	301	303	0	0	7	0.025	0.349	0.265	5.758	4.0	4.30	1.61	**5.91**	***84.9***	200	PVC	***0.33***	**19.66**	0.61	30%		
1-F	HONEYBORNE	111	113	5	0	0	0.019	0.350	0.019	0.350	4.0	0.31	0.10	**0.41**	***53.8***	200	PVC	***0.50***	**24.19**	0.75	2%		
1-G	HONEYBORNE	113	115	2	0	0	0.008	0.180	0.027	0.530	4.0	0.43	0.15	**0.58**	***9.3***	200	PVC	***0.22***	**16.05**	0.49	4%		
1-H	HONEYBORNE	115	117	7	0	6	0.048	0.636	0.074	1.166	4.0	1.20	0.33	**1.53**	***76.4***	200	PVC	***0.37***	**20.81**	0.64	7%		
1-I	HONEYBORNE	117	119	3	0	6	0.032	0.489	0.107	1.655	4.0	1.73	0.46	**2.19**	***83.2***	200	PVC	***0.43***	**22.44**	0.69	10%		
1-N (4-A+2A+1-M)	SADLER DR	303	505	10	0	0	0.038	0.648	1.848	32.093	3.6	27.05	8.99	**36.03**	***97.3***	250	PVC	***0.31***	**34.54**	0.68	104%		
1-O	SADLER DR	505	119	10	0	0	0.038	0.640	1.886	32.733	3.6	27.55	9.17	**36.72**	***97.8***	250	PVC	***0.27***	**32.24**	0.64	114%		
1-P (1-I+1-O+2-G)	SADLER DR	119	507	4	0	0	0.015	0.359	2.485	39.006	3.5	35.34	10.92	**46.26**	***40.7***	300	PVC	***0.25***	**50.44**	0.69	92%		
1-Q	SADLER DR	507	EX6	0	0	0	0.000	0.160	2.485	39.166	3.5	35.34	10.97	**46.30**	***55.6***	300	PVC	***0.22***	**47.32**	0.65	98%		

Notes:
1. Residential Average Flow of 350L/cap/day
2. Population Density (People/unit): Singles = 3.8, Semis = 3.8, Towns =3.5, Apartments = 3.0
3. Peaking Factor (M) = Harmon Formula (4.0 max) = 1+(14/4+(Population/1000)^(1/2))
4. Population Flow = Q(p) = (Population X 350L/day/person X Peaking Factor) ÷ 86,400s/day
5. Infiltration Inflow = Q(i) = 0.28 L/sec/ha
6. Peak Flow = Q(d) = Q(p) + Q(i)

MILL RUN EXTENSION - SANITARY SEWER
HYDRAULIC GRADE LINE ANALYSIS - 2023

Bend Coefficients

<u>0</u>	<u>45</u>	<u>90</u>	<----Bend (in degrees)
0.00	0.29	1.02	900 mm pipe or greater (benching)
0.00	0.40	1.32	825 mm pipe or smaller (300 mm sump)

ANALYSIS OF MILLS LANDS SANITARY SEWER - DESIGN YEAR = 2023

LOCATION	MANHOLE		INVERT ELEVATION		GROUND ELEVATION	COVER	PIPE PARAMETERS			TOTAL FLOW	Q_{cap}	Q_{in}/Q_{cap}	COMPUTATIONAL COLUMNS					HEAD LOSS	SURCHARGE	HGL		MIN USF	SLOPE
	Upstream	Downstream	U/S (m)	D/S (m)	Upstream (m)	Upstream (m)	Dia (mm)	Length (m)	'n'	(m^3/s)	(m^3/s)		Pipe Area (m^2)	L/D	Friction Factor (f)	Velocity V (m/s)	$V^2/2g$	HL (m)	Upstream (m)	Upstream (m)	Downstream (m)	(m)	(%)
MILLS LANDS SUBDIVISION SANITARY SEWER																				**135.81**	**<- OUTLET**		
	SAN 507	EX6	135.56	135.44	140.29	4.430	300	55.60	0.013	0.0463	0.047	0.99	0.073	185	0.03145	0.63	0.02	0.13	0.00	135.86	135.81	136.16	0.22
	SAN 119	SAN 507	135.67	135.57	140.28	4.310	300	40.70	0.013	0.0463	0.050	0.93	0.073	136	0.03145	0.63	0.02	0.10	0.00	135.97	135.87	136.27	0.25
Mill Run Phase 1-6	SAN 505	SAN 119	135.95	135.69	140.19	3.990	250	97.80	0.013	0.0367	0.032	1.15	0.051	391	0.03342	0.72	0.03	0.36	0.13	136.33	135.97	136.63	0.27
	SAN 303	SAN 505	136.26	135.96	140.03	3.520	250	97.30	0.013	0.0360	0.034	1.05	0.051	389	0.03342	0.71	0.03	0.35	0.17	136.68	136.33	136.98	0.31
	SAN 503	SAN 303	136.49	136.30	139.94	3.200	250	70.70	0.013	0.0240	0.032	0.75	0.051	283	0.03342	0.47	0.01	0.11	0.00	136.74	136.68	137.04	0.27
	SAN 501	SAN 503	136.75	136.50	139.75	2.750	250	86.20	0.013	0.0168	0.033	0.50	0.051	345	0.03342	0.33	0.01	0.07	0.00	137.00	136.75	137.30	0.29
Mills Lands Phase 7-9	SAN 101	SAN 501	137.05	136.75	140.56	3.260	250	81.30	0.013	0.0116	0.038	0.31	0.051	325	0.03342	0.23	0.00	0.03	0.00	137.30	137.00	137.60	0.37
	SAN 103	SAN 101	137.29	137.05	140.72	3.180	250	79.00	0.013	0.0050	0.034	0.15	0.051	316	0.03342	0.10	0.00	0.01	0.00	137.54	137.30	137.84	0.30
Future Lands	FUT SAN	SAN 103	137.57	137.29	141.00	3.230	200	70.00	0.013	0.0000	0.022	0.00	0.032	350	0.03600	0.00	0.00	0.00	0.00	137.77	137.54	138.07	0.40

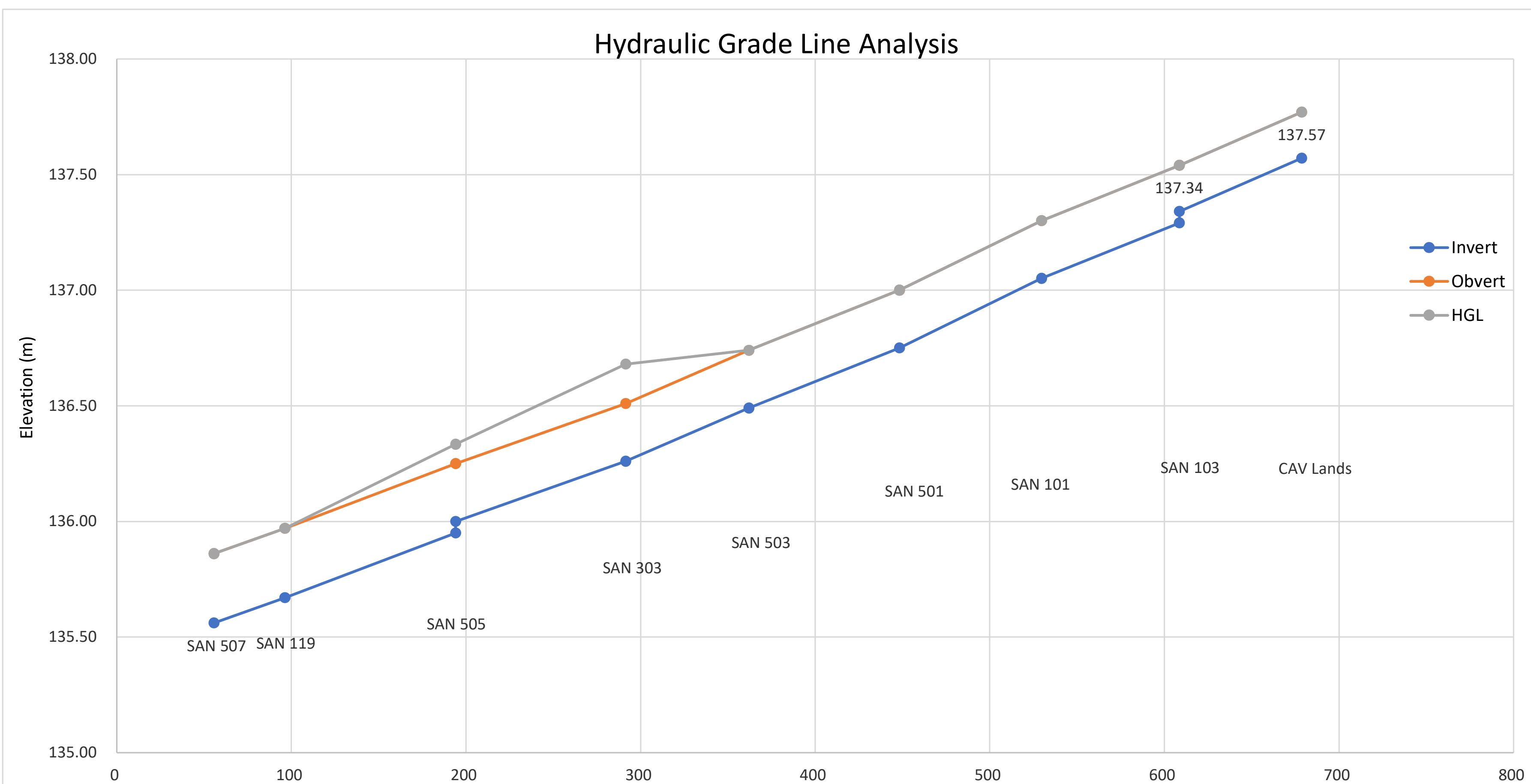
Manhole Loss

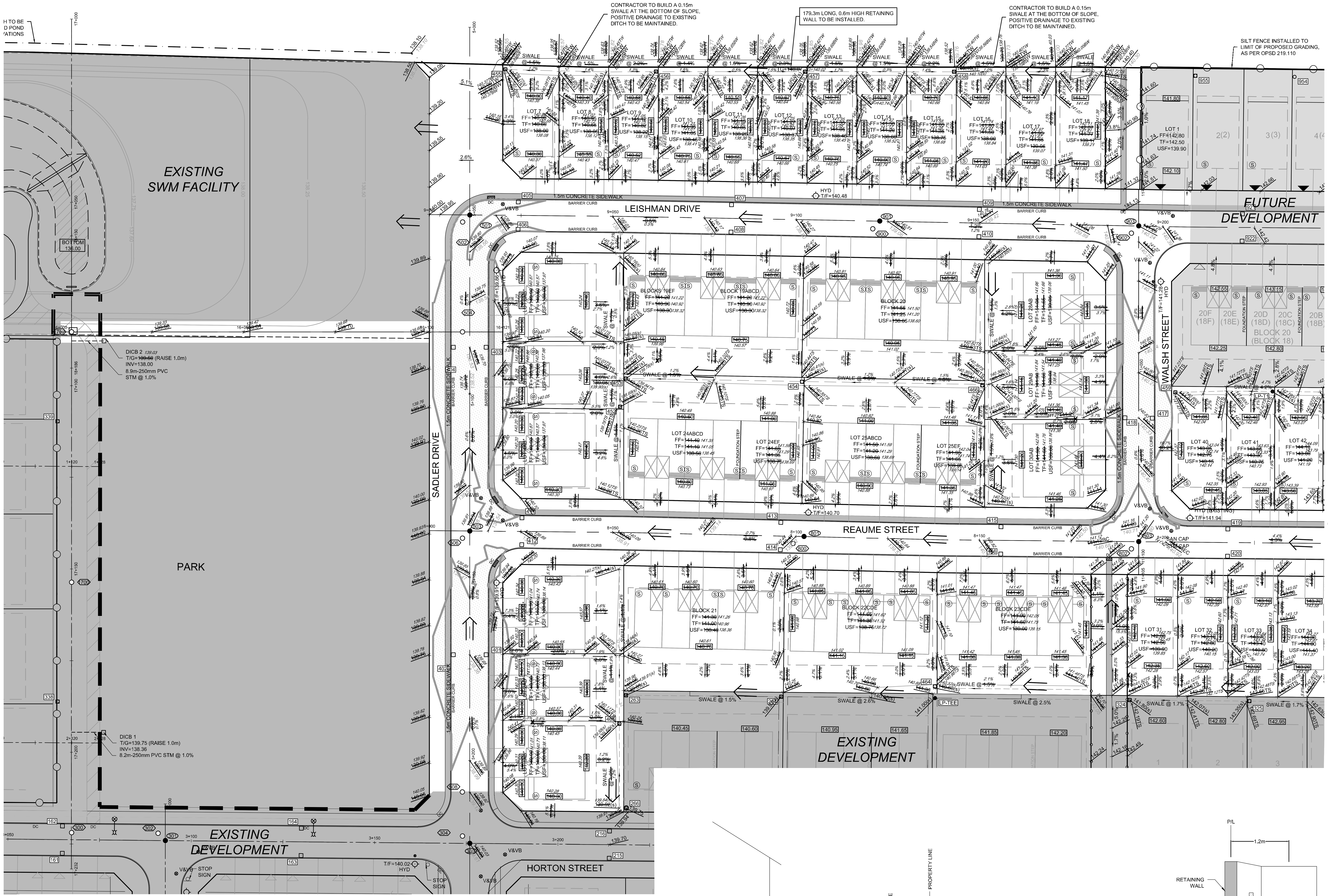
Diameters (mm)			Bend					
U/S MH	Pipe In	Pipe Out	Angle	K_O	C_D	K_b	K_{tot}	HL_{MH} (m)
1200	300	300	0	0.400	1.00	0	**0.400**	0.008
1200	250	300	0	0.400	1.73	0	**0.691**	0.014
1200	250	250	0	0.480	1.00	0	**0.480**	0.013
1200	250	250	0	0.480	1.00	0	**0.480**	0.012
1200	250	250	0	0.480	1.00	0	**0.480**	0.005
1200	250	250	0	0.480	1.00	0	**0.480**	0.003
1200	250	250	0	0.480	1.00	0	**0.480**	0.001
1200	200	250	0	0.480	1.95	0	**0.938**	0.000
1200	200	200	0	0.600	1.00	0	**0.600**	0.000

DESIGN PARAMETERS

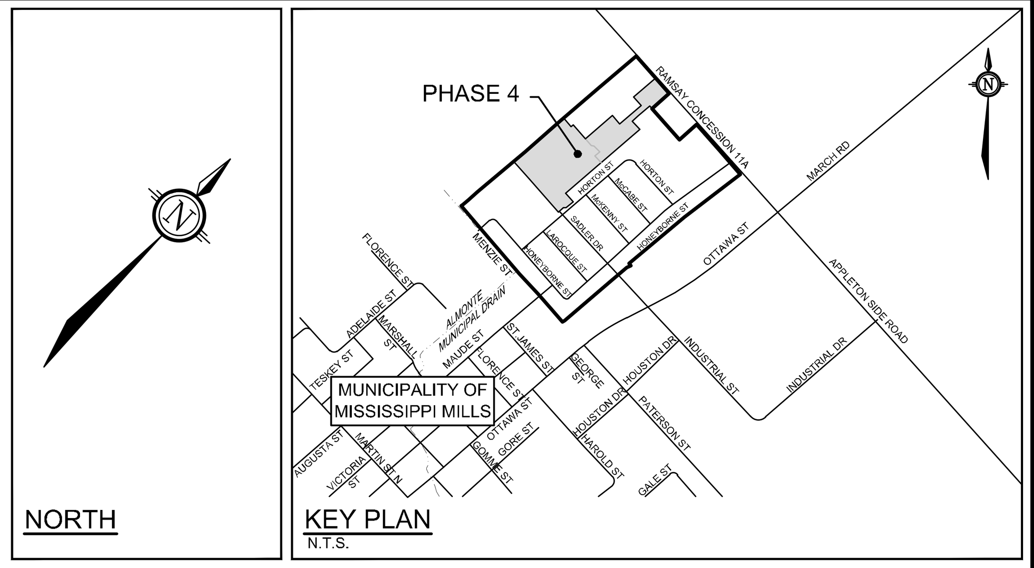
Average Daily Flow=	350 L/cap/day	Industrial Peak Factor= per MOE graph		HGL=Major + Minor Losses
Comm/Inst Flow=	50000 L/ha/day	Extraneous Flow=	0.28 L/s/ha	Major Loss= Pipe Friction (Darcy-Weisbach)
Industrial Flow=	35000 L/ha/day	Minimum Velocity=	0.60 m/s	Minor Loss= Head loss correction for flow through MH, changes in pipe size, and pipe bends
Max Res Peak Factor=	4.00	Manning's n=	0.013	
Comm Peak Factor=	1.50			Friction Factor= 8g/c^2, where c=(1/n)*(D/4)^1/6
Industrial Peak Factor=	1.50	Design Year = 2023		

Designed: BM	PROJECT: Mill Run Extension 121125
Checked: DDB	CLIENT: Regional Group
Dwg. Reference:	Date: February 10, 2023
	Rev.: September 21, 2023





Structure	T/G	Max. Static Ponding (Spill Depth)		5-yr Event (4hr)				100-yr Event (4hr)				
		Elev.	Depth	Elev.	Depth	Cascading	Cascade Depth	Elev.	Depth	Cascading	Cascade Depth	Flow
	(m)	(m)	(m)	(m)	(m)	Flow?	(m)	(m)	(m)	Flow?	(m)	(L/s)
CB401-402	139.55	139.78	0.23	139.13	0.00	N	0.00	139.85	0.30	Y	0.07	150
CB403-404	139.54	139.82	0.28	139.46	0.00	N	0.00	139.63	0.09	N	0.00	281
CB417-418	140.70	141.03	0.33	139.78	0.00	N	0.00	140.97	0.27	N	0.00	214
CB425-426	145.35	145.61	0.26	144.40	0.00	N	0.00	145.39	0.04	N	0.00	21
CB427-428	143.94	144.04	0.10	143.96	0.02	N	0.00	144.11	0.17	Y	0.07	121

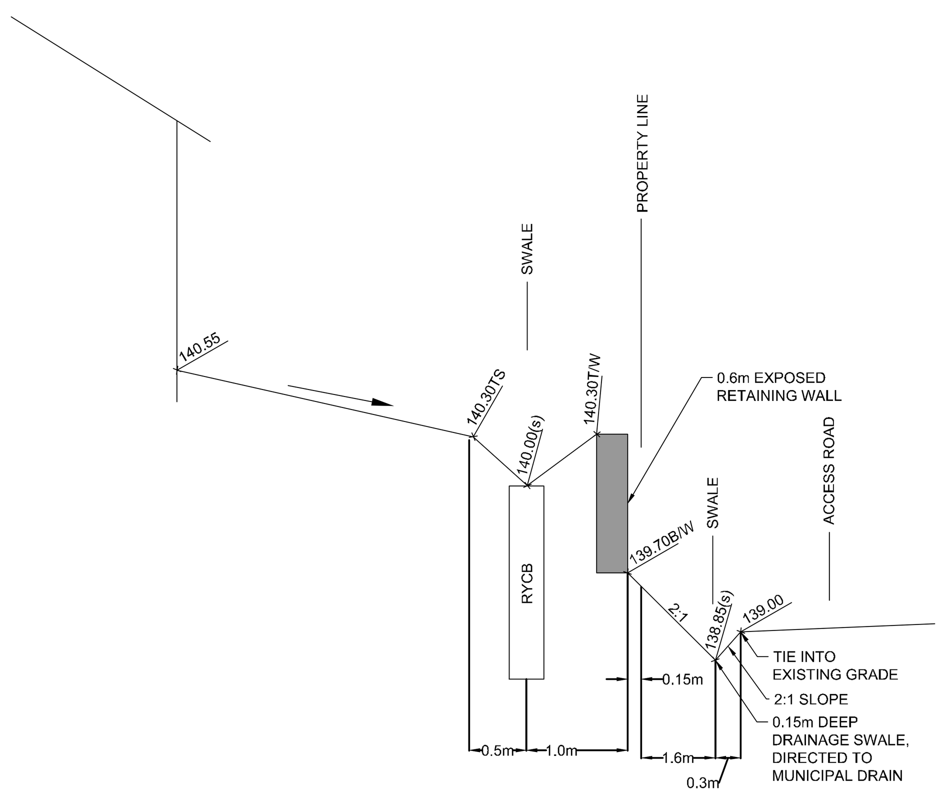


KEY PLAN
N.T.S.

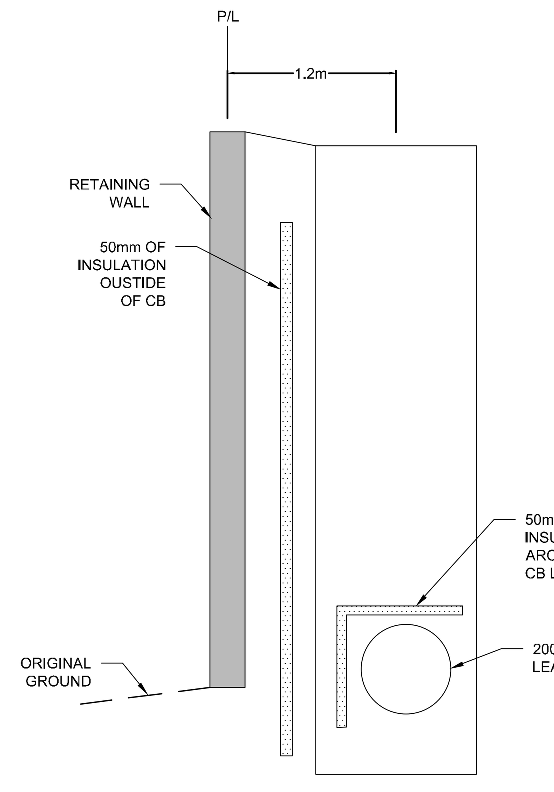
LEGEND:

139.60 / 139.59 / 138.89	AS-BUILT ELEVATION / PROPOSED ELEVATION / EXISTING ELEVATION
139.20(s) / 139.23(s)	AS-BUILT SWALE ELEVATION / PROPOSED SWALE ELEVATION
139.20 / 139.23LP	AS-BUILT LOW POINT / PROPOSED LOW POINT
139.24 / 139.23HP	AS-BUILT HIGH POINT / PROPOSED HIGH POINT
139.26TS / 139.23TS	AS-BUILT TOP OF TERRACE SLOPE / PROPOSED TOP OF TERRACE SLOPE
139.24 / 139.23VPI	AS-BUILT VERTICAL POINT OF INTERSECTION / PROPOSED VERTICAL POINT OF INTERSECTION
127.53 / 127.55	AS-BUILT TERRACE ELEVATION / PROPOSED TERRACE ELEVATION
3.1% / 3.2%	AS-BUILT SLOPE / PROPOSED SLOPE
LOT 30AB	SEMI-DETACHED UNIT
LOT 25 (WO)	SINGLE FAMILY UNIT WITH BASEMENT WALKOUT
FF=~~140.65~~ 140.64	AS-BUILT FINISHED FLOOR ELEVATION
TF=~~140.30~~ 140.34	AS-BUILT TOP OF FOUNDATION ELEVATION
USF=~~137.75~~ 137.74	AS-BUILT UNDERSIDE OF FOOTING ELEVATION
	MAXIMUM 3: 1 SIDESLOPE
SWALE @ ~~2.0%~~ 2.1%	℄ SWALE C/W DIRECTION OF AS-BUILT FLOW AND GRADE
	MAJOR OVERLAND FLOW
T/F=98.45	PROPOSED TOP OF BOTTOM FLANGE
TEE	PROPOSED TEE
11.25°	PROPOSED BEND AND THRUSTBLOCK (SEE PLAN AND PROFILES)
	PROPOSED WATERMAIN REDUCER
	PROPOSED CAP
101	PROPOSED SAN MANHOLE
102	PROPOSED STM MANHOLE
	DIRECTION OF FLOW
	PROPOSED ROAD CATCHBASIN C/W 2x3m - 100Ø SUBDRAIN & SOCK
	PROPOSED REARYARD CATCHBASIN
DC	PROPOSED DEPPRESSED BARRIER CURB
BARRIER CURB	PROPOSED BARRIER CURB
	ZONING SETBACK LINE
	SEMI DETACHED LATERAL
	SINGLE LATERAL
S	SUMP PUMP REQUIRED
HP	PROPOSED HYDRO POLE
EX.HP	EXISTING HYDRO POLE
H-OH	EXISTING OVERHEAD UTILITY WIRES
	MAXIMUM PONDING AREA
	FUTURE RESIDENTIAL DEVELOPMENT
	EXISTING RESIDENTIAL DEVELOPMENT

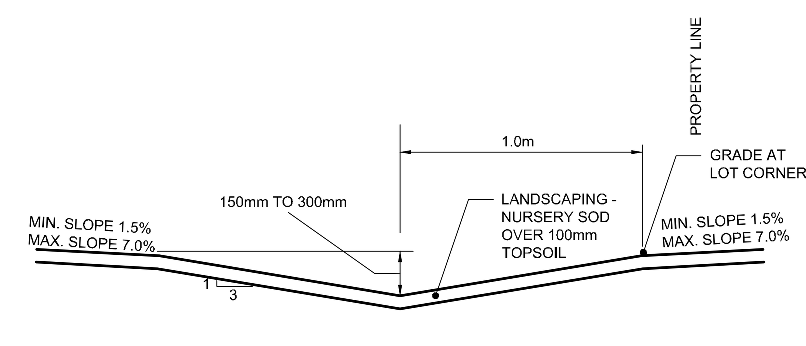
REFER TO110046-D1-PH4 & 110046-D2-PH4 FOR ADDITIONAL NOTES & DETAILS



TYPICAL SECTION
N.T.S.



DETAIL OF CB455
N.T.S.



SWALE DETAIL
N.T.S.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

RECORD DRAWING

No.	REVISION	DATE	BY
15.	RECORD DRAWING		MER
14.	REVISED RETAING WALL	AUG 10/20	MER
13.	REVISED 0.6m RETAING WALL WITH 2:1 SLOPE	JUL 16/20	MER
12.	REVISED RETAINING WALL	MAY 28/20	MER
11.	REVISED USF ELEVATIONS FOR LOTS 9,12,18 & BLOCK 24	AUG 16/19	CV
10.	REVISED LOTS 1-6, REISSUED FOR CONSTRUCTION	JUL 25/19	MER
9.	ADDITION OF SIDEWALK ON REAUME STREET	APR 26/19	MER
8.	REISSUED FOR CONSTRUCTION	APR 8/19	MER
7.	REVISED PER MUNICIPAL COMMENTS (LOT 5)	APR 8/19	MER
6.	ISSUED FOR CONSTRUCTION	FEB 28/19	MER
5.	ISSUED FOR TENDER	JAN 16/19	MER
4.	ISSUED FOR MOE APPROVAL	OCT 31/18	MER
3.	REVISED PER MUNICIPAL COMMENTS/ISSUED FOR MOE APPROVAL	OCT 25/18	MER
2.	REVISED PER MUNICIPAL COMMENTS	OCT 5/18	MER
1.	ISSUED FOR MUNICIPALITY REVIEW	SEPT 21/18	MER

SCALE
1:500
1:500
0 5 10 15 20

DESIGN CV
CHECKED MER
DRAWN CV
CHECKED MER
APPROVED MER

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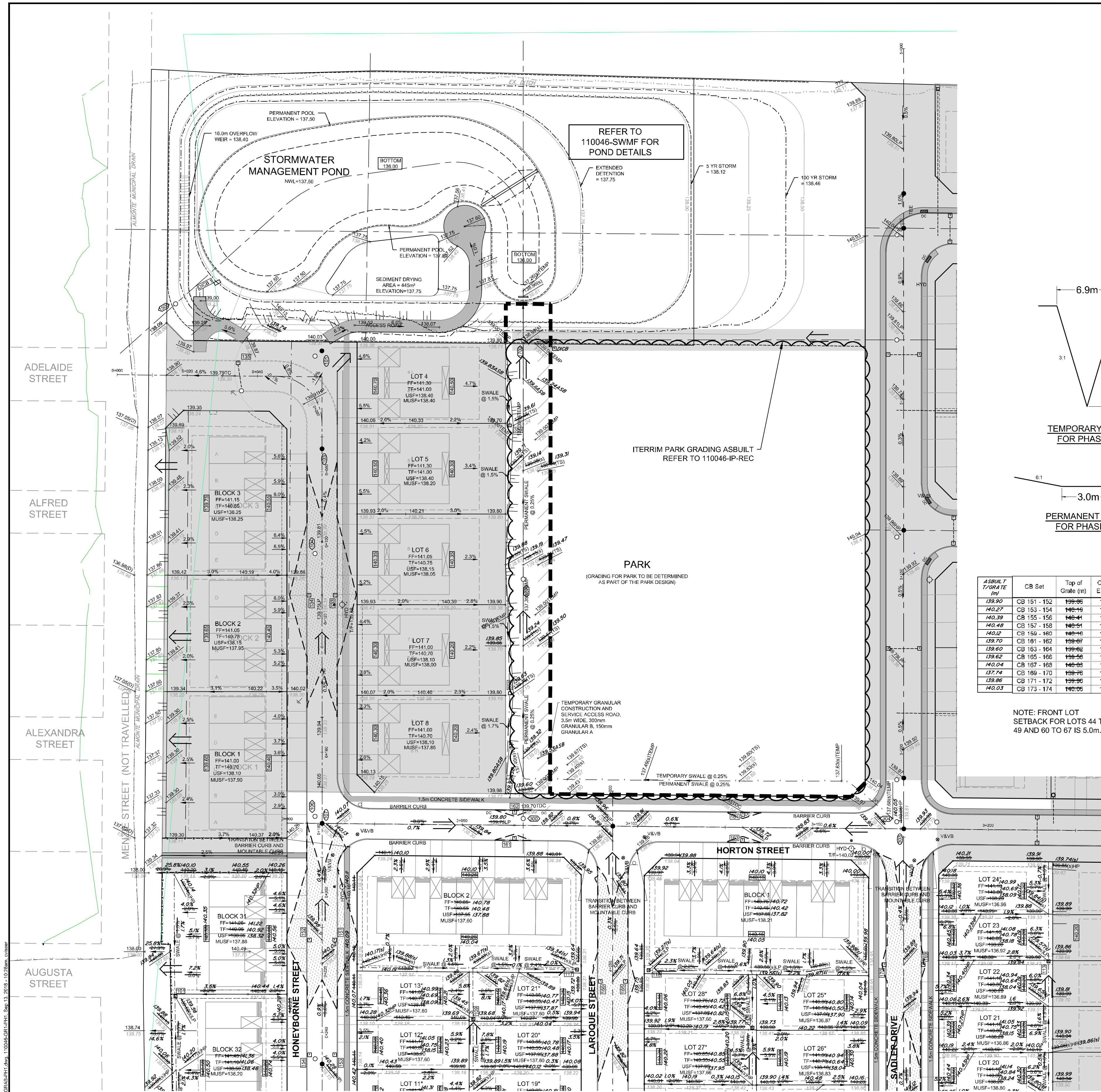
Facsimile (613) 254-5867
Website www.novatech-eng.com

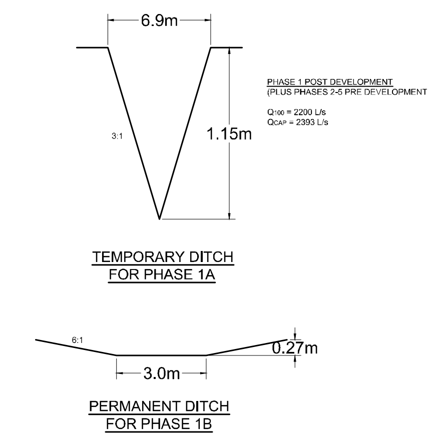
LOCATION
MUNICIPALITY OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 4A
GRADING PLAN

PROJECT No. 110046
REV REV # 15
DRAWING No. 110046-GR8

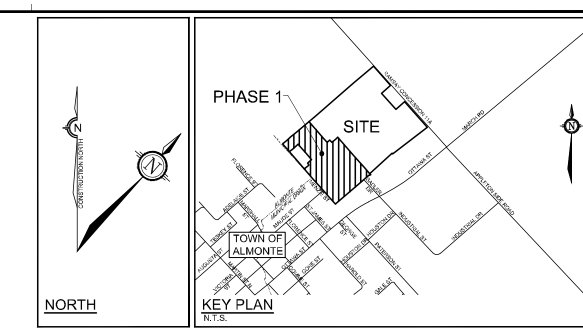
PLANB1.DWG - 1000mmx707mm





ASBUILT T/GRATE (m)	CB Set	Top of Grate (m)	Overflow Elevation	Max Ponding Elevation (m)	Max Ponding Depth (m)
139.90	CB 151 - 152	~~139.86~~	140.06	140.14	0.28
140.27	CB 153 - 154	~~140.19~~	140.19	140.28	0.09
140.39	CB 155 - 156	~~140.41~~	140.61	140.58	0.17
140.48	CB 157 - 158	~~140.51~~	140.71	140.71	0.20
140.12	CB 159 - 160	~~140.10~~	140.30	140.37	0.27
139.70	CB 161 - 162	~~139.67~~	139.70	139.70	0.03
139.60	CB 163 - 164	~~139.62~~	139.65	139.65	0.03
139.62	CB 165 - 166	~~139.56~~	139.78	139.78	0.20
140.04	CB 167 - 168	~~140.03~~	140.03	140.03	0.00
137.74	CB 169 - 170	~~139.76~~	139.96	140.06	0.30
139.86	CB 171 - 172	~~139.90~~	140.10	140.19	0.29
140.03	CB 173 - 174	~~140.06~~	140.26	140.36	0.30

NOTE: FRONT LOT SETBACK FOR LOTS 44 TO 49 AND 60 TO 67 IS 5.0m.



LEGEND: GRADING PLAN

- 139.58 — PROPOSED ELEVATION / EXISTING ELEVATION
- 139.59 TW — PROPOSED TOP OF WALL ELEVATION / PROPOSED BOTTOM OF WALL ELEVATION
- 139.23 (s) — PROPOSED SWALE ELEVATION
- 139.23 LP — PROPOSED LOW POINT
- 139.23 HP — PROPOSED HIGH POINT
- 127.55 — PROPOSED TERRACE ELEVATION
- 3.2% — PROPOSED SLOPE
- FF=140.65 — FINISHED FLOOR ELEVATION
- TF=140.30 — TOP OF FOUNDATION ELEVATION
- USF=137.75 — UNDERSIDE OF FOOTING ELEVATION
- MAXIMUM 3:1 SIDESLOPE
- SWALE @ 2.0% — ℄ SWALE C/W DIRECTION OF FLOW AND GRADE
- PROPOSED 150mmØ SUBDRAIN
- MAJOR OVERLAND FLOW
- MAXIMUM PONDING AREA
- 90.31 — ASBUILT ELEVATION
- 3.5% — ASBUILT SLOPE

NOTES: GRADING

1. REMOVE ALL ORGANIC MATTER AND TOPSOIL FROM AREAS THAT ARE TO BE PAVED.
2. ALL EXCESS EXCAVATED MATERIAL TO BE STOCKPILED OR SPREAD ON-SITE AS DIRECTED BY THE ENGINEER. ALL ORGANIC MATERIAL AND DEBRIS TO BE USED OR STOCKPILED ON SITE AS INSTRUCTED BY ENGINEER.
3. GRADE AND/OR FILL WHERE REQUIRED.
4. MATCH EXISTING ELEVATIONS AT ALL PROPERTY LINES.
5. ENSURE POSITIVE DRAINAGE WHETHER INDICATED OR NOT.
6. PROVIDE POSITIVE DRAINAGE ALONG ALL DITCHES AFTER REINSTATEMENT.
7. MINIMUM OF 2% AND MAXIMUM OF 7% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
8. MAXIMUM TERRACING GRADE IS 3:1.
9. ALL DRIVEWAY SLOPES ARE TO BE BETWEEN 2% AND 8%.
10. SIDEWALK CROSSFALL IS TO BE BETWEEN 2% AND 4%.
11. MINIMUM REARYARD SWALE GRADE IS 1.5%.
12. MUSF IS BASED ON 0.5m ABOVE THE TOP OF THE SANITARY SEWER.
13. LOTS 24 TO 28, LOTS 44 TO 51 AND LOTS 58 TO 70 - BEARING SURFACE INSPECTION TO DETERMINE FOUNDATION RECOMMENDATIONS REQUIRED. SEE GEOTECHNICAL CONSIDERATIONS-GRADING PLAN REVIEW AND SWMP DESIGN RECOMMENDATIONS DATED APRIL 20, 2012 FROM THE PATERSON GROUP.

NOTES: ROADS

1. PAVEMENT STRUCTURE, AS PER GEOTECHNICAL RECOMMENDATIONS

- LOCAL ROADWAYS
  40mm HL3 OR SUPERPAVE 12.5
  50mm HL8 OR SUPERPAVE 19.0
  150mm GRANULAR 'A'
  400mm GRANULAR 'B', TYPE II
  640mm
- LOCAL ROADWAYS (Bearing on Bedrock)
  40mm HL3 OR SUPERPAVE 12.5
  50mm HL8 OR SUPERPAVE 19.0
  300mm GRANULAR 'A'
  390mm

2. REMOVE ANY TOPSOIL/ ORGANICS AND ANY SOFT, WET, OR DELETERIOUS MATERIAL IN PREPARATION OF THE SUBGRADE.
3. ALL ASPHALT TO BE SUPERPAVE MIX DESIGNS.
4. GRANULAR BASE AND SUBGRADE TO BE COMPACTED TO AT LEAST 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. ASPHALTIC CONCRETE TO BE COMPACTED TO AT LEAST 97% OF MARSHALL DENSITY.
6. ALL ROADWAYS TO HAVE 2% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE.
7. ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW THE GRANULAR 'B' DEPTH AND FOR THE NECESSITY OF A WOVEN GEOTEXTILE BELOW THE GRANULAR MATERIALS.
8. PRIOR TO THE PLACEMENT OF TOPLIFT (SUPERPAVE 12.5), CONTRACTOR IS TO ADJUST ALL STRUCTURES AS PER OPSD 704.010.
9. CONNECT TO EXISTING ROADS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
10. AS NOTED ON THE PLAN, CURBS ARE TO BE MOUNTABLE CURB AS PER CITY OF OTTAWA SC 1.3 OR BARRIER CURB AS PER OPSD 600.110.
11. CONCRETE SIDEWALKS ARE TO BE 1.5m WIDE AND 125mm THICK AS PER OPSD 310.010. INTERSECTIONS ARE TO BE AS PER OPSD 310.030.
12. ALL BOULEVARD TO BE LANDSCAPED WITH 125mm TOPSOIL AND SOD.

NOTE:
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AS-BUILT

No.	REVISION	DATE	BY
11.	AS-BUILT		MER
10.	REISSUED FOR CONSTRUCTION (PHASE 1B ONLY)	APR 28/14	MER
9.	ISSUED FOR SUBDIVSION REGISTRATION - PHASE 1B	FEB 21/14	MER

No.	REVISION	DATE	BY
8.	REVISED SADLER DRIVE CROSS SECTION	NOV 12/13	MER
7.	ISSUED FOR CONSTRUCTION (PHASE 1B ONLY)	APR 26/13	MER
6.	ISSUED FOR CONSTRUCTION	SEPT 10/12	JGR
5.	ISSUED FOR LIMITED CONSTRUCTION	JULY 11/12	MER
4.	ISSUED FOR MOE APPROVAL	JUNE 26/12	MER
3.	ISSUED FOR TENDER	MAY 14/12	MER
2.	ISSUED FOR TOWN APPROVAL	APR 30/12	MER
1.	ISSUED FOR TOWN REVIEW	JAN 31/12	MER

SCALE 1:500

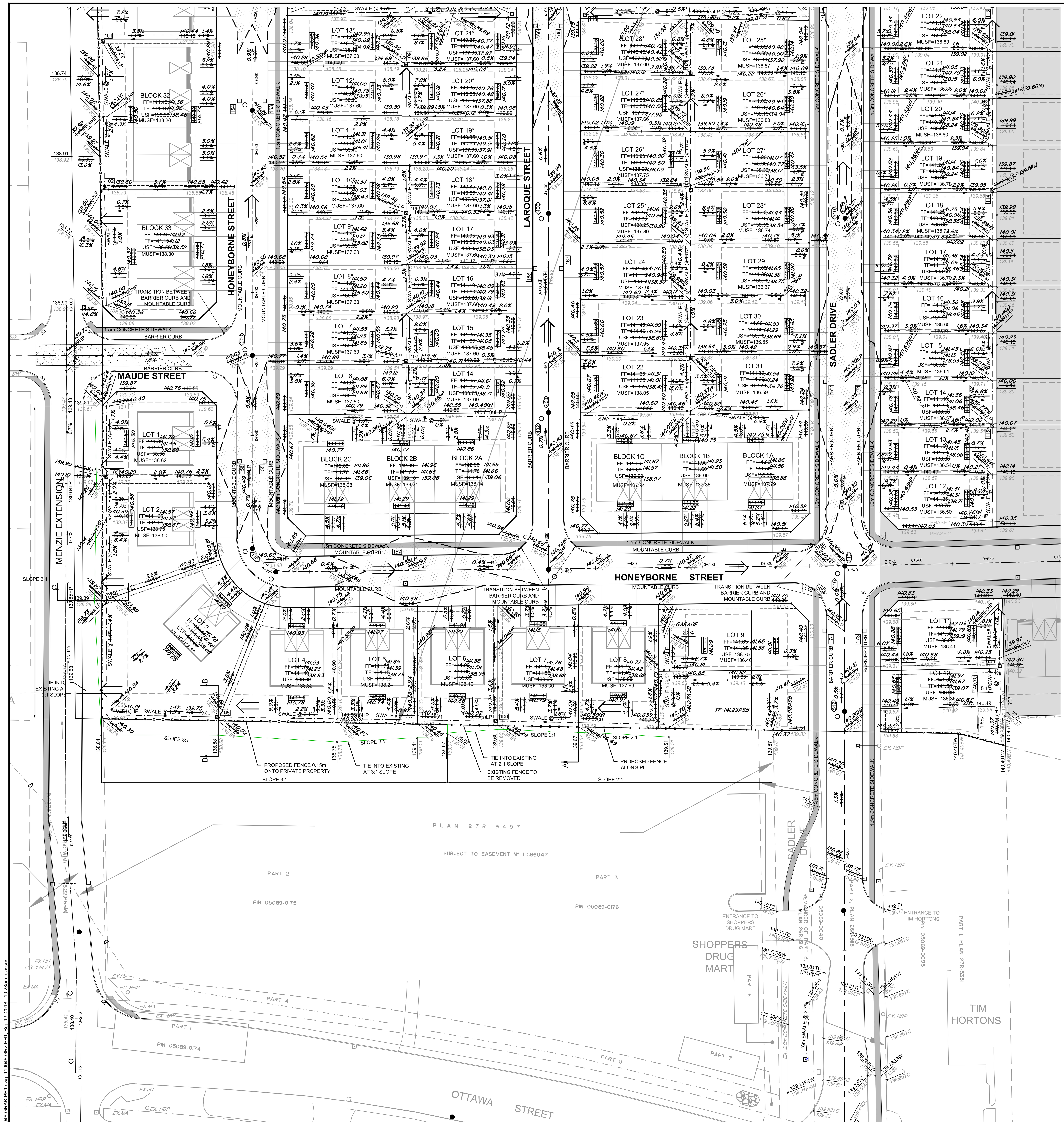
DESIGN CV
CHECKED MER
DRAWN CV
CHECKED MER
APPROVED JGR

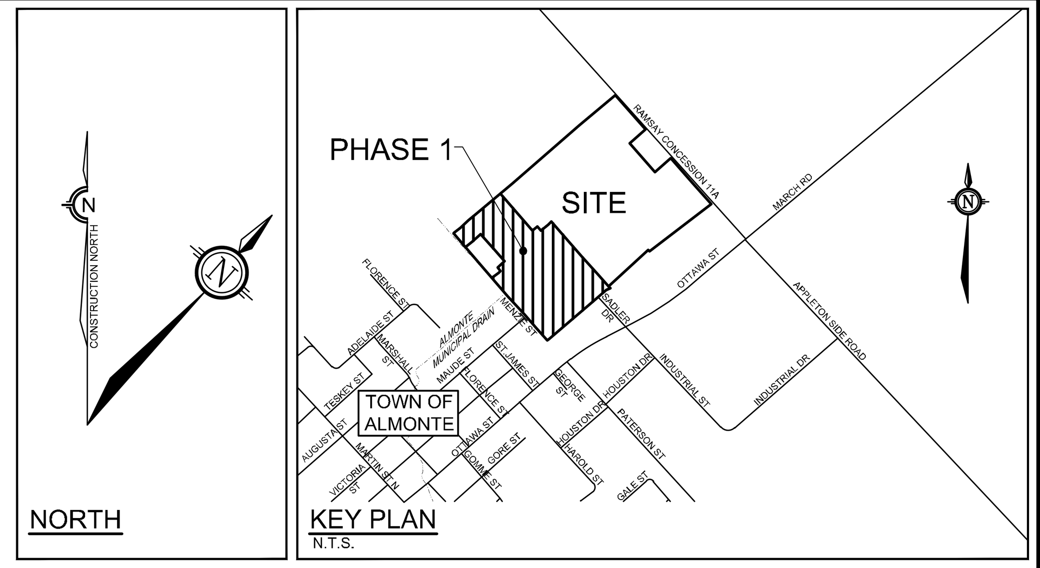
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
TOWN OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 1 - GRADING PLAN

PROJECT No. 110046
REV: REV # 11
DRAWING No. 110046-GR1-REC

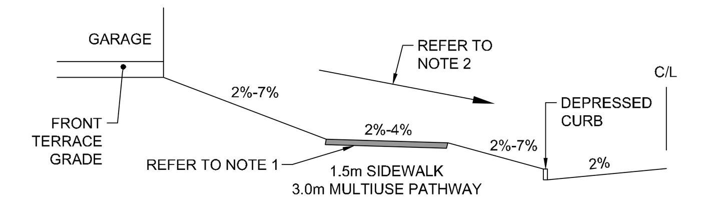




LEGEND: GRADING PLAN

139.58 / 139.51	PROPOSED ELEVATION / EXISTING ELEVATION
90.31 / ~~90.35~~ / 89.39	ASBUILT ELEVATION
139.59 TW / 138.89 BW	PROPOSED TOP OF WALL ELEVATION / PROPOSED BOTTOM OF WALL ELEVATION
3.5% / ~~2.0%~~	ASBUILT SLOPE
139.23 (s)	PROPOSED SWALE ELEVATION
139.23 LP	PROPOSED LOW POINT
139.23 HP	PROPOSED HIGH POINT
127.55	PROPOSED TERRACE ELEVATION
3.2%	PROPOSED SLOPE
FF=140.65	FINISHED FLOOR ELEVATION
TF=140.30	TOP OF FOUNDATION ELEVATION
USF=137.75	UNDERSIDE OF FOOTING ELEVATION
	MAXIMUM 3: 1 SIDESLOPE
SWALE @ 2.0%	℄ SWALE C/W DIRECTION OF FLOW AND GRADE
	PROPOSED 150mmØ SUBDRAIN
	MAJOR OVERLAND FLOW
	MAXIMUM PONDING AREA
	TEMPORARY EMERGENCY ACCESS GRANULAR ROAD

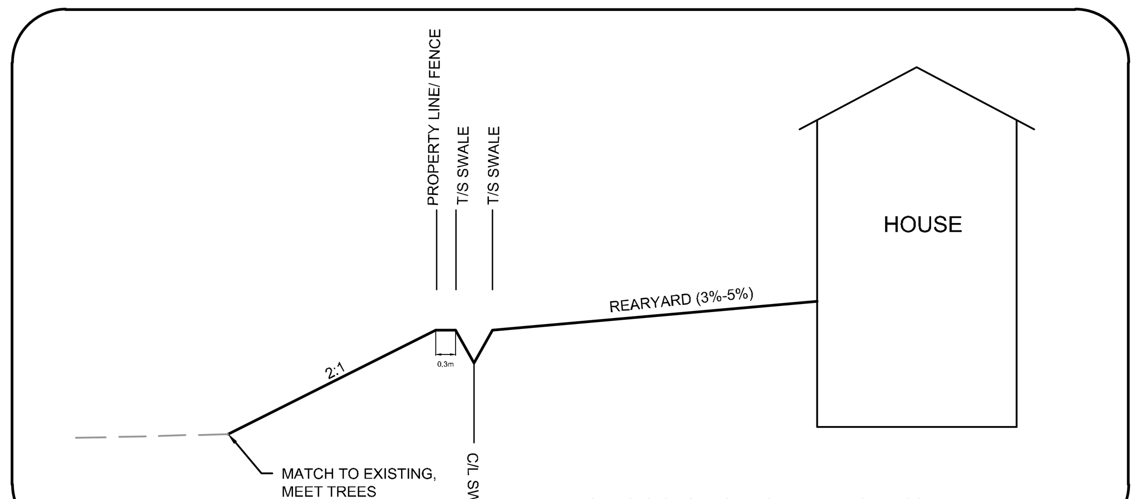
NOTE: FRONT LOT SETBACK FOR LOTS 44 TO 61 AND 66 TO 72 IS 5.0m.



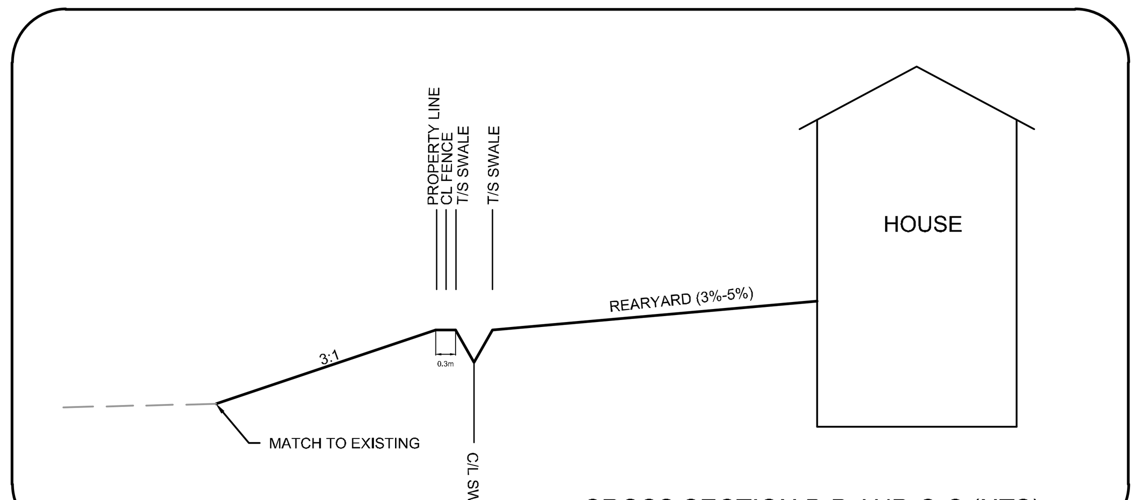
TYPICAL DETAIL OF DRIVEWAY WITH SLOPE OVER 5%

NOTES:

1. SIDEWALK/PATHWAY CROSSFALL TO BE 2-4%.
2. DRIVEWAY GRADES ON PLAN ARE THE AVERAGE FROM FRONT TERRACE TO EDGE OF PAVEMENT.



CROSS SECTION A-A (NTS)



CROSS SECTION B-B AND C-C (NTS)

REFER TO 110046-GR1 FOR NOTES

NOTE:
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AS-BUILT

No.	REVISION	DATE	BY
14.	AS-BUILT		MER
13.	REISSUED FOR CONSTRUCTION (PHASE 1B ONLY)	APR 28/14	MER
12.	ISSUED FOR SUBDIVSION REGISTRATION - PHASE 1B	FEB 21/14	MER
11.	REVISED SADLER DRIVE CROSS SECTION	NOV 12/13	MER
10.	REISSUED FOR CONSTRUCTION (REARYARD LOTS 1-8)	JULY 29/13	MER
9.	ISSUED FOR CONSTRUCTION (REARYARD LOTS 1-8)	JULY 29/13	MER
8.	REVISED REARYARD LOT 1-8	JULY 16/13	MER
7.	ISSUED FOR CONSTRUCTION (PHASE 1B ONLY)	APR 26/13	MER
6.	ISSUED FOR CONSTRUCTION	SEPT 10/12	JGR
5.	ISSUED FOR LIMITED CONSTRUCTION	JULY 11/12	MER
4.	ISSUED FOR MOE APPROVAL	JUNE 26/12	MER
3.	ISSUED FOR TENDER	MAY 14/12	MER
2.	ISSUED FOR TOWN APPROVAL	APR 30/12	MER
1.	ISSUED FOR TOWN REVIEW	JAN 31/12	MER

SCALE 1:500

1:500 — 0 5 10 15 20

DESIGN	CV
CHECKED	MER
DRAWN	CV
CHECKED	MER
APPROVED	JGR

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Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
TOWN OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 1 - GRADING PLAN

PROJECT No. 110046
REV: REV # 14
DRAWING No. 110046-GR2-REC

Billy McEwen

From:	Drew Blair
Sent:	Monday, February 6, 2023 4:13 PM
To:	Billy McEwen
Subject:	FW: Water and Wastewater Calculation Factors

Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 236

From: David Shen <dshen@mississippimills.ca>
Sent: Tuesday, January 31, 2023 11:34 AM
To: Drew Blair <D.Blair@novatech-eng.com>
Cc: Trevor McKay <t.mcKay@novatech-eng.com>; Melanie Riddell <m.riddell@novatech-eng.com>; Mark Bowen <M.Bowen@novatech-eng.com>
Subject: RE: Water and Wastewater Calculation Factors

See my response highlighted below.

Hello David,

We are currently working on a few projects in Mississippi Mills and would like to confirm some items for our water and wastewater calculations moving forward:

1. What are the accepted population density values for different types of dwelling units to be used for water and wastewater calculations? For Mill Run, the densities utilized were: 3.8 persons/unit for singles, 3.8 persons/unit for semi's, 3.5 persons/unit for towns and 3.0 persons/unit for apartments but this project was started in 2010. The City of Ottawa uses 3.4 persons/unit for singles and 2.7 persons/unit for semis/towns and 2-bedroom apartment average at 2.1 persons/unit. Would these lower population densities be acceptable to use?

Yes use the City of Ottawa Table 4.2, your numbers above are good.

2. From the 2018 Water and Wastewater Master Plan Update Report for MM, the average residential daily flow was set to 350 L/capita/day. Does this value still apply and for both water and wastewater calculations?

Yes 350 l/cap/d

3. The correction factor (K) for the Harmon Formula Peaking Factor is assumed to be 1.0 however the City of Ottawa has revised the residential correction factor to be 0.8 in 2018. Will the municipality consider using this correction factor?

Yes you can see k=0.8, please attach the COO 2018 guideline addendum for reference since some of our staff might not be aware of the change.

4. Under a separate submission (attached), we have recommended using OBC calculations to determine the water demand for fire flows versus using the FUS method. The OBC calculations provided fire flow demands that appear in-line with the 2018 Master Plan Update values. Can you please confirm that using OBC for fire flows is acceptable.

Answered in an early email.

Please let us know. We’re happy to discuss further.

Thanks,

Drew

Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
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Ottawa

21 March 2018

To: All holders of the *Ottawa Design Guidelines – Sewer*, Second Edition, October 2012

Subject: TECHNCAL BULLETIN ISTB-2018-01

Revisions to *Ottawa Design Guidelines – Sewer* dated 2012

This Technical Bulletin is being issued to amend sanitary design parameters and manhole spacing of the *Ottawa Design Guidelines – Sewer*, Second Edition, dated October 2012 and all subsequent Technical Bulletins.

Specifically, the following criteria have been reviewed and revised:

- wastewater design flow parameter for the design of sanitary sewers
- sanitary pumping station overflows criteria
- manhole spacing per MOECC *Design Guidelines for Sewage Works*
- ICD installation structure options for rear yard drainage.

For more information, please contact Ms. Anna Valliant, P.Eng., Senior Engineer, Guidelines and Standards at (613) 580-2424 ext 16904 or anna.valliant@ottawa.ca

Thank you,

Alain Gonthier, P.Eng.

Director, Infrastructure Services

21 March 2018

TECHNICAL BULLETIN ISTB-2018-01

This Technical Bulletin amends the *Ottawa Design Guidelines – Sewer*, Second Edition, dated October 2012 and all subsequent Technical Bulletins. All criteria presented in the *Ottawa Design Guidelines – Sewer* and all subsequent Technical Bulletins are considered valid and remain unchanged unless modified per the specific changes as outlined within this bulletin.

Criteria Review
This review deals with design flow parameters, pumping station overflows and storm and sanitary sewer manhole spacing criteria.

Specifically, the following criteria have been reviewed and revised:

1. Wastewater design flow parameter for the design of sanitary sewers
2. Sanitary pumping station overflows criteria
3. Manhole spacing as per MOECC *Design Guidelines for Sewage Works* (IBS 6879)

Summary Description of Changes

1. Design of Sanitary Sewers
Table 1: Comparison of Previous and Current Parameters provides a comparison of previous (no longer applicable) and current (revised) parameters. Under the current (revised) requirements, all new sanitary pipes are to be designed under free flow conditions using the flows as detailed under the Proposed Design Flow column in Table 1.

Table 1: Comparison of Previous and Current Parameters

Parameters	Previous (no longer applicable)			Current (revised)		
	Design	Annual	Rare	Design	Annual	Rare
Res. Per Capita	350	300	300	280	200	200
Commercial	50000	17000	17000	28000	17000	17000
Institutional	50000	17000	17000	28000	17000	17000
Industrial	35000	10000	10000	35000[4]	10000	10000
I/I dry	n/a	n/a	n/a	0.05	0.02[a]	0.02[a]
I/I wet	0.28	0.28[a]	0.5[a]	0.28	0.28[a]	0.53[a]
Total I/I	0.28	0.28[a]	0.5[a]	0.33	0.3[a]	0.55[a]
Harmon – Correction Factor	1	0.4-0.6	0.4-0.6	0.8	0.6	0.6
ICI Peak Factor	1.5	1	1	1.5/1[b]	1	1

Notes
[a] or higher with the support of monitoring data
[b] ICI Peak Factor = 1.5 if ICI in contributing area is >20%; ICI Peak Factor =1.0 if ICI in contributing area <20%

2. Revised Pumping Station Overflows Criteria

The Annual flow column is to be used to assess the HGL in the sanitary system assuming a catastrophic failure of the station (no pumping at all). The HGL under this situation cannot touch the building envelope (i.e. the underside of footing).

The parameters noted under the Rare column are to be used to assess the max HGL in the sanitary system under normal pumping station conditions (i.e. station operating at its rated capacity). Under this scenario, the HGL must be at least 0.3 m below the underside of footing. The pumping station overflow cannot be lower than the 25-year boundary condition of the receiving system.

3. Manhole Spacing

Under the new guidelines, the manhole spacing requirement has been revised to align with the requirements as detailed in the *MOECC Design Guidelines for Sewage Works* (IBS 6879) Section 5.9.1 Location and spacing.

Specific Changes

Based on the above overview, the specific changes to the text of the *Ottawa Design Guidelines – Sewer* are shown below. For clarity and ease of use, certain sections have been revised per the details below and are provided at the end of this bulletin, as indicated.

Section	Section Title	Page	Revision
4.1.1	Hydraulic Grade Line Requirements	4.1	Replace section in its entirety with the following: Sanitary sewer pipes shall be designed to operate under free flow conditions using the design flows. The maximum hydraulic grade line in the system shall be assessed using the rare event and assuming normal operating conditions (i.e. pumping stations are operating at their rated capacity). Under this scenario, the maximum HGL shall be no greater than 0.3 m below the underside of footing. An additional HGL analysis must also be undertaken assuming a catastrophic failure of the pumping station (see section 7.2.1.6.8) using the annual event and the pumping station is at the overflow level. Under this scenario, the maximum HGL must not touch the underside of footing.
4.4.1	Calculation of Peak Design Flows Figure 4.3Peak Flow Design Parameters Summary	4.5	Revise the following (*Revised Section 4.4.1 included at end of the tech bulletin*): Under AVERAGE WASTEWATER FLOWS • Change Residential Average Flow from 350 to 280 L/c/day • Change Commercial Average Flow from 50,000 to 28,000 L/gross ha/day

Section	Section Title	Page	Revision
			• Change Institutional Average Flow from 50,000 to 28,000 L/gross ha/day Under PEAKING FACTORS • Change K=Correction Factor from 1.0 to 0.8 • Under Commercial Peak Factor, add "if commercial contribution >20%, otherwise use 1.0" • Under Institutional Peak factor, "if institutional contribution >20%, otherwise use 1.0" Under PEAK EXTRANEOUS FLOWS: (design event) Remove allowances listed and replace with the following: • Infiltration Allowance (Dry weather): 0.05 L/s/effective gross ha (for all areas) • Infiltration Allowance (Wet weather): 0.28 L/s/effective gross ha (for all areas) • Infiltration Allowance (Total I/I): 0.33 L/s/effective gross ha (for all areas)
4.4.1.1	Domestic Flows	4.6	Replace section in its entirety with the following: For the design of new systems, the average residential flow of 280 L/capita per day (as noted in Figure 4.3) shall be used. The peaking factor shall be derived from the Harmon Formula with the minimum permissible peaking factor being 2.0 and the maximum being 4.0. A correction factor of 0.8 shall then be applied to the Harmon Peaking factor.
4.4.1.2	Commercial and Institutional Flows	4.6	• In the first paragraph, revise the second sentence from 50,000 to 28,000 L/gross ha/d • Add the following to the fourth paragraph: "If the commercial or institutional area is less than 20% of the total area, then a factor of 1.0 can be used."
4.4.1.4	Extraneous Flows New Areas	4.7	Replace section in its entirety with the following: In computing the total peak flow rates for design of sanitary sewers, the designer shall include allowances to account for flow from extraneous sources.

Section	Section Title	Page	Revision
			A general allowance of 0.33 L/s/effective gross ha (as noted in Figure 4.3) shall be applied, irrespective of land use classification, to account for wet-weather extraneous flow. Please note that to minimize extraneous flow through sanitary MH covers, all new sanitary MHs shall have covers without vent holes. Roof downspouts shall not be connected (either directly or indirectly) to sanitary sewers via foundation drains.
4.4.2	Monitored Flows	4.8	Replace section in its entirety with the following: When determining the capacity of an existing sanitary sewer, the use of existing flow data, derived from historical flow monitoring, is permissible. There are two types of monitored flows, namely the annual event and the rare event (see sections 4.4.3.2.2 and 4.4.3.2.3). Annual events are to be used to assess the impact of a catastrophic pumping station failure on the sanitary system while the rare event is to be used to assess the maximum wet weather HGL. In some instances, the use of flow monitoring information can be used to determine the existing flows. This is done on an individual basis and must be discussed with the city project manager beforehand.
4.4.3	Range of Operational Flows	4.8	In the last sentence of the second paragraph, replace "an example of operational flow parameters" with "Monitored Parameters".
4.4.3	Range of Operational Flows Figure 4.4 Example of Operational Parameters on Monitoring Data	4.9	Revise the following (*Revised Figure 4.4 included at end of the tech bulletin*):: Under AVERAGE WASTEWATER FLOWS • change Residential Average Flow from 300 to 200 L/c/day and add "(annual and rare)*" • add "(annual and rare)*" to Commercial Average Flow value • change Institutional Average Flow from 10,000 to 17,000 L/gross ha/d and add "(annual and rare)*" • add "(annual and rare)*" to Industrial Average Flow value • add the caveat "*Annual is the highest I/I during a typical year, Rare is the 100 year I/I"

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Section	Section Title	Page	Revision
			Under PEAKING FACTORS • Change K=Correction Factor from "0.4 to 0.6" to "0.6 (annual and rare)" Replace EXTRANEOUS FLOWS (Typical Values for Separated and Partially Separated Sewers), and Neighborhood and Large Drainage Area – collector Level Analysis with the following: EXTRANEOUS FLOWS (Typical values for Separated Sewers): Dry Weather Extraneous Flow: 0.02 L/s/gross ha (annual and rare) Wet Weather Extraneous Flow (total I/I): 0.30 L/s/gross ha (annual) 0.55 L/s/ha (rare) EXTRANEOUS FLOWS (Typical values for Partially Separated Sewers): Local Street Level Analysis (less than or equal to 10 ha): Wet Weather Extraneous Flow: 5.0 L/s/gross ha (rare event) Annual event to be determined at design Neighborhood Level Analysis (between 10 ha and 100 ha): Wet Weather Extraneous Flow: 3.0 L/s/gross ha (rare event) Annual event to be determined at design Large Drainage area – Collector Level Analysis (greater than 100 ha): Wet Weather Extraneous Flow: 2.0 L/s/gross ha (rare event) Annual event to be determined at design
4.4.3.1	Dry Weather Flows	4.10	• Replace the example with the following (*Revised Section 4.4.3.1 is included at end of the tech bulletin*): Example (Design): For 15 ha area (10 ha separated residential area at 60 persons/ha + 5 ha commercial area): Avg. DWF = (10 ha *60 persons/ha * 280 L/c/day) + (5 ha * 17,000 L/ha/day) + (15 ha * 0.05 L/s/ha) = 3.68 L/s. Peak DWF = (10 ha * 60 person/ha * 280 L/c/day * 4 * 0.8) + (5 ha * 17,000 L/ha/day * 1.5) + (15 ha * 0.05 L/s/ha) = 8.45 L/s • In the last paragraph, replace the first sentence with "It should be noted that the calculation of the peak dry

Section	Section Title	Page	Revision
			weather flow considers a peaking factor for ICI flow contributions because the ICI area is greater than 20%."
4.4.3.2	Wet Weather Flows – Extraneous Flow Contributions	4.10	Revise the last sentence to the following: The range of expected wet weather flows for design purposes can be categorized as typical, annual, or rare events corresponding to the anticipated frequency associated with these conditions.
4.4.3.2.1	Typical Wet Weather Flow Contributions	4.11	• Revise section title to "Typical (Design) Wet Weather Flow Contributions" • Replace section in its entirety to the following: The flow associated with the typical wet weather flow events represents the peak flow that could be expected to occur for most rainfall events. These flows include a computation of the dry weather flow contribution (average and peak where the range is significant) plus a component associated with wet weather extraneous flow. For planning level analyses in separated sewer systems, this component is typically based on a unit area flow contribution derived from rainfall in L/s/ha. When designing with the typical wet weather flow contribution, the sanitary system must remain in free flow condition.
4.4.3.2.2	Annual Peak Wet Weather Flow	4.11	Replace last sentence with the following: For new developments, this parameter is used to assess the HGL in a sanitary system assuming a catastrophic failure of the pumping station (See sections 4.1.1 and 7.2.1.6.8).
4.4.3.2.3	Extreme Wet Weather Flow Event	4.11	• Revise section title to "Rare Wet Weather Flow Event" (*Revised Section 4.4.3.2.3 is included at end of the tech bulletin*): • Replace the first sentence with the following: The flow associated with the rare wet weather flow event represents the maximum peak flow that could be expected to occur (a minimum of 1 time in 10 years). • Replace last sentence with the following:

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Section	Section Title	Page	Revision
			For new developments, this figure is used to assess the maximum HGL in a sanitary system under normal operating conditions (i.e. pumping stations are operating at their rated capacity). See section 4.1.1
5.4.9.3	Rear Yard Minor System (With Perforated Pipe)	5.32	Revise fifth sentence in the second paragraph by removing "to provide access for maintenance purposes." and replacing with "as per MOECC "*Design Guidelines For Sewage Works*" (IBS 6879) manholes location and spacing."
5.4.9.4	Rear Yard Pipe Connection to Storm Sewer	5.32	Replace section in its entirety to the following: For two or more rear yard catch basins connected in series, the last rear yard catch basin prior to connecting to a storm sewer system shall be a catch basin maintenance hole with a 750mm cover or a catch basin as per the City of Ottawa Standard. For structure depths greater than 2.4m, a catch basin maintenance hole shall be used. The inlet shall be located within the City ROW. The lead from the last rear yard CB to the storm sewer shall not be perforated pipe. The catch basin can be located in the roadway and form part of the road way drainage system. Sizing of the ICD must therefore account for roadway flow. If any of the upstream rear yard catch basins have a top of grate that is less than the proposed top of grate of the connecting (in the street), then the street catch basin shall have a solid cover as to not allow roadway ponding to spill into the rear yards via the rear yard pipe system.
6.2.2	Locations and Spacing	6.7	Revise the first sentence of the second paragraph by removing "at a maximum of 120m for all sizes" and replacing with "as per MOECC "*Design Guidelines For Sewage Works*" (IBS 6879) Section 5.9.1 Location and spacing."
7.2.1.6.8	Emergency Provision for Flood Protection	7.17	• Add the following to the end of the first paragraph: The overflow should be designed using the annual wet weather flow condition. The HGL in the upstream sanitary system should also be assessed to ensure that the maximum HGL does not touch the underside of footing of any building.

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Section	Section Title	Page	Revision
			• Remove the third, fourth and fifth sentences in the first paragraph in their entirety “The elevation of this conduit must be maintained at least 1.0 m below the elevation of the lowest basement elevation within the service area. This emergency connection should permit the excess flow to bypass the pumping station. If this is not possible, then a conduit from the pumping station wet well will be permitted.” • Replace the last sentence in the second paragraph with the following: “Emergency conduit connections should be above the 25-year stormwater elevation. • In the third paragraph, replace “Ontario Ministry of the Environment” with “Ontario Ministry of the Environment and Climate Change.

Ottawa

TECHNICAL BULLETIN ISTB-2018-01

Revised Section 4.4.1 Calculation of Peak Design Flows

The formulae and parameters to be applied in the calculation of peak design flows (standard peak flow design parameters) for new or infill developments are illustrated in Figure 4.3 and described as follows:

Figure 4.3 Peak Flow Design Parameters Summary

AVERAGE WASTEWATER FLOWS:

Residential Average Flow:	280 L/c/day
Commercial Average Flow:	28,000 L/gross ha/d
Institutional Average Flow:	28,000 L/gross ha/d
Average Light Industrial Flow:	35,000 L/gross ha/d
Average Heavy Industrial Flow	55,000 L/gross ha/d

PEAKING FACTORS:

Residential Peak factor: Harmon Equation

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where:

P=Population

K=Correction Factor = ~~1~~0.8

Commercial Peak factor:	1.5 if commercial contribution >20%, otherwise use 1.0
Institutional Peak factor:	1.5 if institutional contribution >20%, otherwise use 1.0
Industrial Peak Factor:	Per Figure in Appendix 4-B

PEAK EXTRANEOUS FLOWS: (design event)

Infiltration Allowance: (Dry weather)	0.05 L/s/effective gross ha (for all areas)
Infiltration Allowance: (Wet weather)	0.28 L/s/effective gross ha (for all areas)
Infiltration Allowance: (Total I/I)	0.33 L/s/effective gross ha (for all areas)

Revised Figure 4.4 Example of Operational Parameters on Monitoring Data

(Example – All values to be reviewed on case-by-case basis with City)

AVERAGE WASTEWATER FLOWS:
Residential Average Flow: 200 L/c/day (annual and rare)*
Commercial Average Flow: 17,000 L/gross ha/d (annual and rare)*
Institutional Average Flow: 17,000 L/gross ha/d (annual and rare)*
Industrial Average Flow: 10,000 L/gross ha/d (annual and rare)*
*Annual is the highest I/I during a typical year, Rare is the 100 year I/I

PEAKING FACTORS:
Residential Peak factor: Harmon Equation

$$P.F.=1+\left(\frac{14}{4+\left(\frac{P}{1000}\right)^{\frac{1}{2}}}\right)*K$$

where: P=Population
K=Correction Factor = 0.6 (annual and rare)*

Commercial Peak factor: 1 (non-coincident peak)
Institutional Peak factor: 1 (non-coincident peak)
Industrial Peak factor: 1 (non-coincident peak)

EXTRANEOUS FLOWS (Typical Values for Separated Sewers):
Dry Weather Extraneous Flow: 0.02 L/s/gross ha (annual and rare)*
Wet Weather Extraneous Flow (total I/I): 0.30 L/s/gross ha (annual)*
0.55 L/s/ha (rare)*

EXTRANEOUS FLOWS (Typical values for Partially Separated Sewers):
Local Street Level Analysis (less than or equal to 10 ha):
Wet Weather Extraneous Flow: 5.0 L/s/gross ha (rare event)
Annual event to be determined at design

Neighborhood Level Analysis (between 10 ha and 100 ha):
Wet Weather Extraneous Flow: 3.0 L/s/gross ha (rare event)
Annual event to be determined at design

Large Drainage area – Collector Level Analysis (greater than 100 ha):
Wet Weather Extraneous Flow: 2.0 L/s/gross ha (rare event)
Annual event to be determined at design

Revised Section 4.4.3.1 Dry Weather Flows

Dry weather flows (DWF) represent the typical operating conditions in sanitary sewer systems. They are important considerations in the design of wastewater facilities to reduce potential operational and maintenance problems such as sediment/grit deposition and accumulation as well as extended retention times within the facilities and/or collection system leading to odour and system corrosion concerns.

The calculation of the expected DWF range should consider, at minimum, the determination of the average and peak DWF values. These should be calculated as follows:

Average DWF = AWF(all land uses) + DWGWI(all land uses)

Peak DWF = AWF(res)*Peaking Factor+ AWF(ICI) + DWGWI(all land uses)

Note: DWF = Dry weather flow
AWF = Average Wastewater Flow,
Res = Residential
DWGWI = Dry Weather Ground Water Infiltration,
ICI = Institutional Commercial Industrial

Example: For 15 ha area (10 ha separated residential area at 60 persons/ha + 5 ha commercial area):

Avg. DWF = (10 ha *60 persons/ha * 280 L/c/day) + (5 ha * 17,000 L/ha/day) + (15 ha * 0.05 L/s/ha) = 3.68 L/s.

Peak DWF = (10 ha * 60 person/ha * 280 L/c/day * 4 * 0.8) + (5 ha * 17,000 L/ha/day * 1.5) + (15 ha * 0.05 L/s/ha) = 8.45 L/s

See Figure 4.4 for applicable parameters.

It should be noted that the calculation of the peak dry weather flow considers a peaking factor for ICI flow contributions because the ICI area is greater than 20%. In most cases, the peaking of the residential component rather than the ICI component will provide the more realistic estimate of the peak DWF. In areas where the ICI land uses are larger than the residential component, however, the peaking of the ICI flows may provide a more realistic estimate of the actual peak flow than an estimate based on residential flow.

Revised Section 4.4.3.2.3 Rare Wet Weather Flow Event

The flow associated with the rare wet weather flow event represents the maximum peak flow that could be expected to occur (a minimum of 1 time in 10 years). These flows include the dry weather flows plus a component associated with wet weather extraneous flow. For planning level analyses in separated sewer systems, this component is typically based on a unit-based contribution derived from rainfall in L/s/ha. A statistical analysis of long-term (minimum of 10 years) flow monitoring records will provide the basis for a good estimate of the extreme wet weather flow event for a given area. For new developments, this figure is used to assess the maximum HGL in a sanitary sewer under normal operating conditions (i.e. pumping stations are operating at their rated capacity). See section 4.1.1.

Revised Section 7.2.1.6.8 Emergency Provision for Flood Protection

In anticipation of a potential catastrophic failure of a wastewater pumping facility and above contingency provisions, the feasibility of providing a gravity -based emergency conduit is to be evaluated as a "last line of protection" against basement flooding. The elevation and hydraulic capacity of emergency conduit connections are to be optimized to minimize the risk of basement flooding due to sanitary system backup. The overflow should be designed using the annual wet weather flow condition. The HGL in the upstream sanitary system should also be assessed to ensure that the maximum HGL does not touch the underside of footing of any building.

Provision for an emergency conduit connection to an adjacent or downstream sanitary sewer system is preferred; however, a connection of the conduit to a storm sewer system or watercourse is often the only feasible option. Emergency conduit connections to storm sewers with downstream stormwater treatment facilities are preferred over direct connections to watercourses. Emergency conduit connections should be above the 25-year stormwater elevation.

Emergency conduit connections to storm sewers, storage facilities, natural water courses, or surface outfall points will be subject to approval by the Ontario Ministry of the Environment and Climate Change. The emergency conduits should also be identified as part of the Municipal Class Environmental Assessment Process.

Emergency conduit connections shall be provided with suitable protection to prevent backflow from the flow receptor into the pumping station. This may consist of backwater valves and/or shut off valving.

End of Technical Bulletin ISTB-2018-01

Billy McEwen

From: Drew Blair
Sent: Monday, July 10, 2023 1:49 PM
To: Steve Matthews; Billy McEwen
Subject: FW: Mill Run Extension - Downstream Sanitary Capacity Analysis
Attachments: Re: Mill Run Expansion - Proposal

Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
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240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 236

From: Melanie Riddell <m.riddell@novatech-eng.com>
Sent: Friday, July 7, 2023 6:48 PM
To: Drew Blair <D.Blair@novatech-eng.com>
Subject: FW: Mill Run Extension - Downstream Sanitary Capacity Analysis

Melanie E. Riddell, P.Eng., Director | Land Development
NOVATECH
Engineers, Planners & Landscape Architects
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From: Annie Williams <awilliams@jlrichards.ca>
Sent: Friday, July 7, 2023 5:13 PM
To: Stefanie Kaminski <SKaminski@regionalgroup.com>; David Shen <dshen@mississippimills.ca>
Cc: Bobby Pettigrew <bpettigrew@jlrichards.ca>; Mark Buchanan <mbuchanan@jlrichards.ca>; Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Mathieu Lacelle <mlacelle@jlrichards.ca>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

Hi Stefanie, David,

In response to the email from David Shen (June 28, 2023 – attached), one scenario was assessed based on the future servicing requirements outlined in the email. The scenario used the flow breakdown provided by the municipality in the corresponding email.

In previous email correspondences, the approved flow for the Mill Run Extension was 9.79 L./s. This value accounted for peak daily flows and extraneous flows from the proposed phases Mill Run Extension and used a peaking factor of 3.4 for the residential flows.

The master planning level modelling being carried out applies a calibrated daily flow pattern to provide a dynamic input into the model, therefore the average flow based on population will be used rather than peak flow rates incorporating the peaking factor. To calculate the average flows from the proposed extension project, population and area values were extracted directly from the site servicing report. A population of 515 and a total area of 9.74 ha were used with parameters agreed upon with the municipality for in the Mississippi Mills Master Plan. A residential average flow of 350 L/cap/day was used to determine the average loading flow and an infiltration inflow of 0.28L/s/ha was used to calculate the extraneous flows. The resulting average flows generated by the proposed development is 2.086 L/s, which represents the sum of average daily flows for the proposed residential buildings. Additionally, the resulting baseline flow generated as a result of this project is 2.727 L/s which represents the total extraneous flows. The following scenario was assessed in the dynamic calibrated trunk sewer sanitary model:

Location:	**SA4MH-108, North of the intersection of Ottawa Street and Sadler Drive**	**Total**
Scenario 1	full buildout population (515 population, 9.74 ha total area)	full buildout population (515 population, 9.74 ha total area)

In assessing future capacity two constraints were assessed:

- Maintaining free flow capacity in the dry weather flow scenario; and,
- Maintaining 1.8 metre freeboard to the ground elevation in the 1:25 year return period event storm to protect basements. Where the current sewer is already within the basement elevation the HGL is restricted to 0.3m above the sewer.

In summary:

DWF Event Scenarios:

- No capacity concerns under the DWF event have been triggered by the Mill Run Expansion Development in the dynamic calibrated dry weather flow event for **Scenario 1** above.

25-year Storm Events:

- No capacity concerns under the 25-year storm event have been triggered by the Mill Run Expansion Development in the dynamic calibrated dry weather flow event for Scenario 1 above. The proposed development flows do not impact areas of concern under the existing condition.

Note that the foregoing model results are for current conditions and are based on computer model simulation. We have not reviewed the adequacy of the wastewater flow calculations for the proposed development, which remains the responsibility of the Developer's Engineer.

The model results are based on current simulated operation of the Municipality's sewer collection system. The computer model simulations are based on the best information available at this time. The operation of the system can change on a regular basis, resulting in a variation in the boundary conditions. It is further noted that the operational characteristics of the wastewater collection system and physical properties of the sewers can change and/or deteriorate over time. These changes may affect the collection characteristics of the system and the assumptions made in developing the model, which in turn could lead to variations in the simulation results. This should be considered by any third party undertaking simulation of system upgrades.

Any questions on the above let us know,
Annie

Annie Williams, P.Eng.
Civil Engineer

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& Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

CANADA BEST MANAGED COMPANIES Platinum member

From: Stefanie Kaminski <SKaminski@regionalgroup.com>
Sent: Wednesday, June 28, 2023 11:21 AM
To: Mark Buchanan <mbuchanan@jlrichards.ca>; David Shen <dshen@mississippimills.ca>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

Perfect, thank you!

Stefanie Kaminski
Project Manager, Land Development

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From: Mark Buchanan <mbuchanan@jlrichards.ca>
Sent: Wednesday, June 28, 2023 11:18 AM
To: Stefanie Kaminski <SKaminski@regionalgroup.com>; David Shen <dshen@mississippimills.ca>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

You're welcome Stefanie,

No, sooner we target 2 weeks, 10 business days or less to turn this around.

Mark

Mark Buchanan, P.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-804-5349

From: Stefanie Kaminski <SKaminski@regionalgroup.com>
Sent: Wednesday, June 28, 2023 11:10 AM
To: Mark Buchanan <mbuchanan@jlrichards.ca>; David Shen <dshen@mississippimills.ca>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

Mark,

Thank you for the update. Can we expect the report in 4 weeks' time, at the end of July?

Regards,

Stefanie Kaminski
Project Manager, Land Development

Regional Group
1737 Woodward Drive
Ottawa, ON K2C 0P9
T: 613-230-2100 x 7301
C: 613-858-8821

skaminski@regionalgroup.com
www.regionalgroup.com

From: Mark Buchanan <mbuchanan@jlrichards.ca>
Sent: Wednesday, June 28, 2023 10:50 AM
To: David Shen <dshen@mississippimills.ca>; Stefanie Kaminski <SKaminski@regionalgroup.com>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

Good Morning David,

Sorry to hear you are under the weather. I hope you get well soon.

To close the loop with everyone, we are proceeding with the assignment based on this mornings go ahead, based on our June 22 scoping email. See attached.

Regards,
Mark

From: David Shen <dshen@mississippimills.ca>
Sent: Wednesday, June 28, 2023 10:37 AM
To: Stefanie Kaminski <SKaminski@regionalgroup.com>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>
Subject: Re: Mill Run Extension - Downstream Sanitary Capacity Analysis

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Hi Mark,

I am sick at home today. We have been discussing this assignment for a few times. Two weeks ago a Friday you mentioned you had drafted an email to Regional group. I thought it was already done.

David

Sent from my iPhone

On Jun 28, 2023, at 10:17 AM, Stefanie Kaminski <SKaminski@regionalgroup.com> wrote:

Mark Buchanan, P.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-804-5349

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi David, Mark,

Kindly touching base on the capacity analysis for the Mill Run Extension. Can you confirm if we will receive a copy of the cost estimate to review, or has the green light already been provided to move ahead with the work? Any updates would be greatly appreciated.

Thanks,

Stefanie Kaminski
Project Manager, Land Development

<image001.jpg>

Regional Group

1737 Woodward Drive
Ottawa, ON K2C 0P9
T: 613-230-2100 x 7301
C: 613-858-8821

skaminski@regionalgroup.com
www.regionalgroup.com

From: David Shen <dshen@mississippimills.ca>
Sent: Thursday, June 15, 2023 1:56 PM
To: Mark Buchanan <mbuchanan@jlrichards.ca>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>; Stefanie Kaminski <SKaminski@regionalgroup.com>
Subject: RE: Mill Run Extension - Downstream Sanitary Capacity Analysis

Hi Mark,

See below. I will call you to discuss.

David

From: Stefanie Kaminski <SKaminski@regionalgroup.com>
Sent: Thursday, June 15, 2023 1:42 PM
To: David Shen <dshen@mississippimills.ca>
Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Melanie Knight <mknight@mississippimills.ca>
Subject: Mill Run Extension - Downstream Sanitary Capacity Analysis

Good afternoon David,

To follow up from our discussion about the Mill Run Extension in our meeting on June 6th, can you please confirm that the Town has received a proposal from JL Richards to complete the Downstream Sanitary Capacity Analysis for the Mill Run Extension?

We have not received anything to date. I trust that this proposal will be shared with us once received?

Thanks,

Stefanie Kaminski
Project Manager, Land Development

<image001.jpg>

Regional Group
1737 Woodward Drive
Ottawa, ON K2C 0P9
T: 613-230-2100 x 7301
C: 613-858-8821

skaminski@regionalgroup.com

Appendix D: Water Distribution

Mark Bowen

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Tuesday, July 25, 2023 9:27 AM
To: Melanie Riddell; David Shen
Cc: Luke Harrington; Drew Blair; Stefanie Kaminski; Mark Bowen; Mark Buchanan; Ahrani Gnananayakan
Subject: RE: Mill Run Extension - Watermain Boundary Condition Request (121125)
Attachments: 29920-019_Mill Run Exp_Model Results.pdf

Hi Melanie, David,

Please find below and attached the requested hydraulic boundary conditions for the following connections:

- One (1) connection to the existing 250 mm watermain at the intersection of Sadler and Leishman; and
- One (1) connection to the existing 250 mm watermain at the intersection of Walsh and Leishman.

The proposed Development ("Mill Run Extension, Phases 7 & 8"), located north of Leishman and the existing Mill Run subdivision in the Municipality of Mississippi Mills (Municipality), was simulated using the Municipality's existing hydraulic water model (2017) to determine hydraulic boundary conditions based on theoretical water demands and fire flows provided by the Developer's Engineer (refer to emails below).

Table 1 summarizes the theoretical water demands that were included in the model.

Table 1: Theoretical Water Demands

Scenario	Demand (L/s)
Average Day	1.6
Maximum Day	3.9
Peak Hour	8.5

Table 2 summarizes the various required fire flows as calculated by the Developer's Engineer that were used for the Basic Scope.

Table 2: Fire Flow Calculations

Fire Flows (L/s)	
105	133

The development was modelled with a representative 250 mm diameter on-site watermain loop and junction node J-595. The hydraulic boundary conditions were generated at the connection locations labelled as junction nodes J-546 and J-590 in the model and are summarized in Table 3, with the WaterCAD model outputs provided in the attached. The elevation at the nodes was estimated using Google Earth. The average day scenario assumes the maximum elevated tank level of 180.84 m with all well pumps off. The maximum day plus fire flow and peak hour scenarios assume an elevated tank level of 180.00 m with all well pumps on. **The simulated maximum available fire flow at the representative node is 161 L/s.**

Table 3: Mill Run Expansion Boundary Conditions

Demand Scenario	Connection 1 – Sadler Junction Node J-546 (Elev 141.00 m)		Connection 2 – Walsh Junction Node J-590 (Elev 143.22 m)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Average Day (1.6 L/s)	388	180.68	367	180.68
Max Day (3.9 L/s)	381	179.91	359	179.91
Max Day (3.9 L/s) + Fire Flow (105 L/s)	294	171.05	271	170.95

Max Day (3.9 L/s) + Fire Flow (133 L/s)	249	166.47	226	166.31
Peak Hour (8.5 L/s)	376	179.42	354	179.42

Note that the foregoing model results are for current conditions and are based on computer model simulation. We have not reviewed the adequacy of the domestic demand nor the fire flow requirements for the proposed development, which remains the responsibility of the Developer's Engineer.

Disclaimer: The model results are based on current simulated operation of the Municipality's water distribution system. The computer model simulation is based on the best information available at this time. The operation of the water distribution system can change on a regular basis, resulting in a variation in the boundary conditions. It is further noted that the operational characteristics of the water supply system and physical properties of the watermains can change and/or deteriorate over time. These changes may affect the supply characteristics of the system and the assumptions made in developing the model, which in turn could lead to variations in the simulation results. This should be considered by any third party undertaking simulation of system upgrades.

Please do not hesitate to contact me should you have any questions regarding the foregoing.

Thank you,
Annie

Annie Williams, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-803-4523

J.L. Richards & Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

BEST MANAGED COMPANIES Platinum member

From: Melanie Riddell <m.riddell@novatech-eng.com>
Sent: Monday, July 24, 2023 3:55 PM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: David Shen <dshen@mississippimills.ca>; Luke Harrington <lharrington@mississippimills.ca>; Drew Blair <D.Blair@novatech-eng.com>; Stefanie Kaminski <SKaminski@regionalgroup.com>; Mark Bowen <M.Bowen@novatech-eng.com>
Subject: RE: Mill Run Extension - Watermain Boundary Condition Request (121125)

Hi Annie,

I'm just getting caught up on emails after being on vacation. Please confirm that you have everything you need to provide boundary conditions and that the timing is still this week to receive them.

Thanks,

Melanie E. Riddell, P.Eng., Director | Land Development
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 240 | Cell: 613.276.7240

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Friday, July 14, 2023 11:59 AM
To: Mark Bowen <M.Bowen@novatech-eng.com>
Cc: David Shen <dshen@mississippimills.ca>; Luke Harrington <lharrington@mississippimills.ca>; Melanie Riddell <m.riddell@novatech-eng.com>; Drew Blair <D.Blair@novatech-eng.com>; Stefanie Kaminski <SKaminski@regionalgroup.com>
Subject: RE: Mill Run Extension - Watermain Boundary Condition Request (121125)

Hello Mark,

I have spoken with David Shen and we have received approval from the Municipality to proceed with this request as follows:

Basic Scope for Mill Run Expansion as follows:

1. David Shen to confirm flow rate calculations, modelling to proceed simultaneously.
2. Provide hydraulic boundary conditions assuming two (2) connection points (Connection 1 and Connection 2), under the following demand scenarios:
   a. Average Day
   b. Maximum Day
   c. Peak Hour
3. For Maximum Day + Fire Flow, we will confirm the existing available fire flow on the site under maximum day demand.

We will provide the Basic Scope within seven (7) business days. We will work on a time basis to an upset limit of **$3,500** (excl. disbursement and tax).

We will follow up with an 'Additional Scope' for the other requested connection locations and fire flows.

Thank you,
Annie

Annie Williams, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-803-4523

J.L. Richards
& Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

From: Mark Bowen <M.Bowen@novatech-eng.com>
Sent: Monday, July 10, 2023 1:26 PM
To: David Shen <dshen@mississippimills.ca>; Luke Harrington <lharrington@mississippimills.ca>

Cc: Melanie Riddell <m.riddell@novatech-eng.com>; Drew Blair <D.Blair@novatech-eng.com>; Stefanie Kaminski <SKaminski@regionalgroup.com>
Subject: Mill Run Extension - Watermain Boundary Condition Request (121125)

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi David,

In support of the Mill Run Extension Draft Plan Submission we are requesting watermain boundary conditions. The attached CP8.pdf confirms the scope of the Mill Run Extension develop (Phases 7 and 8). The attached Connection Points.pdf and Key Plan.PDF confirm the locations of the all possible watermain connections.

The Mill Run Extension water demands (excluding fire flow) are:

1. high pressure = 1.6L/s
2. maximum daily = 3.9L/s
3. peak hour = 8.5L/s

The Mill Run Extension requested fire flows (OBC and FUS) are:

1. 45L/s
2. 105L/s
3. 133L/s
4. 167L/s
5. 200L/s
6. 250L/s.

Can you please provide the boundary conditions for the high pressure and peak hour conditions with the following connection points:

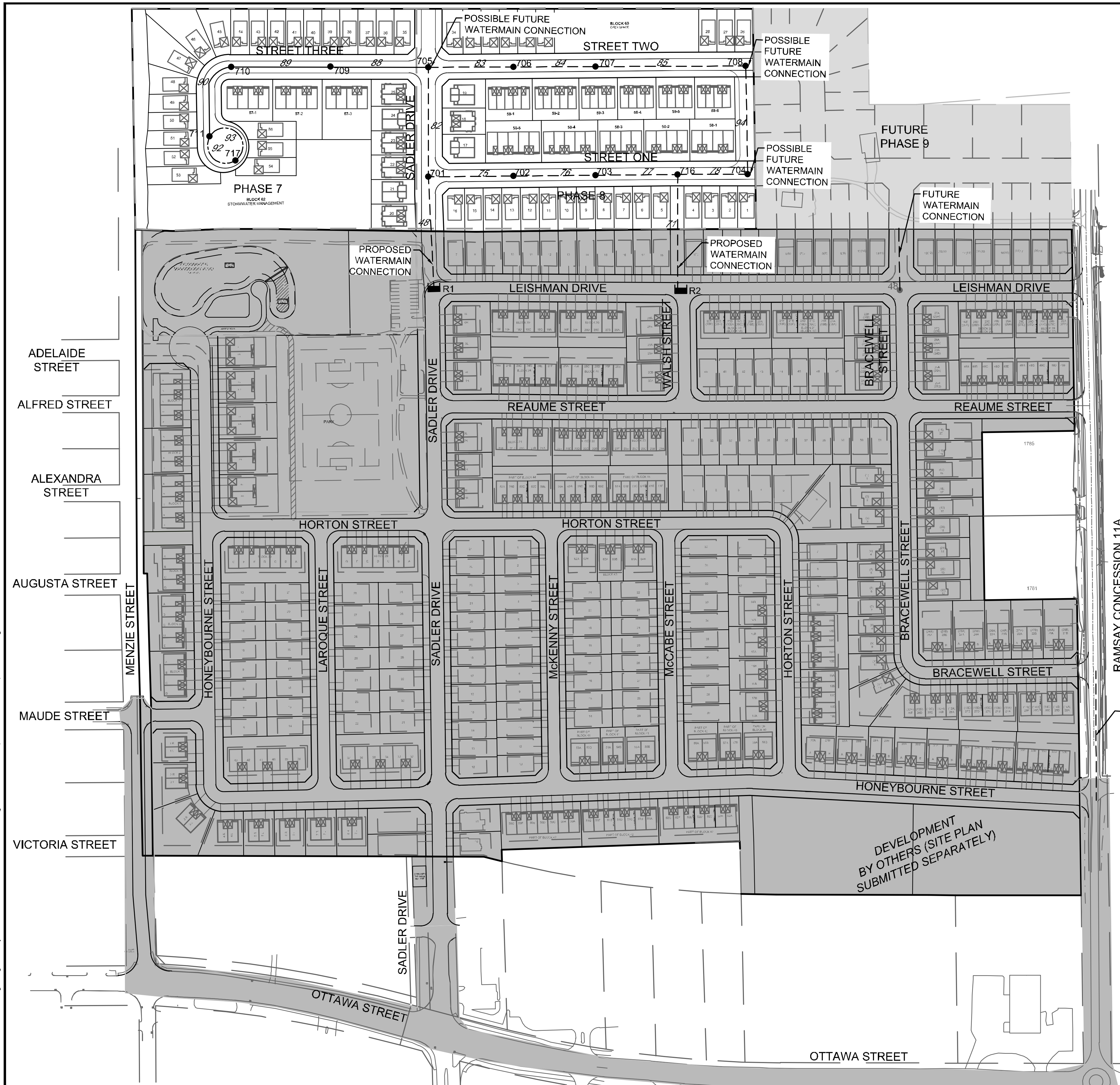
1. Connection points 1 and 2
2. Connection Points 1, 2, and 3
3. Connection points 1, 2, and 4
4. Connection points 1, 2, 3, and 4

Can you please provide boundary conditions for the max. daily demand and all noted fire flows with the following connection points:

1. Connection points 1 and 2
2. Connection Points 1, 2, and 3
3. Connection points 1, 2, and 4
4. Connection points 1, 2, 3, and 4

Please let us know if you have any questions and/or concerns.

Mark Bowen, B. Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 231



LEGEND

92	PROPOSED 50mmØ WATERMAIN PIPE
4	PROPOSED 200mmØ WATERMAIN PIPE
5	PROPOSED 250mmØ WATERMAIN PIPE
4	WATERMAIN NODE
▲	PUMP
	RESERVOIR
	EXISTING PHASE 1-6
	PROPOSED PHASE 7-8
	FUTURE PHASE 9

NOTES:

1. REFER TO APPENDIX D FOR ALL WATERMAIN DETAILS (ie SIZE, LENGTH AND ELEVATIONS).

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

MUNICIPALITY OF MISSISSIPPI MILLS MILL RUN EXTENSION AT ALMONTE PHASES 7-8 WATERMAIN LAYOUT

OCT 6, 2023 121125 FIGURE WM

M:\2021\121125\CAD\Design\Figures\Hydraulic\121125-Ph7-Ph8-WM.dwg, WM-nodes, Sep 20, 2023 - 2:13pm, smclaughlin

SHT11X17.DWG - 279mmX432mm

Table D1
Calculated Water Demand
Mill Lands (Phases 7-8)
Almonte, ON
JOB NO. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Mills Extenstion (Mill Run Phases 7-8)									
Location	Node	Elev. (m)	Unit Type			Pop	Demand (L/s)		
			Semis Singles	Towns	Apart		High Pressure	Max Daily	Peak Hour
Street 1	701	140.6	12	0	0	41	0.17	0.42	0.91
	702	141.0	6	10	0	47	0.19	0.48	1.05
	703	141.5	4	8	0	35	0.14	0.35	0.78
	704	141.7	4	4	0	24	0.10	0.24	0.53
	716	141.6	0	0	0	0	0.00	0.00	0.00
Street 2	705	140.7	12	0	0	41	0.17	0.42	0.91
	706	141.0	4	10	0	41	0.17	0.42	0.91
	707	141.2	0	12	0	32	0.13	0.32	0.71
	708	141.3	3	4	0	21	0.09	0.21	0.47
Street 3	709	141.0	6	6	0	37	0.15	0.37	0.82
	710	141.1	8	6	0	43	0.17	0.44	0.96
	711	141.6	0	0	0	0	0.00	0.00	0.00
	717	141.6	6	0	0	20	0.08	0.20	0.45
Mills Ext. Total			**65**	**60**	**0**	**382**	**1.55**	**3.87**	**8.51**

Table D2
Pipe Data
Mill Lands (Phases 7-8)
Almonte, ON
JOB NO. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D2
Mill Run Phase 7 -8
Pipe Data

Pipe	Length (m)	Diameter (mm)	Roughness Coefficient
48	83.0	250	110
71	83.0	250	110
75	76.0	250	110
76	74.0	250	110
77	24.0	250	110
78	53.0	250	110
82	83.0	250	110
83	66.0	250	110
84	80.0	250	110
85	79.0	250	110
88	68.0	200	110
89	83.0	200	110
90	43.0	200	100
92	40.0	50	100
93	40.0	50	100
94	83.0	250	110

Table D3
High Pressure
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D3 Phase 7 and 8 High Pressure Check						
Node	**Elevation** (m)	**Demand** (LPS)	**Head** (m)	**Pressure** (m)	(PSI)	**Age** (Hrs)
Junc 44	140.0	0.06	180.9	40.9	**58.1**	0.0
Junc 46	141.3	0.21	180.7	39.4	56.0	0.7
Junc 701	140.6	0.17	180.8	40.2	57.1	0.1
Junc 702	141.0	0.19	180.8	39.8	56.6	0.2
Junc 703	141.5	0.14	180.7	39.2	55.8	0.3
Junc 716	141.6	0.00	180.7	39.1	55.7	0.6
Junc 705	140.7	0.17	180.8	40.1	57.0	0.2
Junc 704	141.7	0.10	180.7	39.0	55.5	0.9
Junc 706	141.0	0.17	180.8	39.8	56.6	0.4
Junc 707	141.2	0.13	180.8	39.6	56.3	0.6
Junc 708	141.3	0.09	180.8	39.5	56.1	0.7
Junc 709	141.0	0.15	180.8	39.8	56.6	1.7
Junc 710	141.1	0.17	180.8	39.7	56.4	4.6
Junc 711	141.6	0.00	180.8	39.2	55.7	9.3
Junc 717	141.6	0.08	180.8	39.2	55.7	**9.9**
Resvr 1*			180.7			
Resvr 2*			180.7			
Maximum Pressure						
Maximum Age						
*** Boundary Condition**						

Table D4
Peak Hour
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D4
Phase 7 and 8 Peak Hour Check

Node	Elevation	Demand	Head	Pressure	
	(m)	(LPS)	(m)	(m)	(PSI)
Junc 44	140	0.25	179.42	39.42	56.1
Junc 46	141.3	0.94	179.42	38.12	54.2
Junc 701	140.6	0.91	179.41	38.81	55.2
Junc 702	141	1.05	179.41	38.41	54.6
Junc 703	141.5	0.78	179.41	37.91	53.9
Junc 716	141.6	0	179.42	37.82	53.8
Junc 705	140.7	0.91	179.41	38.71	55.0
Junc 704	141.7	0.53	179.41	37.71	53.6
Junc 706	141	0.91	179.41	38.41	54.6
Junc 707	141.2	0.71	179.41	38.21	54.3
Junc 708	141.3	0.47	179.41	38.11	54.2
Junc 709	141	0.82	179.41	38.41	54.6
Junc 710	141.1	0.96	179.41	38.31	54.5
Junc 711	141.6	0	179.41	37.81	53.8
Junc 717	141.6	0.45	179.37	37.77	53.7
Resvr 1*			179.42		
Resvr 2*			179.42		

*** Boundary Condition**

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D5A Phases 7 and 8 Maximum Daily Fire Demand Fire Flow at Node 701					
Node	**Elevation (m)**	**Demand (LPS)**	**Head (m)**	**Pressure (m)**	**Pressure (PSI)**
Junc 44	140.0	0.11	174.19	34.19	48.6
Junc 46	141.3	0.43	174.55	33.25	47.3
Junc 701	140.6	100.42	173.25	32.65	46.4
Junc 702	141.0	33.48	173.28	32.28	45.9
Junc 703	141.5	0.35	173.63	32.13	45.7
Junc 716	141.6	0	173.74	32.14	45.7
Junc 705	140.7	0.42	173.33	32.63	46.4
Junc 704	141.7	0.24	173.68	31.98	45.5
Junc 706	141.0	0.42	173.4	32.4	46.1
Junc 707	141.2	0.32	173.49	32.29	45.9
Junc 708	141.3	0.21	173.58	32.28	45.9
Junc 709	141.0	0.37	173.33	32.33	46.0
Junc 710	141.1	0.44	173.33	32.23	45.8
Junc 711	141.6	0	173.33	31.73	45.1
Junc 717	141.6	0.2	173.32	31.72	45.1
Minimum Pressure					

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D5B
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 702

Node ID	**Elevation** (m)	**Demand** (LPS)	**Head** (m)	**Pressure** (m)	(PSI)
Junc 44	140.0	0.11	174.4	34.4	33.0
Junc 46	141.3	0.43	174.3	33.0	31.7
Junc 701	140.6	0.42	173.5	32.9	31.1
Junc 702	141.0	100.48	172.9	31.9	30.1
Junc 703	141.5	33.35	173.2	31.7	29.9
Junc 716	141.6	0.00	173.5	31.9	30.1
Junc 705	140.7	0.42	173.5	32.8	30.9
Junc 704	141.7	0.24	173.5	31.8	30.0
Junc 706	141.0	0.42	173.5	32.5	30.6
Junc 707	141.2	0.32	173.5	32.3	30.4
Junc 708	141.3	0.21	173.5	32.2	30.3
Junc 709	141.0	0.37	173.5	32.5	30.0
Junc 710	141.1	0.44	173.5	32.4	29.9
Junc 711	141.6	0.00	173.5	31.9	29.4
Junc 717	141.6	0.20	173.5	31.9	29.4
Minimum Pressure					

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D5C Phases 7 and 8 Maximum Daily Fire Demand Fire Flow at Node 703					
	Elevation	**Demand**	**Head**	**Pressure**	
Node ID	(m)	(LPS)	(m)	(m)	(PSI)
Junc 44	140.0	0.11	174.5	34.5	33.1
Junc 46	141.3	0.43	174.3	33.0	31.6
Junc 701	140.6	0.42	173.6	33.0	31.2
Junc 702	141.0	33.48	173.1	32.1	30.3
Junc 703	141.5	100.35	173.0	31.5	29.7
Junc 716	141.6	0.00	173.4	31.8	30.0
Junc 705	140.7	0.42	173.6	32.9	30.9
Junc 704	141.7	0.24	173.4	31.7	29.9
Junc 706	141.0	0.42	173.5	32.5	30.6
Junc 707	141.2	0.32	173.5	32.3	30.4
Junc 708	141.3	0.21	173.5	32.2	30.3
Junc 709	141.0	0.37	173.6	32.6	30.0
Junc 710	141.1	0.44	173.6	32.5	29.9
Junc 711	141.6	0.00	173.6	32.0	29.4
Junc 717	141.6	0.20	173.6	32.0	29.4
Minimum Pressure					

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D5D
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 705

Node ID	**Elevation** (m)	**Demand** (LPS)	**Head** (m)	**Pressure** (m)	(PSI)
Junc 44	140.0	0.11	174.3	34.3	48.8
Junc 46	141.3	0.43	174.4	33.1	47.1
Junc 701	140.6	0.42	173.4	32.8	46.7
Junc 702	141.0	0.48	173.5	32.5	46.2
Junc 703	141.5	0.35	173.6	32.1	45.6
Junc 716	141.6	0.00	173.6	32.0	45.5
Junc 705	140.7	100.42	172.0	31.3	44.5
Junc 704	141.7	0.24	173.3	31.6	44.9
Junc 706	141.0	33.42	172.0	31.0	44.1
Junc 707	141.2	0.32	172.5	31.3	44.4
Junc 708	141.3	0.21	172.9	31.6	44.9
Junc 709	141.0	0.37	172.0	31.0	44.1
Junc 710	141.1	0.44	172.0	30.9	43.9
Junc 711	141.6	0.00	172.0	30.4	43.2
Junc 717	141.6	0.20	172.0	30.4	43.2

Minimum Pressure

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
Revised: Oct. 6/23

Table D5E
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 706

Node ID	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
Junc 44	140.0	0.11	174.4	34.4	48.9
Junc 46	141.3	0.43	174.4	33.1	47.0
Junc 701	140.6	0.42	173.5	32.9	46.8
Junc 702	141.0	0.48	173.5	32.5	46.2
Junc 703	141.5	0.35	173.5	32.0	45.5
Junc 716	141.6	0.00	173.5	31.9	45.4
Junc 705	140.7	0.42	172.4	31.7	45.1
Junc 704	141.7	0.24	173.1	31.4	44.6
Junc 706	141.0	100.42	171.6	30.6	43.5
Junc 707	141.2	33.32	171.8	30.6	43.5
Junc 708	141.3	0.21	172.4	31.1	44.2
Junc 709	141.0	0.37	172.4	31.4	44.7
Junc 710	141.1	0.44	172.4	31.3	44.5
Junc 711	141.6	0.00	172.4	30.8	43.8
Junc 717	141.6	0.20	172.4	30.8	43.8

Minimum Pressure

Engineers, Planners & Landscape Architects

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

Created: Feb. 6/23
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Table D5F
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 707

Node ID	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
Junc 44	140.0	0.11	174.4	34.4	48.9
Junc 46	141.3	0.43	174.4	33.1	47.0
Junc 701	140.6	0.42	173.5	32.9	46.8
Junc 702	141.0	0.48	173.5	32.5	46.2
Junc 703	141.5	0.35	173.5	32.0	45.5
Junc 716	141.6	0.00	173.5	31.9	45.4
Junc 705	140.7	0.42	172.5	31.8	45.3
Junc 704	141.7	0.24	173.0	31.3	44.5
Junc 706	141.0	33.42	171.8	30.8	43.8
Junc 707	141.2	100.32	171.5	30.3	43.1
Junc 708	141.3	0.21	172.3	31.0	44.0
Junc 709	141.0	0.37	172.5	31.5	44.8
Junc 710	141.1	0.44	172.5	31.4	44.7
Junc 711	141.6	0.00	172.5	30.9	44.0
Junc 717	141.6	0.20	172.5	30.9	44.0

Minimum Pressure

Engineers, Planners & Landscape Architects

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

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Table D5G
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 709

Node ID	**Elevation** (m)	**Demand** (LPS)	**Head** (m)	**Pressure** (m)	(PSI)
Junc 44	140.0	0.11	174.3	34.3	48.8
Junc 46	141.3	0.43	174.5	33.2	47.1
Junc 701	140.6	0.42	173.4	32.8	46.6
Junc 702	141.0	0.48	173.5	32.5	46.2
Junc 703	141.5	0.35	173.6	32.1	45.6
Junc 716	141.6	0.00	173.6	32.0	45.5
Junc 705	140.7	33.42	171.9	31.2	44.4
Junc 704	141.7	0.24	173.4	31.7	45.0
Junc 706	141.0	0.42	172.2	31.2	44.4
Junc 707	141.2	0.32	172.6	31.4	44.6
Junc 708	141.3	0.21	173.0	31.7	45.0
Junc 709	141.0	100.37	167.5	26.5	37.7
Junc 710	141.1	0.44	167.5	26.4	37.6
Junc 711	141.6	0.00	167.5	25.9	36.9
Junc 717	141.6	0.20	167.5	25.9	36.9

Minimum Pressure

Engineers, Planners & Landscape Architects

Table D5A
Max Daily Demand Simplified FUS Fire Flow
Mill Lands (Phases 7-8)
Almonte, ON
Job. No. 121125

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Table D5H
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 711

Node ID	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
Junc 44	140.0	0.11	174.3	34.3	48.8
Junc 46	141.3	0.43	174.5	33.2	47.1
Junc 701	140.6	0.42	173.4	32.8	46.6
Junc 702	141.0	0.48	173.5	32.5	46.2
Junc 703	141.5	0.35	173.6	32.1	45.6
Junc 716	141.6	0.00	173.6	32.0	45.5
Junc 705	140.7	0.42	171.9	31.2	44.4
Junc 704	141.7	0.24	173.4	31.7	45.0
Junc 706	141.0	0.42	172.2	31.2	44.4
Junc 707	141.2	0.32	172.6	31.4	44.6
Junc 708	141.3	0.21	173.0	31.7	45.0
Junc 709	141.0	33.37	164.5	23.5	33.5
Junc 710	141.1	0.44	159.2	18.1	25.8
Junc 711	141.6	100.00	156.0	14.4	20.4
Junc 717	141.6	0.20	156.0	14.4	20.4

Minimum Pressure

Additional Items of Note

i. The required fire flow calculation guide is not expected to provide an adequate required fire flow for complex and unusual risks such as lumber yards, petroleum storage, refineries, grain elevators, and large chemical plants, but may indicate a minimum value for these hazards. Applicable industry standards and guidelines should be consulted when reviewing fire flows and emergency response needs for complex and high consequence risks.

ii. Judgment must be used for business, industrial, and other occupancies not specifically mentioned.

iii. Consideration should be given to the configuration of the building(s) being considered and accessibility by the fire department with respect to applying hose streams.

iv. Consideration should be given to carefully reviewing closely spaced, wood frame construction and the potential for fire spread beyond the building of origin. There are many risk factors that may contribute to the risk of these types of fires, one of which is spacing of structures. If the designer or the Authority Having Jurisdiction determines there to be a high potential for fire spread between closely spaced combustible buildings, the designer should consider the maximum probable fire size involvement when determining the Total Effective Area of the design fire.

v. Where wood shingle or shake roofs contribute to risk of fire spread in the subject building, an additional charge of 2,000 L/min to 4,000 L/min should be added to the required fire flow in accordance with the extent and condition of the risk.

vi. For one and two-family dwellings not exceeding two storeys in height and having Total Effective Area of not more than 450 m^2, the following short method may be used in determining a required fire flow:

Table 7 Simple Method for One and Two Family Dwellings Up To 450 sq.m

Exposure distances	Suggested Required Fire Flow (LPM) [4,5,6]	
	Wood Frame	Masonry or Brick
Less than 3m	8,000 133 6/5	6,000
3 to 10m	4,000	4,000
10.1 to 30m	3,000	3,000
Over 30m	2,000	2,000

[4] For sprinkler protected risks, 50% of the value from this table may be used, to a minimum required fire flow of 2,000 LPM

[5] If all exposures within 30m of subject building are sprinkler protected, a minimum required fire flow of 2,000 LPM may be used

[6] If all exposing building faces within 10m have protected openings (or blank walls) and a minimum 1 hr FRR, the required fire flow may be reduced by 2,000 LPM to a minimum of 2,000 LPM.

vii. For one and two-family dwellings not exceeding two storeys but having a Total Effective Area of more than 450 m^2, and for row housing, the following short method may be used in determining a required fire flow:

Table 8 Simple Method for One and Two Family Dwellings Exceeding 450 sq.m, and Row Housing Exposure distances

Exposure distances	Suggested Required Fire Flow [4,5,6]	
	Wood Frame	Masonry or Brick
Less than 3m	12,000 200 L/s	9,000
3 to 10m	8,000 133 L/s	8,000
10.1 to 30m	6,000	6,000
Over 30m	4,000	4,000

Note that for larger and more complex developments, a full calculation of required fire flows is recommended.

viii. Special hazards

a. In areas where there is a significant hazard of wildfires and a significant level of exposure to fuels, further investigation into adequate water supplies for public fire protection should be made and may consider alternative fire suppression strategies including, but not limited to, exterior exposure protection fire sprinkler systems, structure protection units and other methods of protection of the built environment from wildland fires in the interface areas. For further information see the National Research Council publication National Guide for Wildland-Urban Interface Fires.

b. In areas where there is a significant hazard of seismic events, consideration should be given to the need for redundancy in water supplies both for manual fire fighting and for building sprinkler systems, particularly in areas where there is a significant life safety hazard.

Table 10: Design Criteria - Water Infrastructure and Facilities

Component	Description	Design Criteria
Pumping or Well Systems	▪ With Adequate Zone Storage Available ▪ Without Adequate Zone Storage Available	▪ Maximum Day Flows to Zone and All Subsequent Zones ▪ Peak Hour Flows to Zone and Maximum Day Flows to All Subsequent Zones
Storage	▪ A – Fire Storage ▪ B – Equalization Storage ▪ C – Emergency Storage ▪ Total	▪ Largest Expected Fire Volume ▪ 25% of Maximum Day Demand ▪ 25% of 'A' + 'B' ▪ 'A' + 'B' + 'C'
Fire Flows(1)	Residential Unit Separation ▪ Less than 3m ▪ Residential 3 to 10m ▪ Residential 10.1 to 30m ▪ Residential Over 30m	 ▪ 100L/s (6,000L/min) ▪ 67L/s (4,000L/min) ▪ 50L/s (3,000L/min) ▪ 33L/s (2,000L/min)
System Pressure	▪ Normal Operating Conditions	▪ 275 kPa (40 psi) to 700 kPa (100 psi)

1. This scenario was modelled assuming a minimum pressure of 140 kPa (20 psi) at any junction or hydrant within the service area and a 2 hour fire. Fire flow assessment criteria from the Fire Underwriters Survey, 1999.

4.4 Condition Assessment Report: Potable Water System

A Condition Assessment Report was prepared for the 2012 Master Plan. Refer to Appendix B for a copy of this report. With the exception of reevaluating the linear infrastructure relative to typical design life of piping, a new condition assessment was not undertaken as part of this Master Plan Update, however, the opinion of probable costs and timeframe for recommendations were adjusted to reflect the lapse of time since the original condition assessment was completed. A summary of the potable water system condition assessment updated opinion of probable costs are summarized in Table 11. These costs are carried forward as part of the overall servicing solutions for the potable water system.

It is noted that some condition assessment work was undertaken at Wells 7 and 8 as part of two separate pump replacement projects since 2012, including that which was recommended under the 2012 Master Plan 0 to 5 year and 5 to 10 year timeframes. In addition, protective coating systems for the elevated tower were rehabilitated in 2014 and, therefore, no longer recommended for the immediate or short-term. Typically interior and exterior coating systems require rehabilitation every 15 to 20 years (new long-term recommendation). Table 11 has been adjusted accordingly to reflect work completed to date.