July 26, 2024

Koren Lam, Senior Planner
County of Lanark
99 Christie Lake Road,
Perth, ON K7H 3C6

Melanie Knight, Senior Planner
Municipality of Mississippi Mills
3131 Old Perth Road
P.O. Box 400
Almonte, ON K0A 1A0

Re: Mill Run Extension
Part of Lot 17, Concession 10, Part 1 on Plan 27R-11897 (09-T-23003)
Draft Plan of Subdivision and Zoning By-law Amendment Applications
Response Letter #2

Dear Koren Lam and Melanie Knight,

Please find below a comprehensive response to the comments received from staff regarding the set of comments received on the above noted application. We trust that our responses and revised submission materials are sufficient for Staff's purposes. However please do not hesitate to contact the undersigned should you require anything further. In support of our comment responses, please find attached the following plans and sketches:

- Revised Draft Plan of Subdivision, prepared by Novatech;
- Revised Concept Plan, prepared by Novatech;
- Revised Environmental Impact Statement, Revision 4, prepared by Gemtec, dated July 21, 2024;
- Revised Servicing and Stormwater Management Report, prepared by Novatech, dated July 26, 2024;
- Revised Geotechnical Investigation, Revision 1, prepared by Paterson, dated July 25, 2024;
- Responses to Geotechnical Comments, prepared by Paterson, dated July 25, 2024; and
- Planning & Engineering Comment Response Letter, prepared by The Regional Group, dated July 26, 2024.

The County recirculation fee will be couriered separately.

Municipality of Mississippi Mills Planning Comments

1. Please update the Municipality on any response from the MECP on the Gathering Form.
   Regional Group: The Information Gathering Form was submitted to the MECP on February 5, 2024 and a response indicating that the proponent should proceed to the Alternatives and Avoidance Form was received on April 17, 2024. Following consultation with the MECP regional species at risk biologist and based on the MECPs knowledge of Blanding's turtle in the vicinity of the Spring Creek Municipal Drain, the MECP have determined that an Overall

Benefit Permit will be required to permit the development. GEMTEC is currently in the early stages of preparation of the Overall Benefit Permit application.

2. It is noted that the concept plan indicates that the net density is 29 units/net hectare, which is over the average maximum density introduced in Official Plan Amendment 22 of 25 units/net ha (contained in Section 2.6.5). Please be advised that the Municipality is undertaking Official Plan Amendment 32, which is proposing to remove the restriction of an average 25 units per net hectare and reinstate the former measurement of overall density with a gross hectare density range of 15 to 35 units per gross hectare. Based on this revised submission the gross density is approximately 22.3 units per gross hectare, which falls within the range of the new proposed density.
   Regional Group: This comment is accurate. We look forward to the approval of OPA #32 to rectify an unduly low density cap. As noted, the proposal will comply with the proposed density range of 15 to 35 units per gross hectare.

3. It is acknowledged that as part of Official Plan Amendment 22, the proposed densities do meet Sections 3.6.5.3 and 3.6.5.4. Please be advised that the Municipality is undertaking Official Plan Amendment 32, which is proposing to replace these net density provisions with a minimum gross density of 15 units/ gross hectare for low density residential and a maximum of 35 units/gross hectare for medium density residential. Please provide the calculations for the revised submission to confirm that it will meet these proposed densities.
   Regional Group: The proposal will comply with the proposed density range of 15 to 35 units per gross hectare. As noted in comment #2, the proposal's gross density is 22.3 units per hectare.

4. Staff have reviewed the proposed zoning included in the updated Planning Rationale. Generally, staff have no issues with the proposed zoning as it pertains to two separate zones to capture the different residential uses. A further detailed review will be undertaken once the application is closer to draft approval to determine if the existing R1I and R3E zones are suitable or if new subzones should be created that more accurately reflect the zoning provisions. Please note that a provision will be included in the zoning which requires a distance of 5.75 metres between the vehicular entrance to a private garage and the back face of the curb or planned sidewalk, to ensure that every lot can accommodate one parking space in the driveway in front of the garage without overhanging onto the sidewalk or road.
   Regional Group: We will work with the municipality to finalize the zoning in due course. In relation to the required distance of 5.75 metres between the vehicular entrance to a private garage and the back face of the curb or planned sidewalk, this is accepted on the provision that it only works if the sidewalk is adjacent to the curb with no boulevard in between. We confirm that this is the applicant's intended layout.

Municipality of Mississippi Mills Engineering Comments

Geotechnical Report

1. Section 4.3 – Groundwater elevation has not been sufficiently found. The use of open test holes and soil analysis is not substantial enough given the site conditions. Ground water monitoring should be completed on multiple locations on the site to determine the

seasonally high ground water table. This should also be considered as a part of compliance with the Municipality's CLI design guidelines section 2.9 (Sanitary sewers and Maintenance Holes Installed Below Seasonally High Groundwater Table).
Regional Group: Paterson has provided a response in their letter "Geotechnical Investigation - Response to Municipality of Mississippi Mills Comments, PG5860-MEMO.03 dated July 25, 2024" provided with this submission.

2. Precautions should be taken to prevent the flooding of basements which are located below the ground water table such as back up generators and dual sump pumps. Home buyers should be notified if their home is below the SHGWT and a notification will be included in the Subdivision Agreement and the agreement of purchase and sale to this effect.
Regional Group: Paterson has provided a response in their letter "Geotechnical Investigation - Response to Municipality of Mississippi Mills Comments, PG5860-MEMO.03 dated July 25, 2024" provided with this submission.

3. Section 6.1 - Sump pumps will be required to drain to the exterior of homes (overland flow), not to a municipal storm water pipe. Please amend accordingly.
Regional Group: As discussed at our meeting with the municipality on May 22, 2024, sump pumps are allowed to outlet to the municipal stormwater pipes.

4. Section 6.5 – Groundwater pumped from site in any way shall not be allowed to flow into any municipal storm sewers which are not a part of the new phases without written permission from the Municipality. All pipes which convey pumped groundwater shall be flushed and inspected prior to final acceptance. Please amend accordingly.
Regional Group: Noted. Paterson has provided additional information in Section 6.5 regarding groundwater pumping in the revised report "Geotechnical Investigation Proposed Residential Development PG5860-1 Rev. #3 dated July 25, 2024" provided with this submission.

Stormwater Management

1. Overland flow depth is high. Typically, the limit is 0.3 m. Provide details of the velocity of the water at a depth of 0.35 m.
Regional Group: The maximum 0.35 m overland flow depth comes from the Ottawa Sewer Design Guidelines Technical Bulletin PIEDTB-2016-01. A maximum depth of 0.30 m will be used for the Mill Run Extension. Refer to the revised criteria in the Servicing and Stormwater Management Report. The overland flow velocities cannot be provided at this time as the major system analysis will be completed at the detailed design stage.

2. Depth of overland flow and ponding should remain below 0.3 m.
Regional Group: Refer to response to comment # 1.

3. The second last bullet – what units does the 0.6 have?
Regional Group: The units (m2/s) have been added to the second last bullet in the revised Servicing and Stormwater Management Report.

4. Section 2.3.3 – What is the proposed depth of topsoil?
   Regional Group: The depth of topsoil would be a minimum of 150 mm as per City of Ottawa standards.

5. Section 2.4.2 – Please show how section 5.4.5.2.1 of the Ottawa Design guidelines were incorporated into the calculations. Was the additional 25% added to the C values for the 100-year storm calculation?
   Regional Group: For pre-development conditions, the subcatchments were modeled using an impervious percentage (calculated based on the measured impervious area using aerial imagery) and curve numbers for the pervious areas.
   Refer to the "Runoff Coefficients / Impervious Values" section of the Servicing and Stormwater Management Report for details on the post-development calculations. The additional 25% would be added when using the rational method only. The additional 25% was not added as the subcatchments were modeled in PCSWMM.

6. Does the design for the modified pond take into account the increased TSS removal for the existing phases of Mill Run 1-6? How is the forebay for phases 1-6 changing to increase settlement time and TSS removal?
   Regional Group: Yes, the modified pond takes into account the increased TSS removal for the existing Phases 1 to 6. The permanent pool has been sized using Table 3.2 of the MOE SWM Planning & Design Manual by applying the required storage volume to achieve 80% TSS removal to the total drainage area of Phases 1 to 9.
   The existing forebay has sufficient volume to contain 10 years worth of sediment accumulation assuming 80% sediment removal efficiency and annual sediment loading based on catchment imperviousness as recommended in the MOE SWM Planning & Design Manual. The length of the existing forebay should not be impacted as it was sized using the Settling Length and Dispersion Length calculations which are based on pond inlet/outlet flow rates and target velocities as specified in the MOE SWM Planning & Design Manual.

7. Section 2.5.8 - Where is this ditch inlet catch basin? Is the water entering the structure from the catch basin reaching 80% TSS removal?
   Regional Group: The existing DICB is located within the pond bank at the southern end of the main cell and is connected to the outlet control structure via a 13.4m long 525mm diameter pipe. The water entering the DICB will have reached 80% TSS removal via settlement in the sediment forebay and permanent pool.

8. Section 2.5 – Please make comment on the failures experienced by the current pond and how the new pond will be designed to prevent such failures. This is in regard to the infiltration of water from outside of the pond which flowed over the path and into the pond from the wetland area.
   Regional Group: Under existing conditions, runoff from the southern portion of the future Phase 7 lands flows overland towards the existing subdivision and SWM facility as shown on Figure 2 of the Servicing and Stormwater Management Report. Under post-development conditions, runoff from the developed Phase 7 lands will be captured by the proposed storm drainage system and conveyed to the expanded SWM facility. There will be effectively no runoff from the adjacent wetland towards the site under post-development conditions.

9. Section 2.5.8 – Please change the overflow spillway design to be made of erosion resistant material. During a previous storm event where the spillway was utilized, erosion caused a substantial drop in the overflow elevation of which the pond relies on for functionality. This can cause a run-away failure where the increased flows over the spillway cause further erosion and further outflow and on and on. Please ensure that the spillway/weir is designed such that it is not susceptible to surface erosion that would impact the proper operation of the pond.
   Regional Group: A depressed section of the proposed asphalt pathway surrounding the pond will form the overflow spillway and will be erosion resistant.

10. Stone dust or gravel pathways shall not be used as surround elements for the pond due to being prone to erosion caused by overland flow. They should instead be replaced with permeable pavers suitable for pedestrian use. Please amend accordingly.

    Regional Group: We have proposed an asphalt pathway surrounding the pond.

11. Section 2.5.9 – There is a significant conflict of priorities with a proposed wetland area within a stormwater management pond. The Department would like further details regarding the idea of the stormwater management pond being compensation for the wetland as the Municipality is anticipating that this may increase maintenance costs for the pond. Further information on the functionality of a naturalized stormwater management pond needs to be provided with regards to maintenance and functionality.
    Regional Group: It is no longer proposed to provide wetland compensation/habitat in the expanded SWM facility. Wetland compensation will be provided off-site.

12. Please explain how the sediment within the pond would be cleared out without damaging the proposed habitat features if the pond were to be wetland compensation.
    Regional Group: Please refer to comment response 11 above.

13. Please explain how the species including Blanding's Turtles would be protected during maintenance efforts and sediment clearing.
    Regional Group: Please refer to comment response 11 above.

14. Please explain how the incorporation of woody bundles and basking logs would affect the drainage of the pond during 5- and 100-year storm events. Please address the possibility of these objects obstructing the municipal drain during spill way events and the possibility of these objects obstructing the surface drain within the pond.
    Regional Group: Please refer to comment response 11 above.

Sewer Servicing

15. Please be aware of the municipality's CLI Design Guidelines and the impact on the design of the sanitary and storm sewers.
    Regional Group: Acknowledged.

16. Section 3.4 – Please provide a full map showing the manholes referenced in this section and the ultimate destination of the flows (Ottawa street). Additionally, please propose a solution to the issue. What possibilities could be considered to limit the surcharging? Regional Group: The existing maintenance holes referenced in this section have been highlighted on the Mill Run As-built drawings included in Appendix C. A first step to finding a solution could be to implement a flow monitoring program to analyze existing flows and determine more accurate downstream sanitary design parameters. A flow monitoring program would determine whether the possible surcharging is theoretical and not a concern depending on the actual flow rates present in the existing sanitary sewer system. Additionally, the downstream existing sanitary modeling completed by J.L. Richards concluded that there were no downstream capacity concerns. The Municipality mentioned concerns with existing flows swirling within a maintenance hole on Sadler Drive. Existing structures could be reviewed to analyze if any swirling is causing a loss of capacity in the downstream sanitary system and impacting surcharging. It may be possible for the structure's benching to be optimized to decrease the amount of swirling and capacity loss.

Erosion and Sediment Control

17. Please be aware that the Municipality's CLI ECA has specific design requirements for erosion and sediment control plans which will be implemented at the construction planning stage. Regional Group: Acknowledged.

18. Under site specific details a recommendation for heavy duty silt fencing is made, however; the map showing the installation has lite duty silt fencing. Please amend accordingly. Regional Group: Acknowledged. Light-duty silt fencing has been updated to heavy-duty silt fencing.

19. Please address why there is no silt fencing between the properties in Phase 5 of Mill Run and the new phases.
Regional Group: The existing grade at the rear of the Mill Run Phase 5 properties is much higher than the existing and proposed grades within the Mill Run Extension Phase 7 properties. Silt fencing between the Phase 5 and Phase 7 properties would be considered ineffective as there is an existing retaining wall separating the rear-yards of the Phase 5 and Phase 7 properties.

Hydraulic Impact Statement (HIS)

20. Section 2.1 – Please explain the discrepancy between Section 4.3 of the Geotechnical Investigation performed by Paterson Group and Section 2.1 of the HIS. Patterson field investigators noted the presence of surface water within the organic containing layers of the southwest portion of the site. Gemtech states in Section 2.1 of the HIS that there is no surface water present. Please clarify the discrepancy.

    Regional Group: The GEMTEC reference to no surface water being observed within the on-site wetland in the Hydraulic Impact Statement was in reference to site observations provided in the Environmental Impact Statement. During site investigations completed on June 8, 2021, and August 16, 2022, no surface water was observed. As would be expected

within peat deposit of a wetland, once a test pit is advanced, water contained within the underlying peat will begin to pool within the depression. It is likely this circumstance that the Patterson observation is related to.

MVCA Environmental Review

1. The EIS (Table 3.1) outlines that 3.64 ha of the full parcel is considered willow thicket swamp. The EIS also discusses that a total of 3.64 ha of wetland will be lost due to the proposed development (Section 6.1). Please clarify the text and the calculation to clearly demonstrate that the wetland habitat which extends south into the north of the parcel, as well as all agreed to setback buffers will be no-disturbance areas.
   Regional Group: Excluding the naturalized buffers, the area of wetland loss is 3.42 ha. Text has been updated within the report for greater clarity regarding no-disturbance.

2. Separate from the size of the pond required to address storm water capture, please provide details on the size of the proposed wet meadow habitat and show what ratio of wetland creation will be occurring to account for the proposed amount removed for development.
   a. In alignment with other Conservation Authorities MVCA is currently developing wetland offsetting guidelines. Existing guidelines within Ontario recommended replacement ratios (replacement area: removed area) that range from 1:1 to 3:1 for wetland habitats depending on the feature type and location. How will the Mill Run Phase 7 & 8 development proposal achieve a minimum of 1:1 wetland area and function offsetting?
   b. Be advised that based on our understanding of other agency's wetland compensation guides, green infrastructure such as naturalized storm ponds are not typically considered as part of a sufficient compensation plan. (TRCA, Guideline for Determining Ecosystem Compensation, 2023)

   Regional Group:
   A) The Mill Run Phase 7 & 8 development proposal will achieve, at a minimum, a 1:1 wetland area and function offsetting through creation of a 3.42 ha wetland consisting of meadow marsh and thicket swamp type vegetation communities at roughly a 2:1 ratio. Wetland compensation, although at early design stages, is to occur within the Mississippi River watershed, northwest of Appleton. GEMTEC, Regional Group and Novatech are working with Ducks Unlimited to design and construct the wetland. As design progresses, it is envisioned that preliminary plans will be circulated to MVCA for review and comment.
   B) Acknowledged.

3. MVCA requests the proponent separate the storm pond area and function from the proposed wetland offsetting and provide further details on the impacts of expected storm pond functions and maintenance on the proposed adjacent habitat enhancements including;
   a. Is it feasible for the proposed storm pond functions to be separated from the proposed adjacent wet meadow functions?
   b. How will sediment and other pollutants that enter the storm pond for treatment impact the natural features and functions proposed for the adjacent wetland offsetting?

c. How will long term storm pond maintenance impact the natural features and functions proposed for the adjacent wetland offsetting?

Regional Group: It is no longer proposed to provide wetland compensation/habitat in the expanded SWM facility. Wetland compensation will be provided off-site.

4. Please provide comments in regards to the east-west channel which is situated between the current storm pond and the Phase 7-8 parcel.
   a. What are its current hydrological, wetland habitat, and fish habitat functions? As noted in the SWM review we are aware of a storm event in 2023 which resulted in this channel over flowing the public path around the existing storm pond.
   b. Please also provide impact assessment and mitigation details with regards to the proposal to expand the storm pond and wet meadow features across this watercourse.

   Regional Group: During all site investigations completed in 2021 and 2022 the east-west channel referenced in the comment was dry. Based on a review of air photos from July 2005, the feature in question appears to be a fence line or property line with no surface water present (note that the adjacent Spring Creek Municipal Drain [SCMD] is evident and contains surface water). Similarly, the April 2010 air photo shows some localized pooling where the feature meets the SCMD but again the feature in question is dry as opposed to the surface water present within the SCMD. In the July 2018 air photo, it appears as though the feature had been recently excavated and extended towards Leishman Drive and Sadler Drive and contains surface water. In the 2019 air photo, the feature appears to have been extended further to the north along the rear yards of Leishman Drive and appears to contain isolated areas of surface water. It is also worth noting that at this time the SCMD appears dry. Sometime in early 2021 the SCMD was cleaned out as evidenced by the sediment spoils. Considering the information provided here, it is GEMTECs opinion that the feature is a cutoff ditch constructed during the initial phases of the subdivision and provides rear yard drainage to the properties fronting to Leishman Drive. There is no apparent upgradient catchment or sources beyond the existing development. Further, due to the recent clean out of the SCMD, it is likely that barrier to fish migration is present for small bodied cyprinid fish species at the confluence with the SCMD. Similarly, if following the Headwater Framework, the feature would be considered to provide only contributing hydrologic functions at best and would be classified as mitigation only due to the surrounding habitat which is proposed for removal. Accordingly, it is GEMTECs opinion that no mitigation or compensation is required for this feature.

5. Will the hydric soils and plantings within the proposed wet meadow be able to receive sufficient surface water throughout the year to match pre-construction hydrology functions/balances of the Phase 7 & 8 thicket swamp?

   Regional Group: It is no longer proposed to provide wetland compensation/habitat in the expanded SWM facility. Wetland compensation will be provided off-site.

6. Provide recommended mitigation measures to prevent yard creep into the wetlands and Spring Creek shoreline.

   Regional Group: It is anticipated as a condition of the Overall Benefit Permit for Blanding's Turtle that permanent fencing or an equivalent (i.e., armour stone wall) will be required at the rear of properties backing on to the remnant wetland and Spring Creek shoreline.

Development Design Details:

1. MVCA recommends that a permanent fence be erected to delineate between the end of maintained yard areas and the commencement of the buffer zone which is to be unaltered. This includes the section of residential lots along the north-west of the parcel; where no northern buffer has been proposed.
   Regional Group: Yes, a permanent fence will be installed.

MVCA Water Resources Review

1. There is an existing drainage ditch between the existing Mill Run SWM facility (Phases 1- 6) and the proposed SWM facility expansion. Overflow of the existing drainage ditch towards the existing Mill Run SWM facility was observed during a rain event in June 2023. Please provide potential impacts of the hydrologic functions of the existing drainage ditch and demonstrate adequate conveyance so that the proposed development will not negatively impact or cause adverse flooding on the neighboring properties.
   Regional Group: Please refer to comment response 4 above.
   Additionally, the existing drainage ditch is meant to capture runoff from the southern portion of the future Phase 7 lands and convey it around the existing Mill Run subdivision and SWM facility to the municipal drain. Under post-development conditions, this drainage ditch will no longer be required as runoff from the developed Phase 7 lands will be captured by the proposed storm drainage system and conveyed to the expanded SWM facility.

2. The proposed SWM facility expansion appears to be located in local wetlands. The Environmental Impact Statement (EIS) findings and recommended mitigation measures should be incorporated in the design of the proposed SWM facility expansion. Environmental concerns associated with the wetland identified in the EIS should be addressed and mitigated.
   Regional Group: It is no longer proposed to provide wetland compensation/habitat in the expanded SWM facility. Wetland compensation will be provided off-site.

Algonquins of Ontario

This is your notification that the Algonquins of Ontario Consultation Office has received your correspondence and have determined that this project does not pose impacts to Algonquin rights and interests at this time. However, the Algonquins of Ontario Consultation Office(AOO) wishes to be promptly notified should the project undergo an unforeseen change or new major development.

The AOO also wish to reiterate that, if any artifacts of Indigenous interest or human remains are encountered during ground disturbance construction activities in the AOO Settlement Area, please contact:

The Algonquins of Ontario Consultation Office
31 Riverside Drive, Suite 101
Pembroke, ON K8A 8R6

Phone: 613-735-3759 Ex. 200
Fax: 613-735-6307
Email: algonquins@tanakiwin.com
Website: www.tanakiwin.com

Regional Group: Acknowledged.

County of Lanark Planning Comments

No comments.

County of Lanark Public Works

No comments.

Leeds, Grenville & Lanark District Health Unit

No further comments.

Ministry of Environment, Conservation and Parks

No further comments.

Hydro One

No comments.

Bell

No comments.

Enbridge

No comments.

We trust that the responses above will be sufficient for Staff's purposes, however please do not hesitate to contact the undersigned should you have any comments or questions.

Kind regards,

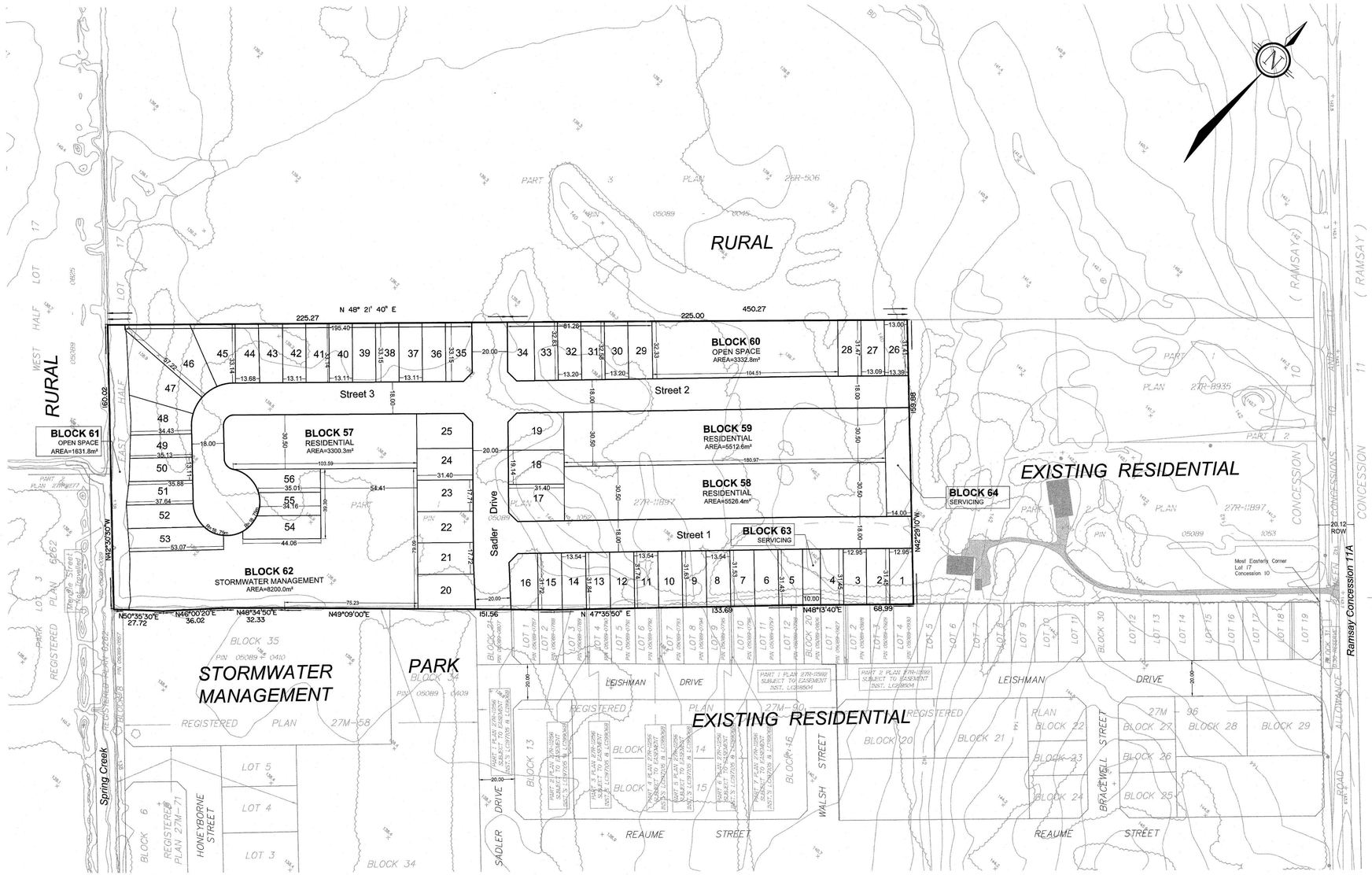
Menzie Almonte 2 Inc.
c/o Regional Group

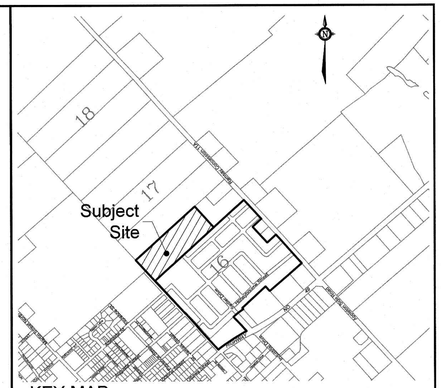
Stefanie Kaminski
Project Manager, Land Development
skaminski@regionalgroup.com | 613-230-2100 x7301

cc: Melanie Riddell, Novatech
Drew Blair, Novatech
James Ireland, Novatech
Greg Winters, Novatech
Drew Paulusse, Gemtec

SCHEDULE OF LANDUSE

BLOCK #'s	LAND USE	UNITS	AREA (hectares)
1-16, 26-56	RESIDENTIAL (Single Family Homes)	47	2.24
17-25	RESIDENTIAL (Semi Detached Homes)	18	0.53
57-59	RESIDENTIAL (Townhomes)	60	1.43
60-61	OPEN SPACE		0.50
62	STORMWATER MANAGEMENT		0.82
63-64	SERVICING		0.12
	ROADS		1.59
TOTAL			7.23





METRIC : MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DRAFT PLAN OF SUBDIVISION OF
PART OF LOT 17
CONCESSION 10
Geographic Township of Ramsay
MUNICIPALITY OF MISSISSIPPI MILLS
COUNTY OF LANARK

SCALE
1 : 1250

DATE: JULY 25, 2024

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJOINING LANDS ARE CORRECTLY SHOWN.

DATED July 26, 2024

MIREL ARADAU
ONTARIO LAND SURVEYOR

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
ONTARIO LAND SURVEYORS
Project No. 23126-22

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT WE, MENZIE ALMONTE 2 INC., ARE THE OWNERS / AGENTS OF THE LANDS TO BE SUBDIVIDED AND THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH OUR INSTRUCTIONS.

July 26, 2024
DATE

David Kardish (Assistant Secretary)
I have the authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT.

A) The boundaries of the land proposed to be subdivided, certified by an Ontario land Surveyor;
As shown on Draft Plan

B) The locations, widths & names of the proposed highways within the proposed subdivision & of existing highways on which the proposed subdivision abuts;
As shown on Draft Plan

C) On a small keyplan, on a scale of not less than 1cm to 100m, all of the land adjacent to the proposed subdivision that is owned by the applicant or in which the applicant has an interest, every subdivision adjacent to the proposed subdivision & the relationship of the boundaries of the land to be subdivided to the boundaries of the township lot of other original grant of which the land forms the whole part;
As Shown on Draft Plan

D) The purpose for which the proposed lots are to be used;
Residential, Stormwater Management, and Open Space shown on Draft Plan

E) The existing uses of all adjoining lands;
Residential, Rural, Stormwater Management, and Park shown on Draft Plan

F) The approximate dimensions & layout of the proposed lots;
As shown on Draft Plan

G) Natural & artificial features such as buildings or other structures or installations, railways, highways, watercourses, drainage ditches, wetlands & wooded areas within or adjacent to the land proposed to be subdivided;
As shown on Draft Plan

H) The availability and nature of domestic water supplies;
Development will be supplied with full municipal piped water service

I) The nature & porosity of the soil;
Very Stiff Brown Glacial Till and Firm to Soft Grey Silty Clay

J) Existing contours or elevations as may be required to determine the grade of the highways and the drainage of the land proposed to be subdivided;
Contours shown at 0.5 metre intervals on Draft Plan

K) The municipal services available or to be available to the land proposed to be subdivided;
Development will be supplied with full sanitary and storm water sewer services.

L) The nature & extent of any restrictions affecting the land proposed to be subdivided, including restrictive covenants or easements. 1994, c. 23, s. 30; 1996, c. 4, s. 28 (3);
As shown on Draft Plan.

MILL RUN EXTENSION

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

PROJECT No. 121125

Phases	Single Lots							Semi-Detached Lots			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	ft	m	ft
PHASE 7																			
Sub-Total	25	27%	0	0%	25	27%	20%	18	20%	20%	48	53%	60%	91	100%	623.5	2046	857.4	2813
PHASE 8																			
Sub-Total	22	65%	0	0%	22	65%	20%	0	0%	20%	12	35%	60%	34	100%	227.7	747	395.5	1298
Total	47	38%	0	0%	47	38%	20%	18	14%	20%	60	48%	60%	125	100%	851.2	2793	1252.9	4111

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	25	1.07	23	22	1.16	19	47	2.23	21
Semi-Detached	18	0.53	34	0	0	0	18	0.53	34
Townhouse	48	1.10	44	12	0.33	36	60	1.43	42
Total	91	2.69	34	34	1.49	23	125	4.18	30

Phases	Overall Site				
	# Units	% Mix	OP Target Mix	Net Density (units/ha)	OP Target (units/net ha)
PHASE 7 & 8					
Low Density	65	52%	60%	24	15 - 30
Medium Density	60	48%	40%	42	30 - 40
High Density	-	-	-	-	-

Low Density = Single Lots + Semi-Detached Lots
Medium Density = Townhouse Lots

SOURCE REFERENCE:
Legal Information: *Plan of Survey (Draft - 27R-xxxx), received January 31, 2023*
Annis, O'Sullivan, Vollebekk Ltd. / MTM Zone 9, Nad83 CSRS
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.

Net Density means the total number of dwelling units divided by the area of land (project area) in exclusively residential use, including lands and parking area internal to development and private amenity area, but excluding public streets, parks and open space, infrastructure and all non-residential uses.

No.	REVISION	DATE	BY
7	REVISED PHASE 8 / SWMF EXPANSION LIMITS	JUN 20/24	DDB
6	UPDATED PHASING LIMITS	JAN 2/24	DDB
5	REVISED SADLER DRIVE ALIGNMENT	SEPT 14/23	DDB
4	REVISED TOWNHOUSE SIDEYARD SPACING	AUG 29/23	DDB
3	REVISED PHASE 8 TOWNS / UPDATED LEGAL LINEWORK	FEB 2/23	DDB
2	ISSUED FOR DRAFT PLAN APPLICATION	JAN 11/23	DDB
1	ISSUED FOR CLIENT REVIEW	NOV 30/22	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

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MISSISSIPPI MILLS
MILL RUN EXTENSION - PHASES 7 and 8

DRAWING NAME
CONCEPT PLAN 10

PROJECT No. 121125-00
REV REV # 7
DRAWING No. 121125-CP10

GEMTEC
www.gemtec.ca

Environmental Impact Statement
Proposed Subdivision Development
Part of Lot 17, Concession 10 (Ramsey)
Almonte, Ontario

GEMTEC
www.gemtec.ca

Submitted to:

Menzie Almonte 2 Inc. (c/o Regional Group)
1737 Woodward Drive
Ottawa, Ontario
K2C 0P9

Environmental Impact Statement
Proposed Subdivision Development
Part of Lot 17, Concession 10 (Ramsey)
Almonte, Ontario

July 18, 2024
Project: 100436.004

experience • knowledge • integrity

EXECUTIVE SUMMARY

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Menzie Almonte 2 Inc. (c/o Regional Group) to complete a Phase 1 Environmental Impact Assessment (EIS) for a subdivision development located on Lot 17, Concession 10 (Ramsey), collectively referred to as Mill Run Extension, in Almonte, Municipality of Mississippi Mills, Lanark County, Ontario. This EIS has been completed in support of a proposed residential development and was completed in accordance with all provincial and county policies and guidelines, as applicable.

In support of this EIS a desktop review and field investigations were completed to identify the presence or absence of natural heritage features and species at risk (SAR) on-site. The field investigations were completed between June 2021 and August 2022. The focus of the site investigations was to describe, in general, the natural and physical setting of the subject property with a focus on confirming the presence or absence of natural heritage features and potential SAR or their habitat as identified in the desktop review.

Following completion of the desktop review and site investigations the following natural heritage features were identified on-site or within the study area: local wetlands, fish habitat, significant wildlife habitat for *confirmed* wetland amphibian breeding habitat, *candidate* marsh breeding bird habitat, special concern and rare wildlife habitat (*candidate* eastern ribbonsnake and *confirmed* snapping turtle) and *candidate* animal movement corridor.

The following SAR and their habitat were identified as having a potential to occur on-site: barn swallow, bobolink, eastern meadowlark, red-headed woodpecker, eastern small-foot myotis, little brown myotis, tri-colored bat, Blanding's turtle and butternut. No SAR species were identified during site investigations. No regulated habitat was identified for barn swallow, bobolink, eastern meadowlark or red-headed woodpecker on-site. No regulated category 1 habitat was identified on-site for Blanding's turtles, however Category 2 and 3 habitat was identified on-site. Category 1, 2 and 3 habitat for Blanding's turtle is present within the study aera. No butternut were observed on-site.

Potential impacts to the natural heritage features within the study area includes the loss of local wetland habitat, primarily for amphibian and reptile species and the loss of regulated Category 2 and 3 Blanding's turtle habitat. Blanding's turtle habitat impacted by the proposed development includes the loss of approximately 0.24 ha of Category 2 habitat and 6.80 ha of Category 3 habitat on-site. Furthermore, impact and alteration of Category 1 habitat off-site adjacent is anticipated as a result of the proposed expansion of the off-site stormwater management pond proposed in conjunction with the Mills Land development. Due to the presence of regulated habitat for Blanding's turtle on-site, an Information Gathering Form will be required to be submitted to the MECP to determine whether the project requirements under the *Endangered Species Act, 2007*.

Direct impacts to local unevaluated wetlands on-site from the proposed development include the loss of approximately 3.42 ha of local unevaluated wetlands. Potential indirect impacts to aquatic habitat within Spring Creek are primarily associated with water quality through increased nutrient and sediment loading.

Potential impacts to natural heritage features and Blanding's turtle habitat are to be mitigated and/or compensated through the implementation of a 15 m setback from the Spring Creek Municipal Drain, a 30 m setback from the northern local wetlands and through the creation of off-site wetlands to compensate for the loss of on-site wetlands.

To provide protection to potential SAR and their habitat on-site, reptile and amphibian exclusion fencing should be installed around all future construction areas prior to any development or site alteration, to prevent the immigration of SAR turtles and other wildlife into the construction area. Should any SAR be discovered throughout the course of any development on-site, operations should stop and the species at risk biologist with the local MECP district should be contacted immediately for further direction. Furthermore, to ensure compliance with applicable legislation, all best management practices and adherence to vegetation clearing for reptiles, birds and bats, outlined in Section 7 should be followed to ensure no negative impacts occur to natural heritage features on-site.

The proposed residential development application complies with the natural heritage policies of the Provincial Policy Statement, the Lanark County Official Plan and the Municipality of Mississippi Mills Official Plan. No negative impacts to identified natural heritage features or their ecological functions are anticipated as a result of the proposed development as long as all recommendation outlined in Section 7 are enacted and best management practices followed.

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LIST OF APPENDICES

1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Menzie Almonte 2 Inc. (c/o Regional Group) to complete an Environmental Impact Statement (EIS) for the proposed residential subdivision development located on Lot 17, Concession 10 (Ramsey), collectively referred to as Mill Run Extension, in Almonte, Municipality of Mississippi Mills, Lanark County, Ontario, (hereafter referred to as "the subject property"). The general location of the subject property is illustrated on Figure A.1 in Appendix A.

1.1 Purpose

The proponent is seeking to develop an approximately 7.22 hectare (ha) rural property into a residential subdivision, consisting of low-rise residential units. Based on Section 5 of the Lanark County Official Plan (Lanark County, 2012) and Section 3.1.4 of the Municipality of Mississippi Mills Official Plan (Mississippi Mills, 2018), an EIS is required showing that the project will not negatively impact any potential natural heritage features which may be present within the study area. The study area is defined as the property boundary and the adjacent lands encompassing an area of 120 m beyond the property boundary. The subject project and the extents of the study area are illustrated on Figure A.2.

1.2 Objective

The 2020 Provincial Policy Statement (MMAH, 2020) issued under Section 3 of the Planning Act states that "development and site alteration shall not be permitted in: habitats of species at risk, significant wetlands, significant woodlands and significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions." Similarly, the 2020 Provincial Policy Statement dictates that 'development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements."

The objective of the work presented herein is twofold; 1) to identify and evaluate the significance of any natural heritage features, as defined in the Provincial Policy Statement (MMAH, 2020), on the subject property and within the broader study area and; 2) to assess the potential impacts from the proposed residential development on any natural heritage features identified and to recommend appropriate and defensible mitigation measures to ensure the long-term protection of any natural heritage features identified.

To meet these objectives, the EIS presented herein has been completed in accordance with the following provincial and municipal regulations, policies and guidelines:

- Provincial Policy Statement (MMAH, 2020);
- Endangered Species Act (Ontario, 2007);
- Conservation Authorities Act (Ontario, 1990);
- Natural Heritage Reference Manual (OMNR, 2010);

- Lanark County Official Plan (Lanark County, 2012); and
- Municipality of Mississippi Mills Community Official Plan (Mississippi Mills, 2018).

1.3 Physical Setting

The subject property is located on Part of 17, Concession 10, in the Geographic Township of Ramsay, Municipality of Mississippi Mills, Almonte, Ontario. The site is comprised of coniferous woodlands, a cultural thicket and local wetlands with the Spring Creek Municipal Drain flowing along the western property border and a stormwater management pond occurring south of the property within the adjacent subdivision. The site is bound to the north by vacant neighbouring property of Lot 17, Concession 10 and to the south by rear yards of Leishman Drive. To the west and east the property is bound by neighbouring lots of Lot 17, Concession 10.

1.4 Land Use Context

The subject property is currently a rural setting situated within a larger urban residential area. The existing land use designation from the Lanark County OP is rural and waterbodies. The land-use from the Mississippi Mills Official Plan is rural. The zoning by-law from the municipality is rural (RU). It is understood that the Official Plan Amendment 22 proposes incorporating the subject property within the town boundaries.

2.0 METHODOLOGY

2.1 Desktop Review

A desktop information gathering exercise was completed to aid in the scoping of field investigations and to gather information relating to natural heritage features which may be present on the subject project or within 1 km of the subject property. An additional component of the desktop review was to assess the potential presence of SAR to occur on the subject property or within the study boundary based on a review of publicly accessible occurrence records, and review of SAR habitat requirements and range maps.

Information regarding the potential presence of natural heritage features and SAR within the vicinity of the site was obtained from the following sources:

- Make A Map: Natural Heritage Areas (OMNRF, 2014a);
- Land Information Ontario (OMNR, 2011b);
- Lanark County Official Plan (Lanark County, 2012);
- Municipality of Mississippi Mills Official Plan (Mississippi Mills, 2018);
- Lanark County Geoportal (County of Lanark Community Map, undated);
- Mississippi Valley Conservation Authority (MVCA Portal, Undated);
- Mississippi Mills Community Map (Mississippi Mills, undated);
- Ontario Geological Survey (OGS, 2019);
- Fisheries and Oceans Canada SAR Maps (DFO, 2019);
- Natural Heritage Information Centre Biodiversity Explorer (OMNRF, 2013);
- Breeding Bird Atlas of Ontario (Cadman et al., 2007)
- Atlas of Mammals of Ontario (Dobbyn, 1994);
- Ontario Herpetofaunal Atlas (Oldham and Weller, 2000); and
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019).

2.2 Field Investigations

Field investigations were undertaken to describe in general, the natural and physical setting of the subject property with a focus on natural heritage features and to identify any potential SAR or their habitat that may exist at the subject property.

Field investigations completed in support of this EIS are outlined in Table 2.1 below. Photographs of site features taken during field investigations are provided in Appendix B.

Table 2.1 Summary of Field Investigations

Date	Time	Weather	Purpose
June 8, 2021	08:00-09:30	24°C, 90% cloud cover, Beaufort wind 1, no precipitation	Preliminary Constraints, Ecological Land Classification
April 24, 2022	21:30-22:30	9°C, 100% cloud cover, Beaufort wind 2, no precipitation	Amphibian Breeding Survey
April 29, 2022	10:30-12:30	5°C, 10% cloud cover, Beaufort wind 3, no precipitation	Turtle Basking Survey
May 10, 2022	12:45-14:00	23°C, 20% cloud cover, Beaufort wind 2, no precipitation	Turtle Basking Survey
May 16, 2022	20:45-21:30	11°C, 85% cloud cover, Beaufort wind 3, light precipitation	Amphibian Breeding Survey
May 18, 2022	12:00-13:45	14°C, 20% cloud cover, Beaufort wind 1, no precipitation	Turtle Basking Survey
May 24, 2022	12:30-14:00	17°C, 40% cloud cover, Beaufort wind 1, no precipitation	Turtle Basking Survey
May 30, 2022	10:30-12:00	24°C, 70% cloud cover, Beaufort wind 1, no precipitation	Turtle Basking Survey
May 31, 2022	07:35-08:35	20°C, 10% cloud cover, Beaufort wind 0, no precipitation	Breeding Bird Survey
June 13, 2022	06:15-07:15	12°C, 10% cloud cover, Beaufort wind 0, no precipitation	Breeding Bird Survey
June 14, 2022	21:15-22:15	22°C, 5% cloud cover, Beaufort wind 0, no precipitation	Amphibian Breeding Survey
June 29, 2022	06:00-06:45	14°C, 20% cloud cover, Beaufort wind 0, no precipitation	Breeding Bird Survey
August 16, 2022	10:00-12:30	23°C, no cloud cover, Beaufort wind 1, no precipitation	Wetland Boundary Delineation, Ecological Land Classification

2.2.1 Preliminary Constraints Assessment

A Preliminary Constraints Assessment was conducted in June 2021 to identify potential natural heritage features on the subject property which may pose a potential environmental constraint for future development of the site or otherwise limit the development yield of the site. A desktop assessment was completed prior the field investigation. The field investigation was conducted in combination with the initial Ecological Land Classification (ELC) assessment.

2.2.2 Ecological Land Classification

Vegetation communities on the subject property were delineated during the desktop review stage of this EIS using publicly available air photos and confirmed in the field on June 8, 2021 and August 16, 2022, following the Ecological Land Classification System for Southern Ontario (Lee et al., 2008). Vegetation communities were confirmed in the field by employing the random meander methodology while documenting dominant vegetation species within the various vegetation community forms.

2.2.3 Breeding Bird Surveys

Breeding bird surveys were conducted on three occasions, at two point count locations in 2022. Breeding bird survey locations are provided on Figure A.2 in Appendix A. Breeding bird surveys followed protocols from the Canadian Breeding Bird Surveys (Downes and Collins, 2003) and the Ontario Breeding Bird Atlas (Cadman, et al. 2007). Point count locations were established in representative habitats on-site and were generally spaced approximately 250 m apart in effort to minimize double counting. Surveys were conducted no earlier than 30 minutes before sunrise and were completed within 5 hours of sunrise, to encompass peak song bird activity. Breeding bird surveys consisted of 5 minutes of passive listening in which all birds heard or seen within the survey period were recorded, including species, sex and breeding behaviour, if possible.

To aid in assessing the possibility of marsh habitat on-site to provide significant wildlife habitat and to confirm the presence or absence of species at risk, breeding marsh bird surveys were completed at all breeding bird survey locations. Breeding marsh bird surveys followed the methodologies outlined in the Marsh Monitoring Program (Bird Studies Canada, 2009) for the purposed of detecting secretive marsh birds. Marsh breeding bird surveys consisted of five minutes of passive listening, followed by a five-minute call broadcast to illicit a response from secretive marsh birds.

A list of all avian species identified on-site and within the study area is provided in Table C.1 in Appendix C.

2.2.4 Breeding Amphibian Surveys

Breeding amphibian surveys were conducted in 2022, on three occasions at four point count locations. Breeding amphibian survey locations are provided on Figure A.2. Breeding amphibian surveys followed protocols from the Marsh Monitoring Program (Bird Studies Canada, 2008). Surveys were conducted no earlier than one half-hour after sunset and concluded by midnight, to encompass peak amphibian calling activity. The first survey was conducted when night air temperature was a minimum of 5°C, the second survey was conducted when night air temperature was a minimum of 10°C, and the third when night air temperature was a minimum of 17°C. Breeding amphibian surveys consisted of 3 minutes of passive listening, in which all amphibians heard within the survey period were recorded, along with an estimation of abundance. A list of all amphibian species identified on-site and within the study area is provided in Table C.1 in Appendix C.

2.2.5 Turtle Basking Surveys

To address a data gap in site biological inventory data, and to confirm whether the site wetland provides significant wildlife habitat for over wintering turtles, five basking turtle surveys were completed in 2022 during the early spring (April to June) while turtle species were actively basking.

Basking turtle surveys were completed following a modified Ministry of Natural Resources and Forestry visual encounter survey methodology for Blanding's turtles (OMNRF, 2015b). Due to the size and complexity of the on-site habitat the approach was modified and deviated from the prescribed 10 metre transect methodology by utilizing a random meander approach. The completion of five surveys allowed for an acceptable degree of coverage and search effort for the purpose of determining the diversity and abundance of over-wintering turtles within the wetland.

While the Stormwater Management Pond (SWMP), which is offsite but adjacent within the study area is not considered to provide significant wildlife habitat under the Provincial definitions, visual turtle basking surveys were also completed for the pond as the off-site SWMP is proposed to be expanded in conjunction with the proposed development.

A list of all reptilian species identified on-site and within the study area is provided in Table C.1 in Appendix C.

2.3 Data Analysis

An evaluation of the significance of natural heritage features, the sensitivity of identified flora and fauna and the potential impacts posed by the proposed development was undertaken through an analysis of desktop and field investigation data using the approaches and criteria outlined in the following documents:

- Natural Heritage Reference Manual (OMNR, 2010);
- Significant Wildlife Habitat Technical Guide (OMNR, 2000);
- Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015); and
- Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014b).

3.0 EXISTING ENVIRONMENT

3.1 Ecoregion

The site is situated in Ecoregion 6E-11 (Lake Simcoe-Rideau), which extends from Lake Huron in the west to the Ottawa River in the east. The climate of Ecoregion 6E is categorized as humid, high to moderate temperate ecoclimate with a mean annual temperature range between 4.9°C to 7.8°C and an annual precipitation ranging between 759 mm to 1,087 mm (Crins et al., 2009).

The eastern portion of the Ecoregion, which the subject property is located, is underlain by glaciomarine deposits as a result of the brief post-glacial incursion of salt water from the Champlain Sea along the St. Lawrence Valley. This Ecoregion falls with Rowe's (1972) Great Lakes-St. Lawrence Forest Region, including its Huron-Ontario and Upper St. Lawrence sections, and a small part of the Middle Ottawa Forest section (Crins et al., 2009).

3.2 Landforms, Soils and Bedrock Geology

The topography of the site is relatively flat with a gently downward gradient from the east end of the property west towards the west property boundary, from a topographical high of 143 metres above sea level (mASL) to a topographical low of 137 mASL.

Two topographical landforms, as mapped by Chapman and Putnam (1984) are described on the subject property, clay plains of the Ottawa Valley Clay Plains physiographic region and limestone plains of the Smiths Falls Limestone Plain physiographic region.

The Ontario Geological Survey (OGS, 2019) identifies two surficial soil units on the subject property, fine-textured glaciomarine deposits consisting of silt and clay, minor sand and gravel being massive to well laminated that occurs in the southwestern half of the property and Paleozoic bedrock that occurs in the northeastern half of the property.

Bedrock at the site, is described by OGS (2019) consists of the Ottawa Group, Simcoe Group and Shadow Lake Formation consisting of limestone, dolostone, shale, arkose and sandstone.

3.3 Surface Water, Groundwater and Fish Habitat

Surface water features on the subject property consist of a portion of a larger local wetland located throughout the west and northwest portions of the study area and beyond. This large, approximately 30 ha local, unevaluated wetland is comprised of wet meadow, deciduous thickets and open-water marsh communities.

Based on air photo imagery reviewed from 1985 to 2021, the wetland extents and flooding regime are variable over time and appear to be significantly affected by beaver activity and drought conditions. The catchment area of the wetland appears to be confined to the portions of Concession 10, east of the Spring Creek Municipal Drain extending north to Lot 20, Concession 10. During two years of site investigations, no direct surface water was observed

within the on-site portions of the local wetland; however, based on dominant vegetation communities and the presence of organic soils, the ecological land classification system for Southern Ontario indicates the presence of wetland. It should be noted that the Natural Heritage Information System and Ontario Base Mapping do not indicate the presence of local wetlands within the study area. Furthermore, Mississippi Valley Conservation Authority (MVCA) geoportal mapping indicates the presence of only 0.25 ha of local wetland within the northern portion of the site.

Based on the temporal variation of wetland extents, the inconsistency in wetland mapping, the presence of beaver activity and drainage improvements associated with the Spring Creek Municipal Drain, the on-site portion of the local wetland may be transitioning to a terrestrial environment.

Surface water features identified off-site but within the study area, include a watercourse, referred to as Spring Creek Municipal Drain to the west of the property, a stormwater management pond to the south of the property within the adjacent subdivision and a cut-off ditch constructed in the early phases of the development which provides stormwater conveyance during peak storm events.

A fisheries assessment was not conducted as part of this EIS. While surface water was present in small areas within the on-site local wetlands at the time of the site investigation, due to its shallow depths and limited continuous connectivity the local unevaluated wetland is not considered to provide direct fish habitat. Similarly, the cut-off ditch has been assumed not to provide fish habitat based on its limited hydro period and the presence of barriers to migration for small bodied fish species. However, the adjacent watercourse to the west of the property, which was observed to be flowing at the time of the site investigation, is assumed to provide direct fish habitat as well as contribute to downstream fish habitat.

Groundwater investigations were not completed in support of this EIS.

3.4 Vegetation Communities

Vegetation communities on the subject property were delineated using publicly available air photos and confirmed in the field on June 8, 2021 and August 16, 2022, following the Ecological Land Classification System for Southern Ontario (Lee et al., 2008). Vegetation communities were confirmed in the field by employing the random meander methodology while documenting dominant vegetation species within the various vegetation community forms. The site is comprised of three vegetation communities, including one forest community, one cultural community resulting from prolonged human disturbance and one wetland community.

Table 3.1 below provides a summary of the various vegetation communities identified on-site while Figure A.3 in Appendix A provides an illustration of the various vegetation communities.

Table 3.1 Vegetation Communities On-site

ELC Type	Description	Size (ha)
Fresh-Moist White Cedar Coniferous Forest (FOC4-1)	Located along the southcentral and southeast portion of the property is a white cedar coniferous forest. This community was dominated by eastern white cedar (*Thuja occidentalis*) and to a lesser extent white pine (*Pinus strobus*), white spruce (*Picea glauca*) and trembling aspen (*Populus tremuloides*). The shrub and herbaceous layer in this community was minimal.	1.26
Cultural Thicket (CUT)	Located throughout the central and eastern portions of the property is a cultural thicket. Dominated by a mix of herbaceous vegetation and small trees and shrubs. Vegetation in this community included American elm (*Ulmus americana*) and trembling aspen in the canopy. The sub-canopy included saplings of green ash (*Fraxinus pennsylvanica*), eastern white cedar, white pine and American elm, as well as common buckthorn (*Rhamnus cathartica*). The herbaceous layer included common juniper (*Juniperus communis*) and a mix of broadleaf and grass like species.	2.32
Willow Thicket Swamp (SWT2)	Located in the west and eastern portions of the property is a willow thicket swamp. This community was primarily dominated by slender willow (*Salix petiolaris*). Tree cover in this community was sparse but included American elm and saplings of red maple (*Acer rubrum*). Herbaceous vegetation was primarily dominated by reed-canary grass (*Phalaris arundinacea*) other herbaceous vegetation included cattail (*Typha latifolia*) and other graminoid species. Standing water and areas of soil saturation were present sporadically within this community during site investigations.	3.64

3.5 Wildlife

Wildlife observed on-site and within the study area during field investigations completed in 2021 and 2022 are summarized in Table C.1 in Appendix C.

4.0 NATURAL HERITAGE FEATURES

Natural heritage features are defined in the PPS as “features and area, including *significant wetlands, significant coastal wetlands, fish habitat, significant woodlands* south and east of the Canadian Shield, *significant valleylands* south and east of the Canadian shield, *habitats of endangered species and threatened species, significant wildlife habitat* and *significant areas of natural and scientific interest*, which are important for their environmental an social values as a legacy of the natural landscape of an area”.

4.1 Significant Wetlands

As described in the Natural Heritage Reference Manual (OMNR, 2010), wetlands “mean lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface.” While *significant* in regard to wetlands means “an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time.”

No PSWs were identified on-site during the desktop review, nor were they identified on-site. A single local wetland was identified on-site during the site investigation. Impacts to local, unevaluated wetlands from the proposed project are discussed in Section 6; however, PSWs are not discussed or assessed further within this EIS.

4.1.1 Unevaluated Wetlands

As mentioned in Section 3.3, a local, unevaluated wetland is present on the subject site which also extends throughout the west and northwest portions of the study area. This large, approximately 30 ha local, wetland is comprised of wet meadow, deciduous thickets and open-water marsh communities.

Based on air photo imagery reviewed from 1985 to 2021, the wetland extents and flooding regime are variable over time and appear to be significantly affected by beaver activity and drought conditions. During two years of site investigations, no direct surface water was observed within the on-site portions of the local wetland; however, based on dominant vegetation communities and the presence of organic soils (Paterson, 2021), the ecological land classification system for Southern Ontario indicates the presence of wetland.

Review of LiDAR topographic data indicates the presence of distinct spatial zones within the broader 30 ha wetland. The upper zone is located in the northern portion of the wetland and is partially isolated from the rest of the wetland by a ridge with a drop of approximately 0.5 m to the south. This separation is likely the result of beaver activity, and results in discharge being directed west to Spring Creek. Portions of the wetland south of the ridge discharge to the local watercourse and to the Spring Creek Municipal Drain.

The wetland is classified as a palustrine, willow thicket swamp, comprising a 3.64 ha area on-site. According to the Hydraulic Impact Statement, the catchment area for the wetland is 304 ha, extending predominately north and east of the site. As with most swamps, the wetland is subject to seasonal flooding during the spring freshet after which water subsides via surface drainage and evapotranspiration. Accordingly, the wetland provides flood attenuation, water quality and nutrient retention services within the study area and for Spring Creek Municipal Drain, in addition to the various ecological functions outlined in Section 4.5, 4.6 and 4.7 below.

Based on provincial mapping resources (AgMaps, 2023) the wetland is not mapped as occurring within a significant groundwater recharge area.

The wetland on-site consists of a single vegetation community as outlined above, and as such has a low degree of interspersion. Within the study area, there appears to be an open-water marsh community located further to the north. The surrounding habitat is generally characterized as abandoned agricultural land.

4.2 Significant Woodlands

Significant woodlands are defined in the natural heritage reference manual (OMNR, 2010) as “an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.”

At the local scale, significant woodlands are defined and designated by the local planning authority. Generally, most planning authorities have defined significant woodlands as any woodland that contains any of the four criteria listed in Section 7.2 of the natural heritage reference manual (OMNR, 2010), including: woodland size, ecological functions, uncommon characteristics and economic and social functional values.

Table C.2 in Appendix C, presents the screening rationale for significant woodlands applied in this EIS. Based on the guidance outlined in the natural heritage reference manual (OMNR, 2010) and the Municipality of Mississippi Mills Official Plan, it is assumed that the woodland coverage within the planning area is between 15% and 30% of the land area, therefore the minimum woodland size for determining significance is 20 ha or greater.

In addition to the criteria from the NHRM presented in Table C.2, neither Lanark County OP nor the Municipality of Mississippi Mills OP have identified any significant woodlands on-site or within the study area.

Based on the results of the significant woodland screening presented in Table C.2, significant woodlands are not present on-site. As such, significant woodlands are not discussed or evaluated further in this EIS.

4.3 Significant Valleylands

Valleylands are defined in the natural heritage reference manual (OMNR, 2010) as 'a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of time". The identification and evaluation of significant valleys lands in Ontario is based on the recommended criteria from the MNRF and is the responsibility of local planning authorities.

In Southern Ontario, conservation authorities have identified valleylands as part of their regulation mapping (i.e., floodplain mapping); however, where valleys lands have not been defined, their physical boundaries are generally determined as the 'top-of-bank', or 'top-of-slope' associated with a watercourse. For less well-defined valleys, the physical boundary may be defined by riparian vegetation, flooding hazard limits, ordinary high-water marks or the width of the stream meander belt (OMNR, 2010).

As discussed in Section 3.2, the site is relatively flat, accordingly no valleylands have been identified on-site and as such, are not discussed or evaluated further in this EIS.

4.4 Significant Areas of Natural and Scientific Interest

The MNRF identifies two types of areas of natural and scientific interest (ANSI) in Ontario: life sciences ANSIs typically represent significant segments of Ontario's biodiversity and natural landscapes, while earth science ANSIs typically represent significant examples or bedrock, fossils or landforms in Ontario (OMNR, 2010).

No ANSI have been identified on-site or adjacent to the site during the desktop review or during site investigations. As such, ANSI are not discussed or evaluated further in this EIS.

4.5 Significant Wildlife Habitat

The natural heritage reference manual (OMNR, 2010), in combination with the significant wildlife habitat technical guide (OMNR, 2000) and the significant wildlife habitat ecoregion criterion schedules (OMNRF, 2015) were used to identify and evaluate potential significant wildlife habitat on-site. The significant wildlife habitat is broadly categorized as habitats of seasonal concentration of animals, rare vegetation communities, specialized habitats for wildlife, habitats of species of conservation concern and animal movement corridors. Table C.3, C.4, C.5 and C.6 in Appendix C, provide the screening rationale for each category of significant wildlife habitat, respectively.

4.5.1 Habitats of Seasonal Concentrations of Animals

Seasonal concentration areas are habitats where large numbers of species congregate at one particular time of the year. The significant wildlife habitat technical guides (OMNR, 2000) and significant wildlife habitat ecoregion criterion schedules (OMNRF, 2015) identify 11 types of seasonal concentration habitats that may be considered significant wildlife habitat. These 11

types of seasonal habitat are presented in Table C.3 in Appendix C, including a brief description of the rationale as to why or why they are not assessed further in this EIS.

Following review of Table C.3 in Appendix C, one *candidate* habitats of seasonal concentration of animals has been identified on-site, turtle wintering area.

4.5.1.1 *Candidate* Turtle Wintering Area

Candidate turtle wintering areas SWH was identified on-site within the local wetlands.

To evaluate the potential for the local wetlands to provide turtle wintering area SWH, a series of turtle basking surveys were conducted. Turtle overwintering areas provide protection for turtle species from winter element and typically consist of permanent water bodies, large wetlands, bogs or fens, with adequate dissolved oxygen, soft substrates and deep water. The defining criteria for confirmed turtle wintering area SWH is the presence of five over-wintering midland painted turtles, one or more northern map turtle or one or more snapping turtle within a wetland (OMNRF, 2015a).

Overwintering areas may be identified by searching basking areas for congregations of turtles on warm, sunny days during the spring or fall (OMNRF, 2015a).A total of five basking turtle surveys were conducted in 2022. Table 4.1 below provides a summary of the basking turtle survey results.

Table 4.1 Summary of Turtle Basking Surveys

Date	Species / Number Observed	Location	Confirmed SWH
April 29, 2022	Midland Painted Turtle / 1	Stormwater Pond	No
May 10, 2022	No turtles observed	N/A	
May 18, 2022	Midland Painted Turtle / 3 Snapping Turtle / 1	Stormwater Pond	
May 24, 2022	Midland Painted Turtle / 5	Stormwater Pond	
May 30, 2022	Midland Painted Turtle / 2	Stormwater Pond	

Following review of Table 4.1 above, the wetland on-site does not provide *confirmed* turtle overwintering areas, as no turtles were observed during basking surveys.

Although snapping turtles and more than five midland painted turtles were observed within the adjacent storm water management pond, in accordance with the Significant Wildlife Habitat Criteria Schedule, man-made storm water management ponds are not considered significant wildlife habitat. As such turtle overwintering area SWH is not present on-site and is not discussed or evaluated further in this ESA.

4.5.2 Rare Vegetation Communities

Rare vegetation communities in the province are described generally as those with an S1 to S3 ranking by the NHIC, and typically include communities such as sand barrens, alvars, old growth forests, savannahs and tallgrass prairies.

The vegetation communities identified on-site and described in Section 3.4 of this report are not ranked by the NHIC as S1, S2 or S3 and are therefore not considered to be rare vegetation communities. As such, rare vegetation communities are not discussed or evaluated further in this EIS.

4.5.3 Specialized Habitats for Wildlife

Specialized wildlife habitats are microhabitats that provide a critical resource to some groups of wildlife. The significant wildlife habitat technical guide (OMNR, 2000), defines eight specialized habitats that may constitute significant wildlife habitat, these eight types of specialized wild habitat are evaluated in Table C.4 in Appendix C.

Following review of Table C.4 in Appendix C, two *candidate* specialized habitat for wildlife have been identified on-site or within the broader study area: waterfowl nesting area and wetland amphibian breeding habitat. The *candidate* SWH are discussed in detail in the subsections below.

4.5.3.1 *Candidate* Waterfowl Nesting Area

Candidate waterfowl nesting area SWH has been identified on-site and is associated with all upland habitats within 120 m of the local wetlands on-site where waterfowl breeding is known to occur, as defined in the SWH criteria schedule (OMNRF, 2015a).

Nine waterfowl species are listed as indicator species for waterfowl nesting areas: American black duck, northern pintail, northern shoveler, gadwell, blue-winged teal, green-winged teal, wood duck, hooded merganser, and mallard. Based on observations from breeding bird surveys, only one of the listed species was observed on-site, wood duck. A total of 10 nesting mallard pairs are required to confirm SWH. Waterfowl nesting can occur in any upland ecosite; however, based on GMETECs professional experience in completion of waterfowl nesting surveys, habitat conditions present on-site are unlikely to provide *confirmed* SWH for nesting waterfowl. This conclusion is supported by the absence of other listed species and the fact that less than 3 listed species pairs, excluding mallard and less than 10 pairs including mallard were observed on-site.

Based on the absence of indicator species outlined in the SWH Criteria schedules, waterfowl nesting SWH is not present on-site. As such, *candidate* waterfowl nesting SWH is not discussed or evaluated further in this EIS.

4.5.3.2 *Candidate* Wetland Amphibian Breeding Habitat

Candidate wetland amphibian breeding habitat was identified within the local wetlands present on-site and within the study area.

Wetland amphibian breeding habitat provides critically important breeding habitat for the following wildlife species: American toad, spotted salamander, four-toed salamander, blue-spotted salamander, gray treefrog, western chorus frog, northern leopard frog, pickerel frog, green frog, mink frog and bullfrog. Wetland amphibian breeding habitat occurs throughout swamps, marshes, fens, bogs, open aquatic and submerged aquatic habitats. The defining use criteria is the presence of breeding populated of one or more listed newt/salamander species, two or more of the listed frog/toad species with at least 20 individuals or two or more listed frog/toad species with a call level code of 3.

To evaluate the potential for the habitats on-site to provide amphibian breeding habitat, a series of amphibian breeding surveys were conducted. Table 4.2 below summarizes the results of the amphibian breeding surveys described in Section 2 of this report. Figure A.2 in Appendix A illustrates the survey locations.

Based on review of Table 4.2 below, wetland habitat on-site does meet the defining use criteria for *confirmed* wetland amphibian breeding SWH for stations 1, 2, 3, and 4, which corresponds to the willow thicket swamp (ELC codes SWT2). Based on the description provided in the Significant Wildlife Habitat Criteria Schedules (OMNRF, 2015), wetland amphibian habitat is considered to be the wetland and the shoreline encompassing the wetland.

Impacts to wetland amphibian breeding habitat from the proposed development is discussed in Section 6.

Table 4.2 Summary of Amphibian Breeding Call Surveys

Survey Location	Breeding Habitat	Species/Highest Call Code/ Date	Confirmed SWH
1	Wetland	SPPE / 3* / April 24, 2022 WOFR / 2-5 / April 24, 2022 CHFR / 3 / May 16, 2022 SPPE / 3 / May 16, 2022 AMTO / 1-1 / June 14, 2022 GRFR / 1-4 / June 14, 2022 GRTR / 3 / June 14, 2022	Yes
2	Wetland	SPPE / 3* / April 24, 2022 WOFR / 1-1 / April 24, 2022 CHFR / 3 / May 16, 2022 SPPE / 3 / May 16, 2022 AMTO / 1-1 / June 14, 2022 GRFR / 1-2 / June 14, 2022 GRTR / 3 / June 14, 2022	Yes
3	Wetland	NLFR / 2-6 / April 24, 2022 SPPE / 3 / April 24 and May 16, 2022 WOFR / 2-6 / April 24, 2022 AMTO / 1-2 / May 16, 2022 CHFR / 3 / May 16, 2022 GRFR / 2-10 / June 14, 2022 GRTR / 3 / June 14, 2022	Yes
4	Wetland	NLFR / 3 / April 24, 2022 SPPE / 3* / April 24, 2022 WOFR / 2-5 / April 24, 2022 AMTO / 1-1 / May 16, 2022 CHFR / 3 / May 16, 2022 SPPE / 3 / May 16, 2022 GRFR / 2-10 / June 14, 2022 GRTR / 3 / June 14, 2022	Yes

Notes:

SPPE = Spring Peeper, GRTR = Gray Treefrog, GRFR = Green frog, NLFR = Northern Leopard Frog, AMTO = American Toad, WOFR = Wood Frog, CHFR = Western Chorus Frog.

Call Codes: the first number indicates the call code where: (1) number of individuals can be accurately counted, (2) individuals can be readily estimated, (3) calls are continuous and overlapping such that estimates of individuals are not reliable. The second number identifies the number of individuals calling. Call codes of 3 do not have a second number, as individual estimates are not possible.

* = Observed calling from off-site.

4.5.4 Habitats of Species of Conservation Concern

Provincial rankings are used by the Natural Heritage Information Centre to set protection priorities for rare species, similar to those described in Section 4.5.2 above for vegetation communities. Provincial rankings (S-ranks), are not legal designations such as those used to define the various protection statuses of species at risk, they are only intended to consider factors within the political boundaries of Ontario that might influence a particular species abundance, distribution or population trend.

Based on the guidance provided in the Significant Wildlife Habitat Ecoregion Criterion Schedules (MNRF, 2015), when a plant or animal element occurrence is recorded for any species with an S-rank of S1 (extremely rare), S2 (very rare), S3 (rare to uncommon) or SH (historically present), the corresponding vegetation ecosite is considered to provide *candidate* habitat for species of conservation concern and further consideration within the EIS is warranted.

The Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015), provides five general habitat types known to support a wide range of species of conservation concern in Ontario. The five general habitat types for Ecoregion 6E-11 are provided in Table C.5 in Appendix C, including a brief rationale as to why they are or are not considered further in this EIS. Following review of Table C.5 in Appendix C, two habitats for species of conservation concern have been identified on-site: marsh breeding bird habitat, and habitat for special concern and rare wildlife species for eastern wood thrush, eastern ribbonsnake, eastern musk turtle, northern map turtle, snapping turtle and river redhorse. The *candidate* SWH are discussed in detail in the subsections below.

4.5.4.1 *Candidate* Marsh Breeding Bird Habitat

Candidate marsh breeding bird SWH for green heron was identified within the thicket swamp (SWT2 on Figure A.3) located throughout the west and northern portions of the property.

Wetlands for marsh breeding birds are typically productive and rare in southern Ontario landscapes. Marsh breeding bird habitat provides critical habitat for the following wildlife species: American bittern, Virginia rail, sora, common moorhen, American coot, pied-billed grebe, marsh wren, sedge wren, common loon, sandhill crane, green heron, trumpeter swan, black tern and yellow rail. The defining use criteria for confirmed marsh breeding bird habitat is the presence of five or more nesting pairs of sedge or marsh wrens, or one pair of sandhill cranes or breeding by any combination of five or more listed species. Any wetland with breeding of one or more black tern, trumpeter swan, green heron or yellow rail is also considered SWH. As outlined in Table C.6, the defining ELC ecosites for the majority of the indicator species is not present on-site. However, ecosite SWT meets the candidate criteria to provide habitat for green heron.

The defining use criteria for confirmed marsh breeding bird SWH is the breeding of one or more green heron pairs. Table 4.3 below summarizes the results of the breeding bird surveys described in Section 2 of this report. Figure A.2 in Appendix A illustrates the survey locations.

Table 4.3 Summary of Marsh Breeding Bird Surveys

Survey Location	Species / Number of Individuals Calling / Date	Confirmed SWH
1	AMBI[1] / 1 / April 29, 2022 GRHE[2] / 2 / May 18, 2022 GRHE[1] / 1 / May 24 2022, May 30 2022	Yes
2	GRHE[2] / 2 / May 31, 2022	Yes

Notes: AMBI = American Bittern, GRHE = Green Heron.
* Denotes species that were detected responding to the Marsh Monitoring Program Call Broadcast used to elicit calls from secretive marsh species
[1]Species observed within the SWM pond adjacent to site, not within on-site wetlands.
[2]Species observed flying between on-site wetlands and off-site wetlands and stormwater management pond.

Based on review of Table 4.3 above, wetland habitat on-site does meet the defining use criteria for green heron, but not for any other marsh breeding birds. However, due to the obscure movement of the observed green herons and limited open water habitat on-site, further surveys would be required to confirm the presence of green heron breeding.

Based on the information provided in the significant wildlife habitat ecoregion criterion schedule (OMNRF, 2015), green heron habitat is typically found at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Due to the lack of preferred habitat on-site it is unlikely that green heron breeding will be present.

Impacts to *candidate* marsh breeding bird habitat from the proposed project are discussed in Section 6.

4.5.4.2 Special Concern and Rare Wildlife Species SWH

Based on occurrence data from the NHIC, Ontario Reptile and Amphibian Atlas, Ontario Breeding Bird Atlas and observation data taken during field investigations, nine species of special concern have been identified on-site or within the broader study area, wood thrush, eastern ribbonsnake, eastern musk turtle, northern map turtle, snapping turtle and river redhorse. Potential impacts to all *candidate* special concern from the proposed development are discussed in Section 6.

Wood Thrush

The wood thrush is a medium-sized songbird with an S-rank of S4 (uncommon but not rare) and is listed as a species of special concern in Ontario. The most recent Ontario Breeding Bird Atlas indicated that the wood thrush populations in Ontario have shown a significant annual increase

of 4.4% between the first and second atlas (Cadman et al., 2007). The NHIC has identified historic observations for the subject property and surrounding study area. Wood thrush is a woodland species often found in moist, deciduous hardwood or mixed forests stands, with dense deciduous undergrowth and tall trees. Preferred habitat for wood thrush is not present on-site, furthermore, the species was not observed during any of the site investigations, or targeted breeding bird surveys. As such wood thrush are not likely to occur on-site and the proposed development is not anticipated to negatively impact wood thrush or their habitat. A such habitats of species of conservation concern are not discussed or evaluated further in this EIS.

Eastern Ribbonsnake

The eastern ribbonsnake is a slender, black snake with three yellow stripes running down its back. Eastern ribbonsnakes are found close to water, typically marshes, where its prey of frogs and small fish are abundant. This species overwinters in underground burrows or rock crevices. Given the availability of suitable aquatic habitat, the site and surrounding area provides suitable foraging and basking habitat for eastern ribbonsnake.

Eastern Musk Turtle

Eastern musk turtles are found in ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. The eastern musk turtle is of special concern and ranked as S3 (rare to uncommon) in Ontario. The NHIC identified eastern musk turtle as having occurred within 2 km of the site. Due to the lack of suitable habitat, eastern musk turtle are not likely to occur on-site and the proposed development is not anticipated to negatively impact eastern musk turtle or their habitat. As such habitats of species of conservation concern for eastern musk turtle are not discussed or evaluated further in this EIS.

Northern Map Turtle

The northern map turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. The northern map turtle is of special concern and ranked as S3 (rare to uncommon) in Ontario. Given the lack of suitable aquatic habitat, the site and surrounding area does not provided suitable foraging or nesting habitat for northern map turtle. Due to the lack of suitable habitat northern map turtle are not likely to occur on-site and the proposed development is not anticipated to negatively impact northern map turtle or their habitat. As such habitats of species of conservation concern for northern map turtle are not discussed or evaluated further in this EIS.

Snapping Turtle

The snapping turtle is a highly aquatic turtle species with an S-rank of S3 (rare to uncommon) and is listed as a species of special concern in Ontario. The NHIC identified the snapping turtle as having historically occurred within 1 km of the site. Snapping turtles are aquatic generalists, found in a variety of wetlands, water bodies and watercourses. Snapping turtle were observed on-site during site investigations. Given the availability of potentially suitable aquatic habitat on-site, there is a high potential for snapping turtle and its habitat to occur on-site.

4.5.5 Amphibian Movement Corridor

Animal movement corridors are elongated areas used by wildlife to move from one habitat to another and allow for the seasonal migration of animals (OMNRF, 2015). The Significant Wildlife Habitat Ecoregion Criterion Schedules for Ecoregion 6E-11 (OMNRF, 2015), identifies two types of animal movement corridor: amphibian movement corridors and deer movement corridors. As per guidance presented in MNRF, 2015, animal movement corridors should only be identified as significant wildlife habitat when a *confirmed or candidate* significant wildlife habitat has been identified by the MNRF district office or by the regional planning authority.

Following review of Table C.6 in Appendix C, one animal movement corridor has been identified on-site, amphibian movement corridor. Amphibian movement corridors are corridors for amphibians moving from their terrestrial habitat to their breeding habitat, and can be important for local populations (OMNRF, 2015). Movement corridors must be determined when wetland amphibian breeding SWH is confirmed.

As discussed in Section 4.5.3.2, wetland amphibian breeding SWH has been confirmed within the local wetland which extends over the western portion of the site and adjacent north properties (ELC code SWT2 on Figure A.3). As such wetlands and the Spring Creek Municipal Drain may provide *candidate* amphibian movement corridors. Impacts to *candidate* amphibian movement corridors are discussed in Section 6.

4.6 Fish Habitat

The protection of fish and fish habitat is a federal responsibility and is administered by the Department of Fisheries and Oceans Canada (DFO). Fish habitat as defined in the Fisheries Act (Canada, 1985) means, “spawning grounds and nursery, rearing food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.”

When development is unable to avoid resulting in the harmful alteration, disturbance or destruction of fish habitat from typical project impacts such as temperature change, sedimentation, infilling, reduction of nutrient and food supply, etc., an authorization under the Fisheries Act is required for the project to proceed.

Based on field observations and as discussed in Section 3.3, the Spring Creek Municipal Drain provides suitable fish habitat while the on-site local wetlands and cut-off ditch lack sufficient water depth and/or permanency to provide direct fish habitat

Impacts to fish habitat on-site are discussed in Section 6.

4.7 Species at Risk

The probability of occurrence for species at risk to occur on-site and within the broader study area was determined through the desktop review stage of this EIS, as described in Section 2.1, and through the site specific surveys conducted as part of this EIS, outlined in Section 2.2.

Table C.7 in Appendix C, provides a summary of all species at risk which were determined to have the potential to occur on-site or within the broader study area, their protection status under the provincial Endangered Species Act (Ontario, 2007), their probability of occurrence and a brief rationale of that probability. Impacts to endangered or threatened SAR determined to have a moderate or high potential to occur on-site or within the broader study area are discussed further in Section 6.

5.0 PROPOSED PROJECT

The proposed project, assessed for potential impacts on the natural heritage features determined to be present within the broader study area, is a development plan for a residential subdivision on an approximately 7.23 ha property located on Part of Lot 17, Concession 10, collectively referred to as Mill Run Extension, in Almonte, Municipality of Mississippi Mills, Lanark County, Ontario.

The proposed plan of subdivision includes the extension of one residential road and the creation of three additional residential roads all providing access to 125 residential units, developing approximately 6.7 ha. All lots will be on municipal water and sewer services. Access to the proposed subdivision will be from Sadler Drive. The proposed plan of subdivision is provided on Figure A.4.

Stormwater management (SWM) for proposed development will be the expansion of the present stormwater management pond located at the southern extent of the subject property. The proposed stormwater management facility is illustrated in Figure A.4 in Appendix A. The SWM pond will continue to discharge to the Spring Creek Municipal Drain west of the property. The wet pond will provide quality control to meet an enhanced level of treatment (80% TSS removal). Quantity control will be required and accomplished by expanding the existing pond to accommodate the additional drainage area and peak flow from the proposed extension meeting pre-development peak flow rates. The existing pond outlet structure will be modified to meet the new allowable release rates.

Future components of the proposed project considered in the impact assessment presented in Section 6 include: tree clearing and vegetation grubbing, fill placement and elevation grading, road construction, laneway construction, excavation and pouring of foundations, construction of low-rise residential units all on municipal services, general landscaping activities and the extension of stormwater management features.

The timeline for the proposed project, from lot creation to completion of residential construction is subject to the regulatory approvals process. For the purpose of assessing impacts to natural heritage features, it is assumed in this EIS that the creation of individual residential lots will happen in the near-term and will not result in any physical alterations to the natural environment of the site and the broader study area. Future construction of residential homes on each of the subdivision lots is assumed to occur over a several year period, and that the construction of any one residential home will be completed such that the duration of any potential impacts on the natural environment during construction will be approximately six months.

6.0 IMPACT ASSESSMENT

Potential impacts to natural heritage features on-site and within the broader study area are assessed for direct, indirect and cumulative effects based on the proposed project outlined in Section 5. Natural heritage features identified in Section 4 of this report as present or likely to be present are discussed in the subsections below.

Potential effects to the environment of the site from the proposed development outlined in Section 5 include: vegetation removal, habitat fragmentation and loss, disturbance of the natural soil mantle, increased noise generation, increased human disturbance, increase stormwater generation, increased nutrient loading to adjacent surface water features, increase in impervious surface and short-term increases in sedimentation and/or erosion.

6.1 Local Wetlands

As outlined in Section 3.3 and Section 4.1, one local unevaluated wetland of approximately 30 ha is located within the study area, with 3.64 ha present on-site. No PSWs are present within the study area.

The proposed development, as illustrated on Figure A.4, is anticipated to result in the loss of approximately 3.42 ha (11%) of the approximately 30 ha local wetland which extends beyond the study area. Approximately 3.42 ha of local wetland located in the west and north portions of the site is proposed to be removed to facilitate the construction of the proposed subdivision.

Direct impacts to the local wetland will include the direct loss of 3.42 ha of wetland area (11%) and a reduction of the wetland catchment area from 304 to 296.8 ha (2%).

As no in-water work is proposed for the development, the greatest potential impacts to wetlands on-site are loss of wetland habitat, encroachment, changes to surface and groundwater balance through increased storm water runoff resulting from an increase in the impervious surface area, compaction of soils and vegetation loss.

As outlined in the Hydraulic Impact Statement (GEMTEC, 2023), due to the zonation within the broader 30 ha wetland, a slight water level increase is expected for the wetland zones located off-site. As the water balance has indicated a slight increase in water level within the off-site wetland zones, most notably adjacent to the development, there are no anticipated impacts to wetland habitat off-site.

While the removal of organic soils have the potential to reduce baseflow to the Spring Creek Municipal Drain, post-development impacts to base flow within Spring Creek are expected to be minimal as the resulting increase in wetland depth adjacent to the wetland would have a corresponding and offsetting increase in runoff from the upgradient wetland to Spring Creek.

Other potential impacts include short duration construction impacts including: heavy machinery encroachment, fill placement and long term human disturbance such as noise generation, dumping of refuse and trampling.

Impacts to the hydraulic regime and hydroperiod of off-site watercourses which receive seasonal flows from local wetlands are not anticipated to be impacted by the development due to the net increase in stormwater storage provided by the proposed stormwater management expansion and the resulting maintenance of connectivity to existing drainage networks off-site to the west.

Impacts relating to habitat loss can be partially offset through application of natural design principles to the design and construction of a naturalized stormwater management pond.

Mitigation measures to protect local wetlands from development impacts are provided in Section 7.

6.2 Significant Wildlife Habitat

The potential presence of significant wildlife habitat on-site and within the study area was evaluated in Section 4.5, as a result of this assessment four types of significant wildlife habitat were determined to be present on-site or within the study area: *confirmed* wetland amphibian breeding habitat, *candidate* marsh breeding bird habitat, habitats of special concern and rare wildlife species, and amphibian movement corridor.

Potential impacts to significant wildlife habitats are discussed in greater detail in the following subsections, while mitigation measures indented to prevent such impacts are presented in Section 7.

6.2.1 *Confirmed* Wetland Amphibian Breeding Habitat

Confirmed wetland amphibian breeding habitat on-site is confined to the thicket swamp in the west and northern portions of the property (SWT2 on Figure A.3). *Confirmed* wetland amphibian breeding habitat is illustrated on Figure A.5 in Appendix A as local wetland.

Direct impacts to wetland amphibian breeding SWH include the direct loss of 3.42 ha of wetland habitat. Indirect impacts may include disturbance of amphibian movement corridors, trampling and foraging from humans and pets.

Other potential impacts include short duration construction impacts including: heavy machinery encroachment, fill placement and long term human disturbance such as noise generation and dumping of refuse.

Mitigation measures to reduce impacts to *confirmed* wetland amphibian breeding habitat SWH are provided in Section 7.

6.2.2 *Candidate* Marsh Breeding Bird Significant Wildlife Habitat

Candidate marsh breeding bird significant wildlife habitat on-site is represented by the local thicket wetland in the north and west portions of the property (local wetland on Figure A.5).

Direct impacts to *candidate* marsh breeding bird habitat for green heron on-site is the loss of wetland habitat and riparian vegetation loss. Other potential impacts include short duration construction impacts including: heavy machinery encroachment, fill placement and long term human disturbance such as noise generation, dumping of refuse, trampling and foraging.

Mitigation measures to reduce impacts to *confirmed* marsh breeding bird habitat SWH are provided in Section 7.

6.2.3 Habitats of Special Concern and Rare Wildlife Species SWH

6.2.3.1 Eastern Ribbonsnake

Eastern ribbonsnake is a long and narrow snake, that is black with three yellow stipes down its back and side. It has a distinct white crescent in front of the eye with a white chin and whitish yellow belly (Ontario, 2021a). As a semi-aquatic species, eastern ribbonsnake are typically found in habitats close to water such as wetlands and shorelines of lakes and rivers (Ontario, 2021a). In Ontario, the eastern ribbonsnake is listed as species of special concern.

Threats to Eastern ribbonsnake are primarily associated with the loss of wetland and adjacent forest habitat. Additional threats to the species include pollution-related impacts to local amphibian populations which negatively affect eastern ribbonsnake as frogs are a primary food source, as well as road mortality and illegal collection (Ontario, 2021a).

Direct impacts to potentially suitable eastern ribbonsnake habitat are primarily associated with a loss of habitat. Potential indirect impacts may include changes to surface water quality and quantity through increased storm water runoff resulting from an increase in impervious surface area and vegetation loss.

Other potential impacts include short duration construction impacts, including: heavy machinery encroachment, fill placement and long-term human disturbance such as noise generation, dumping of refuse and yard waste and trampling. Additional indirect impacts may also include increased human and wildlife interaction associated with migrating snakes, particularly during nesting season.

Mitigation measures intended to minimize impacts to potential eastern ribbonsnake habitat are discussed in Section 7.

6.2.3.2 Snapping Turtle

Snapping turtle is the largest freshwater turtle found in Canada; in central Ontario males average 32 cm in carapace length and have an average mass of 9.3 kg (COSEWIC, 2008). The carapace is keeled, and can be brown, black or olive in colour (COSEWIC, 2008). The plastron is cross-shaped and is small, leaving the limbs and sides of the body exposed (COSEWIC, 2008). The head of a snapping turtle is large with a hooked upper jaw, relatively long neck, and tail that can be as long as the carapace (COSEWIC, 2008). In Ontario the snapping turtle is listed as a species of special concern.

Threats to snapping turtle are primarily related to their life-history, their slow recruitment, late maturity, long lifespan and high adult survival make them extremely vulnerable to a variety anthropogenic impacts (COSEWIC, 2008). Short, cool summers also reduce hatching success. In Canada, snapping turtles are most impacted by events that increase adult mortality, such as harvesting of adults, persecution and road mortality (COSEWIC, 2008). Other threats include loss of habitat, environmental contamination, and nest predation (COSEWIC, 2008).

As no in-water work is proposed as part of the future development, potential impacts to snapping turtle and their habitat are anticipated to be indirect in nature. Potential indirect impacts may include changes to surface water quality and quantity through increased storm water runoff resulting from an increase in impervious surface area and vegetation loss.

Other potential impacts include short duration construction impacts, including: heavy machinery encroachment, fill placement and long-term human disturbance such as noise generation, dumping of refuse and yard waste and trampling. Additional indirect impacts may also include increased human and wildlife interaction associated with migrating turtles, particularly during nesting season, when turtles move between winter and summer habitats.

Mitigation measures to protect snapping turtle and their habitat from the proposed development are presented in Section 7.

6.2.4 Animal Movement Corridors

Impacts to candidate amphibian movement corridors on-site may include a loss of available corridor habitat, impairment to corridor function and increased human-wildlife interactions. As outlined in the SWHMST, if a significant portion of the corridor is impacted by development it can completely disrupt the function of a movement corridor. Potential direct impacts to candidate amphibian movement corridors include loss of woodland cover and creation of movement barriers through the corridor.

The Spring Creek Municipal Drain, located to the west of the property will maintain an uninterrupted movement corridor for amphibians to access off-site wetland habitat, within the study area to the north. It should be noted that wetlands on-site represent the edge of suitable

wetland habitat for amphibians, there is no viable habitat located south of the subject property to support breeding amphibians.

Potential indirect impacts may include changes to surface water quality and quantity through increased storm water runoff resulting from an increase in impervious surface area and vegetation loss. Other potential impacts include short duration construction impacts, including: heavy machinery encroachment, fill placement and long-term human disturbance such as noise generation, dumping of refuse and yard waste and trampling.

Mitigation measures for candidate amphibian movement corridors are provided in Section 7.

6.3 Fish Habitat

According to the Provincial Policy Statement (MMAH, 2020), “development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.” Fish habitat as defined in the Fisheries Act (Canada, 1985) means “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.”

In 2019, changes were made to the Fisheries Act, broadening the protection for fish and fish habitat. Under the new Fisheries Act, protection is afforded to all fish and fish habitat, not just those that support either a recreational, commercial or Aboriginal fishery. Under the Fisheries Act, work that is conducted in or near waterbodies must avoid “the death of fish, other than by fishing” (Canada, 1985). Furthermore, the new Fisheries Act states that work must avoid “the harmful alteration, disruption or destruction (HADD) of fish habitat” (Canada, 1985).

When activities are unable to avoid or mitigate harm to fish or fish habitat from typical project impacts such as temperature change, sedimentation, infilling, reduction of nutrient and food supply, etc., an authorization under Subsection 35 (2) of the Fisheries Act is required for the project to proceed without contravening the Act.

The proposed development, described in Section 5, is not anticipated to impact the Spring Creek Municipal Drain. As no in-water work is proposed as part of the future development, potential impacts to water quality and fish habitat on-site from residential development are anticipated to be indirect in nature.

Potential indirect impacts resulting from increased runoff following construction may include increased inputs to base flow volumes, leading to increases in flow rates and resulting in sedimentation and erosion downstream. Additional indirect impacts to water quality and fish habitat from subdivision development may include increased overland flow and concomitant sediment transport caused by an increase in impervious surface area, as well as increased nutrient loading through both overland and subsurface pathways resulting from landscaping practices.

Mitigation measures intended to protect fish and fish habitat on-site are provided in Section 7.

6.4 Species at Risk

As outlined in the Endangered Species Act (Ontario, 2007), only species listed as threatened or endangered and their general habitat receive automatic protection. When a species-specific recovery strategy is developed, a specific habitat regulation will be established, which eventually replaces the automatic habitat protection. Species of special concern and their habitat do not receive protection under the ESA.

Potential impacts associated with the proposed project to threatened or endangered species identified as having a moderate or high potential to occur on-site in Section 4.7, are discussed on a species-by-species basis in subsections below.

6.4.1 Barn Swallow

The barn swallow (*Hirundo rustica*) is a medium-sized, insectivorous bird with a slightly flattened head and broad shoulders that taper to long, pointed wings. The forked tail is long and extends beyond wingtips when perched. Barn swallows have blue-black coloured wings and tail, with a whitish to orange underside and dark rufus throat.

While most abundant in Ontario south of the Shield, the breeding range for barn swallow in Ontario extends from the Carolinian region in extreme southwest Ontario to the Hudson Bay Lowlands (Cadman et al., 2007). In Ontario, breeding bird survey data demonstrated a decline in barn swallow populations of 60-75% between the first and second breeding bird atlas.

Barn swallows typically build their nests out of mud on ledges or walls on barns or other human made structures. Natural sites, including cliffs and caves are rarely used for nesting (Cadman et al., 2007). Foraging occurs fields and ponds. Barn swallows are less common in highly urban area and areas with higher forest cover (Cadman et al., 2007).

Three diurnal breeding bird surveys were conducted during May and June 2022, under optimum weather conditions (minimal to no rain, low winds) to target breeding birds. The surveys were conducted at two point count locations, one of which targeted potentially suitable habitat for grassland birds such as barn swallow; the survey locations are illustrated on Figure A.2 in Appendix A. Barn swallow were observed foraging during site investigations however, no nests were observed on-site. As such no negative impacts are anticipated to occur to barn swallow as a result of the proposed development and no mitigation measures are provided in Section 7 for the protection of barn swallow and they are not discussed or evaluated further in this EISSA.

6.4.2 Bobolink

Bobolink (*Dolichonyx oryzivorus*) are small, omnivorous songbirds with large, somewhat flat heads, short necks and short tails. The male bobolink has a white back, black underside and a straw-yellow coloured patch on the back of the head. Female bobolinks have a non-descript buff and brown plumage not unlike most species of sparrows.

In Ontario, bobolink are restricted to southern Ontario and occur south of the Highway 17 corridor between North Bay and Sault Ste. Marie. Scattered populations exist in correlation with Clay Belt areas in Timiskaming, Cochrane and Thunder Bay areas. Between the first and second breeding bird atlas, the probability of bobolink observations declined by 28% province wide (Cadman et al., 2007).

Bobolink breed primarily in hayfields and other grasslands with tall vegetation that provides cover for nests which are established on the ground (Cadman et al., 2007). The bobolink is generally sensitive to vegetation structure and composition in its habitat that are generally found in old (> 8 years old) forage crops. Abundance and density are positively correlated with a moderate litter depth, high lateral litter cover, high grass-to-legume rations, an abundance of small shrubs and a high percentage of forb cover (COSEWIC, 2010). Bobolinks typically avoid nesting in habitats that are dominated by overly dense shrub vegetation with an overly deep littler layer or a high percentage of bare soil (COSEWIC, 2010).

Three diurnal breeding bird surveys were conducted during May and June 2022, under optimum weather conditions (minimal to no rain, low winds) to target breeding birds. The surveys were conducted at two point count locations as illustrated on Figure A.2 in Appendix A.

No suitable meadow habitat is present on-site and bobolink were not heard or observed nesting or foraging during any of the site investigations. As such no negative impacts are anticipated to occur to bobolink as a result of the proposed development and no mitigation measures are provided in Section 7 for the protection of bobolink and they are not discussed or evaluated further in this EIS.

6.4.3 Eastern Meadowlark

Eastern meadowlark (*Sturnella manga*) is a chunky, medium-sized grassland songbird, with a short tail, and a long spear-shaped bill. The colour pattern of the species is pale brown marked with black, the underside is bright yellow and a bold black ‘V’ pattern across the chest.

The eastern meadowlark was once well established in southern Ontario, however, due to the natural succession of abandoned agricultural fields transitioning back to forested habitat on the Canadian shield and through the northern portion of the Lake Simcoe-Rideau region, along with intensive farming practices and expanding of urbanization in southwestern and eastern Ontario, the eastern meadowlark has suffered significant habitat loss (Cadman et al., 2007). Between the first and second breeding bird atlas, the probability of observation declined by 13% province wide (Cadman et al., 2007). The current distribution of eastern meadowlark is concentrated through the Lake Simcoe-Rideau region, primarily from Kingston to Lake Simcoe.

Three diurnal breeding bird surveys were conducted during May and June 2022, under optimum weather conditions (minimal to no rain, low winds) to target breeding birds. The surveys were conducted at two point count locations, as illustrated on Figure A.2 in Appendix A.

No suitable meadow habitat is present on-site and eastern meadowlark were not heard or observed nesting or foraging during any of the site investigations. As such no negative impacts are anticipated to occur to eastern meadowlark as a result of the proposed development and no mitigation measures are provided in Section 7 for the protection of eastern meadowlark and they are not discussed or evaluated further in this EIS.

6.4.4 Red-headed Woodpecker

The red-headed woodpecker (*Melanerpes erythrocephalus*) is a medium-sized bird, approximately 20 centimetres long and is easily recognized for its vivid red head, neck and breast. The rest of the bird is black and white, mostly white underneath and black on top (Ontario, 2022).

In Ontario, the species' distribution is discontinuous in the southern part of the province, with many gaps between occurrences. It occurs uncommonly at sites on the southern Canadian Shield, near large urban centres, such as Toronto and Hamilton, and in certain intensively farmed areas. The species is a regular breeder, albeit in small numbers, in northwestern Ontario (i.e., Lake of the Woods area) and eastern Ontario, along the Ottawa River Valley. The Canada Breeding Bird Survey (BBS) shows a significant long-term annual rate of decline of -1.88% per year between 1970 and 2016 for red-headed woodpecker in Canada. Declines have been steepest in Ontario, with a significant decline of -3.42% per year between 1970 and 2016, or -79.8% in total (COSWEIC, 2018).

The main threats to Red-headed Woodpecker are habitat degradation and ecosystem modifications, particularly the loss of standing dead wood critical for nesting, flycatching, and food caching. This is primarily due to suppression of disturbances that may lead to the creation of standing dead wood such as fire, dead wood removal for aesthetic reasons, or through harvesting activities, and other human-driven modifications to the ecosystem that reduce standing dead wood (COSEWIC, 2018).

Red-headed woodpeckers live in a variety of open woodland and woodland edge habitat where there is an abundance of dead trees that are used for nesting and perching. Parks, golf courses and cemeteries are some areas red-headed woodpeckers are commonly found.

Three diurnal breeding bird surveys were conducted during May and June 2022, under optimum weather conditions (minimal to no rain, low winds) to target breeding birds. The surveys were conducted at two point count locations, two of which targeted potentially suitable habitat for woodland birds such as red-headed woodpecker; the survey locations are illustrated on Figure A.2 in Appendix A.

Suitable woodland habitat is present on-site, however red-headed woodpecker were not heard or observed nesting or foraging during any of the site investigations. As such no negative impacts are anticipated to occur to red-headed woodpecker as a result of the proposed development and no mitigation measures are provided in Section 7 for the protection of red-headed woodpecker and they are not discussed or evaluated further in this EIS.

6.4.5 Eastern Small-footed Myotis

Eastern small-footed Myotis (*Myotis leibii*) is the smallest (typically 3-5 g), insectivorous bat found in Ontario. The fur of an eastern small-footed Myotis is golden-brown in colour, with a distinct black mask across the face. The eastern small-footed Myotis is very similar in appearance to the

little brown Myotis and is distinguishable by their small foot and keeled calcar (Fraser, MacKenzie & Davy, 2007).

The eastern small-footed Myotis is found throughout eastern North America. In Ontario the species has been observed in the areas sough of Lake Superior across to the Ontario-Quebec border (Humphrey, 2017).

Eastern small-footed Myotis overwinter primarily in caves and abandoned mines with low humidity and temperatures and stable microclimates (Humphrey, 2017). In comparison to other Ontario bat species, they are able to tolerate much colder temperatures, drier conditions and draftier locations for hibernating (Humphrey, 2017). During the spring and summer months, they utilize a variety of habitats for roosting, including under rocks or rock outcrops, in buildings, under bridges, or in caves, mines or hollow trees (Ontario, 2021b).

Although the forest habitat on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings on-site and within the study area, there is a potential for eastern small-footed myotis to occur on the property, primarily for foraging or non-maternal roosting. Impacts to eastern small-footed myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect eastern small-footed myotis from impacts of the proposed development are discussed in Section 7.

6.4.6 Little Brown Myotis

Little brown Myotis (*Myotis lucifugus*) is a small (typically 4-11 g), insectivorous bat. The fur of a little brown Myotis is bi-coloured; fur is a glossy brown with a darker coloured base. The tragus of the Little Brown Myotis is long and thin, with a rounded tip (Fraser, MacKenzie & Davy, 2007).

In Canada, little brown Myotis' occur throughout all of the provinces and territories (except Nunavut), with its range extending south through the majority of the United States as well. In Ontario, the little brown Myotis is widespread in southern Ontario and has been found as far north as Moose Factory and Favourable Lake (Ontario, 2021c).

Little brown Myotis overwinter in caves and abandoned mines, they require highly humid conditions and temperatures that remain above the freezing mark (Ontario, 2021c). During the summer months, maternity colonies are often located in buildings or large-diameter trees. Little brown Myotis roost in trees and buildings. Foraging occurs over water and along waterways, forest edges and in gaps in the forest. Open fields and clearcuts are not typically utilized for foraging (COSEWIC, 2013).

Although the forest habitat on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings on-site and within the study area, there is a potential for little brown myotis to occur on the property, primarily for foraging or non-maternal

roosting. Impacts to little brown myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect little brown myotis from impacts of the proposed development are discussed in Section 7.

6.4.7 Tri-Colored Bat

Tri-colored bat (*Perimyotis subflavos*) is a small (typically 5-7 g), insectivorous bat. The fur is uniformly coloured on the ventral and dorsal sides, however when parted fur shows three distinct colour bands. The base of the hair is blackish, with a blonde middle and brownish tip. The snout of the tri-coloured bat is also distinct, with swollen bulbous glands present (Fraser, MacKenzie & Davy, 2007).

In Canada, the tri-colored bat has only been recorded in southern parts of Nova Scotia, New Brunswick, Quebec and central Ontario. In Ontario it occurs primarily from the southern edge of Lake Superior across to the Ontario-Quebec border and south (COSEWIC, 2013).

Tri-colored bat overwinter in in caves or mines and have very rigid habitat requirements; they typically roosting the deepest parts where temperatures are the least variable, and have the strongest correlation with humidity levels and warmer temperatures (COSEWIC, 2013). In the spring and summer, tri-colored bat utilizes trees, rock crevices and buildings for maternity colonies. Foraging is mainly done over watercourses and streamside vegetation (COSEWIC, 2013).

Although the woodlands on-site do not meet minimum snag density requirements to support bat maternity colony habitat, given the availability of habitat on-site there is a potential for tri-colored bat to occur on the property, primarily for foraging or non-maternal roosting. Impacts to tri-colored bat are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect tri-colored bat from impacts of the proposed development are discussed in Section 7.

6.4.8 Blanding's Turtle

Blanding's turtles (*Emydoidea blandingii*) have a highly domed, smooth black carapace with small, irregular tan or yellow flecking. The most distinctive characteristic of this species is the bright yellow chin and throat. Their hinged plastron is yellow with a large dark blotch in the corner of each scute, but may also be entirely black (Oldham and Weller, 2000).

In Canada, Blanding's turtles are found throughout southern and south-central Ontario from south of Manitoulin Island to western Quebec. In Ontario, Blanding's turtles are often observed utilizing eutrophic habitats with clear water (COSEWIC, 2016). This turtle species occurs primarily in shallow water; adults are generally found in open or partially vegetated sites, where as juveniles prefer areas that contain thick aquatic vegetation. Blanding's turtles are known to make large overland journeys between connected lakes, rivers, streams, marshes or ponds, upwards of 6 km

in a single active season. Overwintering occurs in permanent pools that average about one metre in depth, or slow flowing streams (COSEWIC, 2016).

The Blanding's Turtle is a largely aquatic turtle that occurs in a variety of habitats including but not limited to swamps, bogs, fens, marshes, marshy meadows, lakes, and ponds (COSEWIC, 2016). In the Great Lakes/St. Lawrence population, the most preferred habitats are wetlands that are eutrophic, with shallow water (typically < 100cm, range 0-200cm), an organic substrate, a high density of aquatic vegetation and slow to no flow (COSEWIC, 2016). Upland forest is a strong predictor for the presence of Blanding's turtle in a landscape, with upland habitat being extensively used as a travel corridor and for hatchling dispersal to overwintering sites (COSEWIC, 2016). Wet forest, vernal pools, beaver ponds and shallow-water wetlands, are also often used by Blanding's turtles when travelling between residence wetlands and during nesting forays (COSEWIC, 2016). Vernal pools and ephemeral wetlands are important foraging sites for Blanding's turtles during spring as they provide rich sources of amphibian and insect eggs and larvae (COSEWIC, 2016).

As outlined in the MNRF general habitat description for Blanding's turtle, Category 1 habitat is defined as "the nest and the area within 30 m of the nest or overwintering sites and the area within 30 m of the site", Category 2 habitat is defined as "the wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from an occurrence and the area within 30 m around those suitable wetlands or waterbodies" and Category 3 habitat is defined as "the area between 30 m and 250 m around suitable wetlands and waterbodies identified as Category 2, within 2 km of an occurrence." The MNRF general habitat description for Blanding's turtle is provided in Appendix D.

Blanding's turtle nests (Category 1 habitat) are created in open habitats with low vegetation cover, loose soils, and high sun exposure such as in forest clearings, meadows, shorelines, beaches and gravel roads (Ontario, 2021) and (COSEWIC, 2016). Suitable Blanding's turtle overwintering habitat typically includes permanent bogs, fens, marshes, ponds, channels or other habitats with free (unfrozen) shallow water. Blanding's turtle may also hibernate within graminoid shallow marsh areas of larger marsh complexes by burying into substrates in areas of pooled water. Blanding's turtle may also overwinter in seasonal pools or small excavated areas with standing water (Ontario, 2021).

Suitable Category 2 habitat for Blanding's turtles during the active season includes a variety of wetlands such as marsh, swamps, ponds, fens, bogs, slow-flowing streams, shallow bays of lakes or rivers, as well as graminoid shallow marsh and slough forest habitats that are adjacent to larger marsh complexes (Ontario, 2021). Suitable wetlands used during the active season are typically eutrophic (mineral or organic nutrient-rich), shallow with a soft substrate composed of decomposing materials, and often have emergent vegetation, such as water lilies and cattails (Ontario, 2021) and (COSEWIC, 2016).

Although wetlands and ponds are used as movement corridors when available, females make extensive movements through upland habitat to access nesting sites (Ontario, 2021). Blanding's turtles also make regular overland movements between wetlands throughout the active season in order to access Category 1 and 2 habitats within their home range (Ontario, 2021). Category 3 habitat provides essential movement corridors of up to 500 m between wetlands, which will encompass the areas that are most likely to be used for overland movement (Ontario, 2021).

Review of NHIC occurrence data indicates the species has been observed within 1 km of the site. During the site investigation, Blanding's turtles were not detected on-site however a historical report completed by Bowfin Environmental Consulting, dated March 8, 2022, for the adjacent west development, known as Hanna Hills makes note of a Blanding's turtle observation on March 30, 2021, within the stormwater management pond directly south of the subject property.

As regulated Blanding's turtle habitat extends up to 2 km from an observation, based conservatively on the NHIC observation data, all wetlands and watercourses on-site are assumed to provide Category 2 and 3 habitat. However, based on field observations and the lack of standing water within the on-site wetland, it is unlikely that the mapped thicket swamp would provide suitable wetland habitat for Blanding's turtle. As such, no Category 1 or Category 2 habitat has been confirmed within the on-site wetlands. However, it should be noted that the adjacent stormwater management facility and wetlands to the north may provide suitable Category 1 habitat for foraging, basking and overwintering for Blanding's turtle based on historical observations.

As no in-water work will occur on the subject property, potential impacts to Spring Creek and the off-site local wetland are anticipated to be indirect and primarily associated with changes to the surface water and groundwater water balance through increased stormwater runoff resulting from an increase in the impervious surface area and encroachment resulting in compaction of soils and vegetation loss. This increase in storm water runoff and flow rates has the potential to result in increased sedimentation and erosion downstream.

Indirect impacts to water quality may include increased overland flow and concomitant sediment transport caused by an increase in impervious surface area, as well as increased nutrient loading through both overland and subsurface pathways resulting from landscaping practices. Other potential impacts include short duration construction impacts, including: heavy machinery encroachment, fill placement and long term human disturbance such as noise generation, dumping or refuse and yard waster and trampling and increased road mortality, particularly during nesting season, when turtles are more transient.

Potential direct impacts to Blanding's turtles are anticipated to be associated with the modification of the stormwater management facility, a loss of Category 2 and 3 habitat and increased interactions between transient Blanding's turtles. Modifications of the stormwater management facility will impact Category 1 habitat, particularly during construction. Additionally the proposed

development is unable to avoid development within Category 2 and 3 habitat on-site. The proposed development has the potential to impact up to 0.64 ha of Category 2 habitat and 7.22 ha of Category 3 habitat. Development within Category 2 and 3 habitat will include a direct loss of vegetation cover within these areas.

Avoidance and mitigation measures intended to prevent harm to Blanding's turtles who have the potential to occur on-site are present in Section 7.

6.4.9 Butternut

Butternut (*Juglans cinerea*) is a relatively short lived, medium-sized tree that can reach heights of up to 30 m. It is easily distinguished by its compound leaves, made up of 11 to 17 leaflets, arranged in a feather-like patter. Each leaflet is 9 to 15 centimetres in length. The bark is grey and smooth on young trees, becoming more ridged with age. Butternut is a member of the walnut family and produces edible nuts in the fall.

The Canadian range for Butternut extends through southern Ontario into southern Quebec, and New Brunswick (COSEWIC, 2017). Butternut is a shade intolerant tree that is commonly found in riparian habitats, and sites in a regenerative state. Butternut can also be found on rich, moist, well-drained gravels, favouring those of limestone origin. Common associates of Butternut trees include basswood, black cherry, beech, black walnut, elm, hickory, oak, red maple, sugar maple, yellow poplar, white ash and yellow birch.

No butternut trees were observed on the proposed severance parcel or within 120 m of the proposed severance parcel. As such the proposed draft plan application and potential future development on the retained lands is not anticipated to impact butternut or their habitat.

As no potential impacts to butternut or their habitat are expected due to the proposed project, no mitigation measures are provided for the protection of butternut or their habitat, and they are not discussed further in this EIS.

6.5 Cumulative Impacts

Potential cumulative impacts associated with the proposed project include an increase in storm water generation, increases in nutrient loading to aquatic features, potential decreases in base flow to Spring Creek during drought conditions, and the loss of wetland, thicket and forest habitat, primarily for avian, amphibian, and reptilian species, including Blanding's turtle.

Cumulative impacts to the natural environment at the site due to increased human presence, increased wildlife and human interaction and increased noise, are expected to be negligible given the existing residential and agricultural land use in the surrounding project area.

Cumulative impacts such as those listed above can be mitigated by implementing the proposed setbacks and recommended mitigation measures outlined in Section 7 below.

7.0 RECOMMENDED AVOIDANCE AND MITIGATION MEASURES

The following avoidance and mitigation measures have been recommended by GEMTEC in order to minimize or eliminate potential environmental impacts identified in Section 6.

For the purpose of this report, a setback is defined as the minimum required distance between any structure, development or disturbance and a specified line. A buffer, for the purpose of this report, is defined as the area located between a natural heritage feature and the prescribed setback. For the purpose of the following subsections, buffers should be located between natural heritage features and lands subject to development or alteration, be permanently vegetated by native or non-invasive, self sustaining vegetation and protect the natural heritage feature against the impact of the adjacent land use.

Vegetated buffers, particularly buffers that are vegetated with a mix of grassy herbaceous vegetation and shrubby or woody vegetation are most effective in mitigating impacts associated with anthropogenic activities in adjacent lands (Beacon, 2012). Buffers recommended in the following subsections and illustrated on Figure A.6, are done so within the context of the existing environmental disturbances but also to promote reasonable natural rehabilitation.

7.1 Local Wetlands

As the proposed development is anticipated to result in the loss of approximately 3.42 ha of local wetlands and significant wildlife habitat for breeding wetland amphibians, compensation is required to offset the loss of 3.42 ha of wetland on-site. It is currently proposed that off-site compensation will take place within the Mississippi River watershed and consist of a minimum of 3.42 ha of newly constructed wetland comprised of approximately 2/3 marsh and 1/3 thicket swamp. Further details on wetland compensation will be provided under separate cover.

With respect to remnant wetland not proposed for removal, Beacon Environmental Review of Ecological Buffers (2012), provides a range for buffer widths to protect various natural heritage features based on the current science. The buffers are presented in a way that determines the risk of not achieving the desired buffer function (i.e. high, moderate and low). The functions analysed include water quantity, water quality, screening or human disturbance/changes in land use, hazard mitigation zone and core habitat protection. Impacts to the local wetlands on and off-site were identified to include potential impacts to water quality, human disturbance and core habitat protection (habitat for Blanding's turtle, *confirmed* wetland amphibian breeding habitat, *confirmed* marsh breeding bird habitat and *candidate* snapping turtle SWH). Wetland buffer widths have a moderate risk of not providing adequate mitigation for water quality impacts at widths between 11 m and 50 m. Wetland buffer widths have a moderate risk of not providing adequate mitigation for human disturbance/land use change impacts at widths between 11 m and 30 m and low risk at widths of 31 m to 50 m. Wetland buffer widths have a moderate risk of not providing adequate mitigation for core habitat protection at widths between 21 m and 60 m.

In consideration of the Spring Creek Municipal Drain, and the nature of the proposed development and similar adjacent developments, a minimum 15 m setback from the watercourse is recommended. The recommended 15 m setback from Spring Creek provides moderate protection for mitigating water quality impacts and human disturbances. At 15 m, the protection the buffer offers for core habitat protection, falls into the high risk of not achieving desired buffer function; however, the Spring Creek MD provides only limited core habitat functions as they relate to small-bodied, warm water fish populations.

In consideration of the off-site, open-water marsh to the north, a 30 m setback is recommended. The recommended 30 m setback provides moderate protection for mitigating water quality impacts and human disturbances. At 30 m, the protection the buffer offers for core habitat protection falls into the moderate risk of not achieving desired buffer function; however, based on the extent of available habitat the moderate risk of not achieving the desired buffer function is acceptable. Furthermore, the MECP has determined that a 30 m buffer is sufficient for the protection of Category 2 Blanding's turtle habitat.

As outlined above, the proposed development illustrated on Figure A.4 is anticipated to result in the loss of 3.42 ha of wetland habitat, 11% of the approximately 30 ha local, unevaluated wetland. A 15 m setback from the top-of-bank of Spring Creek and a 30 m setback from the northern open-water marsh is proposed as illustrated on Figure A.6.

Despite the loss of wetland habitat required to accommodate the construction of residential dwellings and road network, no significant residual negative impacts on local, unevaluated wetlands are anticipated as a result of the proposed development if all mitigation measures recommended above, including the 1:1 off-site compensation for wetland loss, and those provided below are enacted and best management practices followed.

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

- 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 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.

7.2 Significant Wildlife Habitat

7.2.1 *Confirmed* Wetland Amphibian Breeding Habitat

In accordance with the Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014), for large areas of significant wildlife habitat, when complete avoidance is not possible, minimizing the amount of habitat affected may be a satisfactory mitigation measures (i.e., make the development footprint as small as possible, confine development along the edge of the habitat and ensure that is doesn't change wetland water quality or quantity).

Mitigation measures presented in Section 7.1 are sufficient to mitigate and/or offset impacts to local wetlands and amphibian breeding habitat on-site. Furthermore, protection of Spring Creek Municipal Drain as a wildlife travel corridor, allowing it to connect natural and open spaces on-site and off-site, is sufficient to ensure that off-site travel corridors are maintained, which is important for amphibians moving between habitats throughout the year.

In addition to the amphibian monitoring recommended in Section 7.1 above, to confirm the assumption that the loss of 3.42 ha of significant wildlife habitat for wetland amphibians does result in a negative impacts, breeding amphibian surveys should be undertaken for a period of three years to document no residual negative impacts to significant wildlife habitat for breeding wetland amphibians as a result of wetland removal.

The 30 m setback presented in Section 7.1 above, to protect off-site local wetlands not proposed for removal are adequate to protect the ecological function of remaining *confirmed* wetland amphibian breeding habitat.

To protect migrating amphibians associated with *confirmed* breeding habitat on-site during construction, exclusion fencing should be installed around the entire construction area prior to construction commencing to prohibit the movement of turtles and amphibians into the construction area.

7.2.1.1 *Candidate* Marsh Breeding Bird Habitat

The proposed development would result in the loss of 3.64 ha of *candidate* marsh breeding bird habitat; however, the protection of open water marsh habitat within the study area north of the property by way of a 30 m setback and the protection of potential foraging habitat within the Spring Creek Municipal Drain by way of a 15 m setback is sufficient for the preservation of *candidate* significant wildlife habitat for breeding marsh birds, specifically green heron.

7.2.2 Habitats of Special Concern and Rare Wildlife Species

7.2.2.1 Eastern Ribbonsnake

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.

7.2.2.2 Snapping Turtle

The 15 m setback from Spring Creek and 30 m setback from the open water marsh north of the property are sufficient to protect snapping turtle and their habitat on-site from potential impacts of development.

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. Additionally, all stock piled material should be covered with a geotextile to prevent turtles from nesting in the material between May 1 and August 1 of any year.

7.2.3 Animal Movement Corridor

The 15 m setback from Spring Creek and 30 m setback from the open water marsh north of the property are sufficient to protect and maintain existing *candidate* amphibian movement corridors.

Furthermore, the position of each wetland community relative to the property boundaries results in the uninterrupted migration of amphibians on at least one side of each wetland through the watercourse northwest of the property.

7.3 Fish Habitat

The 15 m setback established above to protect Spring Creek is sufficient to protect fish and fish habitat within Spring Creek.

Additional general mitigation measures recommended for the protection of water quality and fish habitat include the following:

- Buffers should be comprised of a mixture of native or non-invasive, self-sustaining trees, shrubs and tall grasses.
- Culverts, if required, should be installed such that it is imbedded in the streambed, ensuring the culvert remains passable (i.e. does not become perched).
- Install and maintain effective sediment and erosion control measures before starting work.
- Schedule work to avoid wet, windy and rainy periods.
- The development plan should include lot-side swales and/or roadside ditches designed to promote infiltration.

- A storm water management plan should be prepared by a qualified engineer with the purpose of reducing suspended sediment and ensuring matching of pre- and post-development flows to Spring Creek.

7.4 Species at Risk

7.4.1 Eastern Small-footed Myotis, Little Brown Myotis, and Tri-Colored Bat

To protect roosting and foraging bats, tree removal where required should take place outside of the spring and summer active season (typically April 1 to November 30), when bats are more likely to be using forest habitat. If vegetation clearing must be conducted during the spring and summer timing window, than a roost survey should be conducted by a qualified professional.

7.4.2 Blanding's Turtle

The 15 m setback as prescribed above is sufficient for the protection of Category 2 habitat within Spring Creek and has been supported by the MECP for the adjacent western development, Hanna Hills.

Blanding's turtle habitat impacted by the proposed development includes 0.24 ha of Category 2 Blanding's habitat on-site and 6.80 ha of Category 3 habitat on-site. To protect nesting and migrating turtles, tree removal where required should take place outside of the spring and summer active season (typically April 1 to October 31), when turtles move between winter and summer habitats. Due to the presence of Blanding's turtle in the surrounding area, presence of Category 2 and 3 habitat on-site and that development cannot avoid impacts to regulated habitat, an Information Gathering Form is required to be submitted to the MECP to determine if the proposed development plan requires an authorization under the Endangered Species Act (ESA).

The following mitigation measures provided are to be implemented *before* issuance of a building permit in order to avoid contravention of the ESA:

- Prior to issuance of a building permit for the property, an Information Gathering Form should be submitted to the Kemptville District Ministry of Environment, Conservation and Parks (MECP).
- The Information Gathering Form is required to outline the proposed development details and avoidance and mitigation measures to be enacted to ensure no adverse effects occur to Blanding's turtle or its regulated habitat. The Information Gathering Form should be prepared by a qualified professional with experience in species at risk management.
- Additionally, wetlands, waterbodies, watercourses and shorelines should be not be altered or destroyed during the construction stages of the residential dwelling. The development can avoid impacts to Blanding's turtle habitat by avoiding wetlands and associated habitats, which ensures no contravention of Section 10 of the Endangered Species Act.

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).
- 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).
- 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.
- To protect aquatic habitat for Blanding's turtles, machinery should be maintained in good working condition and all machinery should be fueled a minimum of 30 m from the high water mark.
- Following construction completion, homeowners will be provided with information and awareness packages for SAR that have the potential to occur on their property. Information and awareness packages will include information on species identification, life-history, and habitat use for all species at risk with a potential to occur on-site, including Blanding's turtle. Information packages will also include contact/reporting options to the MECP and NHIC is species are encountered.

7.5 Wildlife

The following avoidance and mitigation measures are provided in effort to minimize impacts to on-site and off-site wildlife:

- Vegetation removal should occur outside of March 15 - November 30 to avoid the key breeding bird period and bat summer active season. The timing windows provides protection of migratory birds, roosting bats and avoids contravention of the Migratory Bird Convention Act and Endangered Species Act. If vegetation clearing activities must take place during the aforementioned timing window than a nest and roost survey shall be conducted by a qualified professional. Perform daily pre-work sweeps of the construction area to ensure no species at risk are present and to remove any wildlife from inside the construction area.
- Should any species at risk be discovered throughout the course of the proposed works, the species at risk biologist with the local MECP district should be contacted immediately and operations modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by the MECP.

7.6 Best Practice Measures for Mitigation of Cumulative Impacts

The following best management practice measures are provided for the mitigation of cumulative impacts resulting from general construction and development activities;

- Stormwater generated from the proposed development is to be managed on-site such that dewatering discharge during construction and discharge to watercourse post-development, are both equal to pre-development discharge rates. Site stormwater management should also be treated to achieve a reduction of 80% TSS prior to discharge.
- To protect trees identified to be retained during construction, the Critical Root Zone (CRZ) should be identified and fenced. The CRZ is defined as 10 cm from the base of the tree for every centimetre in diameter of the tree trunk measured at breast height.
- Maintain as much permeable surface as possible in future development plans to minimize the generation of storm water runoff.
- Silt fencing should be installed along all setbacks to provide visual demarcation of the setbacks and to prevent machinery encroachment and sediment transport.
- Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized.
- In effort to offset the effect of vegetation clearing, consideration should be given to landscape planting with native tree species indicative of the Great Lakes – St. Lawrence Forest Region, such as white cedar, white spruce, red maple and red oak.

8.0 CONCLUSIONS

The proposed project supported by this EIS is a subdivision application for the development of an existing 7.22 ha property.

Based on the results of the impact analysis, impacts to the existing natural environment are anticipated to be minimal. Provided that mitigation and compensation measures recommended in Section 7 are implemented as proposed, no significant residual impacts are anticipated from the proposed development.

Following review of the information pertaining to the natural heritage features of the site, the following general conclusions are provided by GEMTEC in regard to the Environmental Impact Statement.

- No significant residual impacts to natural heritage features identified on-site, including fish habitat, local wetlands, significant wildlife habitat or habitats of species at risk are anticipated as a result of the proposed project.
- The proposed project complies with the natural heritage policies of the Provincial Policy Statement.
- The proposed development complies with the natural heritage policies of the Lanark County Official Plan and the natural heritage policies of the Municipality of Mississippi Mills Community Official Plan.

9.0 LIMITATION OF LIABILITY

This report and the work referred to within it have been undertaken by GEMTEC Consulting Engineers and Scientists Ltd (GEMTEC), and prepared for Menzie Almonte 2 Inc. (c/o Regional Group) and is intended for the exclusive use of Menzie Almonte 2 Inc. (c/o Regional Group). This report may not be relied upon by any other person or entity without the express written consent of GEMTEC and Menzie Almonte 2 Inc. (c/o Regional Group). Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared.

This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future site conditions, or portions of the site that were unavailable for direct investigation.

Should new information become available during future work, including excavations, borings or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Emily Young, B.Sc.
Junior Biologist

Drew Paulusse, B.Sc.
Senior Biologist

Taylor Warrington, B.Sc.,
Biologist

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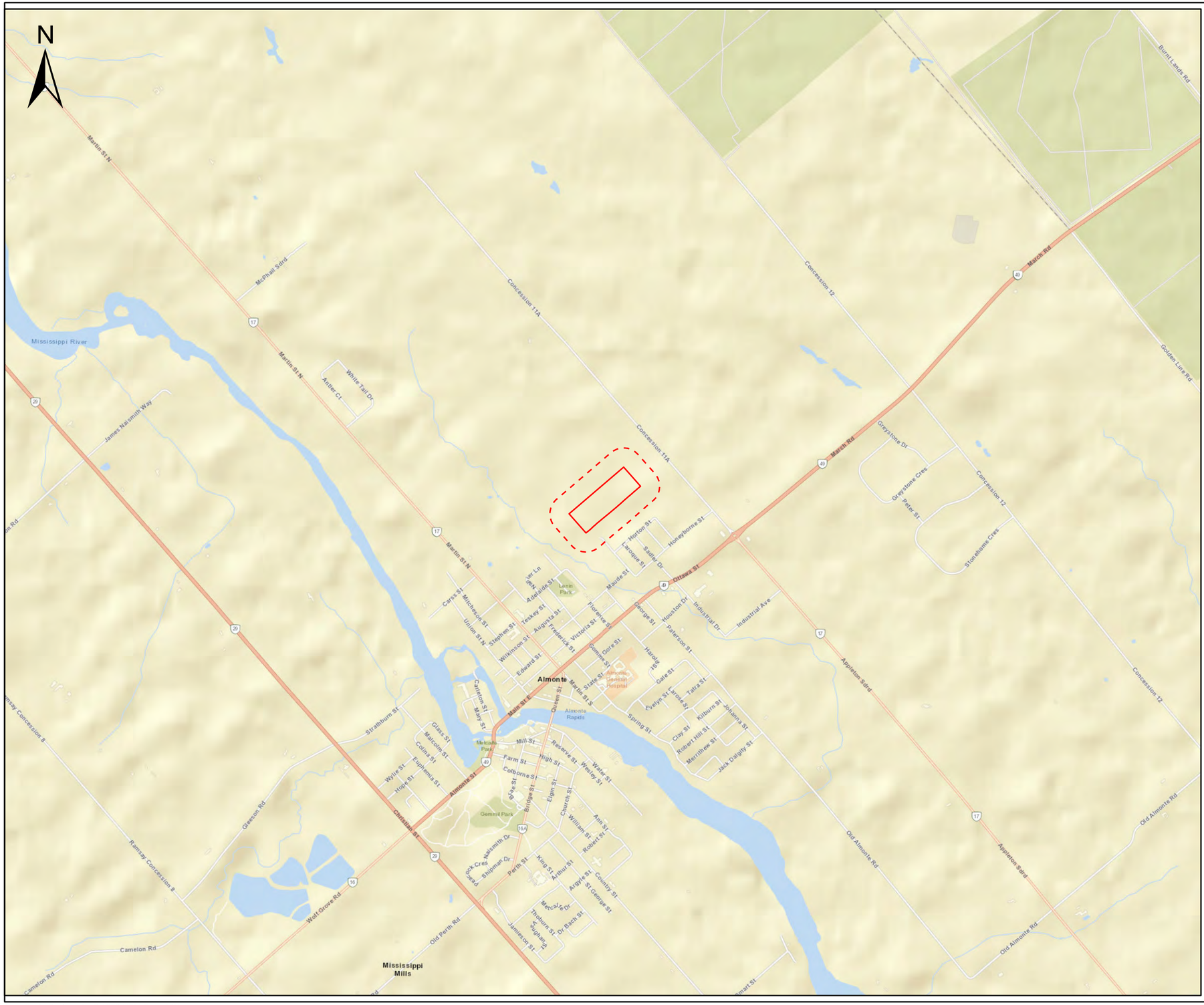
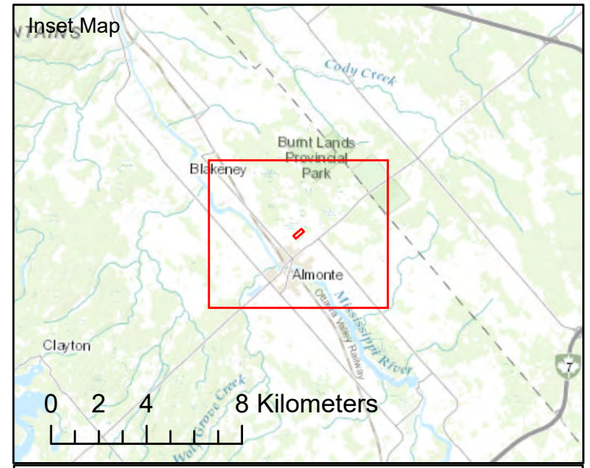
APPENDIX A



Legend

- Property Boundary
- Study Area

Inset Map



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Client: Menzie Almonte 2 Inc. (c/o Regional Group)	Project: 100436.004

Location
Part of Lot 17, Concession 10
Almonte, Ontario

Drwn By: EP	Chkd By: TW	Site Location
Date: July 2024	Rev. 0	Figure A.1

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Topographic Map: City of Ottawa, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan
World Street Map: Esri, HERE, Garmin, INCREMENT P, NGA, USGS, NRCan

Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- MVCA Watercourse
- GEMTEC Watercourse
- Amphibian Breeding Station (100m radius)
- Breeding Bird Station (100m radius)

Scale
1:2,900
0 20 40 80 120 160 Meters

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Project: 100436.004

Location: Part of Lot 17, Concession 10 Almonte, Ontario

Drwn By: EP | Chkd By: TW

Site Layout

Date: July 2024

Rev. 0

Figure A.2

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World_Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
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Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- MVCA Watercourse
- GEMTEC Watercourse
- Vegetation Community

FOC4-1 = White Cedar Coniferous Forest
SWT2 = Willow Swamp Thicket
CUT = Cultural Thicket

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World_Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
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Scale
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Location: Part of Lot 17, Concession 10 Almonte, Ontario

Drwn By: EP | Chkd By: TW

Vegetation Communities

Date: July 2024

Rev. 0

Figure A.3

Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- MVCA Watercourse
- GEMTEC Watercourse

Proposed Development Concept

- Road
- Lot
- Park Lands
- Stormwater Management Pond Expansion
- Naturalized Buffer
- Walkway / Servicing Block

Scale 1:2,900

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Client: Menzie Almonte 2 Inc. (c/o Regional Group)	Project: 100436.004
Location: Part of Lot 17, Concession 10 Almonte, Ontario	
Drwn By: EP / Chkd By: TW	Development Concept
Date: July 2024	Rev. 0

Figure A.4

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Imagery: Maxar, Microsoft
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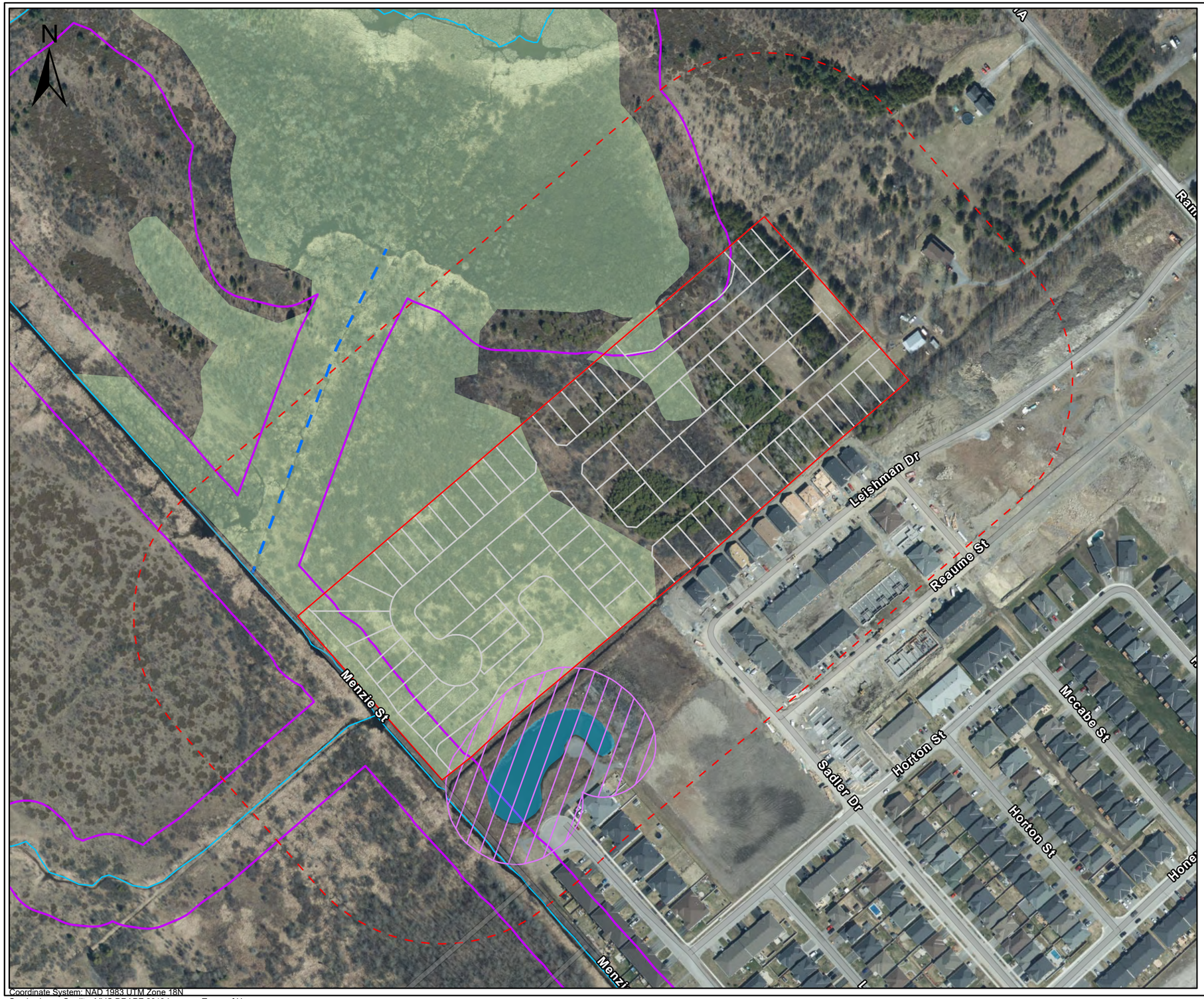
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada



Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- MVCA Watercourse
- GEMTEC Watercourse
- Category 1 Blanding's Turtle Habitat
- Category 2 Blanding's Turtle Habitat (30 m)

Scale
1:2,900
0 20 40 80 120 160 Meters

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Project: 100436.004

Location: Part of Lot 17, Concession 10 Almonte, Ontario

Drwn By: EP | Chkd By: TW

Natural Heritage Features

Date: July 2024

Rev. 0

Figure A.5

Coordinate System: NAD 1983 UTM Zone 18N
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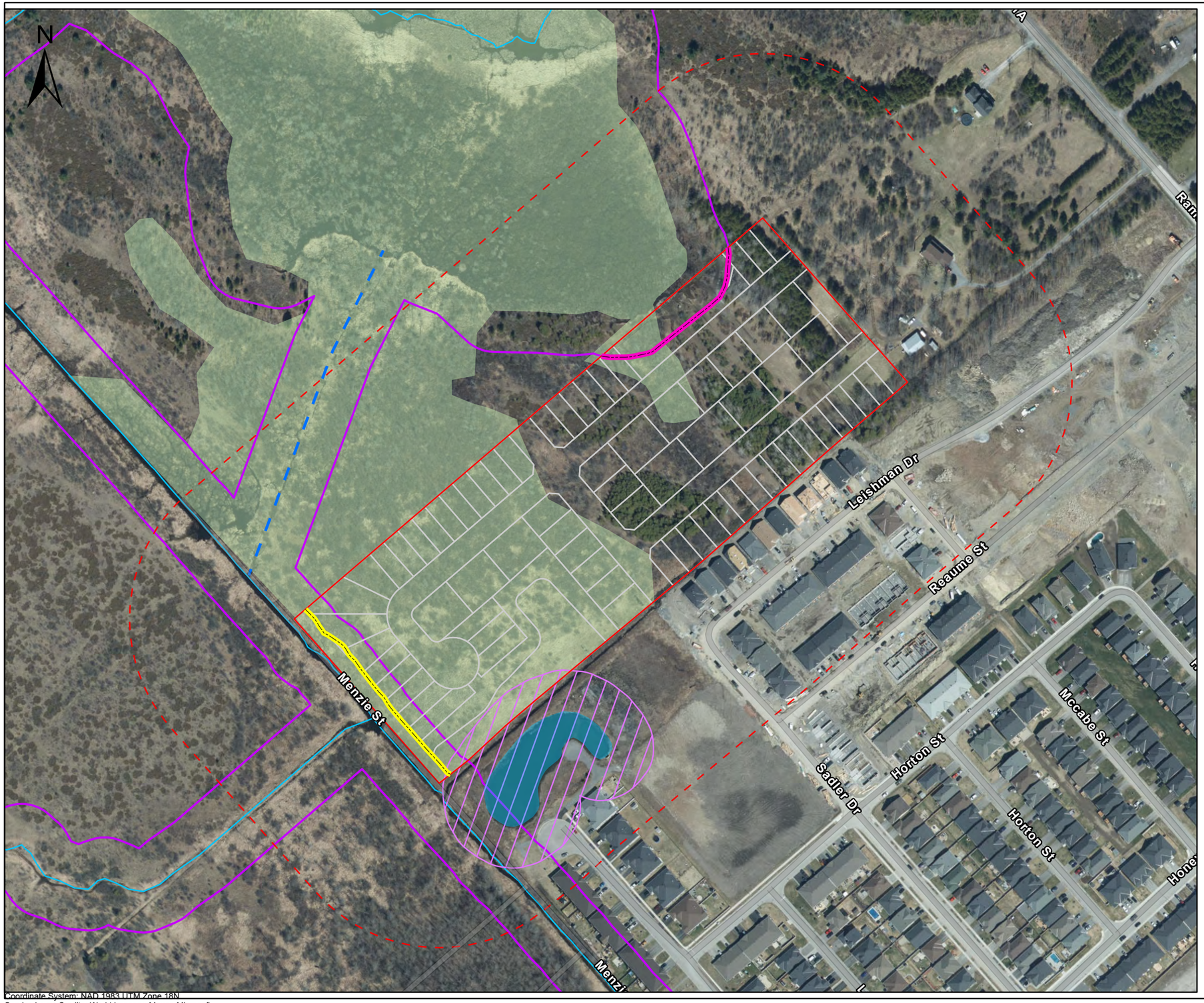
World Imagery: Maxar



Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- MVCA Watercourse
- GEMTEC Watercourse
- Proposed Development Concept
- Category 1 Blanding's Turtle Habitat
- Category 2 Blanding's Turtle Habitat (30 m)
- 15 m Setback
- 30 m Setback

Scale 1:2,900

0 20 40 80 120 160 Meters

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Client: Menzie Almonte 2 Inc. (c/o Regional Group)	Project: 100436.004
Location: Part of Lot 17, Concession 10 Almonte, Ontario	
Drwn By: EP / Chkd By: TW	Mitigation Measures
Date: July 2024	Rev. 0
© Queen's Printer for Ontario	Figure A.6

Coordinate System: NAD 1983 UTM Zone 18N
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MVC DRAPE 2019 Imagery: Terms of Use
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

APPENDIX B

Site Photographs

Site Photograph 1 – White Cedar Coniferous Forest (FOC4-1)

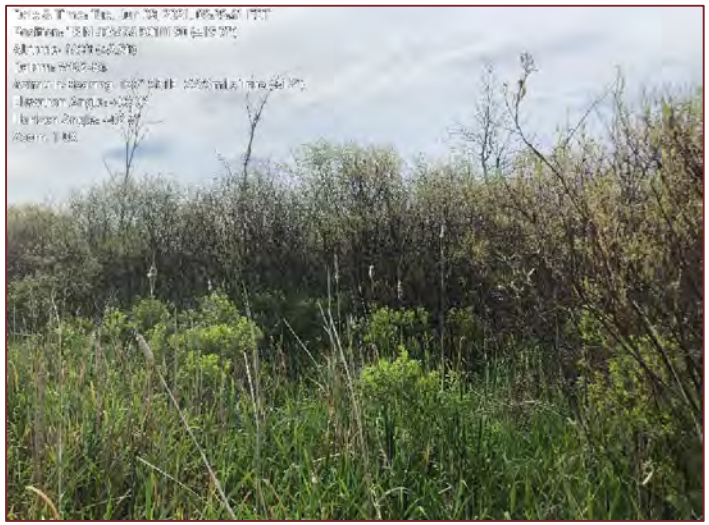
Site Photograph 2 – White Cedar Coniferous Forest (FOC4-1)

Site Photograph 3 – Cultural Thicket (CUT)

Site Photograph 4 – Cultural Thicket (CUT)

GEMTEC Consulting Engineers and Scientists	Project Environmental Impact Statement Mills Lands Subdivision Development Part of Lot 17, Concession 10 (Ramsey) Almonte, Ontario	**ATTACHEMNT B** File No. 100436.004	**Site Photographs**

Site Photograph 5 – Willow Thicket Swamp (SWT)



Site Photograph 6 – Willow Thicket Swamp (SWT)

Site Photograph 7 – Willow Thicket Swamp (SWT)

Site Photograph 8 – Willow Thicket Swamp (SWT)

GEMTEC Consulting Engineers and Scientists	Project Environmental Impact Statement Mills Lands Subdivision Development Part of Lot 17, Concession 10 (Ramsey) Almonte, Ontario	**ATTACHEMNT B** File No. 100436.004	**Site Photographs**

Site Photograph 9 – Adjacent Willow Thicket Swamp (SWT) to the North of the Subject Property

Site Photograph 10 – Willow Thicket Swamp (SWT) leading to the northern Open-Water Marsh

Site Photograph 11 – Willow Thicket Swamp along West Property Boundary and Adjacent Watercourse

Site Photograph 12 – Adjacent Watercourse along West Property Boundary

GEMTEC Consulting Engineers and Scientists	Project Environmental Impact Statement Mills Lands Subdivision Development Part of Lot 17, Concession 10 (Ramsey) Almonte, Ontario	**ATTACHEMNT B** File No. 100436.004	**Site Photographs**

Site Photograph 9 – Stormwater Management Facility to the South of the Subject Property

APPENDIX C

Summary Tables

TABLE C.1
SUMMARY OF WILDLIFE OBSERVED ON-SITE AND ADJACENT TO SITE

Common Name	Scientific Name	S-Rank	Evidence
Avian Species			
Alder flycatcher	*Empidonax alnorum*	S5B	Heard calling
American bittern	*Botaurus lentiginosus*	S4B	Heard calling
American crow	*Corvus brachyrhynchos*	S5B	Heard calling
American goldfinch	*Carduelis tristis*	S5B	Heard calling
American robin	*Turdus migratorius*	S5B	Heard calling
Barn swallow	*Hirundo rustica*	S4B	Observed on-site
Black-and-white warbler	*Mniotilta varia*	S5B	Heard calling
Black-capped chickadee	*Poecile atricapillus*	S5	Heard calling
Blue jay	*Cyanocitta cristata*	S5	Heard calling
Brown-headed cowbird	*Molothrus ater*	S4B	Heard calling
Canada goose	*Branta canadensis*	S5B	Heard calling, observed in storm water pond
Cedar waxwing	*Bombycilla cedrorum*	S5B	Heard calling
Chipping sparrow	*Spizella passerina*	S5B	Heard calling
Common grackle	*Quiscalus quiscula*	S5B	Heard calling
Common raven	*Corvus corax*	S5	Heard calling
Common yellowthroat	*Geothlypis trichas*	S5B	Heard calling
Eastern phoebe	*Sayornis phoebe*	S5B	Heard calling
Field sparrow	*Spizella pusilla*	S4B	Heard calling
Gray catbird	*Dumetella carolinensis*	S5B	Heard calling
Green heron	*Butorides virescens*	S4B	Observed in storm water pond and fly-over
Killdeer	*Charadrius vociferus*	S5B	Heard calling
Merlin	*Falco columbarius*	S5B	Heard calling
Mounring dove	*Zenaida macroura*	S5B	Heard calling
Northern cardinal	*Cardinalis cardinalis*	S5	Heard calling
Red-eyed vireo	*Vireo olivaceus*	S5B	Heard calling
Red-winged blackbird	*Agelaius phoeniceus*	S5B	Heard calling
Ring-billed gull	*Larus delawarensis*	S5B, S4N	Heard calling
Rose-breasted grosbeak	*Pheucticus ludovicianus*	S5B	Heard calling
Ruby-crowned kinglet	*Regulus calendula*	S4B	Heard calling
Song sparrow	*Melospiza melodia*	S5B	Heard calling
Swamp sparrow	*Melospiza georgiana*	S5B	Heard calling
Tree swallow	*tachycineta bicolor*	S4B	Heard calling
Turkey vulture	*Cathartes aura*	S5B	Observed on-site
Wild turkey	*Melagris gallopavo*	S5	Heard calling
Wood duck	*Aix sponsa*	S5B	Observed in storm water pond
Yellow warbler	*Setophaga petechia*	S5B	Heard calling
Yellow-rumped warbler	*Setophaga coronata*	S5B	Heard calling
Mammalian Species			
Coyote	*Canis latrans*	S5	Observed on-site
White-tailed deer	*Odocoileus virginianus*	S5	Observed on-site
Amphibian Species			
American toad	*Anaxyrus americanus*	S5	Heard calling
Blue-spotted salamander	*Ambystoma laterale*	S4	Observed on-site
Gray treefrog	*Hyla versicolor*	S5	Heard calling
Green frog	*Lithobates clamitans*	S5	Heard calling
Northern leopard frog	*Lithobates pipiens*	S5	Heard calling
Spring peeper	*Pseudacris crucifer*	S5	Heard calling
Western chorus frog	*Pseudacris triseriata*	S4	Heard calling
Wood frog	*Lithobates sylvaticus*	S5	Heard calling
Reptillian Species			
Midland painted turtle	*Chrysemys picta marginata*	S4	Observed on-site
Snapping turtle	*Chelydra serpentina*	S3	Observed on-site

Notes:
* Denotes a threatened or endangered Species at Risk under the ESA
Subnational Conservation Status Ranks:
S1 – Critically Imperiled, at very high risk of extirpation, very few populations or occurrences or very steep population decline;
S2 – Imperiled, at high risk of extirpation, few populations or occurrences or steep population decline;
S3 – Vulnerable, at moderate risk of extirpation, relatively few populations or occurrences, recent and widespread population decline;
S4 – Apparently Secure, at a fairly low risk of extirpation, many populations or occurrences, some concern for local population decline;
S5 – Secure, at very low or no risk of extirpation, abundant populations or occurrences, little to no concern for population decline.
Qualifiers:
S#B – Conservation status refers to the breeding population of the species;
S#N – Conservation status refers to the non-breeding population of the species;
S#M – Migrant species, conservation status refers to the aggregating transient population of the species.

TABLE C.2
SCREENING RATIONALE FOR SIGNIFICANT WOODLANDS

Woodland Criteria	Further Considered in EIS	Rationale
Woodland Size	No	Contiguous woodlands on and off-site do not meet the minimum size requirement for the planning area (> 20 ha).
Ecological Functions		
a) Woodland Interior	No	Interior woodlands on-site do not meet the minimum size requirement for the planning area (> 8 ha).
b) Proximity	No	Woodlands on-site are proximal to fish habitat and other identified significant natural features, however the minimum size requirement is not met.
c) Linkages	No	Woodlands on-site do not provide linkages to other natural heritage features.
d) Water Protection	No	Woodlands on-site are proximal to fish habitat, however the minimum size requirement is not met.
e) Diversity	No	Species composition within the on-site woodland is well represented on the landscape and no rare species communities were observed on-site.
Uncommon Characteristics	No	The woodlands on-site do not have a unique species composition, vegetation communities with a ranking of S1, S2 or S3, or a mature size structure.
Economical and Social Functional Values	No	The woodlands on-site do not contain high productivity in terms of economically valuable products, high social value such as recreational use, identified historical cultural or educational values.

TABLE C.3
SCREENING RATIONALE FOR HABITATS OF SEASONAL CONCENTRATION AREAS

Wildlife Habitat	Further Considered in EIS	Rationale
Winter Deer Yard	No	As outlined in the Significant Wildlife Habitat Criteria Schedules (OMNRF, 2015) winter deer yards and deer management are an MNRF responsibility. Based on review of publically available data from the OMNRF on Land Information Ontario Geo-hub, no Stratum I deer yards, Stratum II deer yards, or winter congregation areas have been identified on-site or within the broader study area. The closest deer yard to site is a patch of Stratum II deer yard located approximately 30 km northeast of site.
Colonial Bird Nesting Habitat	No	No suitable nesting habitat is present on-site; however, it may be available within the study area. No nests observed during the site investigation. A singluar green heron was observed in the storm water pond off-site during two site investigations.
Waterfowl Stopover and Staging Areas	No	No suitable wetland habitat is present on-site; however, it may be available within the study area. No indicator species were observed.
Shorebird Migratory Stopover Area	No	Shorebird stopover sites are typically well-known and have a long history of use. The site does not contain suitable shoreline habitat for shorebird foraging.
Raptor Wintering Area	No	Site does not contain suitable mixture of upland and forest ecosites necessary to support raptor wintering area SWH.
Bat Hibernacula	No	Cave and crevice habitat is not present on-site or within the study area.
Bat Maternity Colonies	No	Woodlands on-site do not meet minimum snag density (>10 snags/hectare) requirement to be considered SWH for bat maternity colonies.
Turtle Wintering Area	Yes	Suitable open water habitat may be present to provide turtle wintering habitat on-site. The stormwater management pond is manmade and thus not considered significant wildlife habitat.
Reptile Hibernaculum	No	Structures such as large rock piles, bedrock outcrops, and cervices were not identified on-site.
Migratory Butterfly Stopover Area	No	The site is not located within 5 km of Lake Ontario and therefore does not meet the defining criteria.
Landbird Migratory Stopover Area	No	The site is not located within 5 km of Lake Ontario and therefore does not meet the defining criteria.

TABLE C.4
SCREENING RATIONALE FOR SPECIALIZED WILDLIFE HABITATS

Specialized Wildlife Habitat	Further Considered in EIS	Rationale
Waterfowl Nesting Area	Yes	Suitable upland habitat is present adjacent to suitable wetland habitats on-site.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	No	No suitable forest habitat is located directly adjacent to the open water which may support foraging bald eagles or osprey. No nests were observed on-site, and neither species were observed during investigations. Nesting sites for these species are uncommon in Ecoregion 6E (MNRF, 2012).
Woodland Nesting Raptor Habitat	No	Nesting may occur in any forested ecosites, with species preference towards mature forest stands >30 ha with >10 ha of interior habitat with a 200 m buffer. Contiguous forest stands on-site does not meet the minimum size requirements. No sticks nests were observed on-site.
Turtle Nesting Habitat	No	No suitable habitat (exposed mineral soil with minimal vegetation cover) was observed on-site. Potential suitable habitat was observed within the greater study area; however, it is associated with the storm water pond which is not considered a significant wildlife habitat.
Seeps and Springs	No	Neither seeps nor springs were identified on-site.
Woodland Amphibian Breeding Habitat	No	Suitable woodland habitat is not present to support woodland amphibian breeding SWH.
Wetland Amphibian Breeding Habitat	Yes	Suitable wetland habitat within the swamp thinket (SWT), is located on-site and within the study area, and may support wetland amphibian breeding habitat.
Woodland Area-Sensitive Bird Breeding Habitat	No	Woodland area-sensitive birds require interior forest habitat located >200 m from the forest edge in large (>30 ha) forest stands. Woodlands on-site do not meet the minimum size defining criteria of >30 ha, or interior forest habitat >200 m from a forest edge.

TABLE C.5
SCREENING RATIONALE FOR HABITAT FOR SPECIES OF CONSERVATION CONCERN

General Habitats of Species of Conservation Concern	Further Considered in EIS	Rationale
Marsh Breeding Bird Habitat	Yes	Potentially suitable marsh habitat, ELC SWT, is present on-site to support green heron marsh breeding bird habitat.
Open Country Breeding Bird Habitat	No	No suitable meadow habitat on-site to support open country bird breeding.
Shrub/Early Successional Breeding Bird Habitat	No	Candidate early successional breeding bird habitat typically includes fallow fields transitioning to early successional forest habitats that are > 10 ha but have not been actively used for farming. Thicket habitat on-site does not meet minimum size requirements.
Terrestrial Crayfish Habitat	No	Terrestrial crayfish are only found within southwestern Ontario (MNRF, 2012).
Special Concern and Rare Wildlife Species	Yes	During the site investigations, no species of special concern were identified on-site; however, one species of special concern, snapping turtle, was observed within the greater study area. Occurrence data for the NHIC and HerpAtlas also indicates the following species of special concern to have occurred within 2 km of site: eastern ribbonsnake, eastern musk turlte, northern map turtle, snapping turtle, river redhorse and wood thrush.

TABLE C.6
SCREENING RATIONALE FOR ANIMAL MOVEMENT CORRIDORS

General Habitats of Species of Conservation Concern	Further Considered in EIS	Rationale
Amphibian Movement Corridor	Yes	*Confirmed* wetland amphibian breeding habitat has been identified on-site.
Deer Movement Corridor	No	No winter deer yards have been identified on-site by the OMNRF.

TABLE C.7
SCREENING RATIONALE FOR POTENTIAL SPECIES AT RISK ON-SITE OR WITHIN STUDY AREA

Species	ESA Status	Habitat Use	Probability of Occurrence On-Site or Within Study Area	Rationale
Avian				
Barn Swallow	Threatened	Nests in barns and other semi-open structures. Forages over open fields and meadows.	Moderate	Species was observed foraging on-site. Potentially suitable nesting structures may be present within the broader study area.
Bobolink	Threatened	Nests in dense tall grass fields and meadows, low tolerance for woody vegetation.	Moderate	Suitable grassland habitat not available on-site, but may be available within study area. NHIC indicates species within 1km of site. Species not observed during investigation.
Eastern Meadowlark	Threatened	Nests and forages in dense tall grass fields and meadows, higher tolerance to woody vegetation.	Moderate	Suitable grassland habitat not available on-site, but may be available within study area. NHIC indicates species within 1km of site. Species not observed during investigation.
Eastern Wood-pewee	Special Concern	Woodland species, often found near clearings and edges.	Low	Suitable woodlands present on-stie. No historical occurrence data for species within study area. Species not observed during investigation.
Red-headed Woodpecker	Endangered	Open woodland and woodland edges, and is often found in parks, golf courses and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching.	Moderate	Suitable woodland habitat available on-site and within the study area. NHIC indicates species within 1km of the site. Species not observed during investigation.
Wood Thrush	Special Concern	Prefers deciduous or mixed woodlands	Moderate	Suitable woodland habitat is present on-site and within surrounding study area. NHIC indicates presence of species within 1km of site. Wood Thrush was not observed on-site during site investigations.
Mammalian				
Eastern Small-footed Myotis	Endangered	Roosts in rock crevices, barns and sheds. Overwinters in abandoned mines. Summer habitats are poorly understood in Ontario, elsewhere prefers to roost in open, sunny rocky habitat and occasionally in buildings (Humphrey, 2017).	Moderate	Potentially suitable anthropogenic structures adjacent to site. Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Little Brown Myotis	Endangered	Maternal colonies known to use buildings, may also roost in trees during summer. Affinity towards anthropogenic structures for summer roosting habitat and exhibit high site fidelity (Environment Canada, 2015).	Moderate	Potentially suitable anthropogenic structures adjacent to site. Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Northern myotis (Northern Long-eared Bat)	Endangered	Occurs throughout eastern North America in associated with Boreal forests. Roosts mainly in trees, occasionally anthropogenic structures during summer (Environment Canada, 2015). Overwinters in caves and abandoned mines.	Low	Species affinity is for Boreal forests and rarely roosts in anthropogenic structures.
Tri-colored Bat	Endangered	Roosts in trees, rock crevices and occasionally buildings during summer. Overwinters in caves and mines.	Moderate	Potentially suitable anthropogenic structures adjacent to site. Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Reptilian				
Blanding's Turtle	Threatened	Inhabits quiet lakes, streams and wetlands with abundant emergent vegetation. Frequently occurs in adjacent upland forests.	Moderate	NHIC data indicates Blanding's turtle have been observed within 2km of the site to the east. Based on data obtained from the Herp Atlas (Ontario Nature, 2019), Blanding's turtle have been observed 8 times between 2017 and 2019 within the 10 km2 grid square that encompass the site. The local wetland on-site may provide suitable habitat to support species. Species not observed during field investigation.
Eastern Musk Turtle	Special Concern	Permanent ponds, lakes, marshes and rivers.	Moderate	NHIC data indicates eastern musk turtle has been observed within 2km of the site. Based on data obtained from the Herp Atlas (Ontario Nature, 2019), eastern musk turtle have been observed once in 2017 within the 10 km2 grid square that encompass the site. Suitable wetland habitat may be present within the study area. Species not observed during investigation.
Eastern Ribbonsnake	Special Concern	Usually found close to water, especially marshes. At onset of cold weather species will congregate in underground burrows or rock crevices to hibernate together.	Moderate	NHIC data indicates eastern ribbonsnake has been observed within 2km of the site. Suitable wetland habitat may be present within the local wetland on-site and within the study area. Species not observed during investigation.
Gray Ratsnake	Threatened	On the Frontenac Axis, preference to a mosaic of forest and open habitats (fields; bedrock outcrops) with a high amount of edge habitat. In summer, seeks shelter in standing snags, hollow logs, and rock crevices. Nesting occurs inside standing snags, logs, stumps, compost piles. Overwinters in below ground hibernacula.	Low	Suitable habitat does not exist within the study area. Species not observed during investigation. No historical occurrence records for species within study area.
Northern Map Turtle	Special Concern	Highly aquatic species found only in lakes and large rivers.	Low	Based on data obtained from the Herp Atlas (Ontario Nature, 2019), northern amp turtle have been observed twice in 2015 within the 10 km2 grid square that encompass the site. Suitable wetland habitat may not be present on-site or within the study area. Species not observed during investigation. No historical occurrence records for species within study area.
Snapping Turtle	Special Concern	Highly aquatic species, found in a wide variety of permanent ponds, lakes, marshes and rivers.	High	NHIC data indicates snapping turtle have been observed within 1km of the site. Species observed near the storm water pond during field investigation. Based on data obtained from the Herp Atlas (Ontario Nature, 2019), snapping turtle have been observed 6 times between 2017 and 2019 within the 10 km2 grid square that encompasses the site. The local wetland may provide suitable habitat to support species.
Plants				
American Ginseng	Endangered	Grows in rich, moist but well-drained and relatively mature, deciduous woodlands dominated by sugar maple, white ash and American basswood.	Low	Woodlands on-site may provide suitable habitat to support species. Species was not observed during field investigation. No occurrence record for species on-site or within broader study area.
Butternut	Endangered	Inhabits a wide range of habitats including upland and lowland deciduous and mixed forests.	Moderate	NHIC data indicates butternut has been observed within 2km of the site. Some portions of the site are open and in a regenerative state. Species was not observed on-site during the site investigation.
Insects				

TABLE C.7
SCREENING RATIONALE FOR POTENTIAL SPECIES AT RISK ON-SITE OR WITHIN STUDY AREA

Bogbean Buckmoth	Endangered	Preferred food plant is bog bean, present in a variety of wetlands including bogs, swamps and fens.	Low	Preferred wetland habitat is not present on-site.
Gypsy Cuckoo Bumble Bee	Endangered	Inhabits a wide range of habitats: open meadows, agricultural and urban areas, boreal forests and woodlands.	Low	Currently the only known Ontario population occurs in Pinery Provincial Park.
Monarch Butterfly	Special Concern	Caterpillars required milkweed plants that are confined to meadows and open areas. Adult butterflies use more diverse habitats with a variety of wildflowers.	Moderate	Potentially suitable foraging vegetation available for Monarch on-site.
Mottled Duskywing	Endangered	Larval food plant, New Jersey Tea, is found in sandy areas and alvars.	Low	Preferred habitat of sandy areas and alvars not present in the study area.
Nine-spotted Lady Beetle	Endangered	Habitat generalist	Low	No recent occurrence reports in the area, thought to be locally extirpated.
Rapids Clubtail	Endangered	Distribution in Ottawa not know. Occurs along Mississippi River in Blakeney/Pakenham area upstream of City. One of two extant populations in Ontario (and Canada).	Low	Site lacks suitable habitat for species.
Rusty-patched Bumble Bee	Endangered	Habitat generalist	Low	Currently the only known Ontario population occurs in Pinery Provincial Park.
Traverse Lady Beetle	Endangered	Habitat generalist	Low	No new records in Ontario, species thought to be absent in former habitats.
West Virginia White Butterfly	Special Concern	Requires mature moist, deciduous woods, with larval host plant, toothwort.	Low	Necessary vegetation and toothwort plant are not present on-site or within study area.
Yellow-banded Bumble Bee	Special Concern	Habitat generalist: mixed woodlands, variety of open habitat.	Moderate	Potentially suitable foraging habitat available for yellow-banded bumble bee on-site.

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geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

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MILL RUN EXTENSION – PHASES 7 & 8

Servicing and Stormwater Management Report

Prepared for: Menzie Almonte 2 Inc.

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
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Submitted: February 10, 2023
Revised: December 15, 2023
Revised: July 26, 2024

Novatech File: 121125
Ref: R-2023-013

NOVATECH
Engineers, Planners & Landscape Architects

July 26, 2024

Koren Lam, Senior Planner
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Perth, Ontario K7H 3C6

Melanie Knight, Senior Planner
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 July 26, 2024, 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 January 20, 2024, and January 30, 2024, and the Municipality of Mississippi Mills and Lanark County dated February 26, 2024.

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, 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

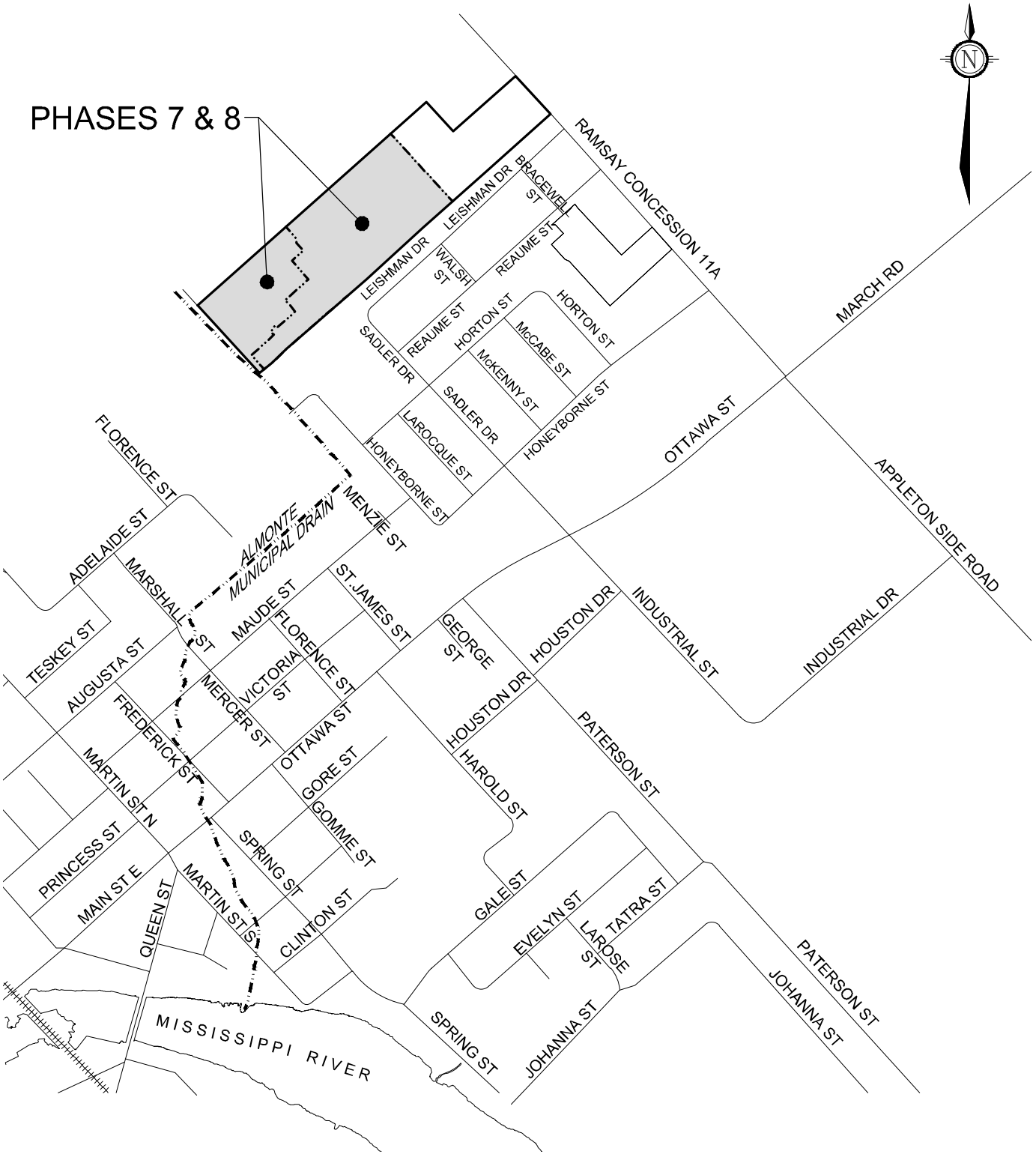
The proposed development of the Subject Lands consists of a residential subdivision with 25 single units, 18 semi-detached units, and 48 townhomes in Phase 7. Phase 8 will be comprised of 22 single units and 12 townhomes. The development will include three (3) new roadways and an extension of the existing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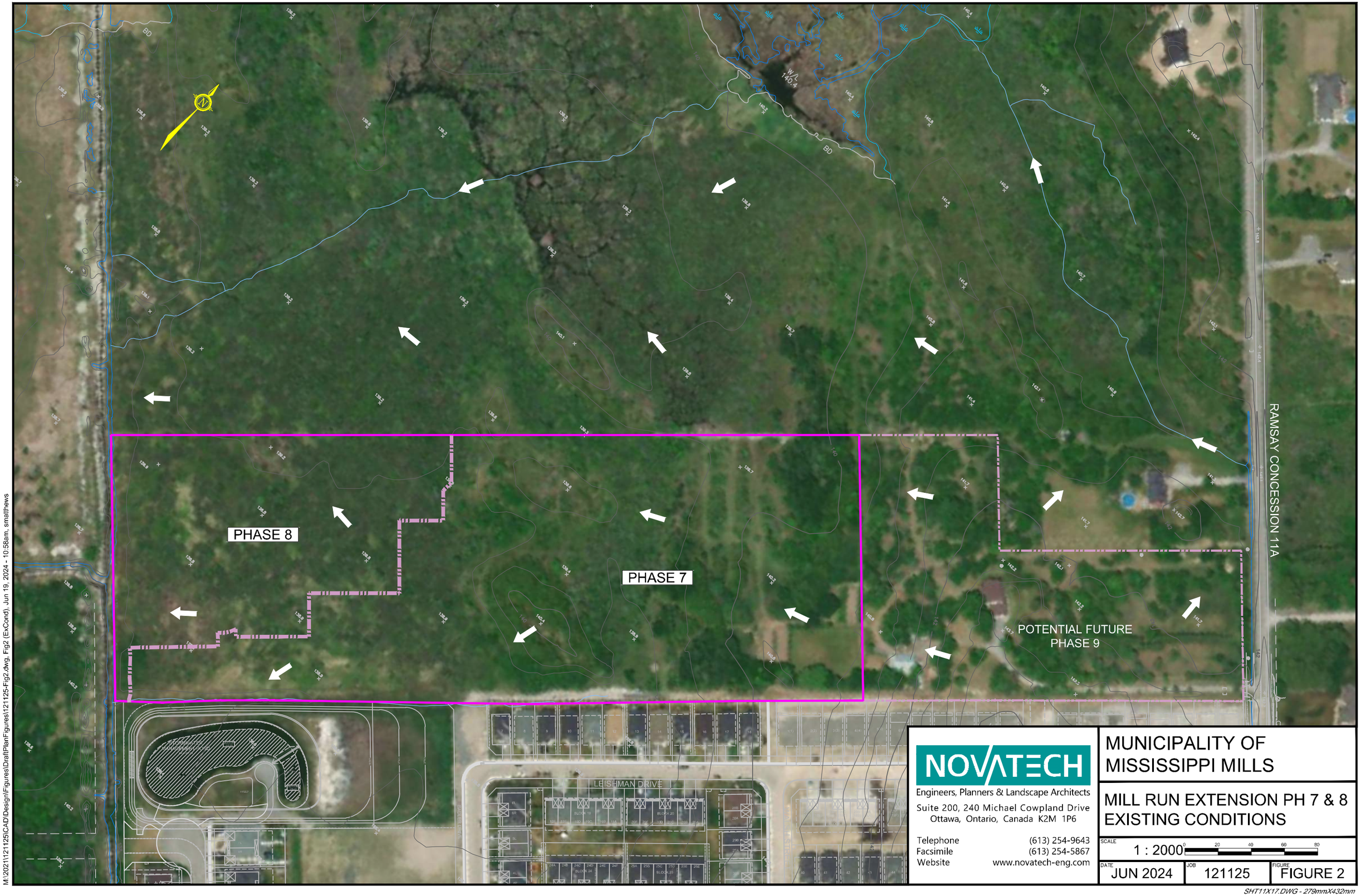
MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PHASES 7 and 8

LOCATION PLAN

JUN 2024 121125 FIGURE 1



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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	JOB	FIGURE
JUN 2024	121125	FIGURE 2

SHT11X17.DWG - 279mmX432mm

LEGEND:

- 43' WIDE MODELS
- SEMI DETACHED
- FREEHOLD 2-STOREY TOWNHOUSES
- FREEHOLD BUNGALOW TOWNHOUSES
- STORMWATER MANAGEMENT POND / PARK
- WALKWAY / SERVICING BLOCK
- PARK LANDS
- NATURALIZED BUFFER
- PHASING LINE

PHASE 8

PHASE 7

POTENTIAL FUTURE
PHASE 9

STREET 1

STREET 2

STREET 3

SADLER DRIVE

Potential Future Road Extension

Temporary Road Connection / Temporary Servicing Block

LEISHMAN DRIVE

WALSH STREET

BRACEWELL STREET

REAUME STREET

HORTON STREET

HONEYBORNE STREET

LAROCQUE STREET

MENZIE STREET

MENZIE STREET (NOT TRAVELLED)

ADELAIDE STREET

ALFRED STREET

ALEXANDRA STREET

AUGUSTA STREET

PARK

1785

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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 JUN 2024 | JOB 121125 | FIGURE 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

BLOCK 60
OPEN SPACE

BLOCK 62
STORMWATER MANAGEMENT

PHASE 8

PHASE 7

STREET 1

STREET 2

STREET 3

SADLER DRIVE

LEISHMAN DRIVE

ACCESS ROAD

STORMWATER MANAGEMENT POND

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
CONCEPTUAL SERVICING

SCALE 1 : 1250 (0 10 20 30 40 50)
DATE JUN 2024
JOB 121125
FIGURE FIGURE 4

SHT11X17.DWG - 279mmX432mm

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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 3 dated July 25, 2024, 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 July 18, 2024, 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 0.30 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 m^2/s;

- 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). 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 0.30 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 Sanitary 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. **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	0.62	0.52	46	40	42	146	0.5
A-05	0.46	0.52	46	40	43	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	2.36 (0.85**)	0.69	70	100	118	200	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:

$$\%IMP = \frac{(C - 0.2)}{0.7}$$

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.

LEGEND

0.454 / A-8 / 0.52 — TRIBUTARY AREA (ha)
STORM DRAINAGE AREA I.D.
WEIGHTED RUNOFF COEFFICIENT (Cw)

STORM DRAINAGE AREA BOUNDARY

0.069 A-9 0.60
0.221 A-3 0.45
0.618 A-4 0.52
0.460 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
0.849 SWM-1 0.23
0.200 A-14 0.60
0.572 A-10 0.60
0.486 A-13 0.52
0.657 A-12 0.52
0.582 A-11 0.52
2.347 PH 9-A 0.52

PHASE 8
PHASE 7
STORMWATER MANAGEMENT POND
SADLER DRIVE
LEISHMAN D
ACCESS ROAD

STM MH 120 T/G=141.25 INV.SW=138.48 INV.E=138.32
14.3m+450mmØ PVC DR35 STM @ 0.2%
74.6m-600mmØ CONC. 65-D STM @ 0.2%
STM MH 119 T/G=146.83 INV.W=138.17 INV.E=138.10
74.1m-675mmØ CONC. 65-D STM @ 0.15%
STM MH 104 T/G=149.68 INV.W=138.36 INV.E=137.98 INV.N=137.98 INV.S=137.75
STM CAP INV=138.80 10.0m+300mmØ PVC DR35 STM @ 0.4%
77.9m-675mmØ CONC. 65-D STM @ 0.2%
STM MH 112 T/G=146.91 INV.E=138.21 INV.W=138.14
80.5m+600mmØ CONC. 65-D STM @ 0.3%
STM MH 114 T/G=141.27 INV.E=138.56 INV.W=138.45
62.6m+525mmØ CONC. 65-D STM @ 0.3%
STM MH 116 T/G=141.26 INV.E=138.23 INV.W=138.75
STM CAP INV=138.86 7.5m+450mmØ PVC DR35 STM @ 0.4%
STM MH 122 T/G=141.09 INV.NW=138.51 INV.S=138.59
39.8m+375mmØ PVC DR35 STM @ 0.4%
STM MH 124 T/G=143.25 INV.W=138.75 INV.SE=138.63
7.9m+300mmØ PVC DR35 STM @ 0.4%
STM MH 126 T/G=141.49 INV.NW=138.93
STM MH 102 T/G=140.52 INV.W=137.63 INV.E=137.71 INV.S=137.00
82.8m-825mmØ CONC. 65-D STM @ 0.3%
STM MH 106 T/G=140.94 INV.E=137.97 INV.W=137.90
80.6m-825mmØ CONC. 65-D STM @ 0.3%
STM MH 108 T/G=141.35 INV.E=138.22 INV.W=138.07
69.5m-825mmØ CONC. 65-D STM @ 0.3%
STM MH 110 T/G=141.69 INV.E=138.50 INV.W=138.42
STM CAP INV=138.53 7.5m+750mmØ CONC. 65-D STM @ 0.3%
45.8m-975x1539mmØ ELLIPTICAL CONC. 65-D STM @ 0.15%
STM MH 100 T/G=149.38 INV.W=137.52 INV.W=137.46
11.8m-675mmØ STM @ 0.3%
BOTTOM 136.00
BOTTOM 135.00
6L 6R 5L 4L 4R
BLOCK 19 19F 19E 19D 19C 19B 19A 20F
BLOCK 24 24A 24B 24C 24D 24E 24F 25A
7 8 9 10 11 12 13 14 15 16 17 18 1(1) 2(2) 3(3) 4(4) 5(5) 6(6) (7)

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
STORM DRAINAGE AREAS

SCALE 1 : 1250 (0 10 20 30 40 50)
DATE JUN 2024
JOB 121125
FIGURE FIGURE 5

SHT11X17.DWG - 279mmX432mm

M:\2021\121125\CADDesign\Figures\Draft\PlanFigures\121125-STM.dwg, Fig5 (STM), Jun 21, 2024 - 11:07am, smatthews

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	582
100-year	2,081	1,527

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	138.45	1.91	0.02	138.75
MH102	140.52	138.57	138.51	2.01	0.00	138.81
MH104	140.68	138.66	138.58	2.10	0.00	138.88
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

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)
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 its 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;
- 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

An asphalt pathway is proposed around the expanded SWM facility. Access to the existing and proposed pond inlets and outlet structures as well as the sediment management area will be provided from both Honeyborne Street and Sadler Drive.

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%.

Based on the increased total tributary area (Phases 1 to 9) to the expanded SWM facility, a minimum permanent pool volume of 5,288 m^3 is required to provide an *Enhanced* level of water quality control based on Table 3.2 of the MOE SWM Planning and Design Manual. 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 1,623 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 an active storage volume of 11,228 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 Error! Reference source not found.. 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	1,623	8,409	37	0	0	37
5-year	138.11	5,757	12,543	65	517	0	582
100-year	138.45	11,228	18,014	75	1,132	320	1,527

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 1,623 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 wide overflow weir with an invert elevation of 138.40 m. It is formed into the pond berm and a depressed section of the access pathway. It also forms the overflow spillway during larger storm events and conveys water directly into the Almonte Municipal Drain.

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**.

LEGEND

- 0.27 / 121-119 / 2 8 — TRIBUTARY AREA (ha); SANITARY FLOW MH to MH; # OF UNITS / POPULATION EQUIVALENT
- SANITARY DRAINAGE AREA BOUNDARY

0.07 CAP-103 0 0

0.26 121-119 2 7

0.62 119-117 14 42

0.46 117-103 9 28

0.46 111-103 10 31

0.72 113-111 14 39

0.55 115-113 11 32

0.28 123-121 3 10

0.46 125-123 6 20

0.85 101-CAP 0 0

0.57 103-101 14 38

0.19 101-CAP 4 11

0.48 105-101 10 31

0.66 107-105 16 47

0.58 109-107 12 36

PHASE 8

PHASE 7

SAN MH 103 T/G=140.72 INV.N=137.29 INV.E=137.24 INV.W=137.34 INV.S=137.29

SAN MH 117 T/G=140.87 INV.W=137.64 INV.E=137.64

SAN MH 119 T/G=141.09 INV.SW=137.87 INV.E=137.94

SAN MH 121 T/G=141.13 INV.NE=138.03 INV.N=138.29

SAN MH 123 T/G=141.29 INV.N=138.21 INV.SE=138.24

SAN MH 125 T/G=141.45 INV.NW=138.60

SAN MH 111 T/G=140.85 INV.E=137.05 INV.W=137.85

SAN MH 113 T/G=141.31 INV.E=138.01 INV.W=138.01

SAN MH 115 T/G=141.62 INV.E=138.26 INV.W=138.26

SAN MH 101 T/G=140.56 INV.N=137.05 INV.E=137.10 INV.S=137.05

SAN MH 105 T/G=140.08 INV.E=137.43 INV.W=137.43

SAN MH 107 T/G=141.26 INV.E=137.76 INV.W=137.76

SAN MH 109 T/G=141.73 INV.E=138.03 INV.W=138.03

74.7m-200mmØ PVC DR35 SAN @ 0.4%

74.7m-200mmØ PVC DR35 SAN @ 0.4%

77.4m-200mmØ PVC DR35 SAN @ 0.4%

89.8m-200mmØ PVC DR35 SAN @ 0.4%

62.6m-200mmØ PVC DR35 SAN @ 0.4%

6.0m-200mmØ PVC DR35 SAN @ 0.4% SAN CAP INV=138.30

12.2m-200mmØ PVC DR35 SAN @ 0.4% SAN CAP INV=137.24

56.8m-200mmØ PVC DR35 SAN @ 0.4%

14.6m-200mmØ PVC DR35 SAN @ 0.4%

74.0m-250mmØ PVC DR35 SAN @ 0.3%

53.3m-200mmØ PVC DR35 SAN @ 0.4%

80.2m-200mmØ PVC DR35 SAN @ 0.4%

66.6m-200mmØ PVC DR35 SAN @ 0.4%

6.0m-200mmØ PVC DR35 SAN @ 0.4% SAN CAP INV=138.06

71.4m-250mmØ PVC DR35 SAN @ 0.3%

111.8m-200mmØ SAN @ 0.6%

70.6m-200mmØ SAN @ 0.6%

40.6m-200mmØ SAN @ 1.1%

STORMWATER MANAGEMENT POND

BOTTOM 135.00

BOTTOM 135.00

11922.7

ACCESS ROAD

SADLER DRIVE

ACCESS ROAD

LEISHMAN D

BLOCK 19 — 19F 19E 19D 19C 19B 19A 20F

BLOCK 24 — 24A 24B 24C 24D 24E 24F 25A

6L 6R 5L 4L 4 L 4 R

7 8 9 10 11 12 13 14 15 16 17 18 1(1) 2(2) 3(3) 4(4) 5(5) 6(6) (7)

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
SANITARY DRAINAGE AREAS

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 6

SHT11X17.DWG - 279mmX432mm

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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:

Demand Values

- 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

System Pressure Requirements

- 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)

Friction Factors

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., **Figure 8** – Typical Road Cross Section Streets 1 & 3: 18m R.O.W., and **Figure 9** – Typical Road Cross Sections Street 2: 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 10** – Typical Cross Section for 14m Easement which includes barrier curbs with sidewalks on one side of the roadway.

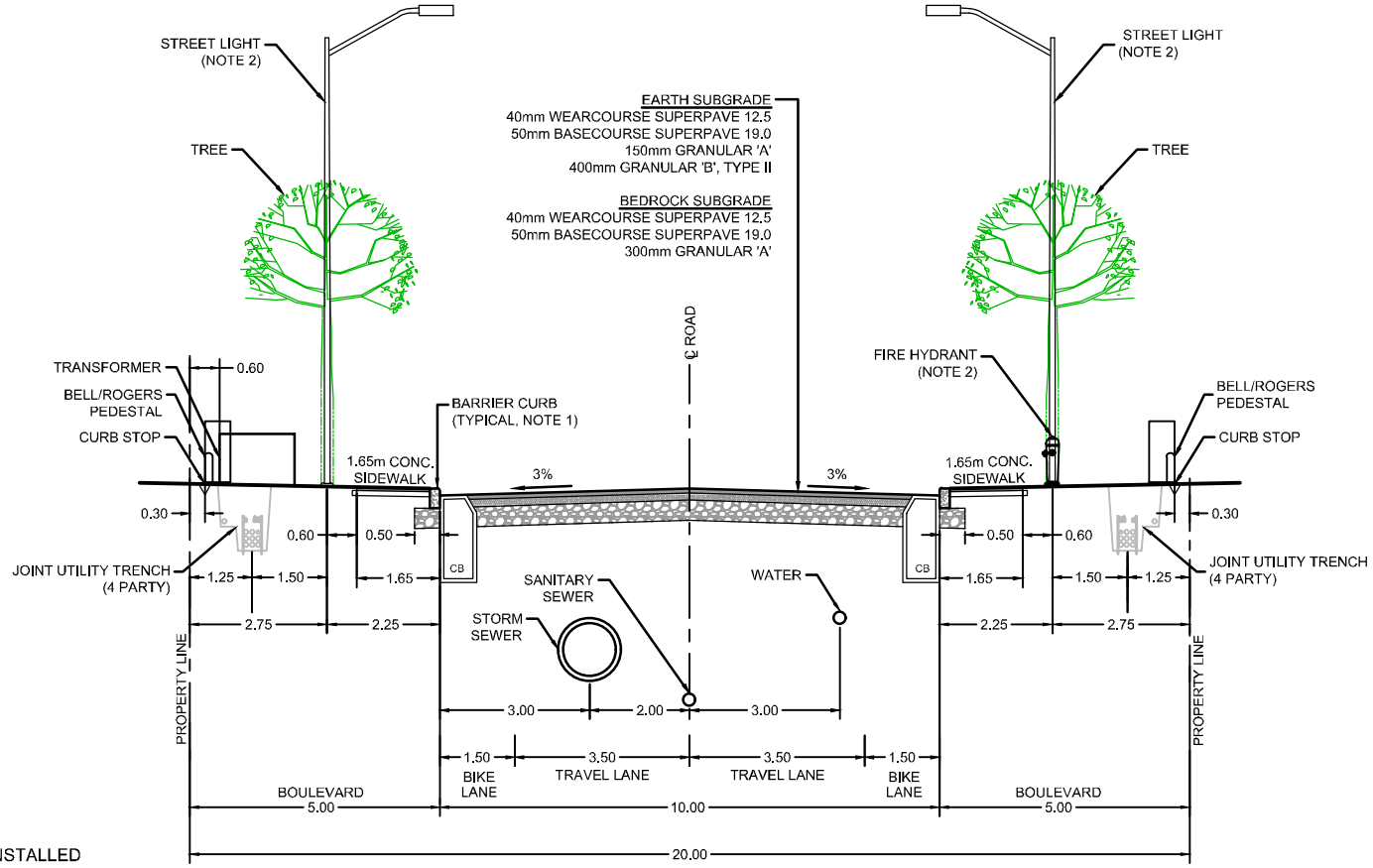
Preliminary grading and the erosion and sediment control plan for the Subject Lands is shown in **Figure 11** – Mill Run Extension Phases 7 & 8 Conceptual Grading and ESC.

An asphalt pathway is proposed to encircle the proposed SWM Facility. The location of the proposed asphalt pathways and concrete sidewalks are outlined in **Figure 12** – Mill Run Extension Phases 7 & 8 Network and Pathways Plan.

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.



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 JUN 2024 | JOB 121125 | FIGURE FIGURE 7

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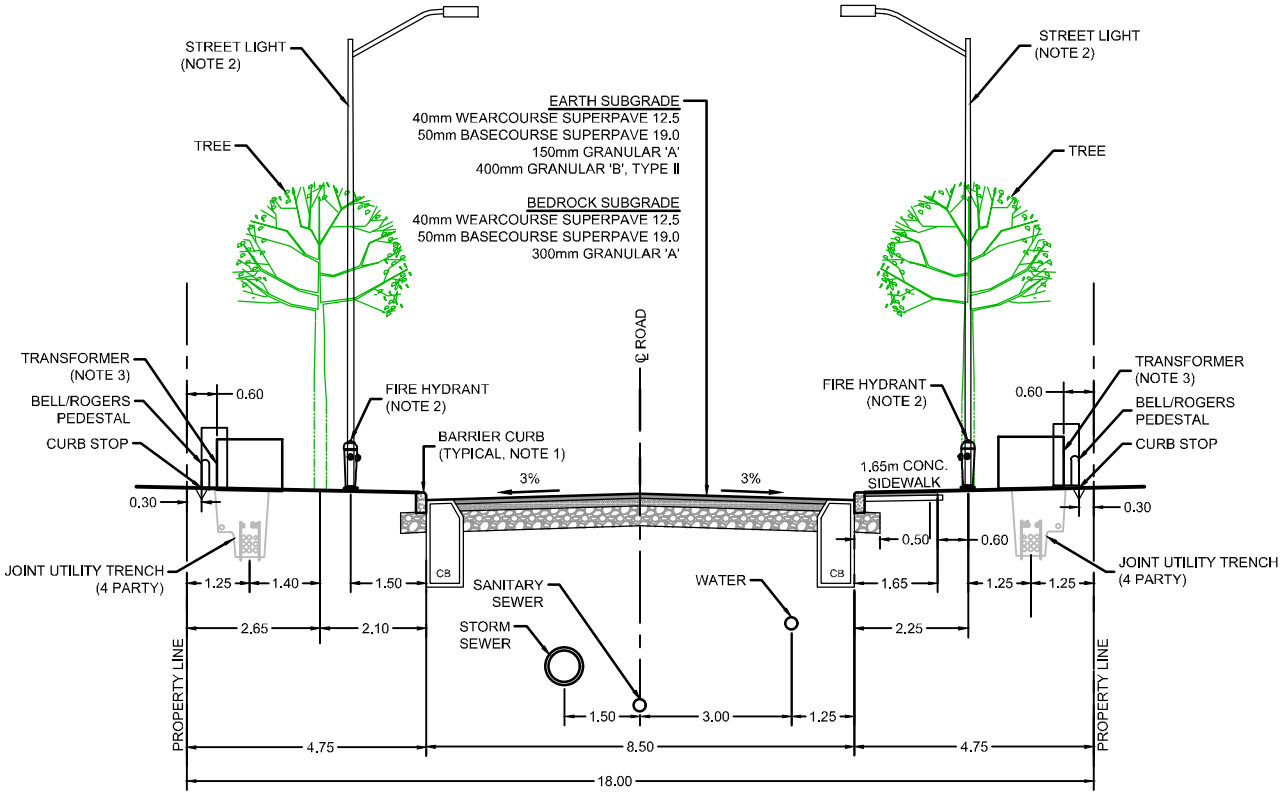

NOTES:

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 CROSS SECTION STREETS 1 & 3: 18m R.O.W.

SCALE 1 : 150

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 8

SHT8X11.DWG - 216mmx279mm

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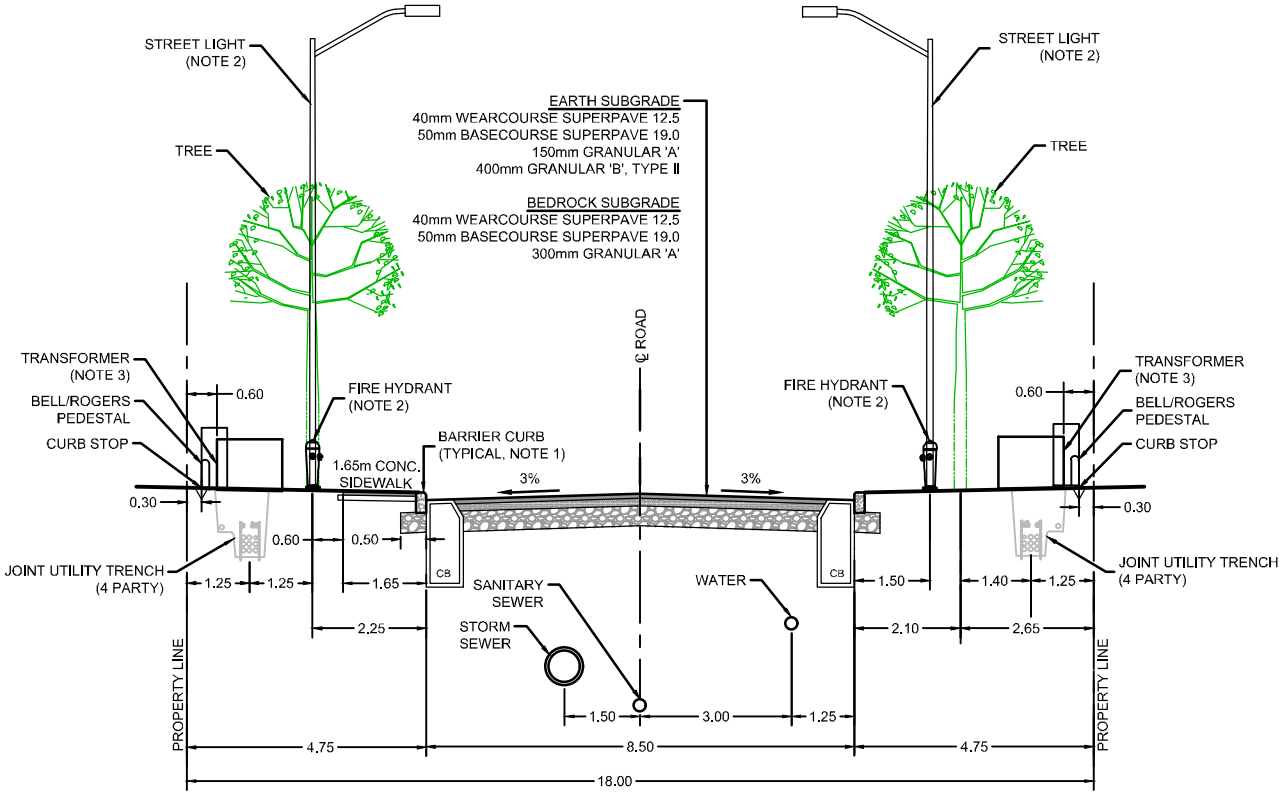

NOTES:

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 CROSS SECTION STREET 2: 18m R.O.W.

SCALE 1 : 150 (0 2 4 6)

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 9

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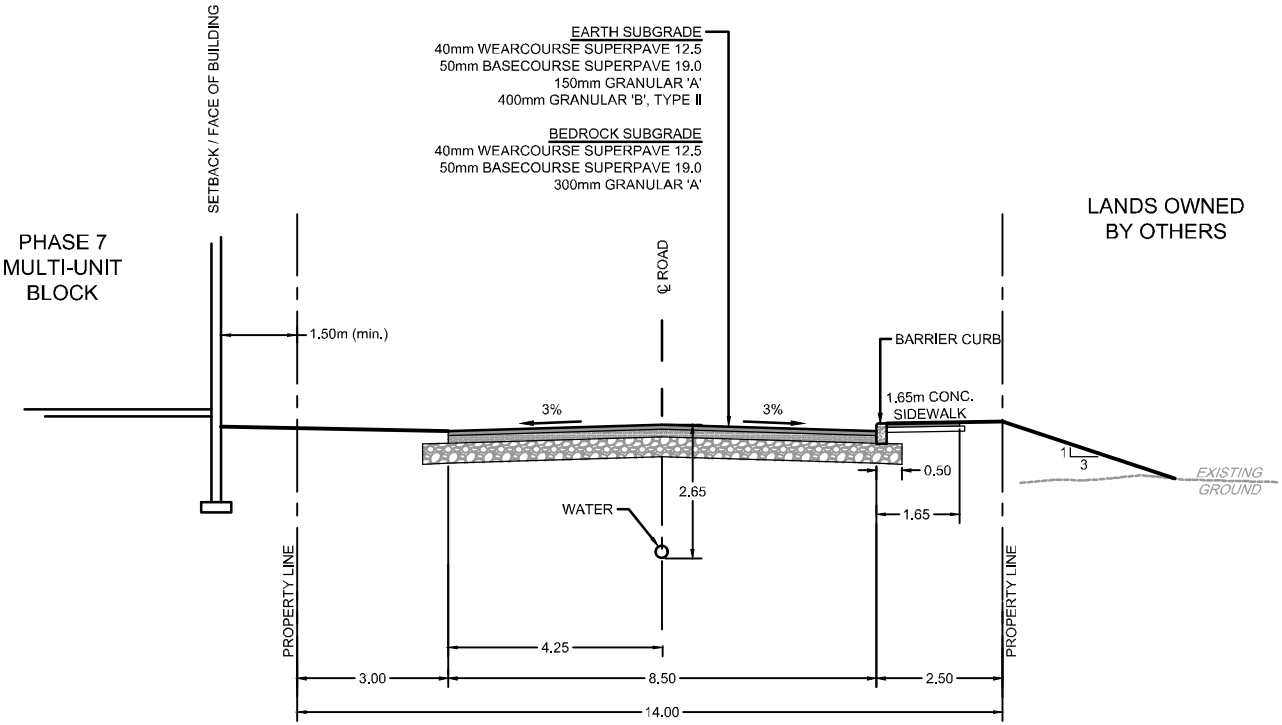

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MUNICIPALITY of MISSISSIPPI MILLS
MILL RUN EXTENSION PHASES 7 & 8

TYPICAL CROSS SECTION FOR 14m EASEMENT

SCALE 1 : 150 (0 2 4 6)

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 10

SHT8X11.DWG - 216mmx279mm

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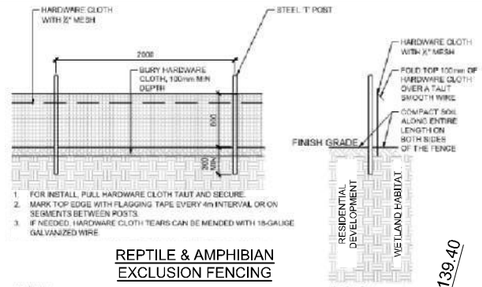
NOTE:

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

- 139.90 — PROPOSED FINISHED GRADE
- *EXISTING ELEVATION*
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED HEAVY-DUTY SILT FENCE
- PROPOSED REPTILE AND AMPHIBIAN EXCLUSION FENCING (SEE DETAILS)
- PROPOSED MUD MAT LOCATION

STREET 3

STREET 2

STREET 1

PHASE 8

PHASE 7

SWM FACILITY EXPANSION

STORMWATER MANAGEMENT POND

SADLER DRIVE

LEISHMAN DRIVE

EAST HALF LOT 17

PART

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8
CONCEPTUAL GRADING & ESC

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 11

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LEGEND

- PROPOSED CONCRETE SIDEWALK
- PROPOSED FUTURE CONCRETE SIDEWALK
- EXISTING PARK PATHWAYS
- EXISTING PARK PATHWAYS TO BE REMOVED
- PROPOSED PATHWAYS
- VEHICLE CONNECTIONS TO FUTURE DEVELOPMENT LANDS
- PROPOSED STOP SIGNS

STREET 3

STREET 2

STREET 1

SADLER DRIVE

LEISHMAN DRIVE

PHASE 8

PHASE 7

BLOCK 60
OPEN SPACE

BLOCK 62
STORMWATER MANAGEMENT

STORMWATER MANAGEMENT POND

ACCESS ROAD

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MUNICIPALITY OF MISSISSIPPI MILLS

MILL RUN EXTENSION PH 7 & 8 NETWORK AND PATHWAYS PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE JUN 2024 | JOB 121125 | FIGURE FIGURE 12

M:\2021\121125\CAD\Design\Figures\Draft\PlanFigures\121125-NPP.dwg, NPP, Jun 25, 2024 - 11:35am, smatthews

SHT11X17.DWG - 279mmX432mm

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 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 heavy-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, wetland compensation will be provided off-site.
- 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 revised 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:

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

Reviewed by:

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			Total Units		Road length	Saleable Frontage
	43' Lots		50' Lots		Subtotal		Target Mix	Semi-Detached		Target Mix	Townhouses		Target Mix				
	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	-	-	-	-	-

LEGEND:

- 50' WIDE MODELS
- 43' WIDE MODELS
- SEMI DETACHED
- FREEHOLD 2-STOREY TOWNHOUSES
- STORMWATER MANAGEMENT POND / PARK
- WALKWAY / SERVICING BLOCK
- NATURALIZED BUFFER
- PHASING LINE

PHASE 8
PHASE 7
POTENTIAL FUTURE PHASE 9
SWM POND EXPANSION AREA=5,090m²
EXISTING SWM FACILITY AREA=11,820m²
AREA=3,400m²
AREA=1,300m²
AREA=2,215m²
AREA=1,130m²
AREA= 68m²
AREA= 120m²
GEMTEC 2022 WETLAND (GROUND TRUTHED)
MVCA LINE/VALUATED WETLANDS LIMIT
CATEGORY 2 HABITAT (30m SETBACK)
MVCA 30m SETBACK
CATEGORY 2 HABITAT (15m SETBACK)
100yr = 18,240m²
5yr = 14,960m²
STREET 1
STREET 2
STREET 3
SADLER DRIVE
LEISHMAN DRIVE
WALSH STREET
BRACEWELL STREET
REAUME STREET
Potential Future Road Extension
Potential Temporary Road Connection (Future Servicing Connection)
SUBJECT TO EASEMENT INST. LC92565 INST. LC82685
PART 1, 27R-8935
PART 2, 27R-8935
PART 3, 26R-506
BLOCK 33
BLOCK 34
BLOCK 37 (0.30 RESERVE)
REGISTERED PLAN 27M-58

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
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

MISSISSIPPI MILLS
MILLS PROPERTY
DRAWING NAME: CONCEPT PLAN 6
PROJECT No.: 121125-00
REV: REV # 1
DRAWING No.: 121125-CP6

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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

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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	0.62	0.52	0.32	0.896	1.985	11.32		97.69			194	194	0.610	600	Conc	0.20	74.6	286.3	0.98	1.27	68%
					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	0.46	0.52	0.24	0.665	2.650	12.59		92.25			244	244	0.686	675	Conc	0.15	74.1	339.4	0.92	1.34	72%
					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

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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	6.288	13.93		87.17			548	548	0.914	900	Conc	0.15	77.6	731.1	1.11	1.16	75%
					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	12.519	15.10		83.25			1,042	1,042	1.219	1200	Conc	0.15	49.6	1,574.6	1.35	0.61	66%
					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	12.519	15.71		81.34			1,018	1,018	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:	July 5, 2024	
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
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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

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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

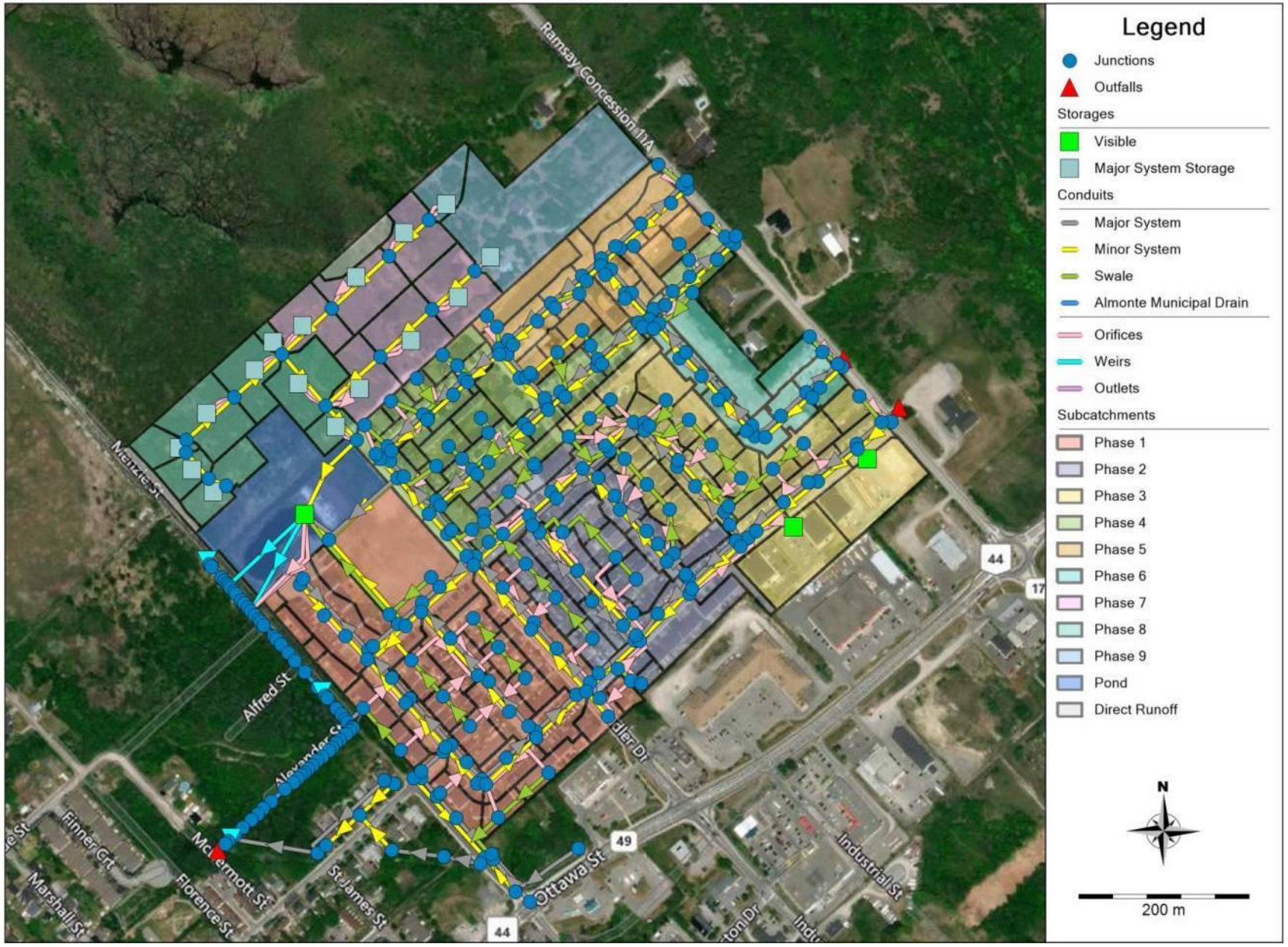
Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A-01	0.42	0.45	36	40	66	64	0.5
A-02	0.23	0.45	36	40	62	37	0.5
A-03	0.22	0.45	36	40	158	14	0.5
A-04	0.62	0.52	46	40	42	146	0.5
A-05	0.46	0.52	46	40	43	108	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	0.85	0.69	70	100	118	200	5.0
TOTAL:	**9.89**						

Mill Run Extension (121125)
Pre-Development Model Schematic

9/28/2023
PREPARED BY: NOVATECH

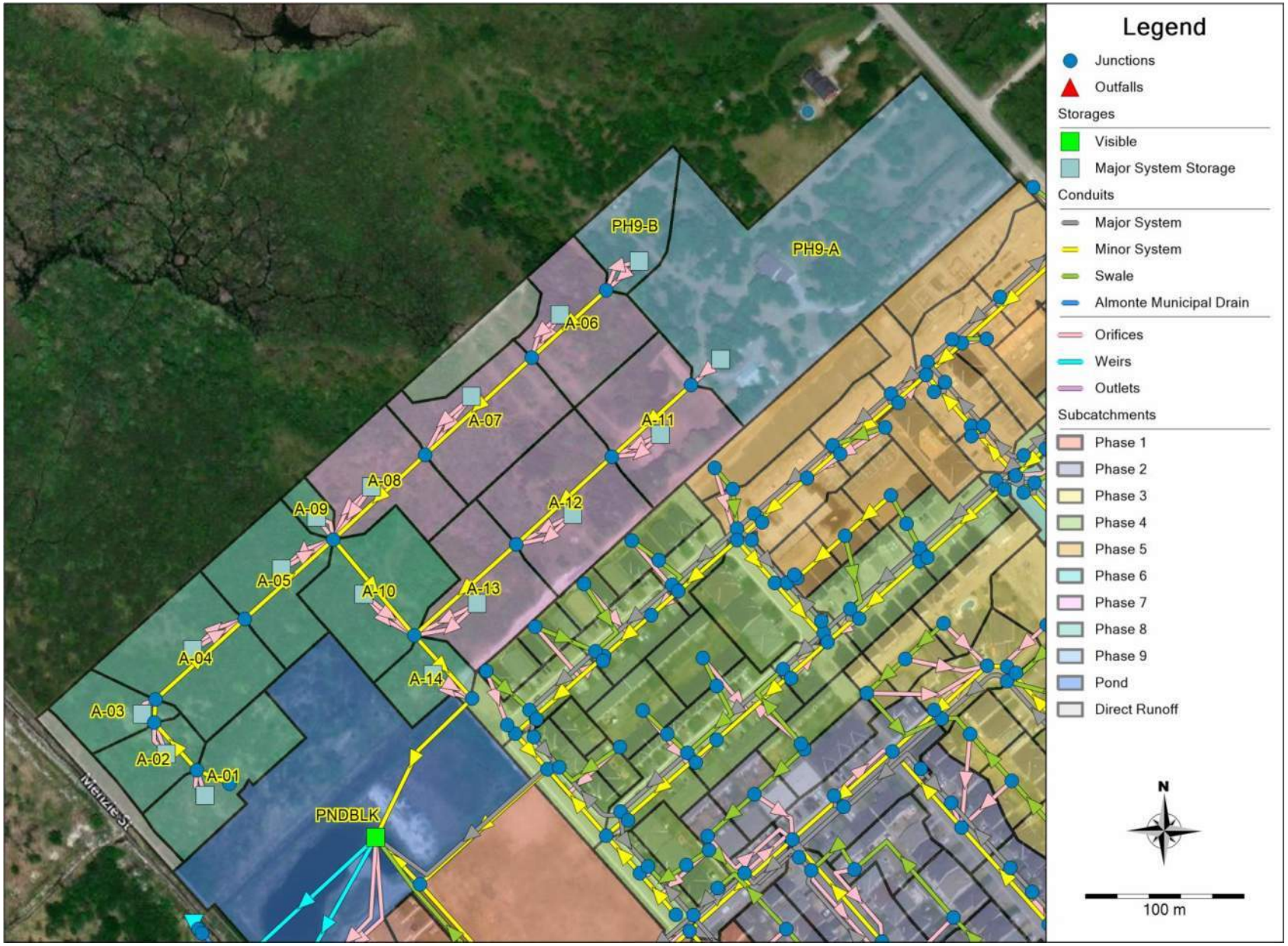
Mill Run Extension (121125)
Post-Development Model Schematic

Overall Schematic



Mill Run Extension (121125)
Post-Development Model Schematic

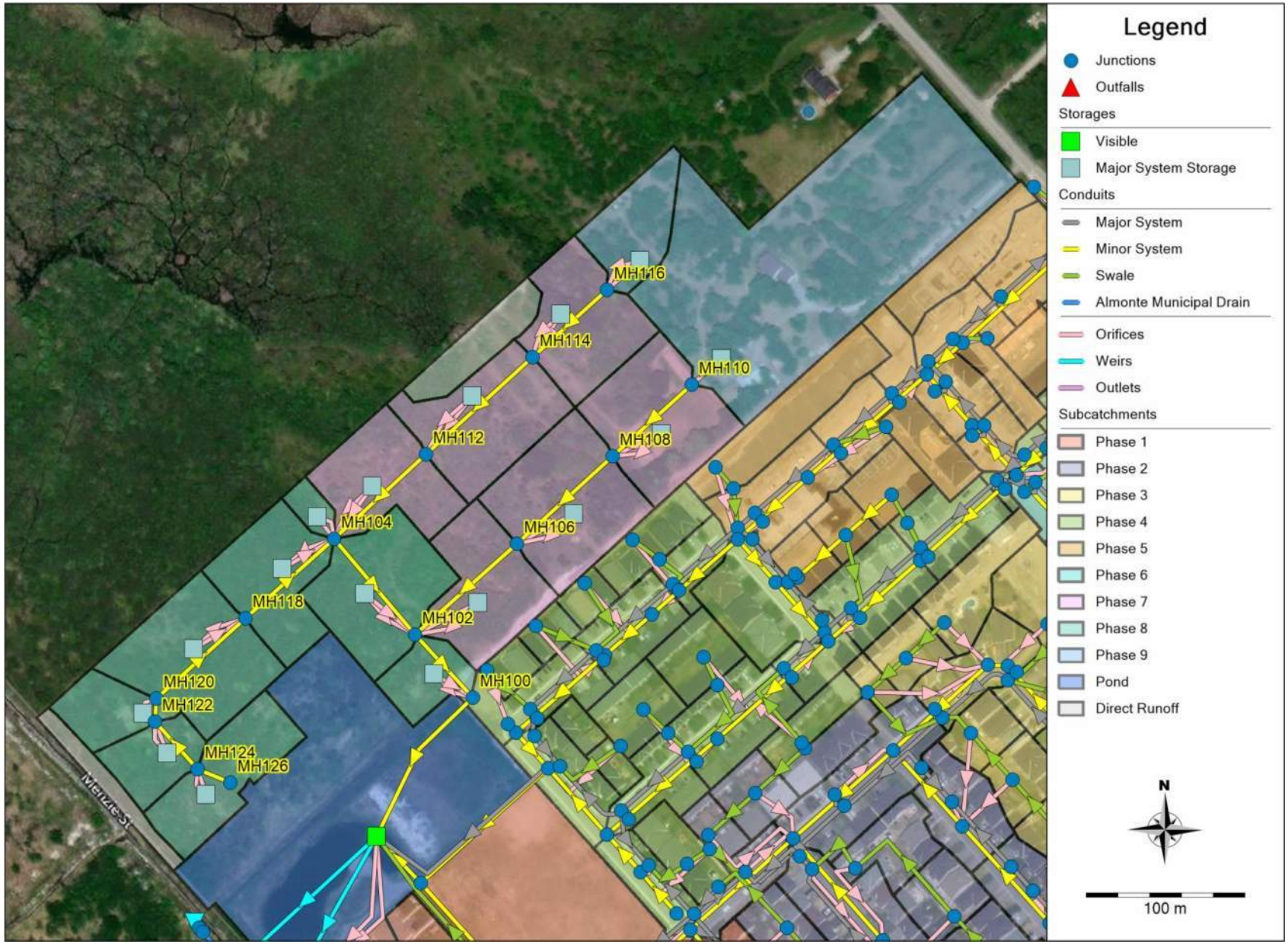
Catchment IDs



Mill Run Extension (121125)
Post-Development Model Schematic

Engineers, Planners & Landscape Architects

Manhole IDs



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

NOVATECH
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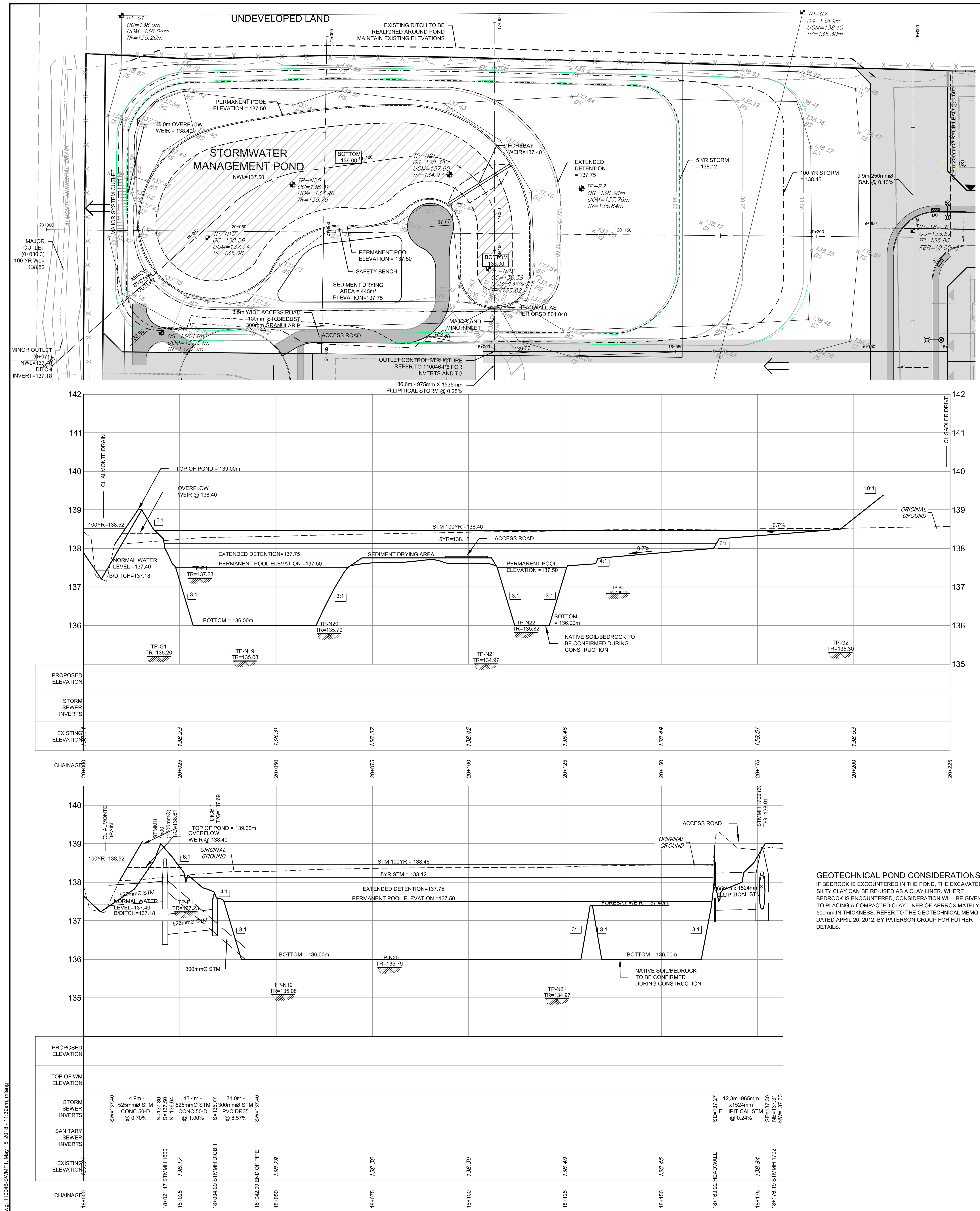
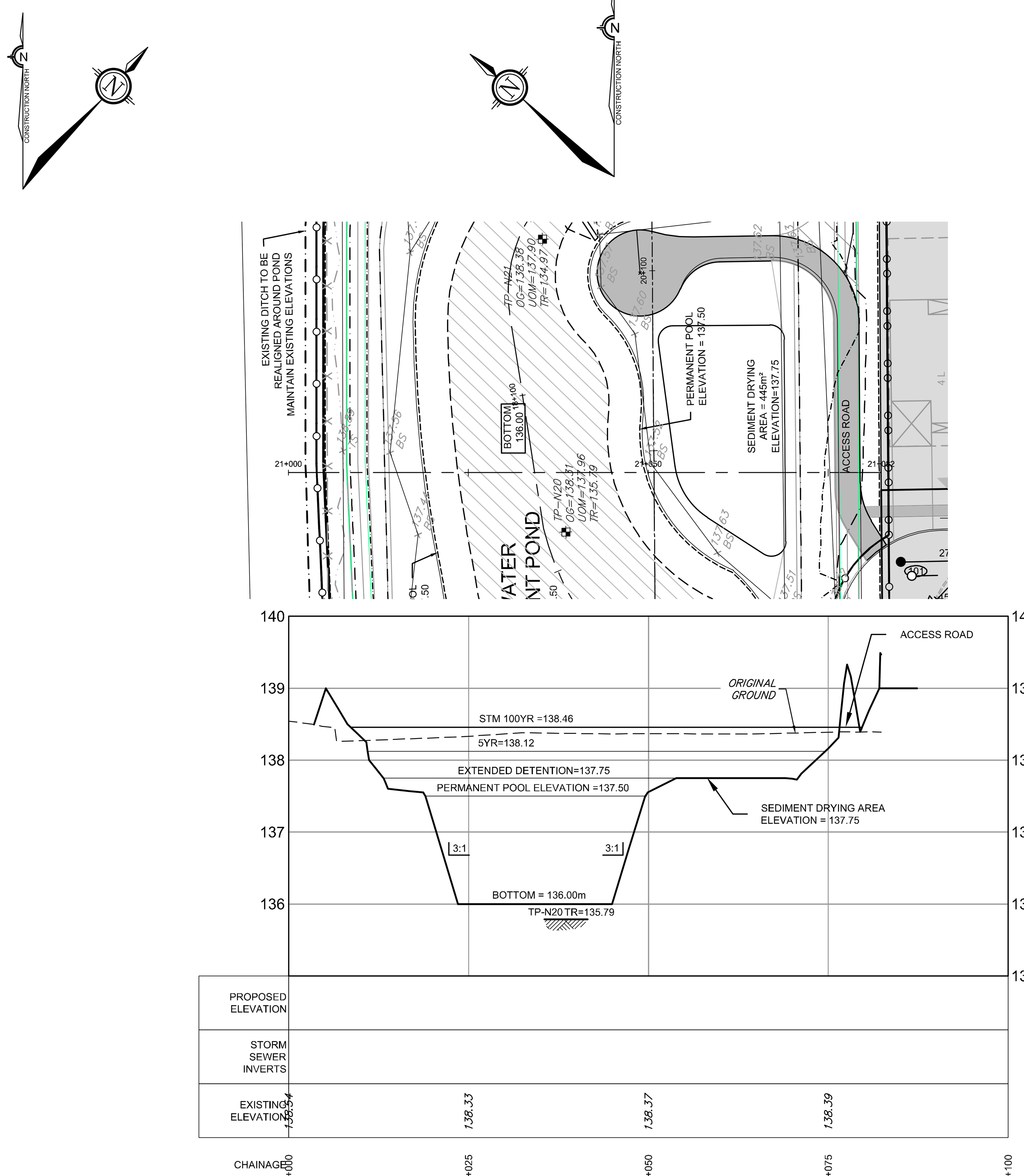
C25mm-4.stm

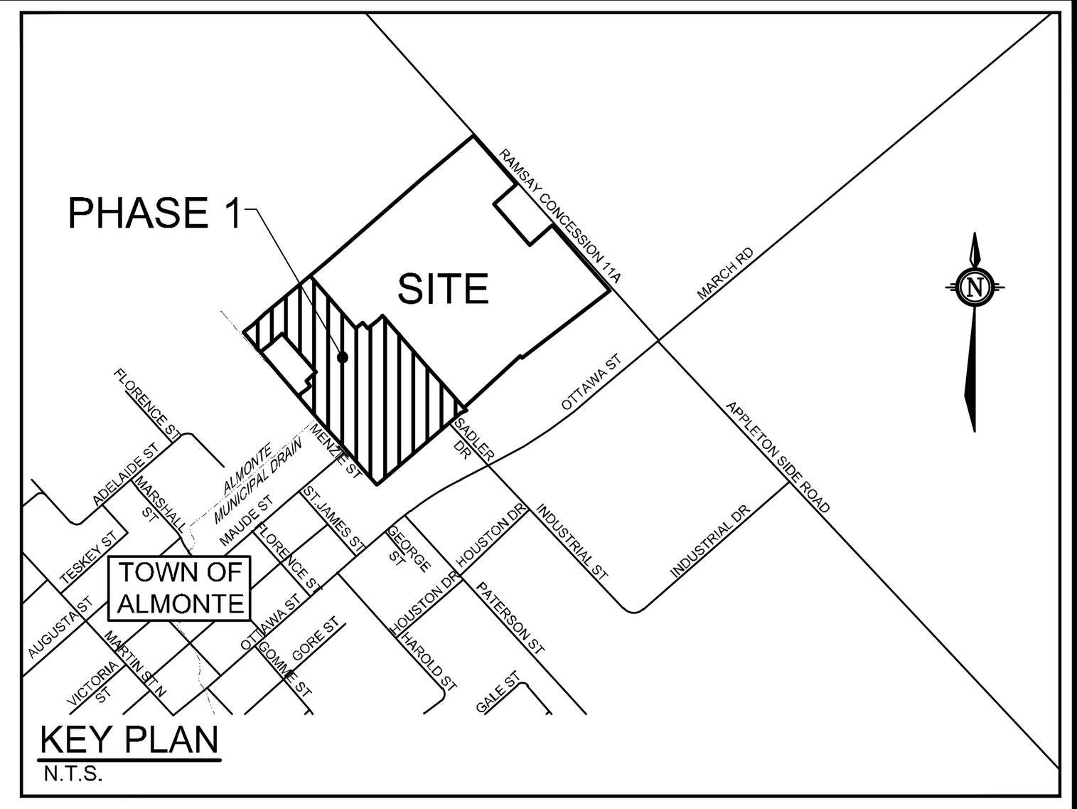
Duration	Intensity
min	mm/hr
0:00	0
0:10	1.51
0:20	1.75
0:30	2.07
0:40	2.58
0:50	3.46
1:00	5.39
1:10	13.44
1:20	56.67
1:30	17.77
1:40	9.12
1:50	6.14
2:00	4.65
2:10	3.76
2:20	3.17
2:30	2.74
2:40	2.43
2:50	2.18
3:00	1.98
3:10	1.81
3:20	1.68
3:30	1.56
3:40	1.47
3:50	1.38
4:00	1.31

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



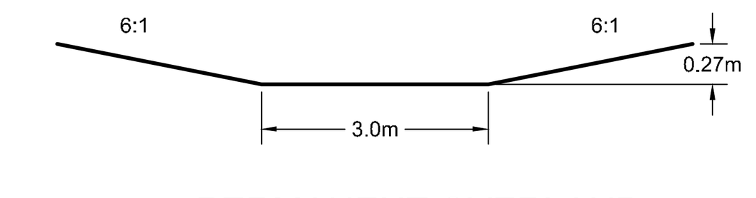




KEY PLAN
N.T.S.

NOTES

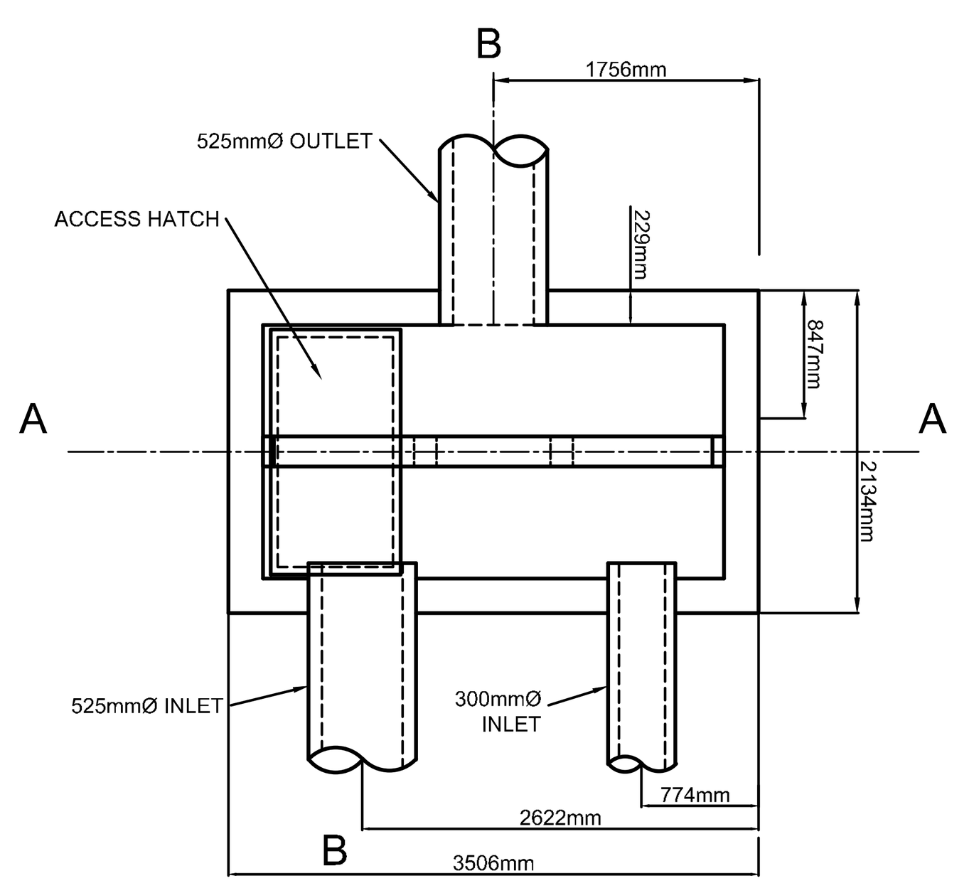
1. RIP RAP TO BE INSTALLED AT ALL OUTLETS & INLETS FOR EROSION PROTECTION. C/W GEOTEXTILE. AS PER OPSD 810.01. THICKNESS AS SPECIFIED.
2. CONCRETE HEADWALLS PER OPSD 804.040. GRATING FOR HEADWALLS PER OPSD 804.050. BAR SPACING PER OPSD 804.050.
3. CONTRACTOR TO CO-ORDINATE CONSTRUCTION OF POND WITH SUBDIVISION 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.



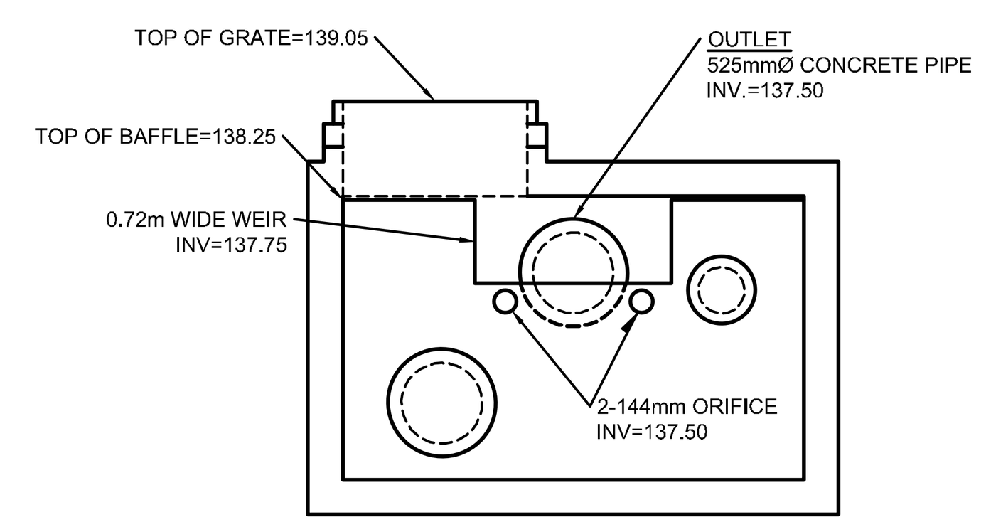
PERMANENT OVERLAND FLOW DITCH

GEOTECHNICAL POND CONSIDERATIONS:

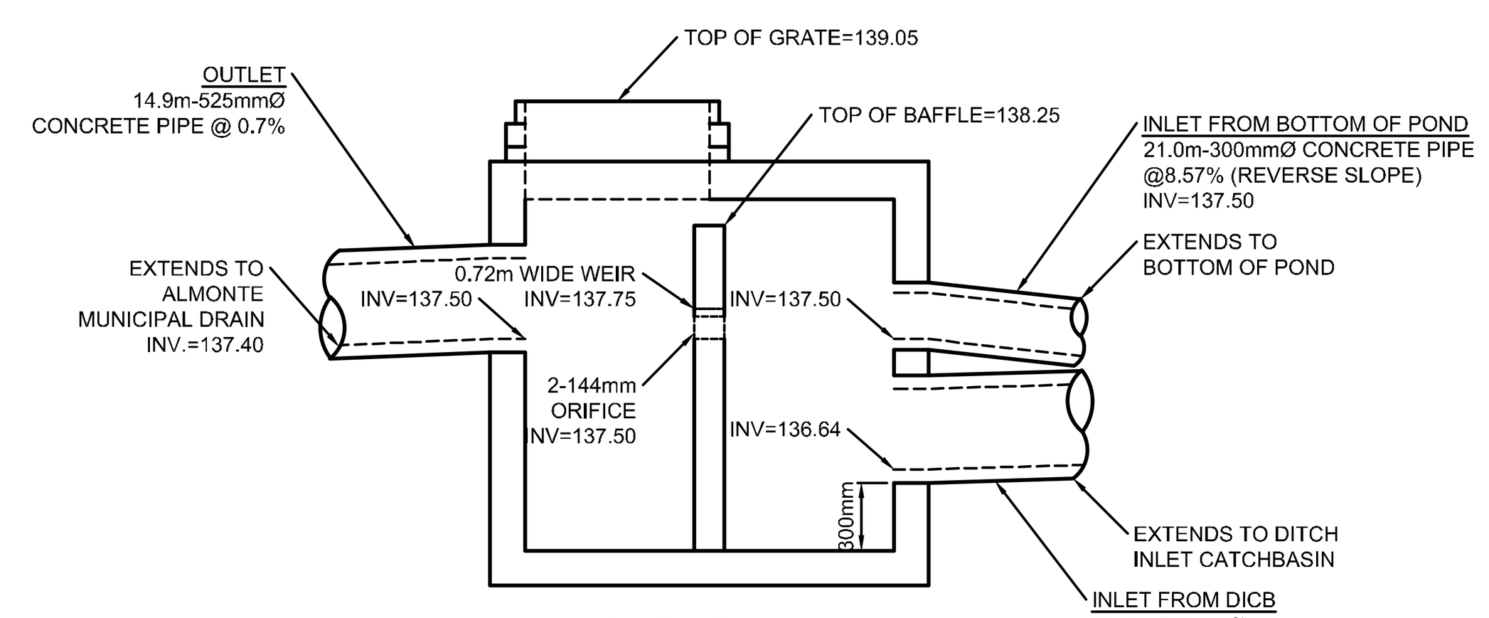
IF BEDROCK IS EXCOUNTERED IN THE POND, THE EXCAVATED SILTY CLAY CAN BE RE-USED AS A CLAY LINER. WHERE BEDROCK IS ENCOUNTERED, CONSIDERATION WILL BE GIVEN TO PLACING A COMPACTED CLAY LINER OF APRROXIMATELY 500mm IN THICKNESS. REFER TO THE GEOTECHNICAL MEMO, DATED APRIL 20, 2012, BY PATERSON GROUP FOR 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 HORIZONTAL
1:50 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

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**								

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

NOVATECH
Engineers, Planners & Landscape Architects

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

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)
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)

POTENTIAL FUTURE FLOWS (NO FLOWS ACCOUNTED FOR IN THIS APPLICATION)

POTENTIAL FUTURE FLOWS (NO FLOWS ACCOUNTED FOR IN THIS APPLICATION)

ADELAIDE STREET

ALFRED STREET

MENZIE STREET (NOT TRAVELLED)

ALEXANDRA STREET

AUGUSTA STREET

MAUDE STREET

VICTORIA STREET

LEISHMAN DRIVE

REAUME STREET

HORTON STREET

HONEYBORNE STREET

OTTAWA STREET

PARK

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

CONCESSION ROAD 11A

WALSH STREET

SADLER DRIVE

LAROCQUE STREET

McKENNY STREET

McCABE STREET

HORTON STREET

BRACEWELL STREET

HONEYBORNE STREET

SADLER DRIVE

BRACEWELL STREET

HONEYBORNE STREET

NORTH

KEY PLAN
N.T.S.

PHASE 6

MUNICIPALITY OF MISSISSIPPI MILLS

LEGEND

- DRAINAGE AREA (hectares)
- AREA ID
- MANHOLE TO MANHOLE
- POPULATION EQUIVALENT
- NUMBER OF UNITS
- SANITARY DRAINAGE AREA BOUNDARY
- SANITARY SERVICE LOCATION
- EXISTING DEVELOPMENT

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

1:1000
0 10 20 30 40

DESIGN CV
CHECKED MSP
DRAWN CV
CHECKED MSP
APPROVED MER

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
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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

P:\110046\110046-CAD\Design\110046-SAN-PH6.dwg, 110046-SAN-PH6, Feb 22, 2021 - 1:18pm, emilie.gillis

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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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

0	45	90	<----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	1.95	0	**0.938**	0.000
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	1200	200	200	0	0.600	1.00	0	**0.600**	0.000

Manhole Loss

Diameters (mm)			Bend					HL_{MH}
U/S MH	Pipe In	Pipe Out	Angle	K_O	C_D	K_b	K_{tot}	(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,
Max Res Peak Factor=	4.00	Manning's n=	0.013	changes in pipe size, and pipe bends
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

Checked: DDB

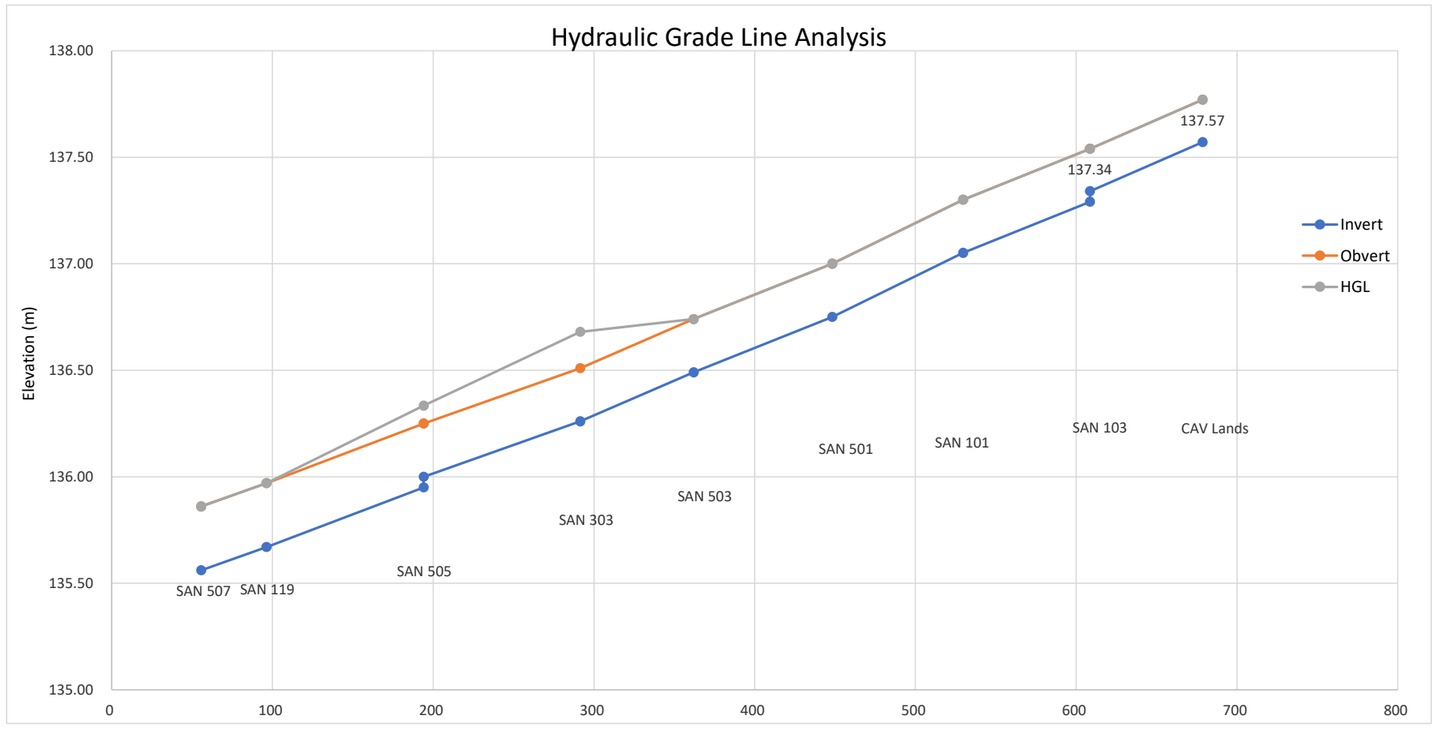
Dwg. Reference:

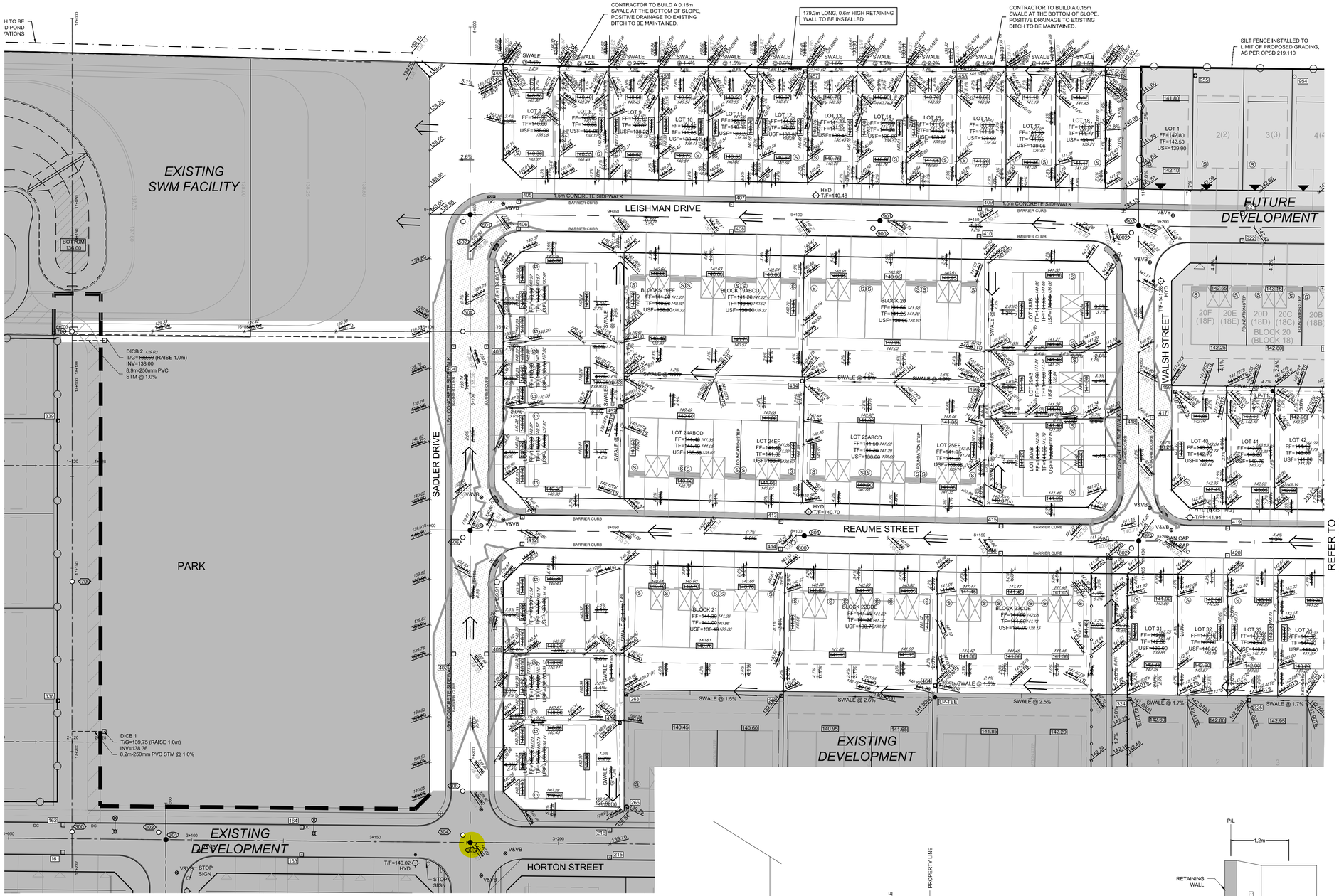
PROJECT:
Mill Run Extension 121125

CLIENT:
Regional Group

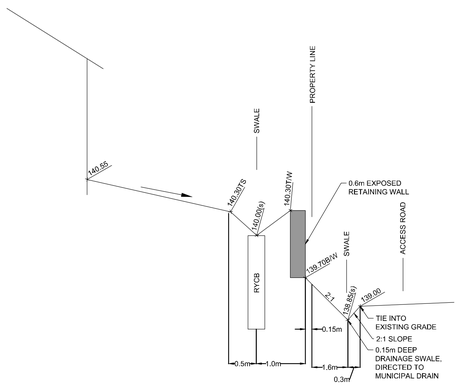
Date: February 10, 2023

Rev.: September 21, 2023

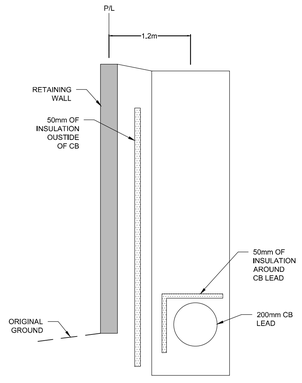




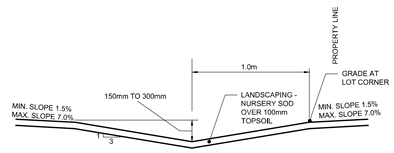
Structure	T/G	Max. Static Ponding (Spill Depth)		5-yr Event (4hr)				100-yr Event (4hr)				
		Elev.	Depth	Elev.	Depth	Cascading	Cascade Depth	Elev.	Depth	Cascading	Cascade Depth	Flow
	(m)	(m)	(m)	(m)	(m)	Flow?	(m)	(m)	(m)	Flow?	(m)	(L/s)
CB401-402	139.55	139.78	0.23	139.13	0.00	N	0.00	139.85	0.30	Y	0.07	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



TYPICAL SECTION
N.T.S.



DETAIL OF CB455
N.T.S.



SWALE DETAIL
N.T.S.

LEGEND:

- AS-BUILT ELEVATION / PROPOSED ELEVATION / EXISTING ELEVATION
- AS-BUILT SWALE ELEVATION / PROPOSED SWALE ELEVATION
- AS-BUILT LOW POINT / PROPOSED LOW POINT
- AS-BUILT HIGH POINT / PROPOSED HIGH POINT
- AS-BUILT TOP OF TERRACE SLOPE / PROPOSED TOP OF TERRACE SLOPE
- AS-BUILT VERTICAL POINT OF INTERSECTION / PROPOSED VERTICAL POINT OF INTERSECTION
- AS-BUILT TERRACE ELEVATION / PROPOSED TERRACE ELEVATION
- AS-BUILT SLOPE / PROPOSED SLOPE
- LOT 30AB — SEMI-DETACHED UNIT
- LOT 25 (WO) — SINGLE FAMILY UNIT WITH BASEMENT WALKOUT
- AS-BUILT FINISHED FLOOR ELEVATION
- AS-BUILT TOP OF FOUNDATION ELEVATION
- AS-BUILT UNDERSIDE OF FOOTING ELEVATION
- MAXIMUM 3: 1 SIDESLOPE
- SWALE @ 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

REFER TO 110046-GR9

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

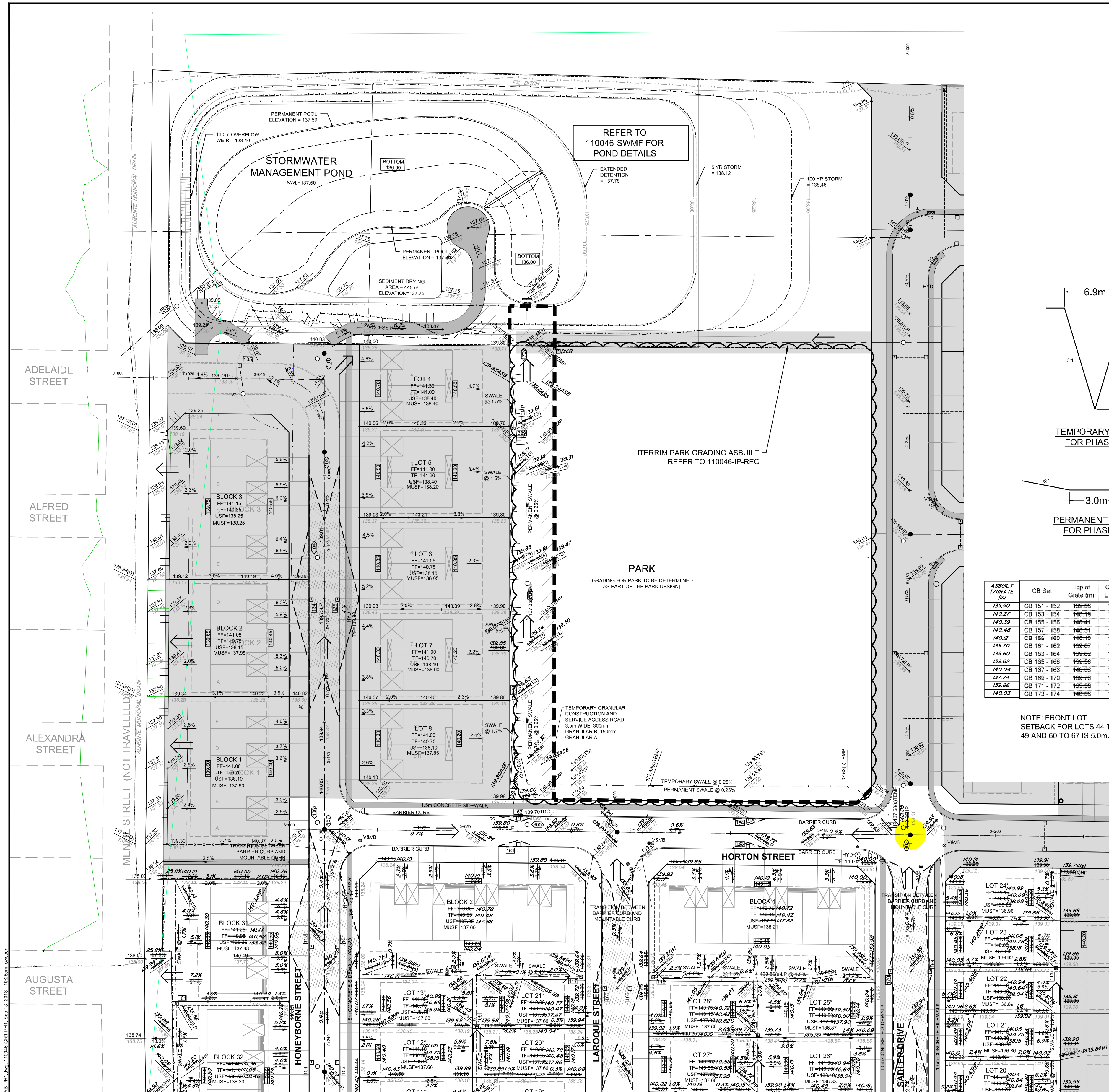
DESIGN CV
CHECKED MER
DRAWN CV
CHECKED MER
APPROVED MER

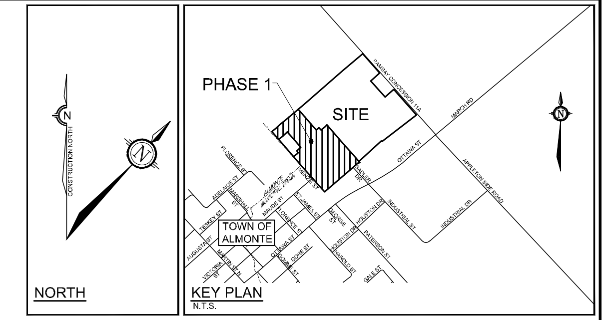
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
MUNICIPALITY OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

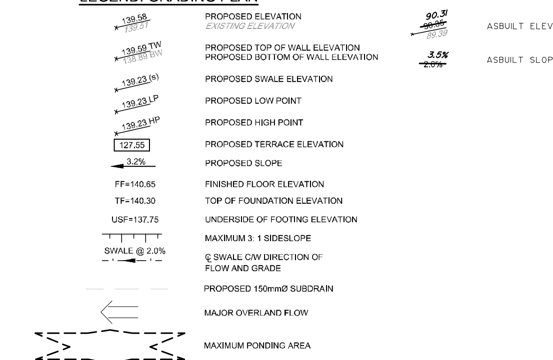
DRAWING NAME
PHASE 4A
GRADING PLAN

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





LEGEND: GRADING PLAN



TEMPORARY DITCH FOR PHASE 1A

PERMANENT DITCH FOR PHASE 1B

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	~~139.58~~	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.

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 SUBDIVISION 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

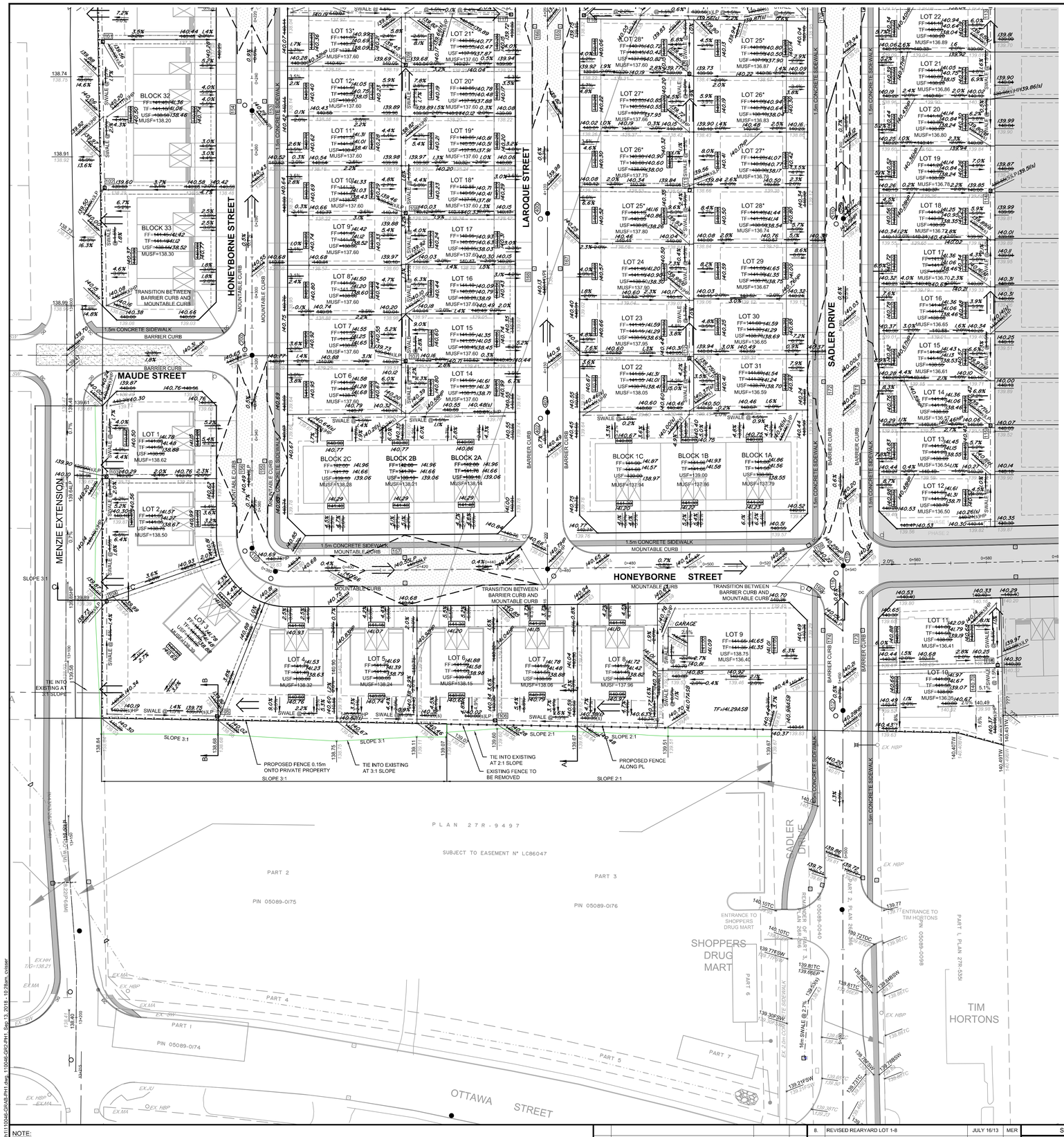
DESIGN CV
CHECKED MER
DRAWN CV
CHECKED MER
APPROVED JGR

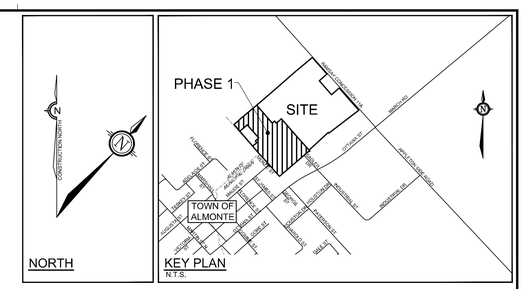
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
TOWN OF MISSISSIPPI MILLS
MILL RUN AT ALMONTE

DRAWING NAME
PHASE 1 - GRADING PLAN

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

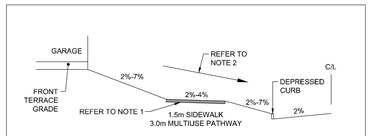




LEGEND: GRADING PLAN

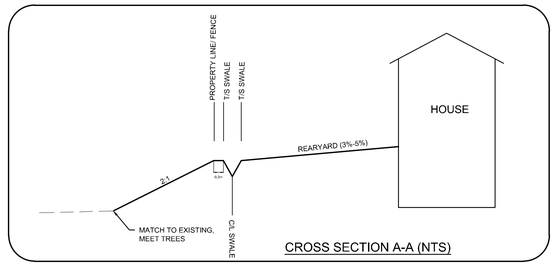
139.58 / 139.58	PROPOSED ELEVATION / *EXISTING ELEVATION*
139.59 TW / 139.59 BW	PROPOSED TOP OF WALL ELEVATION / PROPOSED BOTTOM OF WALL ELEVATION
139.23(s)	PROPOSED SWALE ELEVATION
139.23 LP	PROPOSED LOW POINT
139.23 HP	PROPOSED HIGH POINT
127.55	PROPOSED TERRACE ELEVATION
3.2%	PROPOSED SLOPE
FF=140.65	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
	TEMPORARY EMERGENCY ACCESS GRANULAR ROAD
90.31 / 89.35	ASBUILT ELEVATION
3.5% / 2.0%	ASBUILT SLOPE

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

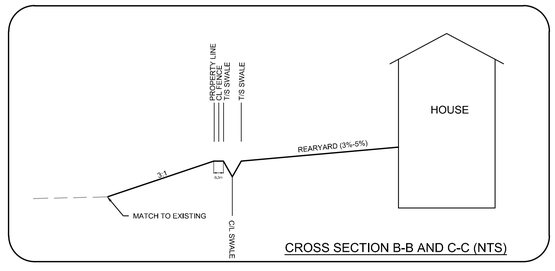


TYPICAL DETAIL OF DRIVEWAY WITH SLOPE OVER 5%

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 SUBDIVISION 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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Ottawa, Ontario, Canada K2M 1P6
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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

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NORTH
KEY PLAN
N.T.S.
PHASE 1
SITE
TOWN OF ALMONTE
LEGEND: GENERAL PLAN
PROPOSED WATERMAIN AND DIAMETER
PROPOSED VALVE LOCATION
PROPOSED VALVE & VALVE BOX
PROPOSED HYDRANT C/W VALVE & LEAD
PROPOSED CROSS
PROPOSED TEE
PROPOSED BEND AND THRUSTBLOCK (SEE PLAN AND PROFILES)
PROPOSED TOP OF BOTTOM FLANGE
PROPOSED WATERMAIN REDUCER
PROPOSED CAP
PROPOSED SAN MH & SEWER
PROPOSED STM MH & SEWER DIRECTION OF FLOW
PROPOSED ROAD CATCHBASIN
PROPOSED REARYARD CATCHBASIN
PROPOSED WOOD FENCE
SILT FENCE AS PER OPSD 219.110
PROPOSED PRECAST BLOCK RETAINING WALL
PROPOSED DEPRESSED BARRIER CURB
PROPOSED BARRIER CURB
PROPOSED MOUNTABLE CURB
PROPOSED STREET LIGHT
ZONING SETBACK LINE
SINGLE SERVICE LATERAL
SEMI DETACHED LATERAL
TOWNHOUSE SERVICES LATERAL
EXISTING WATERMAIN AND DIAMETER
EXISTING SAN MH & SEWER
EXISTING STM MH & SEWER
EXISTING ROAD CATCHBASIN
CLAY SEEPAGE BARRIER
FUTURE RESIDENTIAL DEVELOPMENT
100 YR STORM HGL
GRANULAR ROAD BASE
LEGEND: GEOTECHNICAL
GOLDER ASSOCIATES TEST PIT LOCATION
PATERSON TEST PIT LOCATION
PATERSON BOREHOLE LOCATION
NOVATECH TEST PIT LOCATION
OG=138.28m ORIGINAL GROUND ELEVATION
UOM=137.72m UNDERSIDE OF MARL ELEVATION
TR=136.68m TOP OF ROCK ELEVATION
FBR=(0.15m) DEPTH OF FRACTURED BEDROCK
SADLER DRIVE
HONEYBORNE STREET
HORTON STREET
PARK
LIMIT OF PHASE 1
MATCHLINE STATION 3+150
SEE DRAWING No. 110046-P3
MATCHLINE STATION 0+517
SEE DRAWING No. 110046-P2
1.5m CONCRETE SIDEWALK
BARRIER CURB
PHASE 4
PHASE 1
PROPOSED ELEVATION
TOP OF WM ELEVATION
STORM SEWER INVERTS
SANITARY SEWER INVERTS
EXISTING ELEVATION
CHAINAGE

CB No.	STATION	T/G ELEVATION	INVERT
169	5+261.38	139.70 ~~139.76~~	138.34 ~~138.59~~ (SW)
170	5+261.38	139.65 ~~139.76~~	138.38 ~~138.59~~ (NE)
171	5+365.74	139.93 ~~139.90~~	138.76 ~~138.70~~ (SW)
172	5+365.74	139.97 ~~139.90~~	138.78 ~~138.70~~ (NE)
173	5+435.51	139.99 ~~140.05~~	138.83 ~~138.86~~ (SW)
174	5+435.48	139.93 ~~140.06~~	138.87 (NE)

"T/G ELEVATION" FOR CURB INLETS IS SET AT THE EDGE OF PAVEMENT.

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AS-BUILT

DRAWINGS ISSUED FOR LIMITED CONSTRUCTION: INCLUDES THE CLEARING AND GRUBBING, TOPSOIL STRIPPING AND BLASTING FOR PHASE 1A ONLY AND THE INSTALLATION OF THE PIPES WITH NO CONNECTIONS (SANITARY,STORM & WATERMAIN) ALONG SADLER DRIVE BETWEEN STATIONS (STA.5+410 AND 5+500).

No.	REVISION	DATE	BY
9.	AS-BUILT INFORMATION ADDED (PHASE 1A, 1B, 1C)	XXXX	XXX
8.	ISSUED FOR SUBDIVSION REGISTRATION - PHASE 1B	FEB 21/14	MER
7.	REVISED SADLER DRIVE CROSS SECTION	NOV 12/13	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 HORIZONTAL
1:50 VERTICAL

DESIGN MB/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- PLAN AND PROFILE SADLER DRIVE - STA. 5+212.49 TO 5+608

PROJECT No. 110046
REV # 9
DRAWING No. 110046-P5

PLANB1.DWG - 1000mmx707mm

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
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 236 | Fax: 613.254.5867

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

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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

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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:

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.

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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)

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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
Engineers, Planners & Landscape Architects
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
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 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

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

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

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 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
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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

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

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

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

External Email – Confirm Sender and Beware of Links and Attachments

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

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.

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		Connection 2 – Walsh	
	Junction Node J-546 (Elev 141.00 m)		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

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

CANADA BEST MANAGED COMPANIES Platinum member

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)

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:

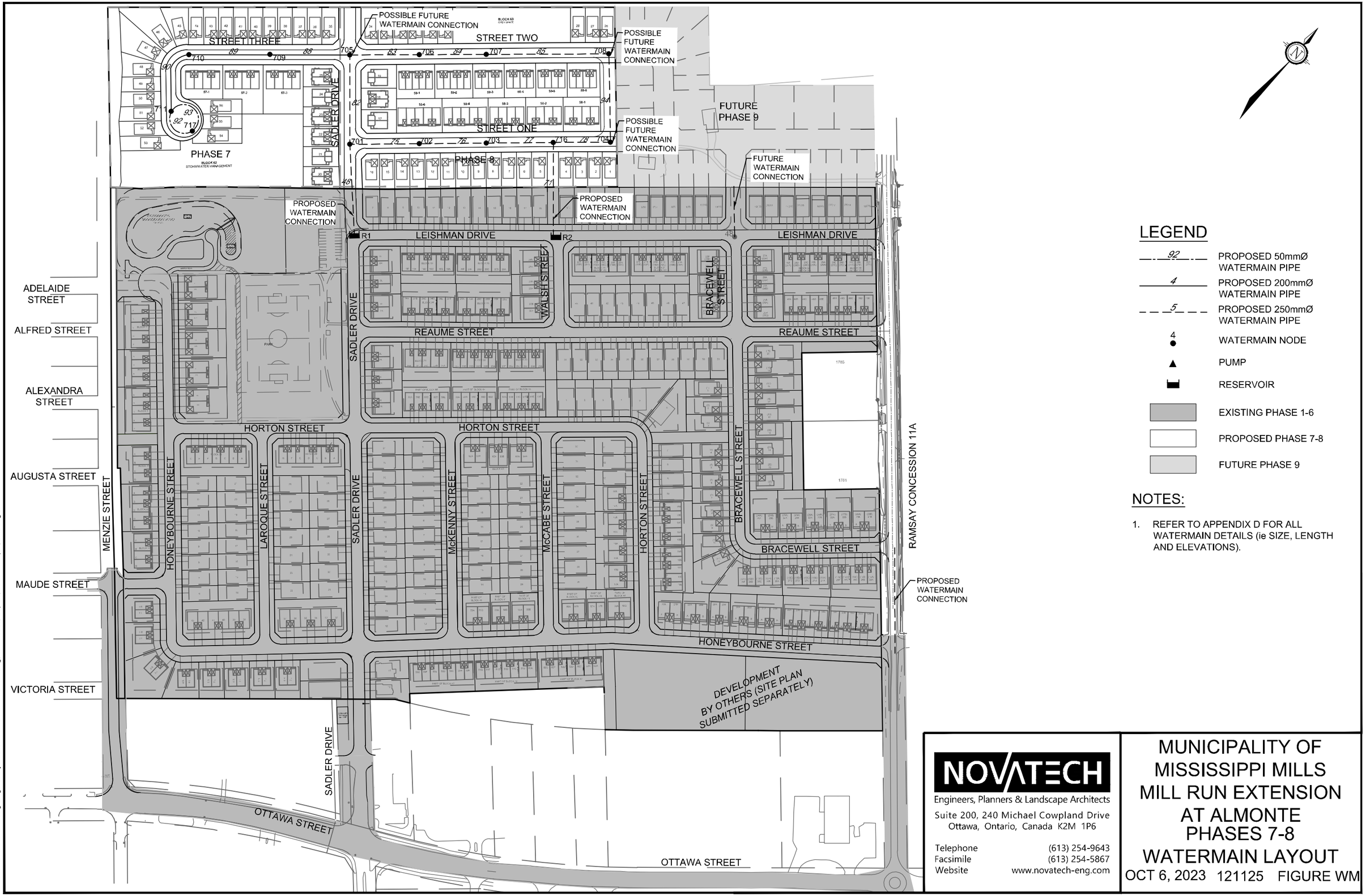
1. Connection points 1 and 2
2. Connection Points 1, 2, and 3
3. Connection points 1, 2, and 4
4. Connection points 1, 2, 3, and 4

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

- PROPOSED 50mmØ WATERMAIN PIPE
- PROPOSED 200mmØ WATERMAIN PIPE
- PROPOSED 250mmØ WATERMAIN PIPE
- 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
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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

NOVATECH
Engineers, Planners & Landscape Architects

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
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
Phase 7 and 8 High Pressure Check

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (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
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
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

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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)	Pressure (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 D5C
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 703

Node ID	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (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 D5D
Phases 7 and 8 Maximum Daily Fire Demand
Fire Flow at Node 705

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	174.4	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 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

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

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)	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	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

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 L/s	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 4/6	9,000
3 to 10m	8,000 133 4/5	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.

PATERSON GROUP

Geotechnical Investigation

Proposed Residential Development

1825 Ramsay Concession 11A
Mississippi Mills, Ontario

Prepared for Menzie Almonte 2 Inc (c/o Regional Group)

Report PG5860-1 Revision 3 dated July 25, 2024

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Menzie Almonte 2 Inc (c/o Regional Group) to prepare a geotechnical investigation report for the proposed residential development to be located at 1825 Ramsey Concession 11A, in the Village of Mississippi Mills, Ontario (refer to Figure 1 - Key Plan presented in Appendix 2).

The objective of the geotechnical investigation was to:

- determine the subsoil and groundwater conditions at the site by means of test holes
- provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect its design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available conceptual drawings, it is understood that the proposed development will consist of residential dwellings with driveways, local roadways, walkways and landscaped areas. It is further understood that a stormwater management pond and a park are to be located within the southwestern portion of the subject site. It is expected that the proposed development will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current geotechnical investigation was carried out on April 2 and 3, 2024. The program consisted of seven (7) boreholes and three (3) hand augered test holes advanced down to a maximum depth of 3.5 m below ground surface A previous geotechnical investigation programs were completed on June 11, 2021 and November 24, 2021, consisted of excavating a total of seven (7) test pits and fifteen (15) hand augered test holes down to a maximum depth of 3.3 m below ground surface. The test pit locations were distributed in a manner to provide general coverage of the subject site and taking into consideration underground utilities and site features. The test hole locations are shown on Drawing PG5860-1 - Test Hole Location Plan attached.

The boreholes were advanced using a CME-55 Power Auger rig and operated by a two-person crew. The drilling procedure consisted of augering to the required depths at the selected locations, and sampling and testing the overburden.

The test pits were completed using an excavator and backfilled with the excavated soil upon completion. The test pit procedures consisted of excavating to the required depth at the selected location and sampling the overburden. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer.

Sampling and In Situ Testing

The soil samples were recovered from the auger flights and using a 50 mm diameter split-spoon sampler. The samples were initially classified on site, placed in sealed plastic bags and transported to our laboratory. The depths at which the auger and split-spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as “N” values on the Soil Profile and Test Data sheets. The “N” value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

The soil samples from the test pits were recovered from the side walls of the open excavation. The samples were initially classified on site, placed in sealed plastic bags and transported to our laboratory.

The depths at which the auger and grab samples were recovered from the test pits are shown as AU, and G respectively, on the Soil Profile and Test Data sheets in Appendix 1.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

The subsurface conditions observed in the test pits were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

Monitoring wells were installed in HA1-24, HA2-24, HA3-24, BH4-24, BH5-24 and BH7-24 test holes during the current investigation to permit monitoring of groundwater levels subsequent to the completion of the drilling program. Typical monitoring well construction details are described below:

- 0.3 m of slotted 50 mm diameter PVC screen at the base of the boreholes HA2-24, HA3-24, BH4-24, BH5-24 and BH7-24.
- 1.5 m of slotted 50 mm diameter PVC screen at the base of the borehole HA1-24.
- 50 mm diameter PVC riser pipe from the top of the screen to the ground surface was installed in BH4-24, BH5-24 and BH7-24.
- 32 mm diameter PVC riser pipe from the top of the screen to the ground surface was installed in HA1-24, HA2-24 and HA3-24.
- No. 3 silica sand backfill within annular space around screen.
- 300 mm thick bentonite hole plug directly above PVC slotted screen.
- Clean backfill from top of bentonite plug to the ground surface.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific well construction details.

The groundwater observations are discussed in subsection 4.3 and presented in the Soil Profile and Test Data Sheets in Appendix 1

Water Level Monitoring

All monitoring wells (HA1-24, HA2-24, HA3-24, BH4-24 and BH5-24) excluding BH7-24 were equipped with Van Essen Instruments TD-Diver water level dataloggers to continuously monitor fluctuations in water levels. The dataloggers were programmed to continuously measure and record groundwater levels at a minimum rate of one (1) reading every twelve (24) hours.

In addition to the continuous datalogger measurements, manual water level measurements were taken during the installation and decommission of the dataloggers using an electronic water level meter. The groundwater monitoring results are presented in Figure 2 to Figure 6 – Groundwater Monitoring Charts in Appendix 2.

3.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the subject site. The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson using a high precision, handheld GPS and referenced to a geodetic datum. The location of the boreholes is presented on Drawing PG5860-1 Revision 4- Test Hole Location Plan in Appendix 2.

3.3 Laboratory Review

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. All test results are included in Appendix 1 and further discussed in Subsection 4.2 of the current report.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures by others. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the samples. The results are discussed further in Subsection 6.7.

4.0 Observations

4.1 Surface Conditions

The site is currently undeveloped, and grass covered. The ground surface across the subject site is relatively flat and approximately 1.5 m lower than the neighbouring roadway. The site was observed to be sparsely vegetated with brush and small adolescent trees. It is worth noting that extremely soft ground conditions were encountered at ground surface within the western portion of the site due to the presence of a peat layer.

The site is bound by a residential subdivision and a storm water pond to the south, a single house and associated landscaped areas to the east, and by similar land to the north and west.

4.2 Subsurface Profile

Overburden

The subsurface profile encountered at the test hole locations varies from west to the eastern portion of the site. Shallow bedrock overlain by glacial till and topsoil with high organics was encountered along the east portion of the site. On the other hand, the subsurface profile at the western portion consists of Peat, topsoil, and marl underlain by silty clay, and glacial till or bedrock.

Peat and Marl

Peat consisting of soft highly organic soils and marl deposits were encountered at in the western portion of the site. Marl consists of soft, light-coloured (white to pale gray or) mud-like sediment typically deposited in freshwater marine environment by algae. The thickness of peat and marl varies between 0.25 to 1.3 m thick.

Topsoil

Generally, the topsoil was observed to be 0.2 to 0.45 m thick overlying silty clay, glacial till and/or bedrock.

Silty Clay

A firm to very stiff brown silty clay deposit was encountered at an approximate depth ranging from 0.2 to 1.2 m transitioning to grey at approx. 1.2 to 1.45 m at the western portion of the site and in BH2-24, BH3-24, and BH4-24 at the site's eastern side.

Glacial Till

A glacial till layer was encountered at an approximate depth ranging from 0.2 to 1.7 m overlying the shallow bedrock. The glacial till consists of compact to very dense silty clay to silty sand with gravel, cobbles, rock fragments, and boulders.

Bedrock

Based on available geological mapping, the local bedrock consists of limestone and dolomite of the Gull River formation with an anticipated overburden thickness of 1 to 3 m depth. Practical refusal on bedrock was encountered in all test holes at approximate depths ranging between 0.4 and 3.5 m. Reference should be made to the Soil Profile and Test Data sheets in the attachments for specific details of the soil profiles encountered at each test hole location.

4.3 Groundwater

Manual Groundwater water level measurements were measured periodically collected from the monitoring well installations during the current field investigations and are summarized in Table 1 below. The manual water level measurements are also noted on the applicable Soil Profile and Test Data sheet presented in Appendix 1.

Table 1 – Summary of Groundwater Levels

Borehole	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
HA1-24	Monitoring Well	138.22	0.24	137.98	April 9, 2024
			0.42	137.80	July 8, 2024
HA2-24	Monitoring Well	138.39	0.99	137.40	April 9, 2024
			0.0	138.39	July 8, 2024
HA3-24	Monitoring Well	138.51	1.2	137.31	April 9, 2024
			0.0	138.51	July 8, 2024
BH4-24	Monitoring Well	138.94	0.1	138.93	April 9, 2024
			0.0	138.94	July 8, 2024
BH5-24	Monitoring Well	138.94	0.19	138.75	April 9, 2024
			0.2	138.74	July 8, 2024
BH7-24	Monitoring Well	139.60	0.06	139.54	April 9, 2024

Notes:
1. The ground surface elevation at each borehole location was surveyed using a high precision GPS and referenced to a geodetic datum.
2. Groundwater reading at BH7-24 was not recorded during July 8, 2024, site visit.

Water Elevation Monitoring Program

In addition to manual water level measurements, a water elevation monitoring program was carried out across the subject site. The water elevation monitoring program provides an overview of the variations in the monitoring well water elevations throughout the monitoring period. Each monitoring well was equipped with a Van Essen TD-Diver Water Level Datalogger to accurately monitor fluctuations in the water levels. The dataloggers were programmed to continuously measure and record water levels throughout the subject site at a fixed rate of one (1) reading every 24 hours for approximately 3 months.

The monitoring program was undertaken from April 2024 to July 2024. The monitoring data was compared with Environment and Natural Resources Canada precipitation data from the Ottawa International Airport over the same timeframe as part of the monitoring program. The monitoring data is presented in Figure 2 to Figure 6 - Monitoring Well Water Elevations sheets in Appendix 2.

Monitoring Results

The data presented in Figure 2 through Figure 6 shows the seasonal high water table was near the surface during the monitoring program. The water levels throughout the site ranged between 0 to 1 m bgs (137.37 to 139.00m asl) during the monitoring program. It is important to note that groundwater level readings could be influenced by perched water condition. The long-term groundwater table can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, it is estimated that the long-term groundwater level can be expected between 1.5 to 2.0 m below ground surface.

It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered acceptable for the future phase of the proposed residential development. However, due to the presence of a peat/marl layer and shallow groundwater within the southwest portion of the site, additional site preparation recommendations are required.

Due to the presence of a sensitive silty clay layer, the western portion of the site will be subjected to grade raise restrictions. The recommended permissible grade raise restriction is presented in Drawing PG5860-2 Revision 3 – Permissible Grade Raise Plan in Appendix 2. If a higher permissible grade raise is required, preloading with or without surcharge, lightweight fill and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction and differential settlements.

Depending on depth of services and building foundations, bedrock removal may be required.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing significant amounts of organics, should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures.

The peat and marl layers encountered within the site should be removed from under any settlement sensitive structures.

Fill Placement

Fill used for grading beneath the building footprints, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site.

It should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building area should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. The reuse of marl and peat is not recommended; however, it is expected that the peat can be mixed with topsoil material and reused for landscaped areas.

If approved site excavated fill is to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Non specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

Bedrock Removal

Should bedrock removal be required, hoe ramming is an option where the bedrock is weathered and/or where only small quantities of bedrock need to be removed. Where large quantities of bedrock need to be removed, line drilling and controlled blasting may be required. The blasting operations should be planned and completed under the guidance of a professional engineer with experience in blasting operations.

Prior to considering blasting operations, the blasting effects on the existing services, buildings and other structures should be addressed. A pre-blast or pre-construction survey of the existing structures located in proximity of the blasting operations should be conducted prior to commencing construction.

The extent of the survey should be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations. The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is also an experienced blasting consultant.

Vibration Considerations

Construction operations could be the cause of vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain a cooperative environment with the residents.

The following construction equipment could be the source of vibrations: hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the cause or the source of detrimental vibrations on the nearby buildings and structures. Therefore, it is recommended that all vibrations be limited.

Two parameters determine the permissible vibrations, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, therefore, a pre-construction survey is recommended to minimize the risks of claims during or following the construction of the proposed building.

5.3 Foundation Design

Based on the subsurface profile encountered, it is expected that footings for the proposed buildings can be founded on either an undisturbed, firm grey silty clay, compact brown glacial till or bedrock bearing surface. Also, footings can be founded on an engineered pad over an approved undisturbed firm grey silty clay, compact brown glacial till, or clean surface sounded bedrock surface.

Bearing Capacity of Conventional Footings

Footings placed on an undisturbed firm, grey silty clay layer or on an engineered pad over undisturbed native soil approved by Paterson at the time of construction, can be designed using a bearing resistance value at serviceability limit states (SLS) of **60 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **125 kPa**.

Footings placed on an undisturbed, compact, brown glacial till bearing surface can be designed using a bearing resistance value at SLS of **150 kPa** and a factored bearing resistance value at ULS of **225 kPa**.

An undisturbed soil bearing surface consists of one from which all topsoil, peat, marl, and deleterious materials, such as loose, frozen or disturbed soil, have been removed, in the dry, prior to the placement of concrete for footings.

Footings placed on a clean, surface sounded bedrock bearing surface can be designed using a bearing resistance value at ULS of **500 kPa**.

A clean surface sounded bedrock bearing surface consists of one from which all loose materials have been removed, and has no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

A geotechnical resistance factor of 0.5 was applied to the reported bearing resistance values at ULS.

Footings placed on a soil bearing surface and designed using the bearing resistance values at SLS given above will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively. Footings placed on a clean surface sounded bedrock bearing surface will be subjected to negligible post construction settlements.

Bedrock/Soil Transition

Where a building is founded partly on bedrock and partly on soil, it is recommended to decrease the soil bearing resistance value by 25% for the footings placed on soil bearing media to reduce the potential long-term total and differential settlements. Also, at the soil/bedrock and bedrock/soil transitions, it is recommended that the upper 0.5 m of the bedrock be removed for a minimum length of 2 m (on the bedrock side) and replaced with nominally compacted OPSS Granular A or Granular B Type II material. The width of the sub-excavation should be at least the proposed footing width plus 0.5 m. Steel reinforcement, extending at least 3 m on both sides of the 2 m long transition, should be placed in the top part of the footings and foundation walls.

Zero Entry Lean Concrete Trenches

Alternatively, a zero-entry, vertical trench can be excavated below the USF down to the bedrock layer and infilled with lean concrete mix (Minimum 15 MPa, 28 day strength). The trench should have near vertical side walls and extend a minimum of 300 mm beyond each face of the footings. The bedrock at the bottom of the excavation should be reviewed by Paterson at the time of construction.

The bearing resistance values used for footings placed over engineered fill or concrete in-filled trenches can be taken as the values provided previously in this report.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels.

Adequate lateral support is provided to native soil, above the groundwater table, when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil or engineered granular fill, as described above. In sound unfractured bedrock, a 1H:6V slope may be used.

Permissible Grade Raise Recommendations

The permissible grade raise recommendations are summarized on Drawing PG5860-2 Revision 3 - Permissible Grade Raise Plan in Appendix 2. Where the grade raise cannot be accommodated with soil fill, the following options could be used alone or in combination.

Option 1 - Use of Lightweight Fill

Lightweight fill (LWF) can be used, consisting of EPS (expanded polystyrene) Type 12 or 15 blocks or other lightweight materials which allow for raising the grade without adding a significant load to the underlying soils. However, these materials are expensive and, in the case of the EPS, are more difficult to use under the groundwater level, as they are buoyant, and must be protected against potential hydrocarbon spills. Use lightweight fill within the interior of the garage and porch areas to reduce the fill-related loads.

Option 2 - Preloading or Surcharging

It is possible to preload or surcharge the proposed site in localized areas provided sufficient time is available to achieve the desired settlements based on theoretical values from the settlement analysis. If this option is considered, a monitoring program using settlement plates and electronic piezometers will have to be implemented. This program will determine the amount of settlement in the preloaded or surcharged areas. Obviously, preloading to proposed finished grades will allow for consolidation of the underlying clays over a longer time period. Surcharging the site with additional fill above the proposed finished grade will add additional load to the underlying clays accelerating the consolidation process and allowing for accelerated settlements. Once the desired settlements are achieved, the site can be unloaded and the fill can be used elsewhere on site.

5.4 Floor Slab Construction

With the removal of all topsoil, peat, marl, and deleterious fill within the footprints of the proposed buildings, the native soil or bedrock surface approved by Paterson will be considered an acceptable subgrade upon which to commence backfilling for floor slab construction.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Types I or II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab (outside the zones of influence of the footings). It is recommended that the upper 200 mm of sub-floor fill consists of 19 mm clear crushed stone.

5.5 Design for Earthquakes

The site class for seismic site response can be taken as **Class C** for the shallow footings founded on glacial till or bedrock and **Class D** for shallow footings founded on the silty clay deposit of the subject site. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

5.6 Pavement Design

For design purposes, the pavement structure presented in the following tables could be used for the design of driveways and local residential roadways:

Table 1 - Recommended Pavement Structure – Driveways

Thickness (mm)	Material Description
50	**Wear Course** - HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE – Either fill, in situ soils or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 2 - Recommended Pavement Structure – Local Roadways

Thickness (mm)	Material Description
40	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course -** HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
400	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

The pavement structure performance is largely dependent on the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing load carrying capacity.

Due to the impervious nature of the subgrade and fill materials and transitions between various pavement structures, consideration should be provided to installing subdrains during the pavement construction. At transition zones between various pavement structures, subdrains should be installed longitudinally to drain any potential water trapped in the granular layers. The subdrains at catch basins should extend in four orthogonal directions and longitudinally when placed along a curb.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer or direct the collected water to the building sump pit, which should be connected to the storm sewer.

Foundation Backfill

Backfill against the exterior sides of the foundation walls should consist of free draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless a composite drainage system (such as System Platon or Miradrain) is used. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be used for this purpose.

6.2 Protection Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. A minimum of 1.5 m of soil cover alone, or a minimum of 0.6 m of soil cover, in conjunction with foundation insulation, should be provided in this regard.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should be either cut back to acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. The excavation side

slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter.
The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides. Slopes in excess of 3 m in height should be periodically inspected by Paterson in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

A minimum of 150 mm of OPSS Granular A should be placed for pipe bedding for sewer and water pipes for a soil subgrade. The bedding should be increased to 300 mm for areas where the subgrade consists of bedrock. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A. The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to a minimum of 95% of the SPMDD.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

The rate of flow of groundwater into the excavation through the overburden soil should be moderate to high for expected founding levels and the conditions within the southwest portion of this site. It is anticipated that pumping from open sumps to overland flow will be sufficient to control the groundwater influx through the sides of the excavations.

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For groundwater or surface water volumes being pumped during the construction phase (between 50,000 to 400,000 L/day), it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project. The subsoil conditions at this site mostly consist of frost susceptible materials. In presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be carried out in a manner to avoid the introduction of frozen materials, snow or ice into the trenches. As well, pavement construction is difficult during winter. The subgrade consists of frost susceptible soils which will experience total and differential frost heaving as the work takes place. Also, the introduction of frost, snow or ice into the pavement materials, which is difficult to avoid, could adversely affect the performance of the pavement structure.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site.

The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a moderate slightly aggressive corrosive environment.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following material testing and observation program be performed by the geotechnical consultant.

- ❑ Review of the grading plan from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to ensure that the specified level of compaction has been achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

All excess soils, with the exception of engineered crushed stone fill, generated by construction activities that will be transported on-site or off-site should be handled as per *Ontario Regulation 406/19: On-Site and Excess Soil Management.*

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test hole locations, we request immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on our undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Menzie Almonte 2 Inc (c/o Regional Group) or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Balaji Nirmala, M.Eng.

David J. Gilbert, P.Eng.

Report Distribution:

- ❑ Menzie Almonte 2 Inc (c/o Regional Group) (email copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TESTING RESULTS

PATERSON GROUP
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
TEL: (613) 226-7381

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329073.795 **NORTHING:** 5010884.638 **ELEVATION:** 138.22
DATUM: Geodetic
REMARKS:
BORINGS BY: Hand Auger **DATE:** April 3, 2024

FILE NO. PG5860
HOLE NO. HA 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	138.22
PEAT		G	1				
0.35							
MARL		G	2			1	137.22
1.00							
GLACIAL TILL: Firm grey silty clay, trace sand and gravel		G	3			2	136.22
						3	135.22
3.50							
End of Hand Auger							
Practical refusal to hand augering at 3.5 m depth							
(GWL at 1.31 m - July 8, 2024)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

PIEZOMETER CONSTRUCTION

PATERSON GROUP
9 Auriga Drive
Ottawa, Ontario
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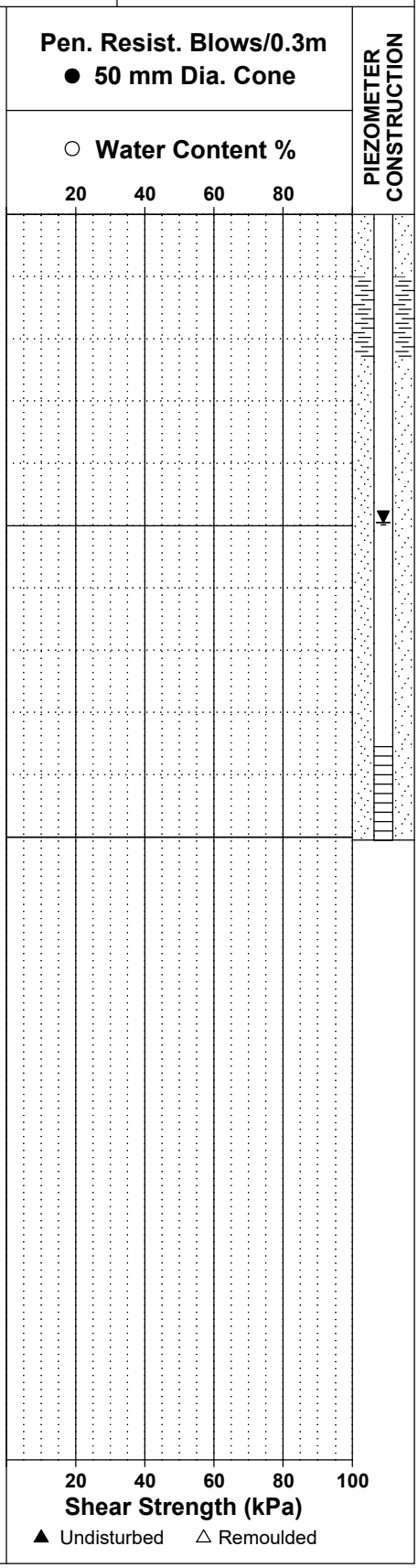
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329136.169 **NORTHING:** 5010950.849 **ELEVATION:** 138.39
DATUM: Geodetic
REMARKS:
BORINGS BY: Hand Auger **DATE:** April 3, 2024

FILE NO. PG5860
HOLE NO. HA 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	138.39
PEAT							
0.30		G	1				
MARL							
		G	2			1	137.39
1.20							
Firm grey **SILTY CLAY**		G	3				
2.00		G	4			2	136.39
End of Hand Auger							
Practical refusal to hand augering at 2.0 m depth							
(GWL at 0.99 m - July 8, 2024)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329101.611 **NORTHING:** 5011044.112 **ELEVATION:** 138.51
DATUM: Geodetic
REMARKS:
BORINGS BY: Hand Auger **DATE:** April 3, 2024

FILE NO. PG5860
HOLE NO. HA 3-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	138.51
PEAT		G	1				
0.80						1	137.51
Firm brown **SILTY CLAY** to **CLAYEY SILT**		G	2				
- Stiff by 1.4 m depth							
1.70						2	136.51
GLACIAL TILL: Stiff grey silty clay, trace gravel		G	3				
3.00						3	135.51
End of Hand Auger							
Practical refusal to hand augering at 3.0 m depth							
(GWL at 1.01 m - July 8, 2024)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

PIEZOMETER CONSTRUCTION

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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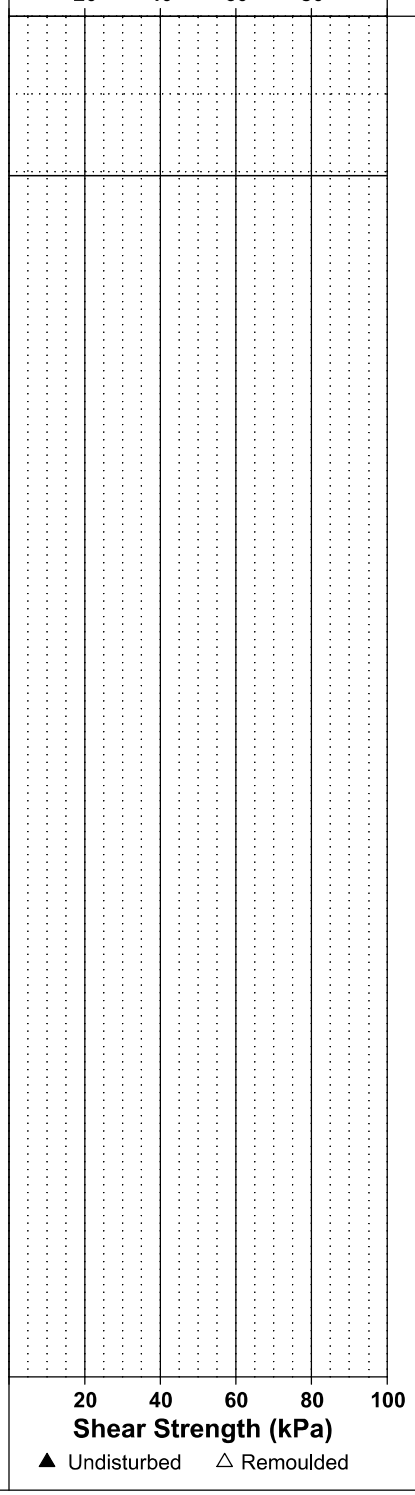
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329331.768 **NORTHING:** 5011139.119 **ELEVATION:** 140.3
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** April 2, 2024

FILE NO. PG5860
HOLE NO. BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	PIEZOMETER CONSTRUCTION
Ground Surface									
TOPSOIL and organics						0	140.30		
0.41									
End of Borehole Practical refusal to augering at 0.41 m depth									



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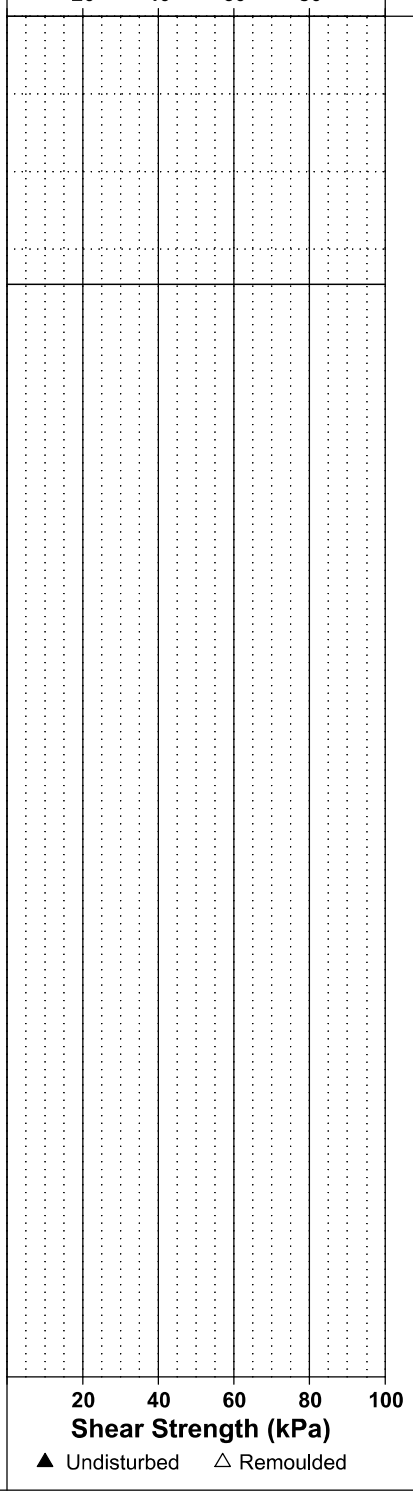
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329240.717 NORTHING: 5011170.15 ELEVATION: 139.45
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill DATE: April 2, 2024

FILE NO. PG5860
HOLE NO. BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	PIEZOMETER CONSTRUCTION
Ground Surface						0	139.45		
TOPSOIL and organics									
0.20									
Stiff brown **SILTY CLAY**, trace to some gravel		AU	1						
0.69									
End of Borehole Practical refusal to augering at 0.69 m depth									



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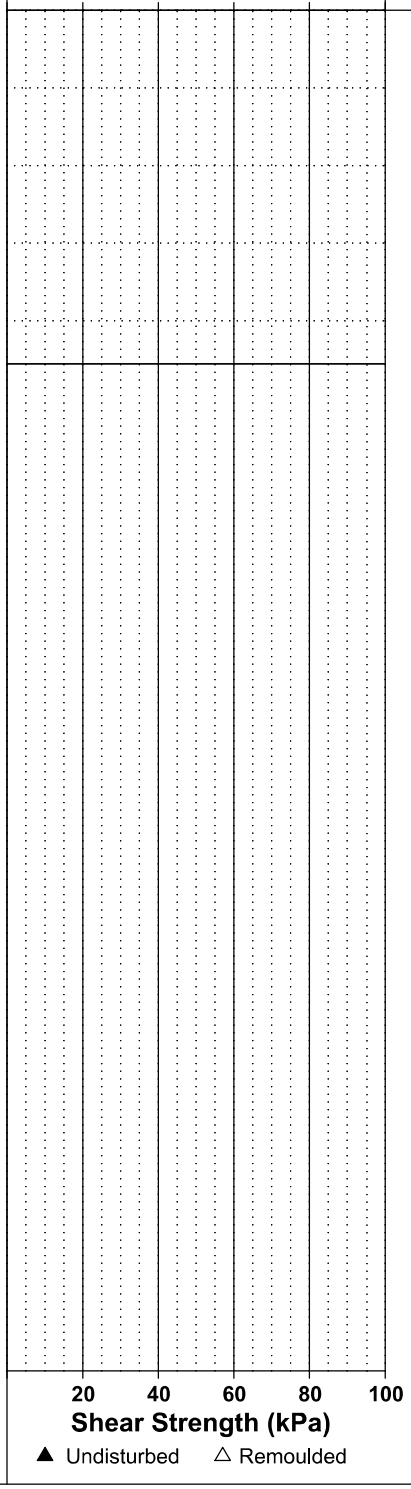
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329236.833 **NORTHING:** 5011172.994 **ELEVATION:** 139.44
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** April 2, 2024

FILE NO. PG5860
HOLE NO. BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	PIEZOMETER CONSTRUCTION
Ground Surface						0	139.44		
TOPSOIL and organics									
0.20									
Stiff brown **SILTY CLAY**, trace of some gravel									
0.69									
GLACIAL TILL: Very dense brown silty clay with gravel, cobbles and boulders		SS	1	33	+50				
0.91									
End of Borehole									
Practical refusal to augering at 0.91 m depth									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329238.779 **NORTHING:** 5011122.692 **ELEVATION:** 138.94
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** April 2, 2024

FILE NO. PG5860
HOLE NO. BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows / 0.3m ● 50 mm Dia. Cone ○ Water Content %	MONITORING WELL CONSTRUCTION
GROUND SURFACE						0	138.94		
TOPSOIL and organics									
0.23									
Very stiff brown **SILTY CLAY**									
- Intermittent sand seams		SS	1	92	16	1	137.94		
- Grey by 1.45 m depth		SS	2	92	P				
2.21						2	136.94		
GLACIAL TILL: Dense grey silty clay with gravel and sand		SS	3	74	21				
2.87									
End of Borehole									
Practical refusal to augering at 2.87 m depth									
(GWL at 0.56 m - July 8, 2024)									

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329258.901 NORTHING: 5011053.276 ELEVATION: 138.94
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill DATE: April 2, 2024

FILE NO. PG5860
HOLE NO. BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows / 0.3m ● 50 mm Dia. Cone ○ Water Content %	MONITORING WELL CONSTRUCTION
GROUND SURFACE						0	138.94		
TOPSOIL and organics									
0.25									
GLACIAL TILL: Compact brown silty clay with sand and gravel		AU	1						
		SS	2	67	10	1	137.94		
- Grey by 1.45 m depth		SS	3	54	12	2	136.94		
		SS	4	75	11				
3.00						3	135.94		
End of Borehole									
Practical refusal to augering at 3.0 m depth									
(GWL at 1.02 m - July 8, 2024)									

Pen. Resist. Blows / 0.3m: 20 40 60 80
Water Content %: 20 40 60 80
Shear Strength (kPa): 20 40 60 80 100
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329283.747 **NORTHING:** 5011094.84 **ELEVATION:** 139.26
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** April 2, 2024

FILE NO. PG5860
HOLE NO. BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	PIEZOMETER CONSTRUCTION
Ground Surface						0	139.26		
TOPSOIL and organics									
0.25									
GLACIAL TILL: Compact brown silty clay with sand and gravel		AU	1						
		SS	2	27	+50	1	138.26		
1.14									
End of Borehole									
Practical refusal to augering at 1.14 m depth									

Pen. Resist. Blows/0.3m: 20 40 60 80
Shear Strength (kPa): 20 40 60 80 100
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

EASTING: 329274.739 **NORTHING:** 5011201.172 **ELEVATION:** 139.60
DATUM: Geodetic
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** April 2, 2024

FILE NO. PG5860
HOLE NO. BH 7-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows / 0.3m ● 50 mm Dia. Cone ○ Water Content %	MONITORING WELL CONSTRUCTION
GROUND SURFACE						0	139.60		
TOPSOIL and organics									
0.28									
GLACIAL TILL: Compact brown silty sand with some clay and gravel		AU	1						
		SS	2	40	+50				
0.89									
End of Borehole Practical refusal to augering at 0.89 m depth (GWL at 0.06 m - April 9, 2024)									

Pen. Resist. Blows / 0.3m: 20 40 60 80
Water Content %: 20 40 60 80
Shear Strength (kPa): 20 40 60 80 100
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 1-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.56
TOPSOIL/PEAT							
0.35							
Stiff, brown **SILTY CLAY**						1	137.56
1.10							
Stiff to hard, grey **SILTY CLAY** with sand and gravel							
1.60							
End of Hand Auger							
Practical refusal to hand augering at 1.60m depth							
(GWL @ 0.1m depth based on field observations)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Piezometer Construction

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Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

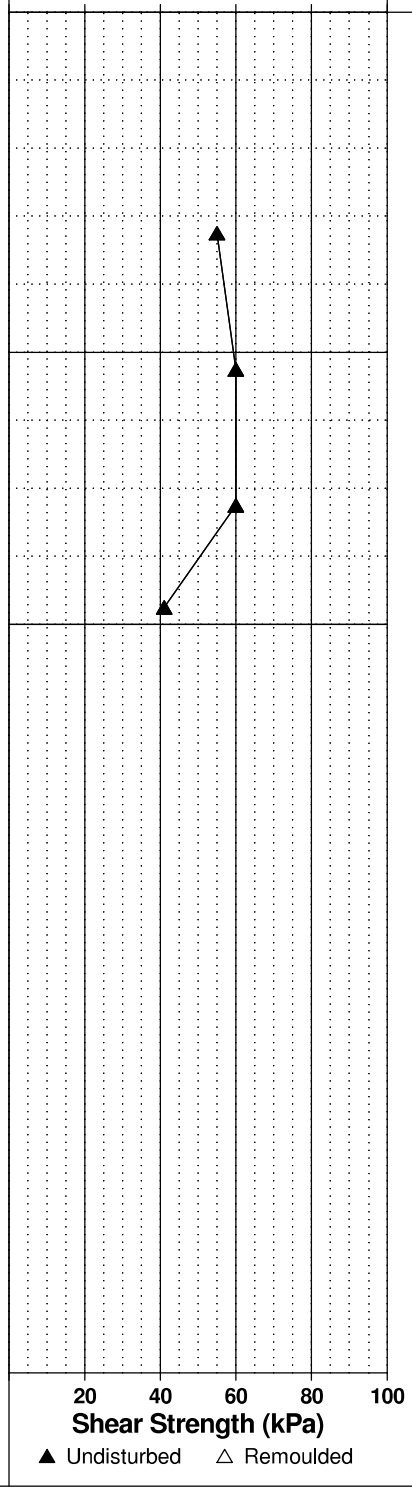
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 2-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.40	20 40 60 80	▽
TOPSOIL/PEAT									
0.45									
Stiff to firm, brown **SILTY CLAY**						1	137.40		
- grey by 0.9m depth									
1.80									
End of Hand Auger Hole									
(Water encountered at ground surface)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 3-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.47
TOPSOIL/PEAT							
0.90						1	137.47
Stiff to firm, grey **SILTY CLAY**							
2.10						2	136.47
End of Hand Auger Hole							
(Water encountered at ground surface)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

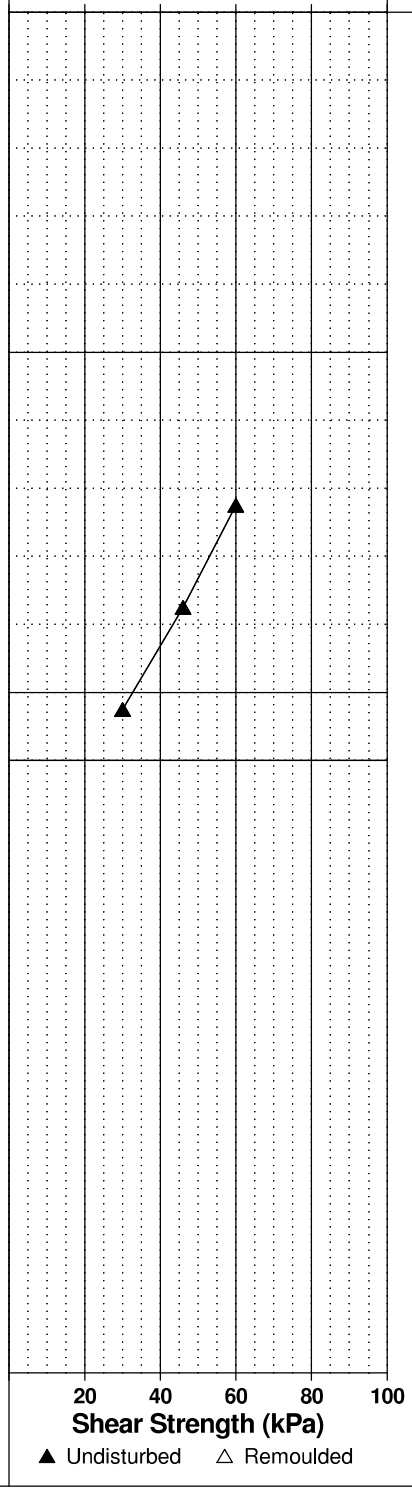
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 4-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.37		▽
TOPSOIL/PEAT									
						1	137.37		
1.25									
Stiff to firm, grey **SILTY CLAY**									
						2	136.37		
2.20									
End of Test Pit (Water encountered at ground surface)									



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SOIL PROFILE AND TEST DATA

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Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

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REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 5-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.44		▽
TOPSOIL/PEAT									
0.80									
MARL						1	137.44		
1.30									
Firm, grey **SILTY CLAY,** trace sand and gravel									
1.80									
End of Hand Auger Hole									
(Water encountered at ground surface)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %; 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

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REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 6-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	139.12		
TOPSOIL 0.25									
GLACIAL TILL: Hard to very stiff, brown silty clay with sand and gravel - sand content increasing with depth 0.70									
End of Hand Auger Hole (GWL @ 0.5m depth based on field observations)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

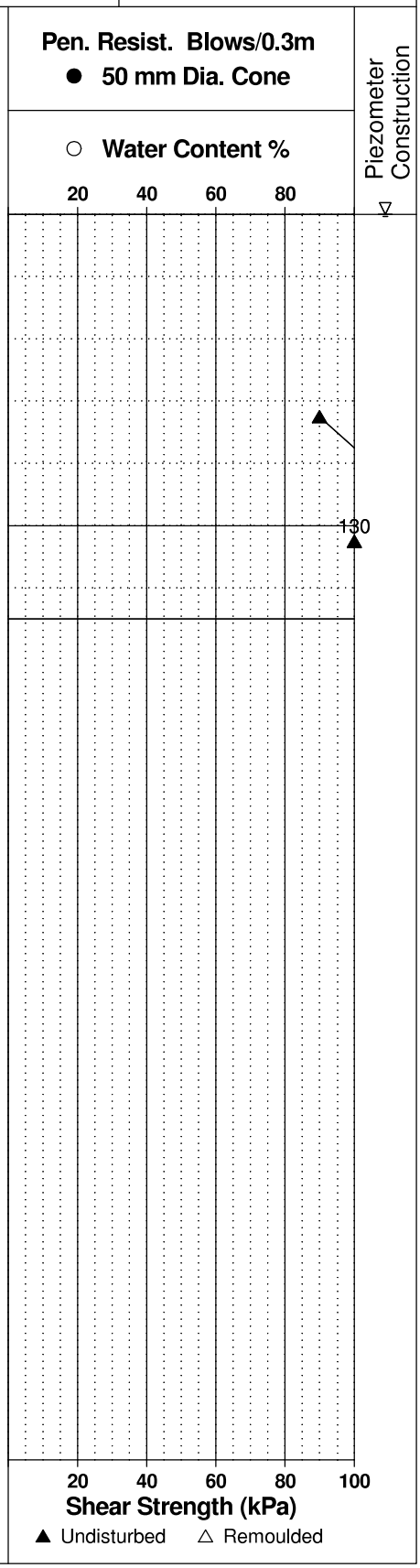
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 7-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.65
TOPSOIL/PEAT							
0.33							
Stiff to very stiff, brown **SILTY CLAY**							
- sand seam at 0.7m depth						1	137.65
1.30							
End of Hand Auger Hole							
Practical refusal to hand augering at 1.30m depth							
(Water encountered at ground surface)							



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SOIL PROFILE AND TEST DATA

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Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

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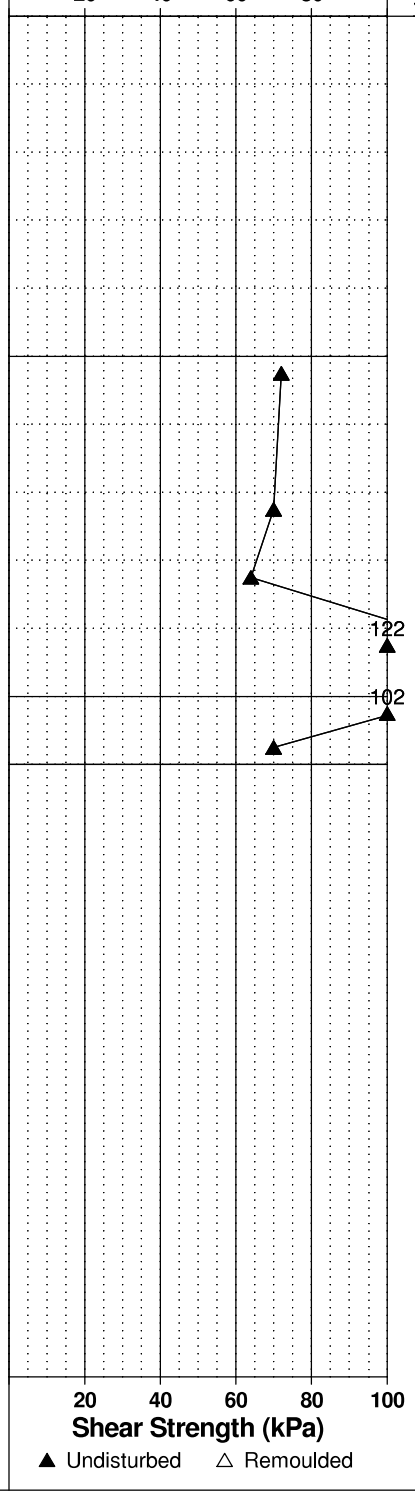
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA 8-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.65		▽
TOPSOIL/PEAT									
0.60									
Stiff to very stiff, grey **SILTY CLAY**						1	137.65		
- sand seam at 1.5m depth									
2.20						2	136.65		
End of Hand Auger Hole									
(Water encountered at ground surface)									



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REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

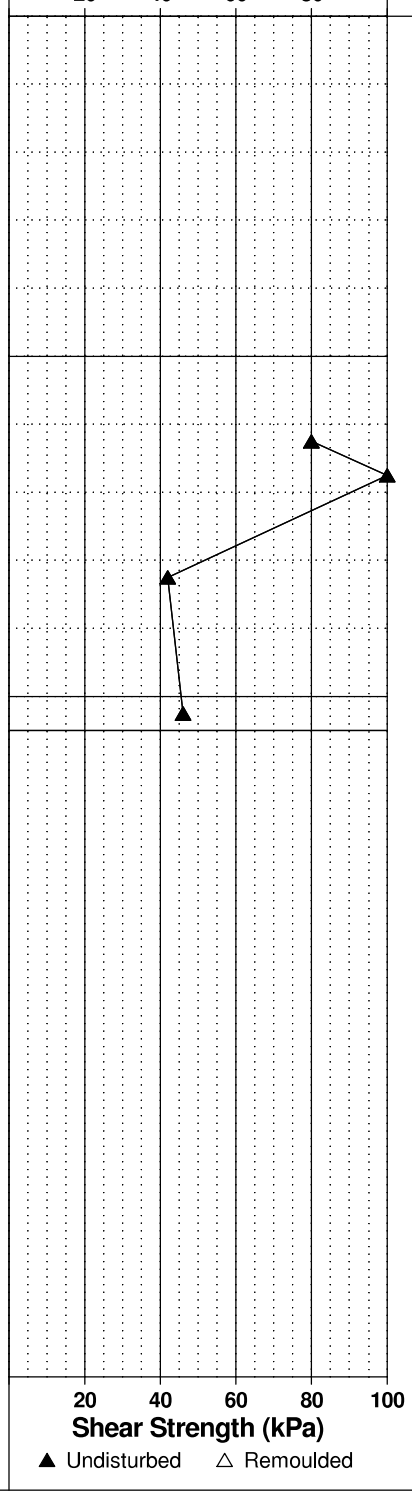
FILE NO. PG5860

HOLE NO. HA 9-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.59
TOPSOIL/PEAT							
						1	137.59
1.10							
Stiff to firm, grey **SILTY CLAY**							
- sand seams at 1.2 and 1.9m depth							
2.10						2	136.59
End of Hand Auger Hole							
(Water encountered at ground surface)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

Piezometer Construction



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
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DATUM Geodetic

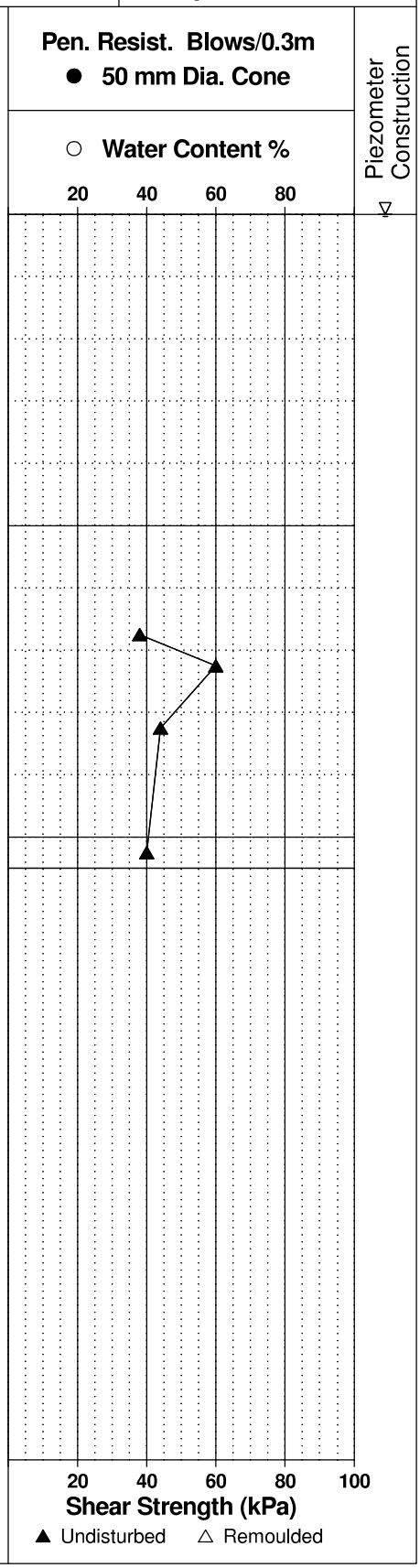
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA10-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.66
PEAT							
0.75							
MARL						1	137.66
1.25							
Firm, grey **SILTY CLAY**							
- some silt seams from 1.4 to 1.7m depth							
2.10						2	136.66
End of Hand Auger Hole							
(Water encountered at ground surface)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA11-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.56		
PEAT									
0.70									
MARL						1	137.56		
1.20									
Stiff to firm, grey **SILTY CLAY,** trace sand									
1.80									
End of Hand Auger Hole Practical refusal to hand augering at 1.80m depth (Water encountered at ground surface)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %; scale 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100; ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA12-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.47		
PEAT									
0.70						1	137.47		
MARL									
- trace gravel by 1.2m depth									
1.60									
Soft to firm, grey **SILTY CLAY**									
- some sand, trace by 1.9m depth						2	136.47		
2.10 End of Hand Auger									
(Water encountered at ground surface)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA13-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.40
PEAT							
0.65							
MARL						1	137.40
1.30							
Soft to firm, grey **SILTY CLAY**						2	136.40
2.10							
End of Hand Auger Hole							
(Water encountered at ground surface)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

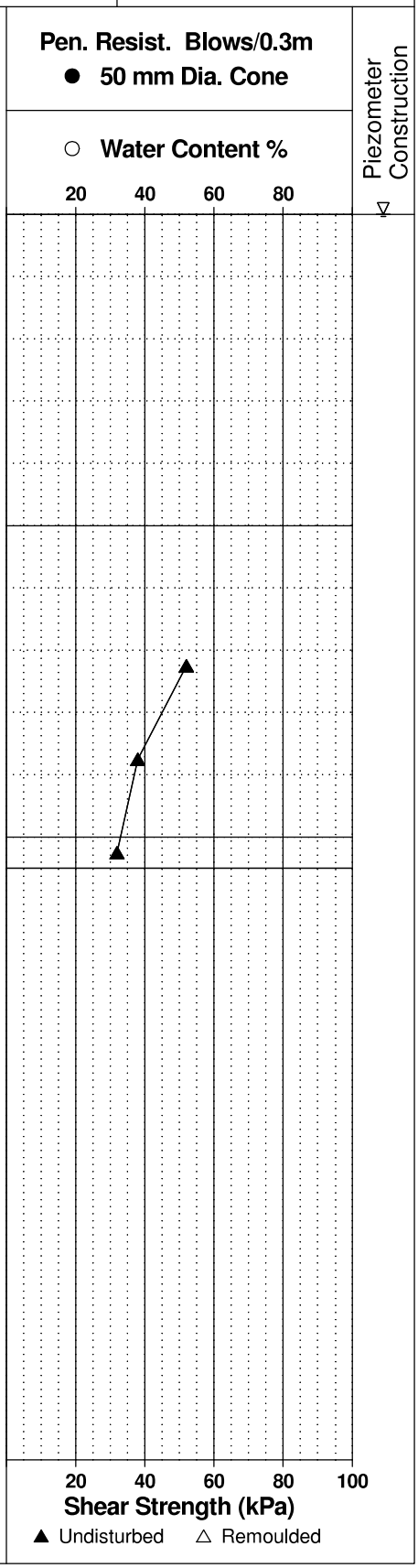
REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA14-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.40
PEAT							
0.80						1	137.40
MARL							
1.35							
Stiff to firm, grey **SILTY CLAY**							
- sand seam at 1.4m depth							
2.10						2	136.40
End of Hand Auger Hole							
(Water encountered at ground surface)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
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DATUM Geodetic

REMARKS

BORINGS BY Hand Auger **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. HA15-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.37		
PEAT									
0.55									
MARL						1	137.37		
1.30									
Stiff to firm, grey **SILTY CLAY**						2	136.37		
2.10									
End of Hand Auger Hole									
(Water encountered at ground surface)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 11, 2021

FILE NO. PG5860

HOLE NO. TP 1-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.54	20 40 60 80	
PEAT		G	1						▽
0.42		G	2						
MARL						1	137.54		
0.75									
		G	3						
Firm, grey **SILTY CLAY**						2	136.54		
2.62									
End of Test Pit TP terminated on bedrock surface at 2.62m depth. (GWL @ 0.3m depth based on field observations)								20 40 60 80 100 **Shear Strength (kPa)** ▲ Undisturbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
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DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 11, 2021

FILE NO. PG5860

HOLE NO. TP 2-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.61		
PEAT		G	1						
0.25									
GLACIAL TILL: Very stiff, brown silty clay with sand, gravel, cobbles and boulders - grey by 0.8m depth						1	137.61		▽
		G	2			2	136.61		
2.15									
End of Test Pit TP terminated on bedrock surface at 2.15m depth. (GWL @ 1.0m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 11, 2021

FILE NO. PG5860

HOLE NO. TP 3-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL		G	1			0	138.93		
0.17									
GLACIAL TILL: Very stiff, brown silty clay with sand, gravel, cobbles and boulders						1	137.93		▽
		G	2						
- grey by 2.0m depth						2	136.93		
		G	3						
2.58									
End of Test Pit									
TP terminated on bedrock surface at 2.58m depth.									
(GWL @ 1.7m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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Future Phase for Proposed Residential Development
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DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 11, 2021

FILE NO. PG5860

HOLE NO. TP 4-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.97		
TOPSOIL 0.19		G	1						
GLACIAL TILL: Very stiff, brown silty clay with sand, gravel, cobbles and boulders		G	2			1	137.97		▽
- grey by 1.8m depth		G	3			2	136.97		
2.60 End of Test Pit									
TP terminated on bedrock surface at 2.60m depth.									
(GWL @ 1.7m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
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DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 11, 2021

FILE NO. PG5860

HOLE NO. TP 5-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.41		
PEAT		G	1						▽
0.42									
MARL		G	2						
0.98						1	137.41		
Firm to soft, grey **SILTY CLAY**		G	3						
						2	136.41		
2.51									
End of Test Pit									
TP terminated on bedrock surface at 2.51m depth.									
(GWL @ 0.3m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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REMARKS

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FILE NO. PG5860

HOLE NO. TP 6-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	138.29		
PEAT		G	1						▽
0.37									
		G	2						
Stiff, grey **SILTY CLAY,** trace sand and gravel						1	137.29		
						2	136.29		
2.37									
End of Test Pit TP terminated on bedrock surface at 2.37m depth. (GWL @ 0.35m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Future Phase for Proposed Residential Development
1825 Ramsay Concession 11A, Mississippi Mills, Ont.

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** November 24, 2021

FILE NO. PG5860

HOLE NO. TP 7-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	138.41
PEAT		G	1				
0.55							
		G	2				
MARL						1	137.41
1.30							
		G	3				
Soft, grey **SILTY CLAY**						2	136.41
2.90							
GLACIAL TILL: Very stiff, grey silty clay with sand and gravel						3	135.41
3.30							
End of Test Pit							
(Groundwater infiltration at 0.1m depth)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

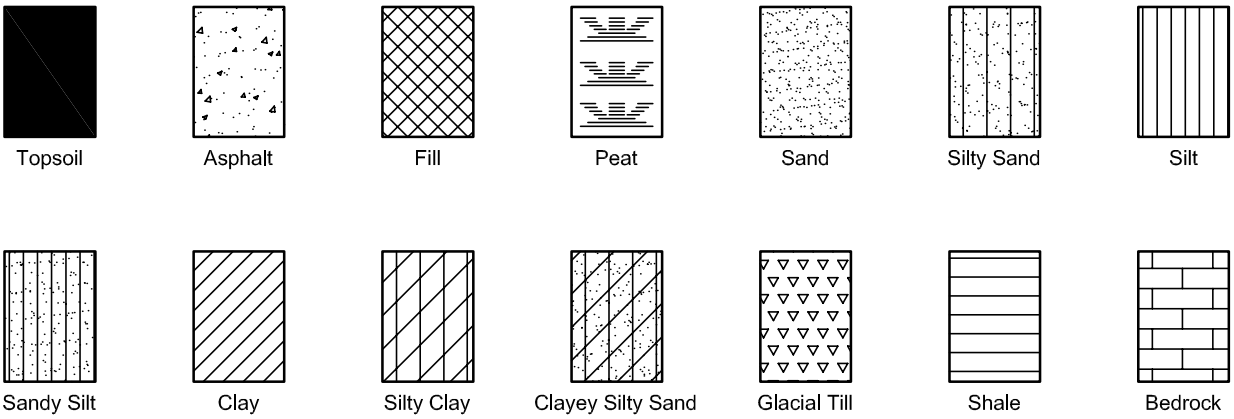
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

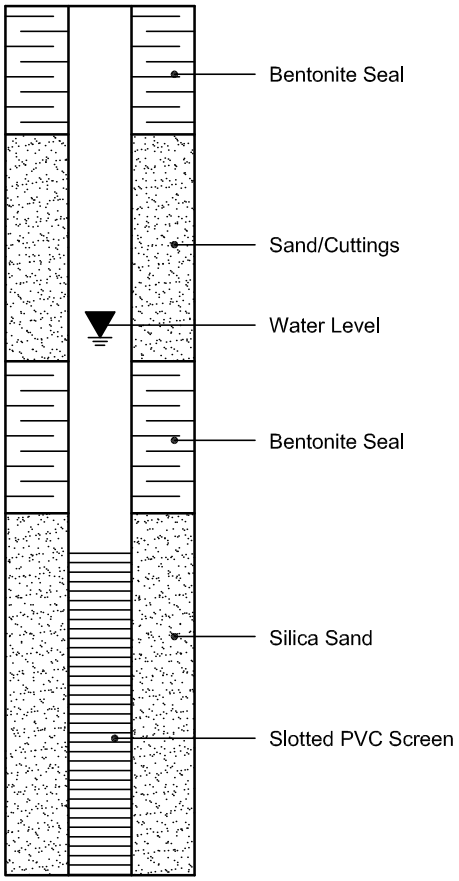
SYMBOLS AND TERMS (continued)

STRATA PLOT

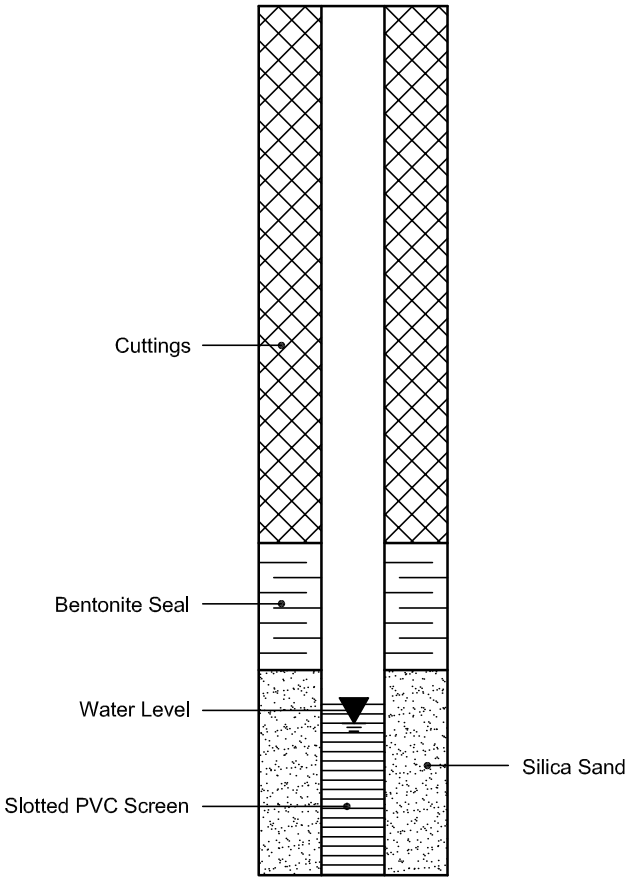


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Report Date: 21-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 15-Jun-2021

Client PO: 32278

Project Description: PG5860

	Client ID:	TP6-21 G2	-	-	-
	Sample Date:	11-Jun-21 09:00	-	-	-
	Sample ID:	2125235-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	77.7	-	-	-
General Inorganics					
pH	0.05 pH Units	7.53	-	-	-
Resistivity	0.10 Ohm.m	57.2	-	-	-
Anions					
Chloride	5 ug/g dry	14	-	-	-
Sulphate	5 ug/g dry	52	-	-	-

APPENDIX 2

FIGURE 1 – KEY PLAN

FIGURE 2 TO 6 – GROUNDWATER MONITORING CHARTS

DRAWING PG5860-1 – TEST HOLE LOCATION PLAN

DRAWING PG5860-2 – PERMISSIBLE GRADE RAISE PLAN

FIGURE 1

KEY PLAN

PATERSON GROUP

Figure 2 - HA1-24 - Monitoring Well Water Elevations

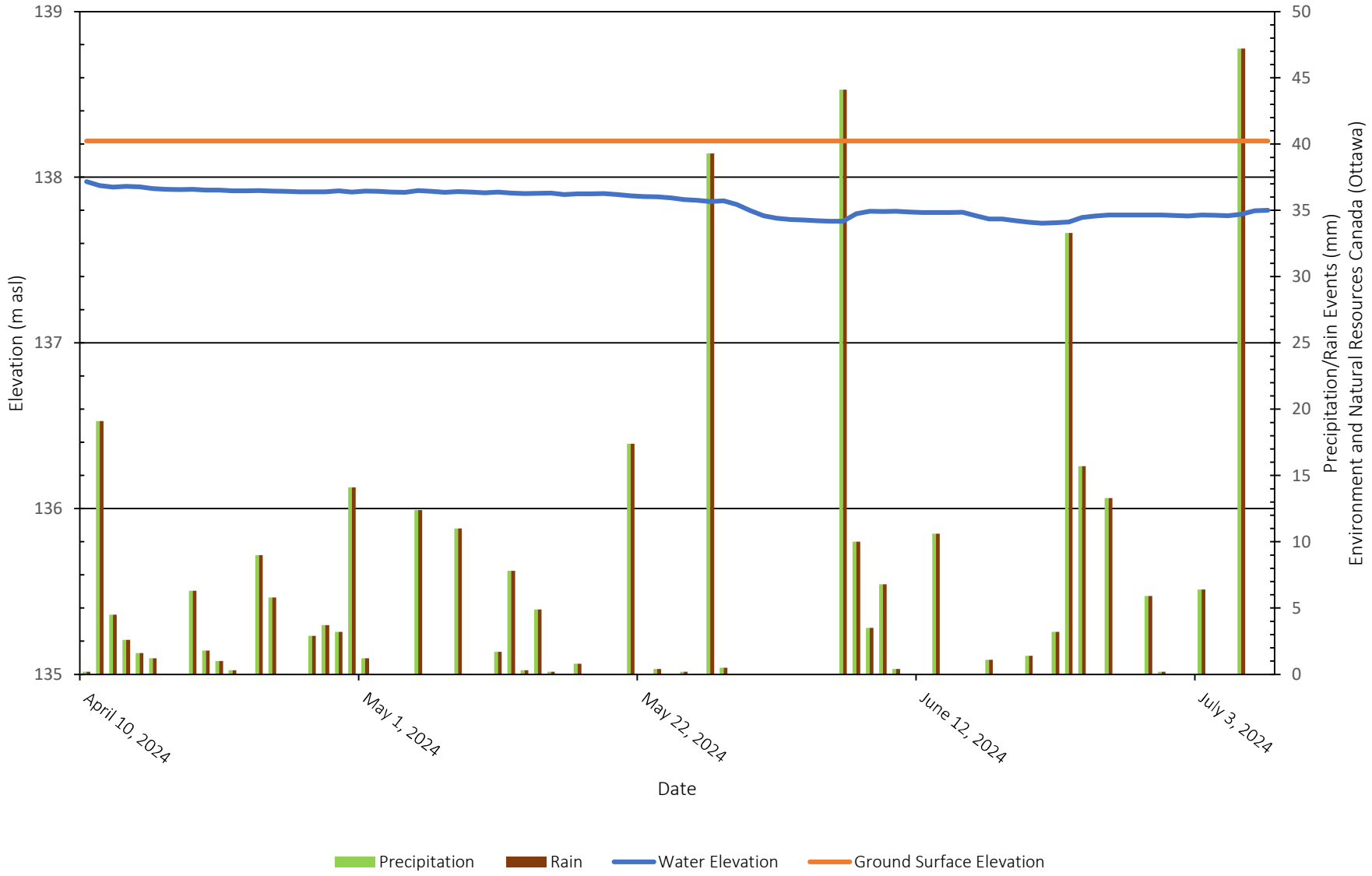


Figure 3: HA2-24 - Monitoring Well Water Elevations

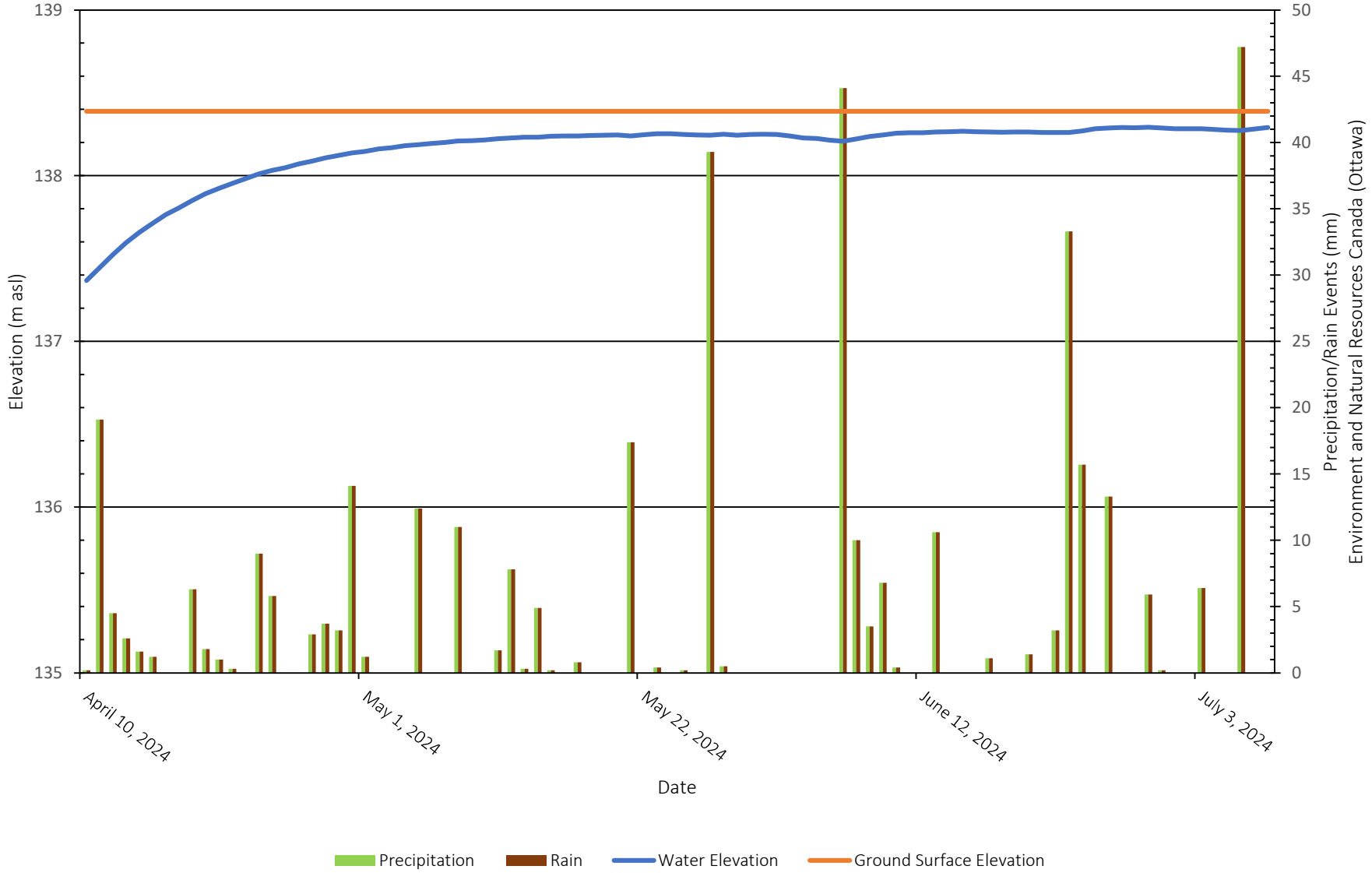


Figure 4: HA3-24 - Monitoring Well Water Elevations

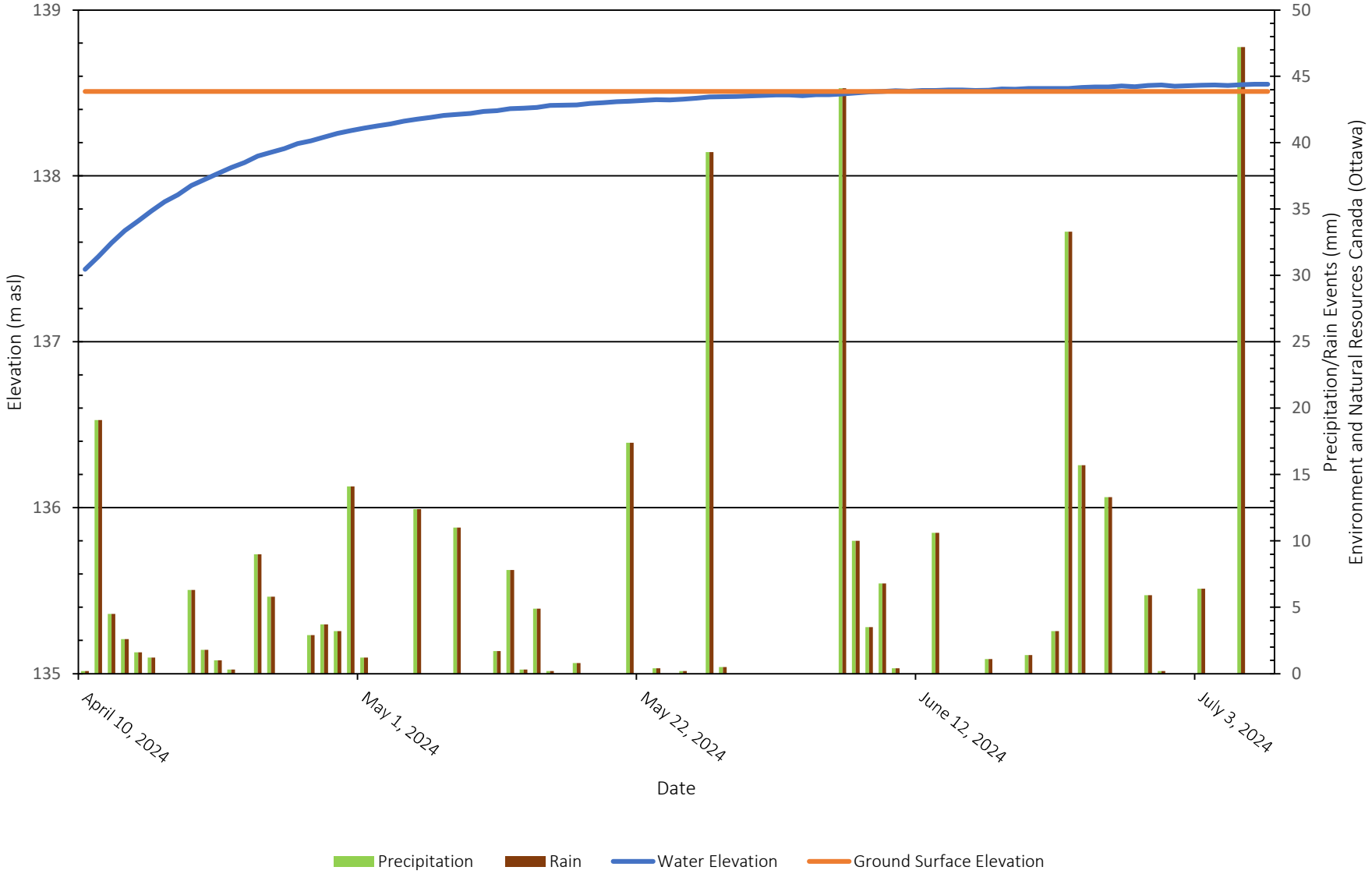


Figure 5: BH4-24 - Monitoring Well Water Elevations

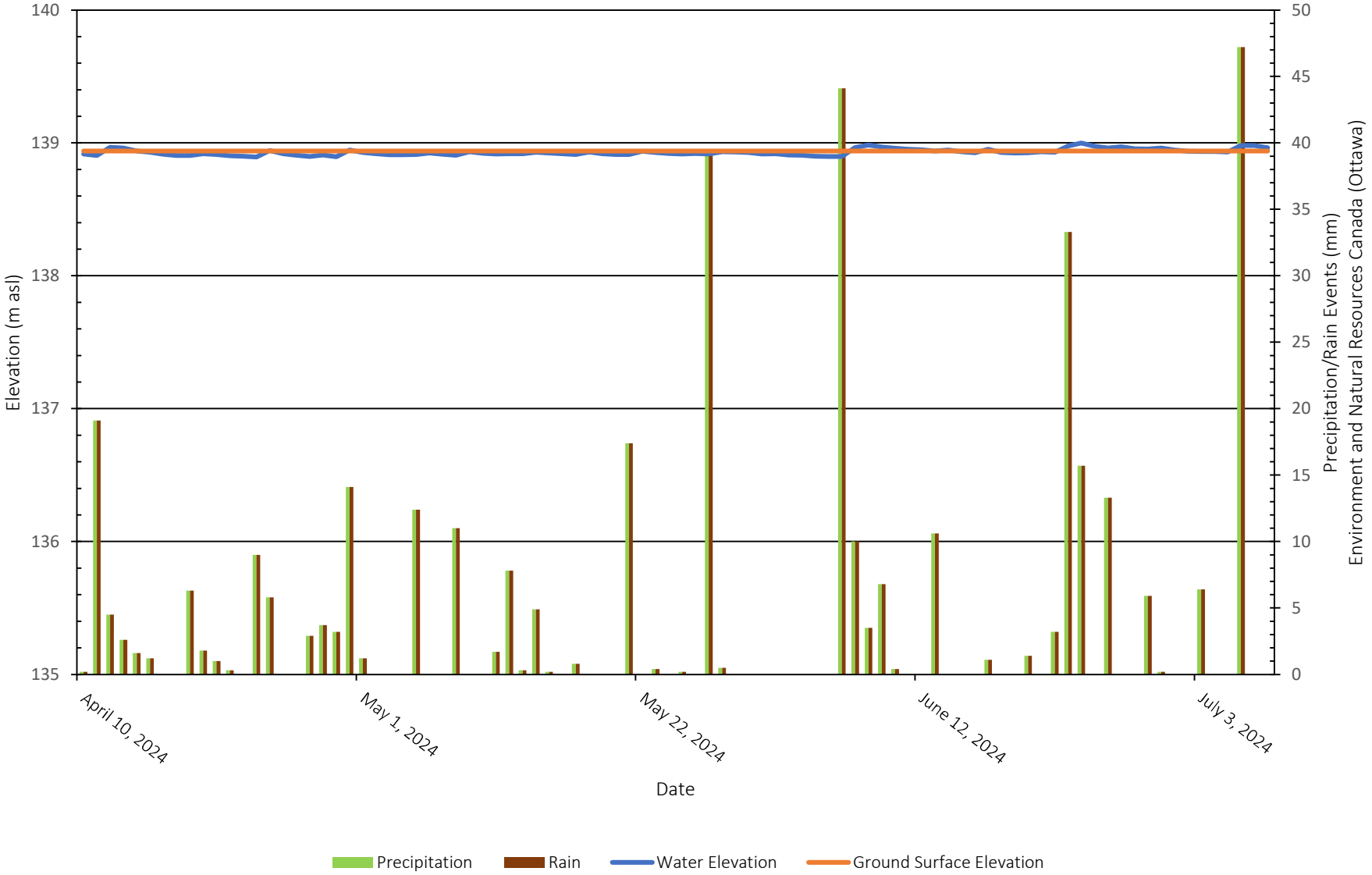
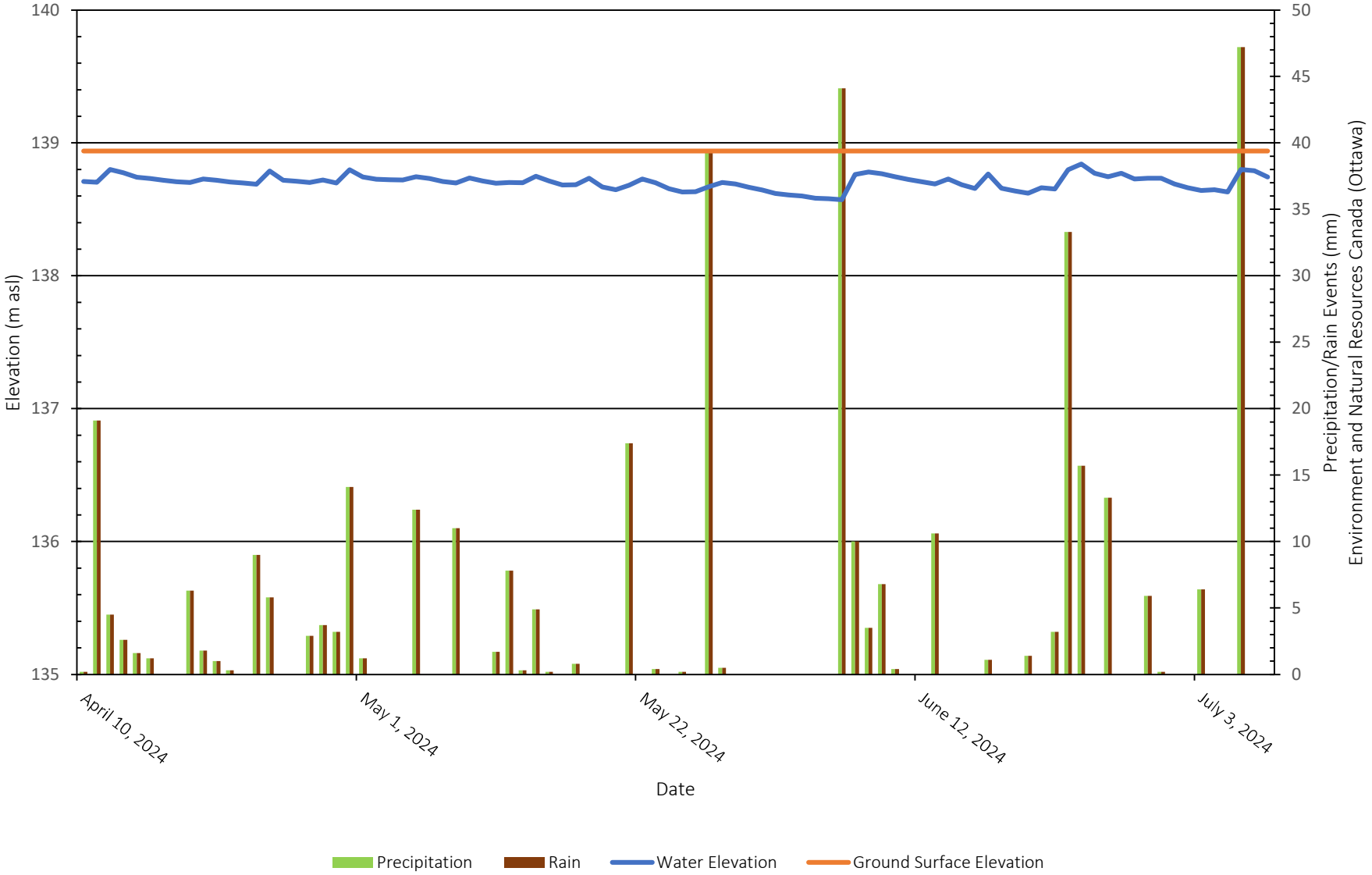
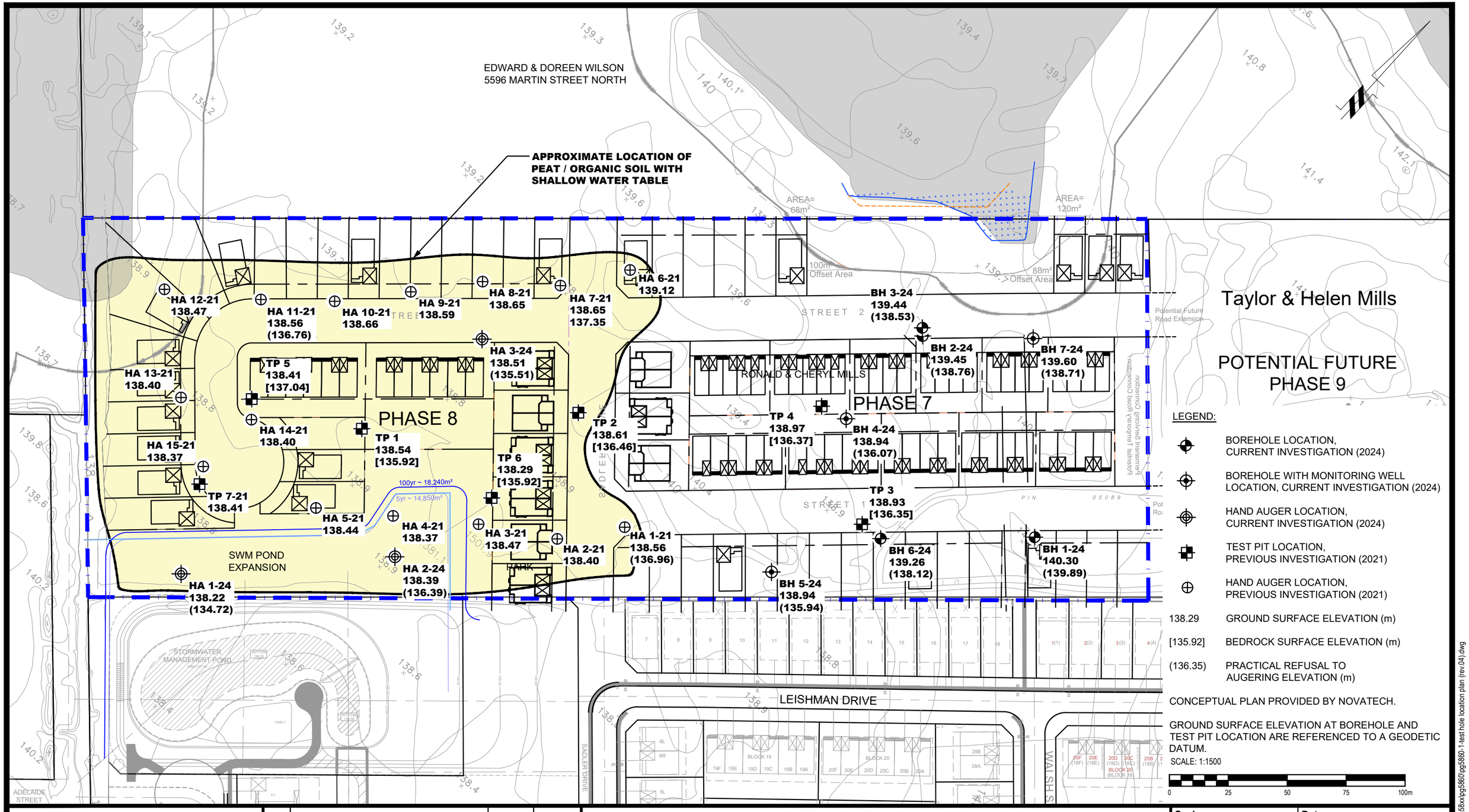


Figure 6: BH5-24 - Monitoring Well Water Elevations





PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7S9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
4	ADDED 2024 BOREHOLE AND HAND AUGER LOCATIONS	11/07/2024	BN
3	UPDATED TO NEW CONCEPTUAL PLAN	07/02/2023	GA
2	UPDATED TO NEW CONCEPTUAL PLAN	12/01/2023	ZM
1	HA 1-21 - HA 15-21 & TP 7-21 ADDED TO PLAN	11/01/2021	MS

MENZIE ALMONTE 2 INC. c/o REGIONAL GROUP
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
1825 RAMSAY CONCESSION 11A
TOWNSHIP OF MISSISSIPPI MILLS, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 06/2021
Drawn by: YA	Report No.: PG5860-REP.01
Checked by: BN	Dwg. No.: PG5860-1
Approved by: DJG	Revision No.: 4

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EDWARD & DOREEN WILSON
5596 MARTIN STREET NORTH

PHASE 8

PHASE 7

RONALD & CHERYL MILLS

SWM POND EXPANSION

STORMWATER MANAGEMENT POND

LEISHMAN DRIVE

STREET 1

STREET 2

SADLER DRIVE

ADELAIDE STREET

WALSH ST

Poter Road

HA 12-21 138.47
HA 11-21 138.56 (136.76)
HA 10-21 138.66
HA 9-21 138.59
HA 8-21 138.65
HA 7-21 138.65 137.35
HA 6-21 139.12
HA 13-21 138.40
HA 14-21 138.40
HA 15-21 138.37
TP 7-21 138.41
HA 5-21 138.44
HA 4-21 138.37
HA 2-24 138.39 (136.39)
HA 1-24 138.22 (134.72)
TP 5 138.41 [137.04]
HA 3-24 138.51 (135.51)
TP 1 138.54 [135.92]
TP 6 138.29 [135.92]
HA 3-21 138.47
HA 2-21 138.40
HA 1-21 138.56 (136.96)
TP 2 138.61 [136.46]
TP 4 138.97 [136.37]
TP 3 138.93 [136.35]
BH 3-24 139.44 (138.53)
BH 2-24 139.45 (138.76)
BH 4-24 138.94 (136.07)
BH 7-24 139.60 (138.71)
BH 6-24 139.26 (138.12)
BH 5-24 138.94 (135.94)
BH 1-24 140.30 (139.89)

100yr ~ 18,240m²
5yr ~ 14,850m²
AREA= 68m²
100m² Offset Area
AREA= 120m²
88m² Offset Area

PERMISSIBLE GRADE RAISE:

- NO PERMISSIBLE GRADE RAISE RESTRICTION
- UP TO 0.8 m
- UP TO 1.0 m
- UP TO 1.3 m
- UP TO 2.5 m

LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION (2024)
- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION (2024)
- HAND AUGER LOCATION, CURRENT INVESTIGATION (2024)
- TEST PIT LOCATION, PREVIOUS INVESTIGATION (2021)
- HAND AUGER LOCATION, PREVIOUS INVESTIGATION (2021)

138.29 GROUND SURFACE ELEVATION (m)

[135.92] BEDROCK SURFACE ELEVATION (m)

(136.35) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY NOVATECH.

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST PIT LOCATION ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:1500

0 25 50 75 100m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7S9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
3	ADDED 2024 BOREHOLE AND HAND AUGER LOCATIONS	11/07/2024	BN
2	UPDATED TO NEW CONCEPTUAL PLAN	07/02/2023	GA
1	UPDATED TO NEW CONCEPTUAL PLAN	21/09/2022	ZM

MENZIE ALMONTE 2 INC. c/o REGIONAL GROUP
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
1825 RAMSAY CONCESSION 11A
TOWNSHIP OF MISSISSIPPI MILLS, ONTARIO

Title:

PERMISSIBLE GRADE RAISE PLAN

Scale: 1:1500	Date: 01/2022
Drawn by: YA	Report No.: PG5860-REP.01
Checked by: BN	Dwg. No.: PG5860-2
Approved by: DJG	Revision No.: 3

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PATERSON GROUP

memorandum

re: **Geotechnical Investigation – Response to Municipality of Mississippi Mills Comments**
Proposed Residential Development
1825 Ramsay Concession 11A- Mississippi Mills, Ontario

to: Regional Group - **Ms. Stefanie Kaminski** - skaminski@regionalgroup.ca
cc: NOVATECH - **Mr. Drew Blair** - D.Blair@novatech-eng.com
date: July 25, 2024
file: PG5860-MEMO.03

Further to your request and authorization, Paterson Group (Paterson) prepared this memorandum to provide responses to the geotechnical-related comments from the Municipality of Mississippi Mills. This memorandum should be read in conjunction with the Geotechnical Investigation Report (Paterson Group Report PG5860-1 Revision 3 dated July 25, 2024) which has been prepared for the proposed development at the aforementioned site.

Geotechnical Investigation Comments

Comment 1: *Section 4.3 – Groundwater elevation has not been sufficiently found. The use of open test holes and soil analysis is not substantial enough given the site conditions. Ground water monitoring should be completed on multiple locations on the site to determine the seasonally high ground water table. This should also be considered as a part of compliance with the Municipality's CLI design guidelines section 2.9 (Sanitary sewers and Maintenance Holes Installed Below Seasonally High Groundwater Table).*

Response:

Please refer to the Paterson Group Report -1 Revision 3 dated July 25, 2024.

Comment 2: *Precautions should be taken to prevent the flooding of basements which are located below the ground water table such as back up generators and dual sump pumps. Home buyers should be notified if their home is below the SHGWT and a notification will be included in the Subdivision Agreement and the agreement of purchase and sale to this effect.*

Response:

It is understood that sump pumps are anticipated as part of the development due to the proposed shallow storm sewer invert level. Based on the groundwater monitoring program completed between April 2024 to July 2024, the water levels were recorded to be at 0 to 1 m bgs. However, It is important to note that groundwater level readings could be influenced by perched water condition. The long-term groundwater table can also be

estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, it is estimated that the long-term groundwater level can be expected between 1.5 to 2.0 m below ground surface. Further, based on our review of the conceptual grading plan, the underside of the footing is anticipated to be located above the pre-development long-term groundwater level and post-development groundwater level, and therefore, a dual sump pump system with a battery-powered secondary pump should be sufficient, which is expected to be active only during the spring high or heavy rain scenarios.

Comment 3: *Section 6.1 - Sump pumps will be required to drain to the exterior of homes (overland flow), not to a municipal storm water pipe. Please amend accordingly.*

Response:

It is understood that the municipality has allowed the dwellings to connect to the municipal storm sewers.

We trust that this information satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.

Balaji Nirmala, M.Eng.

David J. Gilbert, P.Eng.