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Highland Park Remembrance
2037 McGee Side Road

Servicing & Stormwater Management Report

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2037 McGee Side Road

Servicing and Stormwater Management Report

Prepared By:

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

June 3, 2019
Revised August 29, 2019
Revised November 18, 2019

Novatech File: 101063
Ref: R-2019-086

Engineers, Planners & Landscape Architects

Npovember 18, 2019

City of Ottawa
Planning & Growth Management Department
110 Laurier Avenue West
4th Floor Infrastructure Approvals Division
Ottawa, ON K1P 1J1

Attention: Krishon Walker, Planner

Reference: Highland Park Remembrance 2037McGee Side Road
Servicing and Stormwater Management Report
City File No.: D07-12-19-0112
Our File No.: 101063

Please find enclosed the Servicing and Stormwater Management Report for the proposed construction of a Visitation Centre at the Highland Park Cemetery. The report outlines the detailed servicing and stormwater management design to meet the requirements of the City of Ottawa and Mississippi Valley Conservation Authority (MVCA) in support of an application for Site Plan approval. This report has been revised in response to the City of Ottawa comments dated September 24, 2019 and MVCA comments dated October 11, 2019.

A copy of this report has been forwarded directly to the Mississippi Valley Conservation Authority.

If you have any questions, please call the undersigned.

Yours truly,

NOVATECH

Alex McAuley, P.Eng.
Project Manager | Land Development Engineering

Enclosed.

cc: Niall Oddie – Mississippi Valley Conservation Authority

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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1.0 INTRODUCTION

Novatech has been retained to provide design services for the proposed addition of a visitation centre to the existing Highland Park Cemetery. This report provides the detailed design for site servicing, storm drainage and stormwater management for the proposed visitation centre. This report has been updated to respond to the City of Ottawa comments dated September 24, 2019 and MVCA comments dated October 11, 2019. The comments and Novatech's response letter is provided in **Appendix A**.

The Highland Park Cemetery is located at 2037 McGee Side Road, in Carp (Ottawa), Ontario. Refer to **Figure 1** – Key Plan. The specific area of the property being developed is shown on the **Figure 2** – Location Plan.

1.1 Background Reports

This report references the following background documents:

- Pre-Consultation Minutes, City of Ottawa (April 19, 2018)
- "Hydrogeological Assessment" report prepared by Gemtec (July 2010)
- "Hydrogeological Assessment" letter prepared by Gemtec (Jan 25, 2019);
- "Geotechnical Investigation" prepared by Gemtec (Jan 25, 2019);
- Carp River Subwatershed Study
- City of Ottawa Sewer Design Guidelines

1.2 Existing Conditions

Highland Park Cemetery has been in operation for over 30 years. The cemetery property consists of approximately 49 ha and is mostly vegetated with a mix of agricultural fields, maintained grass and laneways. There is an existing office/maintenance building complete with well and septic system. The neighbouring land uses are primarily agricultural fields. An existing ditch acts as the drainage outlet for the cemetery. Given the rural location, there are no municipal services available on McGee Side Road. Refer to **Figure 3** – Existing Conditions Plan.

Soils

The soils on this site are primarily topsoil underlain by silty clay over glacial till. Boreholes and test pits were advanced by Gemtec. Refer to the "Geotechnical Investigation" prepared by Gemtec (Jan 25, 2019) for more information.

Topography / Storm Outlet

Under existing conditions, the site is gradually sloped towards the north east and drains towards the Carp River. The existing cemetery is serviced by localized swales and culverts.

The pre-development drainage areas are shown on the Pre-Development Storm Drainage Area Plan (101063-PRE). Under pre-development conditions the site generally drains in two directions, to the existing ditch at the north property line, and to the east towards Oak Creek Side Road through the existing agricultural fields.

1.3 Proposed Development

The proposed visitation centre consists of a new building, parking lot / laneways and associated infrastructure. Refer to Site Plan (1513-A1.02 prepared by Hobin Architects).

1.4 Scope

The scope of Novatech's design is limited to the grading and servicing of the proposed visitation centre. This work includes the immediately adjacent parking lot / laneways, the septic system, the two roadside swales, and the stormwater management facility. Analysis of the existing infrastructure onsite is beyond the scope of this report.

1.5 Approvals

The proposed stormwater conveyance and stormwater management design will require approval from the City of Ottawa, and the Mississippi Valley Conservation Authority (MVCA). The proposed septic system design will require approval from the Ottawa Septic System Office (OSSO).

2.0 SERVICING

Since municipal services are not available on McGee Side Road, it is proposed to service the proposed visitation centre with a drilled well and septic system.

The stormwater runoff will be conveyed overland via proposed swales, which will complement the existing swales and culverts.

2.1 Grading

Based on the architectural design, the proposed building will be elevated above the surrounding land and existing driveways. The elevated design allows for grading away from the proposed building, and towards proposed grassed swales. The architectural plans call for a depressed loading zone with direct basement access. It is proposed to construct an exterior heated concrete ramp to access the basement level. Drainage of the depressed loading zone will be discussed in **Section 3.3** of this report.

2.2 Water Supply

The building will be serviced by a new drilled well that was drilled and tested as part of the "Hydrogeological Assessment" report (Gemtec, July 2010) and subsequent "Hydrogeological Assessment – Comments/Update" letter (Gemtec, Jan 25, 2019). The test well may be used for domestic water supply per the recommendations by Gemtec. The approximate location of the well is shown on the Grading and Servicing Plan (Drawing 101063-GR).

2.3 Wastewater Disposal

The building will be serviced by an individual sewage disposal system in accordance with the recommendations of the "Hydrogeological Assessment" report (Gemtec, July 2010) and subsequent "Hydrogeological Assessment – Comments/Update" letter (Gemtec, Jan 25, 2019). The sewage disposal system shown on the Grading and Servicing Plan (Drawing 101063-GR) is a fully raised conventional (Class IV) tile field based on a design flow of 6,000 L/day.

A Sewage System Permit application will be required from the Ottawa Septic System Office.

Refer to **Appendix B** for details on the proposed septic system design.

2.4 Pavement Design

The typical pavement cross-section is shown on the Grading and Servicing Plan (Drawing 101063-GR).

The pavement structure being proposed is as follows:

Table 1: Pavement Structure

Pavement Material Description	Layer Thickness (mm)	
	Heavy Duty	Light Duty
Asphalt Wear Course (Superpave 12.5)	40	50
Asphalt Base Course (Superpave 19.0)	50	-
OPSS Granular A	150	150
OPSS Granular B Type II	450	300
TOTAL	**690**	**500**

The proposed pavement structure is consistent with the recommendations provided in the Geotechnical Investigation report prepared by Gemtec.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management criteria and storm drainage design are based on a pre-consultation meeting with City of Ottawa staff. Correspondence is provided in **Appendix A**.

3.1 Stormwater Management Criteria

The following criteria have been applied to the stormwater management design:

Water Quantity

- Provide storage to attenuate post-development peak flows to pre-development conditions for all storms up-to and including the 100-year storm event.
- Design a storm drainage system to safely convey post-development flows for all storms up-to and including the 100-year storm event.
- Provide 100-year level of service for the depressed basement loading zone.

Water Quality

- Provide an Enhanced level of water quality treatment corresponding to 80% long-term removal of total suspended solids (TSS).
- Implement conveyance best management practices.

Infiltration

- Infiltrate 73 mm annually based on the total drainage area; per the Carp River Subwatershed Study for low-pervious soils.

Erosion and Sediment Control

- Provide erosion and sediment control to minimize erosion and sediment transport during and after construction.

3.2 Proposed Drainage System

The proposed storm drainage system has been designed to minimise the impact to the existing storm drainage system for the cemetery. The proposed storm drainage system will drain overland towards the north property line and will expand the existing outlet swale into a dry stormwater facility.

The area of proposed development will be serviced with swales along the existing laneways, directing drainage towards the outlet ditch / stormwater management facility. The swales have been designed to provide stormwater conveyance, water quality treatment and infiltration. The depressed basement loading zone adjacent to the building (Area B04) will be serviced with a catchbasin and trench drain. Stormwater will be collected with a sump pump system inside the proposed building and pumped to the surface.

3.3 Stormwater Management Modeling

The PCSWMM hydrologic / hydraulic model was used to complete the storm drainage analysis of the proposed storm drainage system and stormwater management facility. The hydrologic analysis included the delineation of storm drainage areas and the selection of modelling parameters for each subcatchment area.

3.3.1 Storm Drainage Area Plan

The drainage area plan (Drawing 101063-POST) generally maintains the existing storm drainage strategy for the cemetery. The drainage boundary between the north outlet and the drainage towards the east have been adjusted to reflect the current grading design and existing topography. They have also been delineated based on land cover (i.e. building rooftop, parking lot, grassed areas).

3.3.2 Model Parameters

Hydrologic modelling parameters for each subcatchment were developed based on soil type, land use, and topography. Modelling parameters were determined as follows:

- Soil types were identified based on the "Geotechnical Investigation" prepared by Gemtec (Jan 25, 2019);
- Land use and ground cover were determined from aerial photos images (**Figure 3**);
- SCS Curve Numbers were assigned for each ARM subcatchment based on the soil types and land use for areas with less than 20% imperviousness. The ARM subcatchments use the NASHYD routine (runoff-based calculations), which is best suited for large rural catchments.
- For areas with more than 20% imperviousness, standard subcatchments were used (Horton's infiltration-based calculations).

The subcatchment input parameters used to pre-development and post-development models are shown in **Table 2**.

Table 2: Subcatchment Parameters

Area ID	Area (ha)	CN (HSG 'C')	Ia (mm)	Tc (min)	Runoff Coef.	% Imp. (%)
Existing Conditions						
EX01	8.88	77	7.6	23	-	-
Proposed Conditions						
A01	7.56	77	7.6	10	-	-
A02	0.37	77	7.6	10	-	-
B01	0.05	-	-	-	0.90	100%
B02	0.42	-	-	-	0.85	93%
B03	0.43	77	7.6	10	-	-
C01	0.05	-	-	-	0.90	100%
C02	0.48	-	-	-	0.85	93%
C03	0.45	77	7.6	10	-	-
TOTAL	**9.81**	**-**	**-**	**-**	**-**	**-**

The grading design has increased the total contributing drainage area to the north outlet from 8.88 ha to 9.81 ha (additional 0.93 ha). This represents a 9.5% increase in the overall drainage to the north outlet. The additional drainage area from the proposed works will have no adverse impact on the existing outlet ditch or downstream culverts. Peak flows will be attenuated by the inline dry pond.

The proposed works will reduce the drainage area towards the east. Therefore, no further analysis of drainage towards the east was completed.

3.3.3 Design Storms

The hydrologic analysis was completed using the following design storms; generated using IDF parameters presented in the City of Ottawa Sewer Design Guidelines (October 2012).

4 Hour Chicago Storms:	*12 Hour SCS Type II Storms*:
25mm 4hr Chicago storm	
2-year 4hr Chicago storm	2-year 12 hour SCS Type II storm
5-year 4hr Chicago storm	5-year 12 hour SCS Type II storm
100-year 4hr Chicago storm	100-year 12 hour SCS Type II storm

Of the two modelled storm distributions, the 12-hour SCS distribution generated the highest peak flows and was selected as the critical distribution for this site. The site was also 'stress tested' using based on the 100-year (+20%) design storm. This storm distribution has 20% more rainfall and intensity than the 100-year storm event.

3.3.4 Modelling Files and Schematics

The PCSWMM model schematic and 100-year model output for pre-development and post-development conditions is provided in **Appendix C**.

3.3.5 Peak Flows

The allowable release rates for the site is based on the pre-development (existing conditions) peak flows. Pre-development peak flows were estimated from the pre-development PCSWMM model. The pre-development PCSWMM model results are based on the runoff from the overall drainage area to the outlet from the site (Subcatchment EX01).

Controlled post-development peak flows are controlled to the allowable release rates for the 2-year, 5-year and 100-year storm events. In addition, there is existing uncontrolled runoff which is directed to the storm outlet and is being routed through the inline dry pond. The 12-hour SCS storm distribution governs the design of the storage requirements in the inline dry pond and outlet control structure.

Table 3 provides a summary of the pre-development and controlled post-development peak flows at the outlet.

Table 3: Summary of Peak Flows

Area ID	Peak Flow (L/s)			
	25mm	2-year	5-year	100-year
Existing Conditions (allowable release rate)				
4-hour Chicago Storm	61.1	140.2	280.8	800.9
12-hour SCS Storm	-	189.6	342.8	860.0
Post-Development Conditions (controlled)				
4-hour Chicago Storm	82.6	111.0	146.9	695.0
12-hour SCS Storm	-	112.7	211.3	772.8

3.4 Stormwater Conveyance and Quantity Control

Stormwater conveyance and quantity control will be provided for the site based on the following measures.

Depressed Loading Zone:

A proposed catchbasin and trench drain will collect stormwater runoff and direct it to a sump pump system, which will discharge storm runoff to the surface.

Building Rooftops:

Stormwater runoff from the building rooftops will discharge into two (2) rain garden landscape features. The purpose of these features is to dissipate energy from the downspouts and prevent stormwater from flowing over pedestrian pathways during frequent storm events.

Parking / Landscaped Areas:

Stormwater runoff from the parking / landscaped areas will be directed towards two (2) swales. The swales will converge into one (1) outlet swale downstream the proposed development works. The outlet swale will convey flows towards an inline dry pond, which will attenuate post-development peak flows to pre-development release rates. The outlet swale will also intercept peak flows from the upstream (external) drainage areas.

3.4.1 Depressed Loading Zone

The proposed basement loading zone is located below the elevation of the surrounding parking and landscaped areas. The lowered elevation will require that any drainage to this area be pumped. It is proposed to construct a catchbasin and trench drain to collect stormwater runoff and direct it to a sump pump system. The sump pump system will be required to provide a 100-year level of service, in combination with surface storage in the depressed loading zone without impacting the basement.

It is proposed to provide a duplex sump pump system, with each pump capable of providing 3 L/s (3000gph) of constant flow, for a combined maximum flow rate of 6 L/s. The details of the sump pump system will be designed by the mechanical engineer as part of the mechanical design for the building.

The pump system is included in the PCSWMM model. To be conservative, it is assumed that only one pump would be operating. The subcatchment runoff volumes, runoff peak flows, and corresponding HGL elevations from the PCSWMM model are shown in **Table 4** below. For the pump system the 4-hour Chicago storm produced the most conservative results.

Table 4: Depressed Loading Zone Storage

Location	Storm Event	Pump Rate (L/s)	Runoff Peak Flows[1] (L/s)	HGL Elevation[1] (m)	Subcatchment Runoff Volumes[1] (m^3)	Available Storage Volumes (m^3)
Catchbasin	-	-	-	109.70	-	0.4
Trench Drain	2-year	3	9.4	109.83	4.5	5.2
Surface Ponding	5-year	3	13.1	109.87	6.6	19.5
	100-year	3	22.7	109.96	15.1	
Basement Floor	-	-	-	110.00	-	
Power Failure	5-year (45mm rainfall)	0	13.1	110.00	19.5	

[1]PCSWMM model results for a 4-hour Chicago Storm.

Based on the above table, a duplex sump pump system, with only one pump operating will be able to accommodate the 100-year storm event, without impacting the basement floor. In the event of a complete power failure, including failure of the onsite automatic backup generator, the available storage provided is equivalent to the amount of runoff from a 5-year 4-hour Chicago storm (approx. 45 mm of rainfall).

3.4.2 Swales (Conveyance)

The two (2) proposed swales have been sized to convey the 100-year peak flows, based on Manning's equation. They will have a trapezoidal cross-section, a bottom width of 2.0m, minimum depth of 0.3m, and side slopes of 3:1. Both proposed swales are approximately 100m each in length.

All storm drainage will be confined within the swales. The proposed cross-sections are shown on the Grading and Servicing Plan (Drawing 101063-GR). In all cases, the maximum capacity of the swales exceeds the 100-year design flow. Supporting Manning's capacity calculations for the swales are included in **Appendix C**.

The outlet channel conveys flows to the inline dry pond. Manning's capacity calculations and flow depths for the outlet channel to the inline dry pond are provided in **Appendix C**. Refer to the Outlet Plan and Profile (Drawing 101063-PP1) for details on the outlet channel.

3.4.3 Stormwater Management Facility (Inline Dry Pond)

An inline dry pond will provide stormwater management by attenuating peak flows. A low flow channel (i.e., the existing outlet channel) is provided along one side of the dry pond. The total storage volume within the dry pond is approximately 620 m^3. The stage-storage-discharge (release rate) relationship of the inline dry pond is shown in **Table 5** below.

Table 5: Stage-Storage-Discharge (Inline Dry Pond)

Return Period	Stage[1] (m)	Storage (m^3)	Release Rate[1] (L/s)
Bottom of Pond	107.75 (min.)	0	-
2-year	108.47	150	112.7
5-year	108.77	320	211.3
100-year	109.05	510	772.8
Top of Pond	109.20 (min.)	620	-

[1]Based on PCWMM model results (12-hour SCS storm distribution).

3.4.4 Outlet Structure

The outlet control structure will consist of a 300mm orifice in a 450mm HDPE pipe and 1.5 m wide overflow weir. The weir will be constructed of 150 mm dia. D_{50} rip-rap. The design of the outlet structure is based on the model results to maintain pre-development release rates.

Details of the storm outlet and inline dry pond are shown on the Outlet Plan and Profile drawing (101063-PP1).

3.5 Stormwater Quality Control

The Highland Park Cemetery is located within the jurisdiction of Mississippi Valley Conservation Authority which requires an *Enhanced* level of treatment (80% long term removal of total suspended solids).

3.5.1 BMP Treatment Train

A treatment train approach will be used to provide to required quality control of stormwater. The treatment train is site level conveyance controls and Best Management Practices. The following site level conveyance controls and Best Management Practices will be implemented to provide water quality treatment:

- The overall site drainage patterns generally remain the same.
- Roof leaders are to be directed to rain garden landscape features.
- Stormwater from roof areas is considered 'clean' and quality control of stormwater for these areas is not required.
- The drainage system for the proposed works will consists of grassed swales. This will promote surface water infiltration within the drainage system. The proposed swales will be constructed at minimum grades and will be treated with amended topsoil.
- The grassed swales will be enhanced with rock flow check dams.

3.5.2 Grassed Swales

Although grassed swales are generally used for the conveyance of stormwater, under the appropriate conditions they permit significant amounts of total suspended solid (TSS) removal. Grassed swales are effective for treatment when the bottom width is maximized while the depth of flow and channel slope is minimized.

The grassed swales have been designed based on guidelines from the following publications:

- Young et. al., "Evaluation and Management of Highway Runoff Water Quality (FHWA, 1996)
- Stormwater Best Management Practices in an Urban Setting: Selection and Monitoring (FHWA, 1996)
- Stormwater Management Planning and Design Manual (MOE, 2003)

Case studies on the effectiveness of grassed ditches and swales for water quality control have provided variable results, which precludes the ability to precisely calculate pollutant removal efficiencies. However, the above referenced publications indicate that properly designed grassed channels can provide in excess of 80% long-term TSS removal, which will meet the requirements for an Enhanced level of quality control as per the MOE guidelines.

Both dry and wet swales demonstrate good pollutant removal, with dry swales providing significantly better performance for metals and nitrate. Dry swales typically remove 65 percent of total phosphorus (TP), 50 percent of total nitrogen (TN), and between 80 and 90 percent of metals. Wet swale removal rates are closer to 20 percent of TP, 40 percent of TN, and between 40 and 70 percent of metals. The total suspended solids removal for both swale types is typically between 80 and 90 percent. (FHWA, 1996)

The proposed swales servicing the proposed expansion have been designed to meet MOE standards for water quality treatment. The recommended MOE & FHWA criteria for water quality are summarized in **Table 6**.

Table 6: Grassed Channel Design (Based on MOE & FHWA Guidelines)

Criteria	Recommended	West Swale Areas B1-B4	East Swale Areas C1-C3
Channel Dimensions			
Channel Slope	< 4.0% (MOE)	0.45% to 1.28%	0.34% to 1.0%
Bottom Width	> 0.75 m (MOE)	2.0 m	2.0 m
Side Slopes (H:V)	> 2.5:1 (MOE)	3:1	3:1
25mm Event (Water Quality – 4-hour Chicago)			
Peak Flow	-	0.058 m^3/s	0.067 m^3/s
Flow Depth	± 0.1 m (FHWA)	0.07 – 0.08 m	0.08 – 0.11 m
Velocity	< 0.5 m/s (MOE)	0.32 – 0.38 m/s	0.30 – 0.34 m/s
100-year Event (4-hour Chicago)			
Peak Flow	-	0.253 m^3/s	0.302 m^3/s
Flow Depth	< 0.5 m (MOE)	0.16 – 0.19 m	0.19 – 0.24 m
Velocity	N/A	0.53 – 0.59 m/s	0.51 – 0.56 m/s

The results of the hydrologic / hydraulic analysis summarized in **Table 6** indicate that the flow depths and velocities in the swales meet the recommended flow depth and velocity criteria for the 25mm event (water quality event). As the grassed swales meet the water quality criteria for frequent storm events they should provide long-term water quality control.

3.5.3 Maintenance

Pollutant removal efficiencies of swales are related to flow retardance, vegetation density and the stiffness of grass blades, providing a "scrub brush" effect (Khan, 1993). Best removal rates have been achieved through dense turf grasses where a uniform blade height is maintained at least 50mm (2 in) above the design water depth. Grasses too short do not provide sufficient flow reduction or pollutant filtration; grasses too long tend to bend and flatten, allowing the runoff to skim over the bent grass, reducing flow retardance and filtration. (FHWA, 1996).

Based on the above statement, the proposed swales and inline dry pond should be planted with dense turf grass or similar vegetation. The height of vegetation in the swales should be maintained at approximately 150 to 200mm (6 to 8 inches) by the Owner.

Annual inspection of the swales and inline dry pond is recommended to monitor accumulation of sediment or debris:

- Sediment removal should be performed when sediment depths build up to no more than 100mm;
- Grass damaged during the sediment removal process should be promptly replaced using the same seed mix used during initial vegetation establishment; and,
- If any areas are eroded, they should be filled, compacted, and reseeded so that the final grade is level with the bottom of the swale.
- Inspect the outlet structure regularly and remove any blockage

The proposed storm drainage system, in conjunction with site level best management practices, will provide the requisite level of water quality treatment.

3.6 Infiltration

Infiltration Target

The Carp River Subwatershed Study identifies the site as a low recharge zone, with an annual infiltration target of 73 mm/year based on low imperviousness soils. This is supported by type of surficial soils identified in the Geotechnical Report (silty clay / sandy silt). The 73 mm / year of infiltration required corresponds to 7,161 m^3 / year, based on an overall drainage area of 9.81 ha or 730 m^3 / year based on the proposed development area (1.00 ha). The development area is considered to be Areas B1, B2, B4, C1, & C2 as shown on the on Post-Development Storm Drainage Area Plan (101063-POST).

Proposed Best Management Practices (Amended Topsoil)

To meet the 730 m^3/year annual infiltration criteria amended topsoil within each of the two (2) outlet swales will be provided. The west and east outlet swales will have 150 mm of amended topsoil placed along the bottom (2.0m width) over the entire length of each outlet swale (approx. 100m / swale).

As per the MOE SWM Planning and Design Manual (2003), a void ratio of 25% was assumed for the amended topsoil. The total storage provided within the amended topsoil is 15.0 m^3. The

drawdown (retention) time for the amended topsoil is approximately 37.5 hours. This is due to the low permeability of the surrounding silty clay / sandy silt soils. The geotechnical consultant (GEMTEC) estimated a minimum percolation rate of 1.0 mm/hr for the native silty clay soils. Refer to correspondence provided in **Appendix C**.

The rain gardens are not being designed to provide infiltration as the infiltration targets are being met by the amended topsoil within the swales.

Annual Rainfall

The average annual precipitation in Ottawa is 914 mm (rain + snow). This is based on thirty (30) years of daily climate data (1971-2000) from the Ottawa CDA Environment Canada Weather Station (STA ID: 6105976). The average annual rainfall is 733 mm, and the annual rainfall between May and October is 515 mm. Infiltration is generally only achieved during these months when the surficial soils are not saturated or frozen. Refer to the Climate Normals provided in **Appendix C**.

Volume Captured

The storage provided within the amended topsoil (15.0 m^3) is equivalent to storing 1.5 mm over the 1.00 ha developed area. By infiltrating 1.5 mm of rainfall, between May and October, the annual infiltration volume is 959 m^3/year. This exceeds the Carp River Subwatershed Study target of infiltrating 730 m^3/year. Refer to calculations provided in **Appendix C**.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures would be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). Details and specific locations of temporary and permanent Erosion and Sediment Control measures are shown on the Grading and Servicing Plan (101063-GR).

4.1.1 Temporary Measures

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control.

The following erosion and sediment control measures will be implemented during construction.

- Placement of geotextile or filter bags (catch basin inserts) under catch basins and maintenance holes;
- Silt fences around the area under construction;
- Light duty straw bales at key locations in the ditches and swales as shown on the plans;
- Vegetating disturbed areas.

The erosion and sediment control measures are to be implemented prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures are to be undertaken.

4.1.2 Permanent Measures

Permanent erosion and sediment control measures will include the following:

- Roof leaders are to be directed to the rain garden landscape features.
- Ditches and swales are to be constructed at minimum grade, where possible.
- Ditches and swales are to be vegetated to provide permanent erosion and sediment control.
- Rip-rap will be installed at significant changes in grades of the proposed swales where shown on the plans.

5.0 CONCLUSIONS

The conclusions are as follows:

Servicing

- Potable water will be provided by means of a new well drilled as part of the Hydrogeological Assessment report and letter prepared by Gemtec.
- The proposed septic system is based on design flow of 6,000 L/day for a fully raised conventional system. A Sewage System Permit application will be required from the Ottawa Septic System Office.
- The underside of footing (USF) elevation shown on the plan was set at a minimum 0.3m above the groundwater elevation indicated in the Geotechnical Report prepared by Gemtec.

Stormwater Management

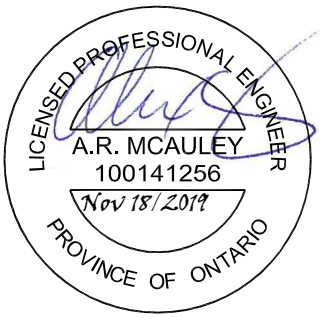
- Storm drainage and stormwater management will be provided via swales, an outlet channel, and an inline dry pond.
- Quantity control of storm runoff is provided to control to the pre-development levels to the existing tributary to the Carp River.
- The vegetated swales will provide an Enhanced level of water quality treatment corresponding to 80% long-term total suspended solids removal.
- The infiltration requirement of the Carp River Subwatershed Study is being met.
- Erosion and sediment control will be provided to minimize erosion and sediment transport during and after construction.

6.0 CLOSURE

This report outlines detailed servicing and stormwater design to meet the requirements of the City of Ottawa and Mississippi Valley Conservation Authority (MVCA) and is submitted in support of Site Plan Approval.

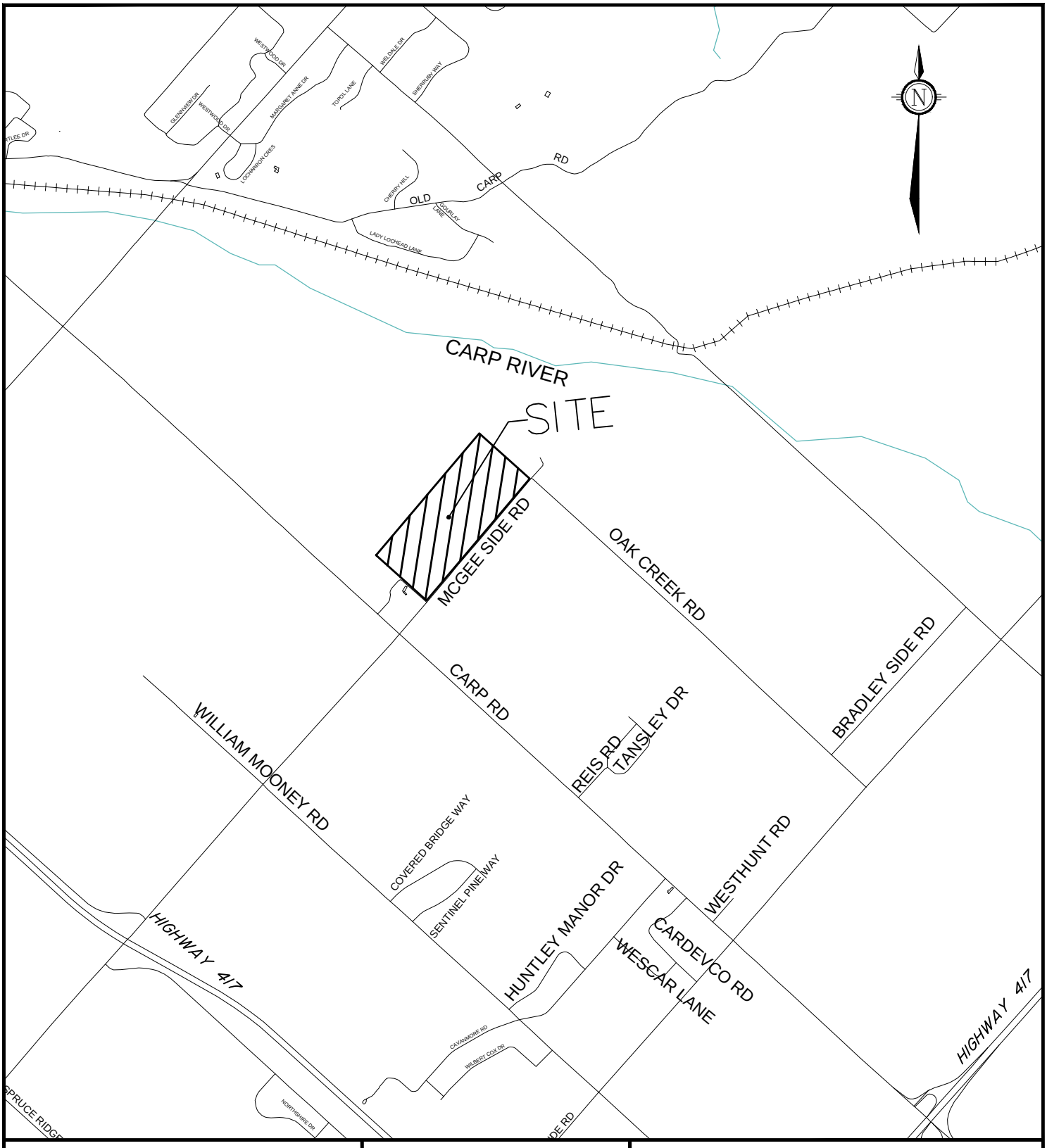
NOVATECH

Prepared by:



Alex McAuley, P.Eng.
Project Manager | Land Development

Conrad Stang, M.A.Sc., P.Eng.
Project Manager | Water Resources



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

KEY PLAN

2037 McGEE SIDE ROAD
CITY OF OTTAWA

HIGHLAND PARK REMEMBRANCE

DATE	JOB	FIGURE
AUG 2019	101063	FIG 1

SNOW
STORAGE
AREA

POSSIBLE FUTURE
EXPANSION

PROPOSED
VISITATION
CENTRE

MCGEE SIDE ROAD

M:\2001\101063\CAD\Figures\101063-FIGS.dwg, FIG2, Aug 29, 2019 - 11:41am, arongve

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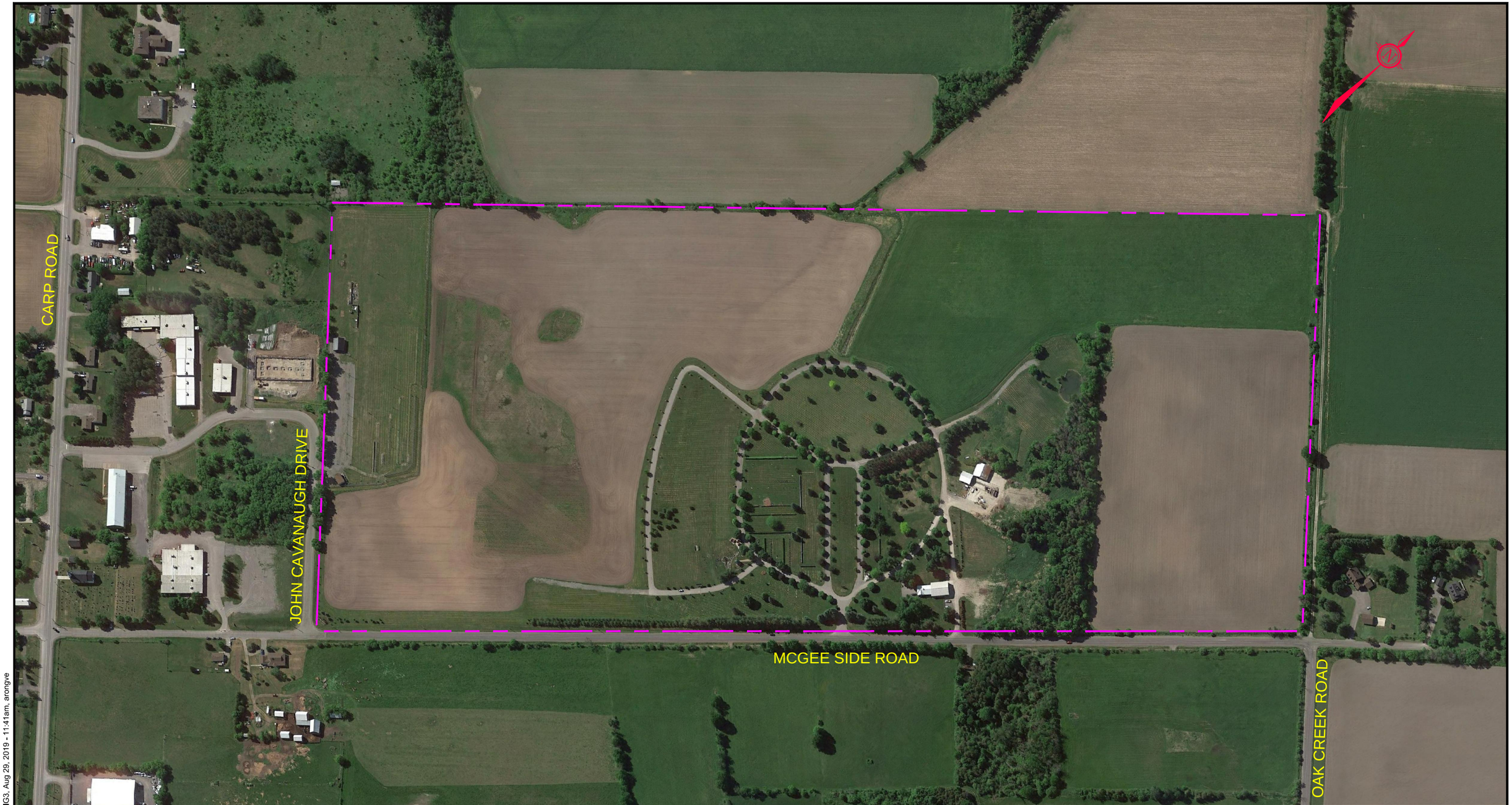
HIGHLAND PARK REMEMBRANCE

LOCATION PLAN

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

DATE AUG 2019 | JOB 101063 | FIGURE FIG 2

SHT11X17.DWG - 279mmX432mm



M:\2001\101063\CAD\Figures\101063-FIGS.dwg, FIG3, Aug 29, 2019 - 11:41am, arongve

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HIGHLAND PARK REMEMBRANCE

EXISTING CONDITIONS

SCALE 1 : 4000 (0, 40, 80, 120, 160)

DATE AUG 2019 | JOB 101063 | FIGURE FIG 3

SHT11X17.DWG - 279mmX432mm

Appendix A

Correspondence

Site Plan Control Application Pre-Consultation- 2037 McGee Side Road

Meeting Date: April 19, 2018

Attendee:

- John Cole, Pinecrest Remembrance Services
- Leila Emmrys, Hobin Architecture
- Susan Gordon, Novatech
- Alex McAuley, Novatech
- Sobha Kunjikutty, Water Resources Engineer, MVCA
- Niall Oddie, Environmental Planner, MVCA
- Kevin Hall, Infrastructure PM, City of Ottawa
- Kerry Reed, Environmental Planner, City of Ottawa
- Mark Young, Urban Designer, City of Ottawa

Information:

- Lise Guevremont, Planner 2, Parks and Recreation, City of Ottawa
- Amira Shehata, Transportation PM, City of Ottawa

Proposal:

The proponent wishes to develop a new one-storey funeral home (1019 sq m), with a partial basement (400 sq. m.). The building will consist of assembly, office and storage spaces (embalming and cremation services will continue to be done at the existing Pinecrest facility). A second phase of approx. 900 sq. m. will be considered, based on demand, in 5-10 years.

Application type:

The application will be considered as: "*Application for New Development*", "*Manager Approval, Public Consultation*", "– see link http://app06.ottawa.ca/online_services/forms/ds/site_plan_control_en.pdf

Submission requirements:

Plan of Survey (5 copies)

Site Plan (15 copies)

- Site plans should show conceptually the proposed Phase II expansion.
- Site plan should also provide total area of the proposal including parking. Parkland Cash-in-lieu will be calculated based this area.
- Site plan should show the 30 meters setback from the adjacent watercourse.
- Site plan should show accessibility design of the parking lot.
- Site plan should confirm parking compliance.
- Please separate grading from site plan. Keep the plan clear.

Landscape Plan (15copies)

- Indicate proposed paving for parking lot and around the building

Building Elevations (15 copies)

- Show façade treatments
- Show any signage location and dimensions.

Planning Rationale (4 copies)

- Please address Official Plan designation.
- Given the nature of the proposal, planning rationale can be in cover letter format.

Grading and Drainage Plan (15 copies)

Lighting Plan (7 Copies)

- A Letter from a certified Engineer to confirm the proposal lighting meets the City's Standard is sufficient.

Erosion and Sediment Control Plan (15 Copies)

Stormwater Management Brief (7copies)

- SWM Quantity: The post-development stormwater generated from the proposed site should be restricted to the pre-development flow for the 5-year and 100-year peak events.
- SWM Quality: A normal level of quality control treatment is required for the proposed development.
- Infiltration Target: The Carp River Watershed Subwatershed Study indicates that a moderate target of 104mm/yr can be used unless the soils present on site are clay or if there is a high groundwater table. If these conditions are present, a revised target of 73mm/yr can be used.

Geotechnical Study (7 copies)

Hydrogeological and Terrain Analysis (7 copies)

- The report should provide discussion relating to Recharge Area identified in the Carp Road CDP.

Please provide electronic copy (PDF) of all plans and studies required.

All plans and drawings must be produced on A1-sized paper and folded to 21.6 cm x 27.9 cm (8½"x 11").

A scale of 1:200 is recommended for the Site Plan and Landscape Plan.

Note that many of the plans and studies collected with this application must be signed, sealed and dated by a qualified engineer, architect, surveyor, planner or designated specialist.

Other Development Considerations :

- ROW protection requirement can be waived, as McGee Side Road ends at Oak Creek Road.
- A permit from MVCA will be required if any modifications to the watercourse at the northern boundary of the site are required or anticipated as a result of SWM. Surface water, groundwater features and fish habitat do not trigger the requirements for an EIS under the policies of the OP.
- Extra engineering design needs to be considered for the design of the ramp to the loading facility. Flood protection from the 100 year storm event will be critical.
- There is no requirement for a tree conservation report.
- The landowner indicated that the trees on the subject property were planted but I recommend that if they are removing trees they should survey for butternut and if butternut is present on the site, then a qualified Butternut Health Assessor (BHA) will conduct the necessary assessment to enable the MNRF to determine whether or not provincial authorization is required prior to the removal of any trees.
- There are SAR grassland bird observations in the vicinity but there is no suitable habitat on site or adjacent to the site where the septic system has been identified to be installed as the land is currently mowed lawn and active cash crops, therefore no EIS is required.
- Accessibility Design Standards – particularly for parking, as the standards are stricter that the Traffic and Parking By-law in regards to accessible parking spaces. A copy of the accessibility design standards can be found on City's Website.
- Construction activities should follow Protocol for Wildlife Protection during Construction.
- Proposal does not trigger any transportation studies
- Parkland Cash-in-lieu will be required at 5% of the proposed development area (including parking area). The value of land will be determined as of the day before planning approval is given for Site Plan Control. The calculation is based on City of Ottawa *Guidelines for Parkland Dedication*. (attached)
- Should consult with Fire Services that the proposal water tank is sufficient.

File No.: D07-12-19-0112

2019-Aug-08

Bryan Bonell
Hobin Architecture
63 Pamilla Street
Ottawa, ON, K1S 3K7

Via email: bbonell@hobinarc.com

Subject: Site Plan Control Application – 2037 McGee Side Road - 1st Review Comments

Please find below the consolidated comments from the 1st review of the above noted application.

1. Engineering

List of Drawing(s) reviewed:

Highland Park Cemetery Grading and Servicing Plan #101063-GR, prepared by Novatech, revision #3 dated June 3, 2019

Comments:

1.1. There does not appear to be enough cover over the water service from the well.
1.2. Provide clarification on the grades in the area of the sidewalk and the bottom of the loading ramp. There is quite a drop from the parking lot sidewalk to the parking stalls at the bottom of the ramp. Should some kind of railing be installed?
1.3. Provide grades and slop % on the sidewalk going down to the basement garage entrance.
1.4. The pavement structure detail does not match the reports

Highland Park Cemetery Outlet Plan and Profile #101063-PP1 prepared by Novatech, Revision 1 dated June 3, 2019

Comments:

1.5. Provide the 5- and 100-year ponding elevations in the outlet ditch

Highland Park Cemetery Landscape Notes & Details #L202 prepared by Catherine H. Kirk Landscape Architect, Revision 3 dated June 15, 2019

Comments:

1.6. The Riverstone Detail does not match with the cross-section on the Grading and Servicing plan

List of Report(s) reviewed:

Highland park Cemetery Visitation Centre Servicing & Stormwater Management Report prepared by Novatech dated June 3, 2019

1.7. Section 1.5 the OSSO does not provide approvals for Stormwater.
1.8. Section 2.4 the total of the Heavy-Duty road structure is not correct.
1.9. Section 3.3 what is the amount of runoff in the 2,5, and 100 rainfall events? I need this to confirm the size of pump is adequate.
1.10. Section 3.4.7 discusses the outlet structure of the ditch, but there are no calculations to determined how the size of the orifice and weir were determined.
1.11. Section 3.5.1 bullet point #2 states the rip-rap is 0.5m thick, but the cross-section on the grading plan shows 300mm.
1.12. Section 3.6 the part discussing Infiltration from Initial Abstractions needs to be written clearer. I find it hard to understand where the 7.6mm of infiltration comes from and am not able to recreate the results in table 6.
1.13. There are 2 areas of the site being discussed in section 3.6. The developed portion and the area that will remain grassed. It might be a good idea to label the 2 sections.
1.14. It is not clear how the infiltration rate was determined. I don't see any information in the Geotech report on that. Infiltration testing needs to be completed.
1.15. How were the infiltration trenches sized?
1.16. The "rain garden" appears to be more of an infiltration trench. The MOE manual and the Credit Valley LID manual have design criterial for this type of SWM facility. It does not appear that either of these guides have been used.
1.17. What is the groundwater elevation below the raingardens?
1.18. I don't see any storage tables for the outlet ditch?
1.19. Some of the info I am requesting may be in the model. There should be a section that lists and discusses the results of the modelling.

Geotechnical Investigation Highland Park Cemetery visitation Centre 2037 McGee Side Road prepared by Gemtec January 25, 2019.

Comments:
1.20. I don't see any infiltration testing to support the infiltration design in the stormwater report.

Additional Comments

Comments:
1.21. I did not see a Lighting Certificate confirming the lighting on this site will conform to City standards.

Feel free to contact Kevin Hall (Kevin.Hall@ottawa.ca), Infrastructure Project Manager, for follow-up questions.

2. Mississippi Valley Conservation Authority

Comments Forthcoming

3. Planning

General Comments

Comments:

3.1. Please include the file number **D07-12-19-0112** on the bottom right of all plans.

3.2. Ensure that the title block include the name and address of the owner and applicant, architect(s), designer(s), engineer(s) and surveyor(s) with their full address including Postal Code and telephone number on all plans.

3.3. Ensure that the title and location referenced on plans and studies are consistent. If referenced as 'Highland Park Remembrance' and '2037 McGee Side Road' on one plan or study, it should be the same on all plans and studies.

List of Drawing(s) reviewed:

Highland Park Remembrance Site Context Plan, A1.01, prepared by Hobin Architecture, Project No. 1513, dated June 17, 2019.
Highland Park Remembrance Site Plan, A1.02, prepared by Hobin Architecture, Project No. 1513, dated June 17, 2019.

Comments:

3.4. Setbacks are to be determined from the ROW protection limits. Please ensure that setbacks are correctly shown on plan and in the zoning table and are consistent with one another.

3.5. Please update legend to correctly reference the 'City of Ottawa's Standards' as it currently references the 'City of Arnprior's Standards'

3.6. Consider replacing the word 'Handicapped' with 'Accessible'.

3.7. The barrier free sign should be compliant with the City's accessibility design standards.

- mark with International Symbol of Accessibility;
- ensure size of 300 mm wide by 600 mm high (minimum);
- mount at height of 1500 mm to 2000 mm (centre) (e.g., wall or postmounted), from ground / floor;
- ensure a high tonal contrast is provided between sign and background environment;
- provide information text, compliant with City By-law requirements; and f. provide additional bilingual signage that identifies Type A spaces as "van accessible / fourgonnette accessible.

Please refer to the City of Ottawa Accessibility Design Standards for more information.

3.8. "Unless otherwise specifically required pursuant to an approval of a fire route in accordance with the Fire Protection and Prevention Act or the Fire Code, the Building Code Act or the Ontario Building Code or a Site Plan Control By-law under the Planning Act, the following requirements shall apply to signs for fire routes:

3.8.1. A sign prohibiting parking in a fire route shall,

- be not less than 45 centimetres in height and not less than 30 centimetres in width;
- bear the markings and message that the area is a fire route where parking is prohibited and include double arrows, except at the ends of a fire route where single arrows shall be included;

- include, in black letters of a minimum height of 4.0 cm, the English Language message “FIRE ROUTE” and the French Lanaguage message “ROUTES DES POMPIERS”, below the message “FIRE ROUTE”, and
- have the design and dimensions as described in the following Figure:

3.8.2. Despite subsection (a), signs of a larger size and pavement or curb markings may be required where considered necessary by the Fire Chief to more clearly delineate a fire route.,

3.8.3. Authorized signs shall be located as shown on a site plan approved by the City, and shall be located no more than 25.0 metres apart unless otherwise specifically approved because of unusual site conditions or fire route configuration, and the lower edge of each sign shall be between 2.0 metres and 2.5 metres above the ground.

3.8.4. Despite the above minimum requirements, any sign which lawfully existed as an authorized and required sign at the date of the passing of this by-law continues to be lawful as an authorized and required sign:

- provided it continues to be maintained in accordance with Section 4. of this by-law or
- unless such sign has been required to be changed pursuant to an order of the Fire Chief under the Fire Protection and Prevention Act or Fire Code."

Please refer to the City of Ottawa Fire Routes (By-law No. 2003-499) for more information.

3.9. Please show all building-mounted lights and light standards.

3.10. Show snow storage. Storage shall not interfere with approved grading and drainage patterns or servicing. If snow is to be removed from the site, then please make a note of that on the Site Plan and include where the snow will be placed in the interim. Temporary snow storage areas should not conflict with utility box, landscaping, required parking, and site circulation

3.11. Please show design details of the Garbage Enclosure. Garbage Enclosure details must show an opaque screen (no gaps). Refer to the Guide for Preparing Studies and Plans.

List of Report(s) reviewed:

Highland Park Cemetery Overall Landscape Plan, L200, prepared by Catherine H. Kirk Landscape Architect Project No. 201721, dated March 13, 2018.
Highland Park Cemetery Landscape Enlargements & Plant List, L201, prepared by Catherine H. Kirk Landscape Architect Project No. 201721, dated March 13, 2018.

Comments:

3.12. Please update Plant List Sheet L200 to include 'Ps' and 'Pgl'.

3.13. Please provide information on snow storage. Snow storage shall not interfere with approved grading and drainage patterns or servicing. If snow is to be removed from the site, then please make a note of that on the Landscape Plan and include where the snow will be placed in the interim. Temporary snow storage areas should not conflict with utility box, landscaping, required parking, and site circulation.

4. Parks Planner

4.1. Parkland Dedication

As per City of Ottawa Parkland Dedication By-law No. 2009-95, parkland dedication is owed for the proposed development for the funeral home, parking, associated driveways of this parcel of land. As per the By-law, the parkland requirement for commercial and industrial purposes is calculated as 2% of the gross land area of the site being developed. The portion of the land used for cemetery is exempt. Therefore, the application must provide the following information:

> Total area of site used for funeral home less area used for cemetery: __?__ha
> Parkland dedication calculated (5% gross land area used for funeral home): _?_ ha

In this circumstance, the City will require payment of money in-lieu of accepting a conveyance of land (Cash-in-lieu-of-Parkland).

The value of the land will be determined as of the day before planning approval is given for Site Plan Control, and in the amount as provided by a market appraisal as approved by the City.

5. Building Code Services

5.1. The size and location of the water storage tank(s) will be reviewed / confirmed at the time of the building permit application review.

5.2. Please confirm the location of the Fire Department Connection (FDC) and Fire Access Route to the provided facilities with Ottawa Fire Service. As the building is being served by a water storage tank on-site and the fire pump has been indicated in this locating as well, with no FDC indicated on the building or at the storage tank location.

6. City Surveyor

6.1. The site plan requires a note stating where the property boundary information was derived from and how the topographic information was related to the boundary.

7. Fire Services

7.1. Please show the location of Fire Department Connection

7.2. Where will the water storage tank be located for fire services (assuming building is >600 m2)?

7.2.1. If intent is to use the location of the fire pump house/storage for us as well, fire would like to have input as this current location doesn't work as shown.

8. Bell Canada

8.1. "The Owner shall indicate in the Agreement, in words satisfactory to Bell Canada, that it will grant to Bell Canada any easements that may be required, which may include a blanket easement, for communication/telecommunication infrastructure. In the event of any conflict with existing Bell Canada facilities or easements, the Owner shall be responsible for the relocation of such facilities or easements".
We hereby advise the Developer to contact Bell Canada during detailed design to confirm the provision of communication/telecommunication infrastructure needed to service the development.

As you may be aware, Bell Canada is Ontario's principal telecommunications infrastructure provider, developing and maintaining an essential public service. It is incumbent upon the Municipality and the Developer to ensure that the development is serviced with communication/telecommunication infrastructure. In fact, the 2014 Provincial Policy Statement (PPS) requires the development of coordinated, efficient and cost-effective infrastructure, including telecommunications systems (Section 1.6.1).
The Developer is hereby advised that prior to commencing any work, the Developer must confirm that sufficient wire-line communication/telecommunication infrastructure is available. In the event that such infrastructure is unavailable, the Developer shall be required to pay for the connection to and/or extension of the existing communication/telecommunication infrastructure.

If the Developer elects not to pay for the above noted connection, then the Developer will be required to demonstrate to the satisfaction of the Municipality that sufficient alternative communication/telecommunication will be provided to enable, at a minimum, the effective delivery of communication/telecommunication services for emergency management services (i.e., 911 Emergency Services).

WSP operates Bell Canada's development tracking system, which includes the intake and processing of municipal circulations. Please note, however, that all responses to circulations and other requests, such as requests for clearance, come directly from Bell Canada, and not from WSP. WSP is not responsible for the provision of comments or other responses.

9. Enbridge Gas Distribution

9.1. Please take note of the following:

Enbridge Gas Inc. does not object to the proposed application(s).

This response does not constitute a pipe locate or clearance for construction.

The applicant shall contact Enbridge Gas Inc.'s Customer Connections department by emailing SalesArea60@Enbridge.com for service and meter installation details and to ensure all gas piping is installed prior to the commencement of site landscaping (including, but not limited to: tree planting, silva cells, and/or soil trenches) and/or asphalt paving.

If the gas main needs to be relocated as a result of changes in the alignment or grade of the future road allowances or for temporary gas pipe installations pertaining to phase construction, all costs are the responsibility of the applicant.

In the event that easement(s) are required to service this development, the applicant will provide the easement(s) to Enbridge Gas Inc. at no cost. The inhibiting order will not be lifted until the application has met all of Enbridge Gas Inc.'s requirements.

Enbridge Gas Inc. reserves the right to amend or remove development conditions.

10. Canada Post

10.1. **Service type and location**

10.1.1. Canada Post will provide mail delivery service to the development through centralized Community Mail Boxes (CMBs).
10.1.2. **The development will be served by an existing CMB located 112 JOHN CAVANAUGH RD.**
10.1.3. If the development includes plans for (a) multi-unit building(s) with a common indoor entrance, the developer must supply, install and maintain the mail delivery equipment within these buildings to Canada Post's specifications.

10.2. **Municipal requirements**

10.2.1. Please update our office if the project description changes so that we may determine the impact (if any).
10.2.2. Should this subdivision application be approved, please provide notification of the new civic addresses as soon as possible.

10.3. **Developer timeline and installation**

10.3.1. Please provide Canada Post with the excavation date for the first foundation/first phase as well as the date development work is scheduled to begin. Finally, please provide the expected installation date(s) for the CMB(s).

Additional Comments

Appendix A
Additional Developer Requirements:

10.4. The developer will consult with Canada Post to determine suitable permanent locations for the Community Mail Boxes. The developer will then indicate these locations on the appropriate servicing plans.
10.5. The developer agrees, prior to offering any units for sale, to display a map on the wall of the sales office in a place readily accessible to potential homeowners that indicates the location of all Community Mail Boxes within the development, as approved by Canada Post.
10.6. The developer agrees to include in all offers of purchase and sale a statement which advises the purchaser that mail will be delivered via Community Mail Box. The developer also agrees to note the locations of all Community Mail Boxes within the development, and to notify affected homeowners of any established easements granted to Canada Post to permit access to the Community Mail Box.
10.7. The developer will provide a suitable and safe temporary site for a Community Mail Box until curbs, sidewalks and final grading are completed at the permanent Community Mail Box locations. Canada Post will provide mail delivery to new residents as soon as the homes are occupied.
10.8. The developer agrees to provide the following for each Community Mail Box site and to include these requirements on the appropriate servicing plans:
10.9. Any required walkway across the boulevard, per municipal standards
10.10. Any required curb depressions for wheelchair access, with an opening of at least two meters (consult Canada Post for detailed specifications)

11. For the next submission:

- The next submission should address all and each of the comments or issues, to ensure the effectiveness and consistency of the next review.
- A cover letter must be included that states how each comment was addressed in the resubmission. Please co-ordinate the numbering of each resubmission comment, or issue, with the above noted comment number.
- Please include 3 copies of revised drawings and 3 copies of revised reports.
- All addenda or revisions to any studies or plans must be accompanied by a PDF copy.
- In order to achieve the target review and approval timeline, please provide the next submission in 3 weeks, by August 30th. Otherwise, the application will be placed on-hold.

The development review team will be happy to meet you to discuss comments and resolve issues. We are available to hold a comments review meeting within one week from the date of this letter. Please contact me at your earliest convenience to schedule a meeting date, time, format and location if desired.

Should there be any other questions, please do not hesitate to contact me.

Yours Truly,

Krishon Walker

cc.
Kevin Hall, Infrastructure Project Manager

File No.: D07-12-19-0112

2019-Aug-14

Bryan Bonell
Hobin Architecture
63 Pamilla Street
Ottawa, ON, K1S 3K7

Via email: bbonell@hobinarc.com

Subject: Site Plan Control Application – 2037 McGee Side Road - 1st Review Comments (Conservation Authority Comments)

Please find below the MVCA's comments from the 1st review of the above noted application.

1. Mississippi Valley Conservation Authority

The staff of Mississippi Valley Conservation Authority (MVCA) has reviewed the above noted site plan application for concerns related to natural heritage, natural hazards and water quality and quantity for the subject property and surrounding lands. The scope of the natural heritage review includes wetlands, watercourses and significant valleylands, while the focus of the natural hazards review includes flood plain, unstable slopes and unstable soils.

1.1. Natural Heritage

1.1.1. The mapping indicates that the subject lands contained an existing watercourse providing drainage from the centre portion of the property northwards into a tributary of the Carp River. During pre-consultation discussions, it was agreed that the watercourse on the subject lands was constructed as a drainage ditch in the past and was not a naturally occurring watercourse until the northern property line of the subject lands.

1.2. Natural Hazards

1.2.1. MVCA's mapping sources did not identify any natural hazards on or in proximity to the subject lands that would affect the proposed development. We therefore have no concerns from a natural hazards perspective.

1.3. Regulated Areas

1.3.1. A permit under MVCA's Ontario Regulation 153/06 "Development, Interference with Wetlands and Alteration to Shorelines and Watercourses" would be required for any alterations to the watercourse at the northern limit of the subject lands, however it was agreed during the pre-consultation meetings that the watercourse on the subject lands was a drainage feature constructed by the property owner and a permit would not be required for alterations occurring on the subject lands.

1.4. **Stormwater Management**

1.4.1. Please MVCA staff reviewed the report titled “Servicing & Stormwater Management Report for Highland Park Cemetery Visitation Centre” prepared by Novatech and dated June 3, 2019. The following comments are offered on the report:

1.4.1.1. MVCA would like to review the PCSWM model files to review the calculations and results;

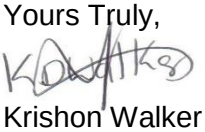
1.4.1.2. The calculation of allowable release rate should be included within the report;

1.4.1.3. The design details and calculation for infiltration gallery and swale should be included within the report;

1.4.1.4. Provide calculation for infiltration depth/volume in the galleries.

Should there be any other questions, please do not hesitate to contact me.

Yours Truly,



Krishon Walker

August 28, 2019 **By Email**

City of Ottawa
Planning, Infrastructure & Economic Development
110 Laurier Street West, 4th Floor
Ottawa, Ontario K1P 1J1

Attention: Krishon Walker, Planner

Reference: **2037 McGee Side Road – Site Plan Control Application**
Response to Comments – 1st Review
City File No.: D07-12-19-0112
Our File No.: 101063

Novatech has prepared the following letter in response to the City of Ottawa comments dated August 8, 2019 and MVCA Engineering and Stormwater Management comments dated August 14, 2019.

The engineering related comments have been addressed in the updated Servicing and Stormwater Management Report, revised August 28, 2019.

Section 3 of the report has been revised for clarity. The rain garden landscape areas are no longer being quantified for infiltration, and their primary purpose is as a landscape feature and to dissipate the energy of runoff from the roof drains. Please note that the section numbers indicated in the City of Ottawa comments have changed with this version of the report. The new section numbers are referenced in our responses below.

City of Ottawa Comments: Engineering

Highland Park Cemetery Grading and Servicing Plan (101063-GR)

1.1 There does not appear to be enough cover over the water service from the well.

Novatech Response: General Note 12 has been added to indicate that a minimum cover of 2.4m must be maintained above the water service line from the well to the building.

1.2 Provide clarification on the grades in the area of the sidewalk and the bottom of the loading ramp. There is quite a drop from the parking lot sidewalk to the parking stalls at the bottom of the ramp. Should some kind of railing be installed?

Novatech Response: Inset detail has been added to Drawing No. 101063-GR to provide clarification. The wall extends above the grade of the parking lot sidewalk. Please refer to Architectural Drawing 1/A3.02 West Elevation – Section O/S Receiving.

1.3 Provide grades and slope % on the sidewalk going down to the basement garage entrance.

Novatech Response: As noted above, inset detail has been added to Drawing No. 101063-GR to provide clarification.

1.4 The pavement structure detail does not match the reports.

Novatech Response: Pavement Structure detail in Drawing No. 101063-GR (rev3) has been revised to match the reports.

Highland Park Cemetery Outlet Plan and Profile (101063-PP1)

1.5 Provide the 5- and 100-year ponding elevations in the outlet ditch.

Novatech Response: 5- and 100-year ponding elevations in the outlet ditch have been added to Drawing No.101063-PP1.

Highland Park Cemetery Landscape Notes & Details (L202)

1.6 The Riverstone Detail does not match with the cross-section on the Grading and Servicing plan.

Novatech Response: Please refer to response letter from Hobin Architecture.

Highland Park Cemetery Visitation Centre – Servicing & Stormwater Management Report

1.7 Section 1.5 of the OSSO does not provide approvals for Stormwater.

Novatech Response: Report has been revised to indicate that the septic system design will require approval from the OSSO.

1.8 Section 2.4 the total of the Heavy-Duty road structure is not correct.

Novatech Response: Report has been revised to indicate the correct total thickness of the Heavy-Duty road structure.

1.9 Section 3.3 what is the amount of runoff in the 2,5, and 100 rainfall events? I need this to confirm the size of pump is adequate.

Novatech Response: Peak runoff flow rates and volumes from the PCSWMM model have been added to the Depressed Loading Area storage table (Table 4).

1.10 Section 3.4.7 discusses the outlet structure of the ditch, but there are no calculations to determine how the size of the orifice and weir were determined.

Novatech Response: Sections 3.4.3 & 3.4.4 has been revised and now includes additional discussion on the outlet control structure and a stage-storage-discharge table. The outlet control structure was sized using the PCSWMM model.

1.11 Section 3.5.1 bullet point #2 states the rip-rap is 0.5m thick, but the cross-section on the grading plan shows 300mm.

Novatech Response: The depth of riverstone in the rain gardens is 0.3m. The report has been revised accordingly.

1.12 Section 3.6 the part discussing Infiltration from initial Abstractions needs to be written clearer. I find it hard to understand where the 7.6mm of infiltration comes from and am not able to recreate the results in table 6.

Novatech Response: Based on the comments and estimated infiltration rate provided by the geotechnical consultant, the infiltration approach has been revised.

Section 3.6 has been revised accordingly and simplified for clarity.

1.13 *There are 2 areas of the site being discussed in section 3.6. The developed portion and the area that will remain grassed. It might be a good idea to label the 2 sections.*

Novatech Response: The description of the development area references the corresponding areas on the Post-Development Drainage Area Plan (101063-POST) for clarity.

1.14 *It is not clear how the infiltration rate was determined. I don't see any information in the Geotech report on that. Infiltration testing needs to be completed.*

Novatech Response: The infiltration rate of the native sub soil has been estimated by the geotechnical consultant. Refer to correspondence provided in Appendix C.

1.15 *How were the infiltration trenches sized?*

Novatech Response: The swales are sized for conveyance, water quality and infiltration. For infiltration purposes the depth of amended topsoil was calculated to allow 1.5mm of rainfall over the improved area (1.0ha) to infiltrate.

1.16 *The "rain garden" appears to be more of an infiltration trench. The MOE manual and the Credit Valley LID manual have design criteria for this type of SWM facility. It does not appear that either of these guides have been used.*

Novatech Response: The rain gardens are functioning primarily as a landscape feature. They are not being designed to provide infiltration as the targets can be met by the swales alone.

1.17 *What is the groundwater elevation below the raingardens?*

Novatech Response: The rain gardens are functioning primarily as a landscape feature, therefore the groundwater elevation does not impact the design of the gardens. Based on the geotechnical report the groundwater elevation is about 1.7 to 1.9m below the ground surface (elevation of 108.9 to 109.7).

1.18 *I don't see any storage tables for the outlet ditch?*

Novatech Response: A stage-storage-discharge table for the dry pond has been added to the revised report. Refer to Table 5 in Section 3.4.3.

1.19 *Some of the info I am requesting may be in the model. There should be a section that lists and discusses the results of the modelling.*

Novatech Response: The model results and discussion have been added to Section 3.3.5.

Geotechnical Investigation Highland Park Cemetery Visitation Centre (**Gemtec January 25, 2019)**

1.20 *I don't see any infiltration testing to support the infiltration design in the stormwater report.*

Novatech Response: The infiltration rate of the native sub soil has been estimated by the geotechnical consultant. Refer to correspondence provided in Appendix C.

MVCA Comments: Stormwater Management

1.4.1.1 MVCA would like to review the PCSWM model files to review the calculations and results.

Novatech Response: The pre and post-development PCSWMM model files are provided on the CD enclosed in the updated report.

1.4.1.2 The calculation of allowable release rate should be included within the report.

Novatech Response: Refer to Section 3.3.5 for allowable release rates.

1.4.1.3 The design details and calculation for infiltration gallery and swale should be included within the report.

Novatech Response: Refer to Section 3.6 for details. Additional calculations are included in Appendix C.

1.4.1.4 Provide calculation for infiltration depth/volume in the galleries.

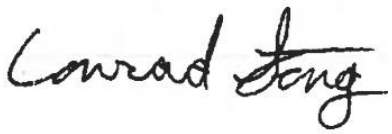
Novatech Response: Refer to Section 3.6 for details. Additional calculations are included in Appendix C.

Should you have any questions or concerns do not hesitate to contact us.

Yours truly,

NOVATECH

Alex McAuley, P.Eng.
Project Manager | Land Development Engineering



Conrad Stang, MASc., P.Eng.
Project Manager | Water Resources

Encl.
cc: Niall Oddie (MVCA), w. report copy

File No.: D07-12-19-0112

2019-Sep-24

Bryan Bonell
Hobin Architecture
63 Pamilla Street
Ottawa, ON, K1S 3K7

Via email: bbonell@hobinarc.com

Subject: Site Plan Control Application – 2037 McGee Side Road – 2nd Review Comments

Please find below the consolidated comments from the 2nd review of the above noted application.

1. Engineering

1.1. Comments issued. One or more rock check dams will be added to the outlet ditches to enhance the ability of the water to infiltrate into the ground. This change can be shown on the final drawings if no other changes are required

Feel free to contact Kevin Hall (Kevin.Hall@ottawa.ca), Infrastructure Project Manager, for follow-up questions.

2. Planning

2.1. Please include the file number **D07-12-19-0112** on the bottom right of all plans. This can be shown on the final drawings.
2.2. Ensure that the title block include the name and address of the owner and applicant, architect(s), designer(s), engineer(s) and surveyor(s) with their full address including Postal Code and telephone number on all plans. This can be shown on the final drawings.
2.3. Ensure that the title and location referenced on plans and studies are consistent. If referenced as 'Highland Park Remembrance' and '2037 McGee Side Road' on one plan or study, it should be the same on all plans and studies. This can be shown on the final drawings.

3. City Surveyor

3.1. How was the topographic information related to the property boundary information?

4. Fire Services

4.1. Is there an overhang over the fire access route? If so, does it meet requirements of OBC (esp. the 5m overhead clearance). (See point 1 on FS-Res)

4.2. Is this the draft hydrant? If so can we move it to 3 and extend the fire access route to that location? (See point 1 on FS-Res)

4.3. This would be a better location for the draft hydrant. We actually prefer to have the water source slightly outside the 45m OBC requirement due to the way we setup these locations. There would be an additional cost for heavy duty asphalt, but decrease in cost for excavation and pipe to the hydrant at point 2. (See item 1 on FS-Res)

Additional Comments

Please make sure draft hydrant is either bollard or curb protected and needs to be 1-1.5m away from the edge of curb.

5. For the final submission:

- The final submission should address all and each of the comments or issues, to ensure the effectiveness and consistency of the final review.
- The above comments can be addressed in the form of an email.
- Please provide unsecured electronic copies of revised drawings.

Should there be any other questions, please do not hesitate to contact me.

Yours Truly,

Krishon Walker

cc.

Kevin Hall, Infrastructure Project Manager

Conservation Partners
Partenaires de conservation

Mississippi Valley Conservation Authority | Office de protection de la nature de la vallée Mississippi | Office de protection de la nature de la vallée Rideau – Rideau Valley Conservation Authority | South Nation Conservation de la Nation Sud

File: PHTSP-103

October 11, 2019

Krishon Walker
City of Ottawa
Development Review West
110 Laurier Avenue West, 4th floor
Ottawa, ON K1P 1J1

Dear Mr. Krishon Walker:

Re: Application for Site Plan Approval (D07-12-19-0112)
2037 McGee Side Road, City of Ottawa

During our August 13, 2019 comment letter, we indicated that there were no natural heritage or natural heritage features within the scope of our review present on the subject lands. Our previous comment letter focused on the review of the proposed stormwater management plan.

MVCA staff reviewed the revised report "Servicing and Stormwater Management Report – Highland Park Remembrance, 2037 McGee Side Road, Ottawa, ON" prepared by Novatech and dated August 29, 2019.

1. The swales proposed on the east and west sides are meant to provide the required water quality and meet the infiltration target for the site. However, it is unclear from the direction of flow shown on the 'post-development storm drainage area plan' if the overland flow from the uncontrolled/undeveloped areas is intended to the in-line pond. No intercepting swales to direct this runoff around the SWM system seemed to be shown on the plan. If any part of the uncontrolled drainage area flows to these swales, the design of the swale should be updated to account for the additional flows coming into the swales. Please clarify.
2. As per the MECP guide (MOE, 2003), the minimum outlet pipe size for a dry pond should be 450mm to avoid any clogging and/or issues with freezing. The outlet pipe proposed in the SWM plan is 300mm in size. Please explain the proposed diametre.
3. Re-suspension of settled material is a major concern with dry pond design. Therefore, it is recommended to include a maintenance plan for the dry pond to be included in the report, including the winter care for the pipes, as there is no permanent pool.
4. The ponding volume, ponding depths (elevation for 2 and 100-year storm events), and extent to which the ponding occurs are to be included on the Grading Plan.
5. It is recommended to include 'catch basin inserts' with all catch basins proposed in the plan.

6. Both the west and east swales are approximately 100m in length with varying depths and slopes. The flow velocity in each swale for 100-year flow event is above the required 0.5m/s. Moreover, these swales are the only measure proposed in the plan to achieve the required enhanced water quality treatment. Therefore, it is recommended that segment-wise details in a table, with length, slope, depth, etc. be provided, rather than providing the overall flow velocity along the entire 100m length of the swale.

7. Please include calculations of the maximum allowable flow in each swale with respect to its drainage area and design parameters.

8. As per the MECP guide (MOE, 2003), the effectiveness of a swale depends on its design and maintenance. Therefore, swales should be used for water quality treatment as part of a multi-component system; it should be a measure in a series of other stormwater quality treatment measures. As the swales are the only water quality treatment measure proposed in the plan, it is recommended to design the swales at the least with 'performance enhancements' such as check dams at appropriate locations.

Recommendations and Conclusions
MVCA recommends the following prior to moving forward with approval of the site plan application:

1. The above stormwater management comments should be addressed and a revised report submitted for further review.

Thank you for the opportunity to review and comment on this application. Please contact the undersigned with any questions or concerns.

Regards,

Niall Oddie, MCIP, RPP
Environmental Planner

November 18, 2019 **By Email**

City of Ottawa
Planning, Infrastructure & Economic Development
110 Laurier Street West, 4th Floor
Ottawa, Ontario K1P 1J1

Attention: Krishon Walker, Planner

Reference: **2037 McGee Side Road – Site Plan Control Application**
Response to Comments – 2nd Review
City File No.: D07-12-19-0112
Our File No.: 101063

Novatech has prepared the following letter in response to the City of Ottawa comments dated September 24, 2019 and MVCA Engineering and Stormwater Management comments dated October 11, 2019.

The engineering related comments have been addressed in the updated Servicing and Stormwater Management Report, revised November 18, 2019.

City of Ottawa Comments: Engineering

Highland Park Cemetery Grading and Servicing Plan (101063-GR)

1.1 *One or more rock check dams will be added to the outlet ditches to enhance the ability of the water to infiltrate into the ground. This change can be shown on the final drawings if no other changes are required*

Novatech Response: Four (4) rock flow check dams have been added to the outlet ditches in and are shown on the Grading Plan (101063-GR) and Outlet Plan & Profile (101063-PP1).

MVCA Comments: Stormwater Management

1. *The swales proposed on the east and west sides are meant to provide the required water quality and meet the infiltration target for the site. However, it is unclear from the direction of flow shown on the 'post -development storm drainage area plan' if the overland flow from the uncontrolled/ undeveloped areas is intended to the in-line pond. No intercepting swales to direct this runoff around the SWM system seemed to be shown on the plan. If any part of the uncontrolled drainage area flows to these swales, the design of the swale should be updated to account for the additional flows coming into the swales. Please clarify.*

   Novatech Response: Additional overland flow arrows have been added to the drawing (101063-POST). All drainage tributary to each swale has been accounted for in the design of each swale, as indicated in Table 6 in the Report.

2. *As per the MECP guide (MOE, 2003), the minimum outlet pipe size for a dry pond should be 450mm to avoid any clogging and/or issues with freezing. The outlet pipe proposed in the SWM plan is 300mm in size. Please explain the proposed diameter.*

   Novatech Response: The pond outlet has been revised to a 450mm pipe with a 300mm diameter orifice.

3. *Re-suspension of settled material is a major concern with dry pond design. Therefore, it is recommended to include a maintenance plan for the dry pond to be included in the report, including the winter care for the pipes, as there is no permanent pool.*

   Novatech Response: Maintenance of the dry pond has been added to Section 3.5.3 (page 11) in the SWM report. Since the grassed swales provide quality control upstream of the inline dry pond, and above the 100 year ponding elevation, resuspension will be minimized.

4. *The ponding volume, ponding depths (elevation for 2 and 100-year storm events), and extent to which the ponding occurs are to be included on the Grading Plan.*

   Novatech Response: 5-year and 100-year ponding contours, volumes and elevations are shown on the Grading Plan (101063-GR) and Outlet Plan & Profile (10106-PP1). The 2-year ponding contour, volume and elevation has been added to the above noted drawings.

5. *It is recommended to include 'catch basin inserts' with a all catch basins proposed in the plan.*

   Novatech Response: As indicted in Section 4.1.1 of the Report and as identified on the Grading Plan (101063-GR) geotextile or filter bags (catchbasin inserts) will be provided for all catchbasins within the area of the proposed works.

6. *Both the west and east swales are approximately 100m in length with varying depths and slopes. The flow velocity in each swale for 100-year flow event is above the require 0.5m/s. Moreover, quality treatment. Therefore, it is recommended that segment-wise details in a table, with length, slope, depth, etc. be provided, rather than providing the overall flow velocity along the entire 100m length of the swale.*

   Novatech Response: Per the MOE (2003) guidelines, the flow velocity is required to be less than 0.5m/s during the 25mm-4-hr Chicago storm. There is no flow velocity criteria for the 100-year storm, therefore Table 6 has been revised accordingly. During the 25mm-4hour Chicago storm the maximum velocity within the east and west swales ranges from 0.30 to 0.38m/s based on free flow conditions which do not account for the attenuation provided by the rock check dams. Therefore the flow velocities meet MOE (2003) guidelines.

7. *Please include calculations of the maximum allowable flow in each swale with respect to its drainage area and design parameters.*

   Novatech Response: Manning's capacity calculations for the maximum allowable flow in each swale without overtopping are provided in Appendix C of the Report. This includes the design parameters such as the cross section and longitudinal slopes for each swale. As indicated in Section 3.4.2 of the Report, the 100-year design flow from each drainage area does not exceed the maximum capacity of each swale.

8. *As per the MECP guide (MOE, 2003), the effectiveness of a swale depends on its design and maintenance. Therefore, swales should be used for water quality treatment as part of a multi-component system: it should be a measure in a series of other stormwater quality treatment measures. As the swales are the only water quality treatment measure proposed in the plan, it is recommended to design the swales at the least with 'performance enhancements' such as check dams at appropriate locations.*

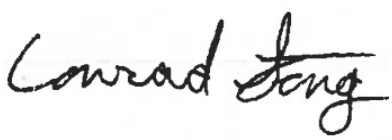
   Novatech Response: Refer to Section 3.5.3 (page 11) in the SWM report for maintenance of the swales. In addition, four (4) rock flow check dams have been added to the swales as shown on the Grading Plan (101063-GR).

Should you have any questions or concerns do not hesitate to contact us.

Yours truly,

NOVATECH

Alex McAuley, P.Eng.
Project Manager | Land Development Engineering



Conrad Stang, MASc., P.Eng.
Project Manager | Water Resources

Encl.
cc: Niall Oddie (MVCA), w. report copy

Appendix B

Septic System Design Brief

Engineers, Planners & Landscape Architects

August 28, 2019

Septic System Design Brief

Highland Park Remembrance
2037 McGee Side Road, Ottawa

Report Reference: R-2019-086
Novatech File No.: 101063

Existing Conditions

Highland Park Cemetery has been in operation for over 30 years. The cemetery property consists of approximately 49 ha and is mostly vegetated with a mix of agricultural fields, maintained grass and laneways. There is an existing office/maintenance building (110m^2) serviced by a well and a septic system. The existing system has a theoretical design flow of 900L/day. The office building is intended to remain.

Proposed Development Scenario

The owners of Highland Park cemetery are proposing to construct a visitation centre on the existing property. The new building (1015m^2) would be serviced by a well and a fully raised conventional septic system, separate from the well and septic system servicing the existing office/maintenance building.

The new building includes:

- Visitation rooms (2 rooms)
- Office space
- Kitchen (food provided by external catering)
- Water closets
- Embalming room (process liquids collected separately and disposed off-site)

The preliminary floor plans prepared by Hobin Architecture Incorporated are attached for reference.

Purpose

This report has been prepared in support of a Septic System Permit Application to the Ottawa Septic System Office.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

Native Soil Conditions

Gemtec/Houle Chevrier Engineering prepared the following documents in support of the site development and the septic system design:

- Geotechnical Investigation - Highland Park Cemetery Visitation Centre, January 25, 2019.
- Geotechnical Investigation - Highland Park Cemetery Visitation Centre, March 2010.

A review of these documents provided the following soil information in the area of the septic tile field:

Topsoil: The investigations confirmed that the topsoil generally extends to a depth of 0.3m and 0.4m below the existing ground surface at the site of the proposed septic tile field.

Insitu Soils: The geotechnical consultant noted that the silty sand and silty clay in the area of the septic tile field has a relatively low permeability. It was recommended to design a fully raised bed and imported sand mantle.

Water Table Elevation: The static groundwater elevation is approximately 109.70, which is approximately 1.7m below the surface.

Design Flow

The theoretical design flow is based on two visitations daily with 150 guests each. Staff are on-site during visitations. The proposed building is not expected to have any full-time staff.

Activity	People	Flow (L/day)	Total Flow (L/day)
Visitors (Assembly Hall), 150 visitors per room per day = total 300 people			
Food Service provided	100	20	2,000
No Food Service provided	200	8	1,600
Employees			
Per 8 hour shift	6	75	450
			4,050

The design flow used to size the septic system is 6,000L/day.

Septic System Design

The proposed building will be serviced by a Class 4 tile field. The proposed septic system consists of a septic tank, a manhole, gravity sewer, a lift pump, and an absorption trench leaching bed.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

Refer to the Grading & Servicing Plan and the Septic System Plan (**101063-GR** and **101063-SEP**) for septic system details.

Septic Tanks

The minimum septic tank required would be 3x design flow. The septic tank would require an effluent filter.

Size required: 3 x 6,000 = 18,000L

Size provided: 18,500L

Absorption Trench Leaching Bed Design

Length of distribution pipe

Length of distribution pipe required: L = QT/200 = (6,000 x 8)/200 = 240m

(Design Flow (Q) increased based on capacity of the septic tank)

Length of distribution pipe provided: L = 12 runs at 21m = 252m

Loading Rate Calculations

Contact area required: A = Q/6 = 6,000/6

$A = 1,000m^2$

Contact area provided: $A = 1,300m^2$ (including mantle)

Setbacks

The following minimum setbacks are required:

- Tile field to any Drilled well: 18.0m
- Tile field to Property line: 6.0m
- Septic tank to any Drilled well: 15.0m
- Septic tank to Building: 1.5m

Septic System Installation

The septic system is to be installed in accordance with the following engineering drawings prepared by Novatech:

- Grading & Servicing Plan (101063-GR)
- Septic System Plan (101063-SEP)

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

The proposed septic system consists of a septic tank, a manhole, gravity sewer, a lift pump, and an absorption trench leaching bed.

A mantle is required in the direction of the surface drainage. The imported sand, which is to be used to construct the septic system including the mantle, is to have a percolation rate of 8 min/cm, with less than 8% silt, tested and approved before placement.

Construction traffic and materials are to be kept away from the septic system, including the mantle.

The surface area of the septic system is to be graded to provide positive drainage, and treated with 100mm permeable topsoil and seed. No impermeable material is to be placed over or adjacent to the area bed.

This septic system has been designed to treat domestic waste only. The following are not to be connected to the septic system:

- Water softener
- Sump pump
- Embalming waste
- Eavestroughs/Roof Drains
- Refrigeration or Condensing Units

Novatech's design and inspection services do not relieve the septic system installer of the responsibility for guaranteeing workmanship and materials.

Prepared by:

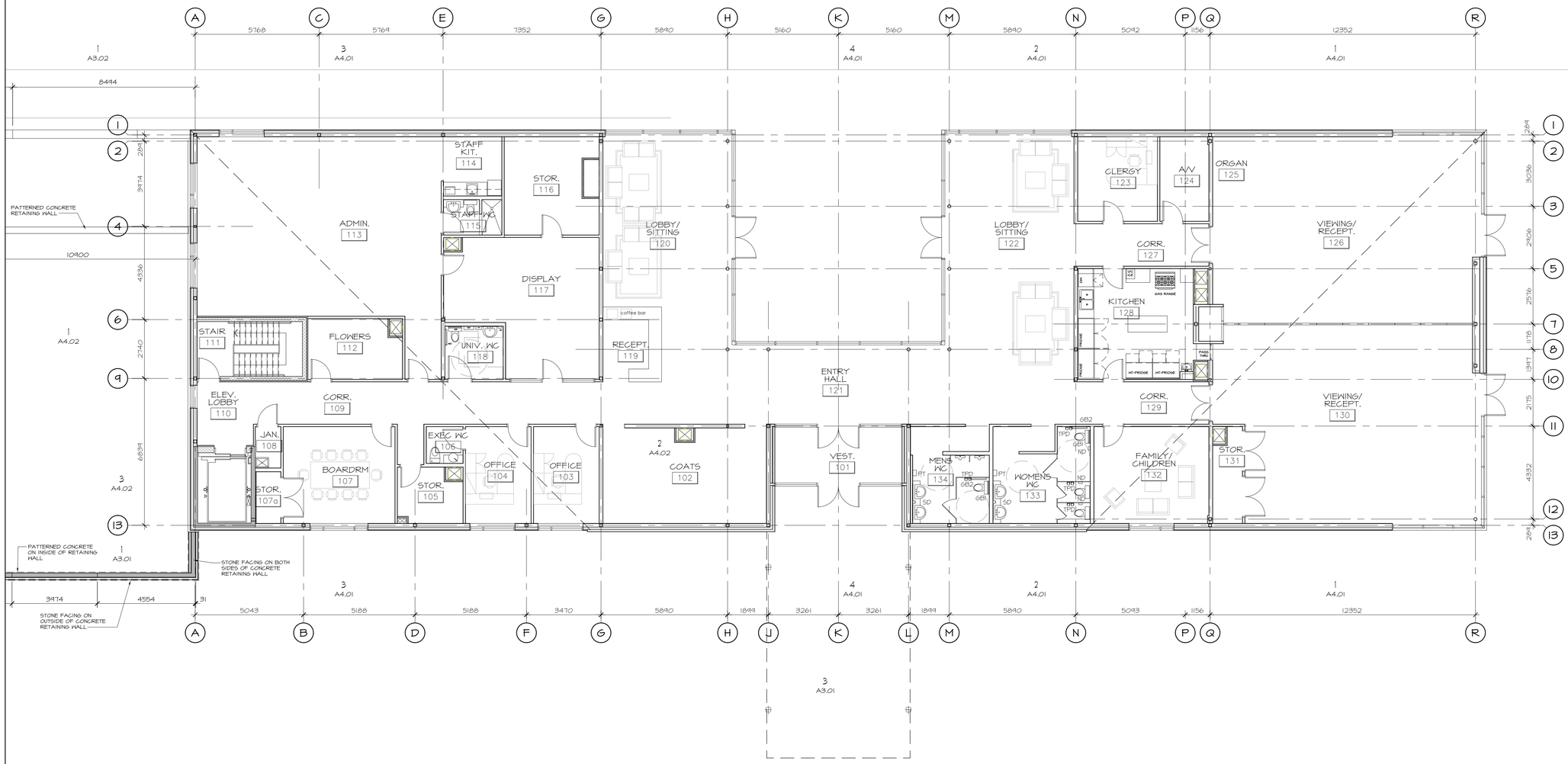
NOVATECH

Lisa Bowley, P.Eng
Project Manager | Land Development Engineering

Attachments

1. Preliminary floor plans prepared by Hobin Architecture Incorporated
2. Drawings
   Grading and Servicing Plan 101063-GR, revision 4
   Septic System Plan 101063-SEP, revision 2

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com



Highland Park Cemetery

no.	date	revision
4	MAY 1/19	ISSUED FOR INFORMATION
3	JAN. 8/19	ISSUED FOR INFORMATION
2	Dec. 14/18	EMBALMING ROOMS ADDED
1	AUG. 31/18	ISSUED FOR COSTING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

Hobin Architecture Incorporated
63 Parmilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com

HOBIN ARCHITECTURE

PROJECT/LOCATION:
HIGHLAND PARK REMEMBERANCE
2037 McGEE SIDE ROAD

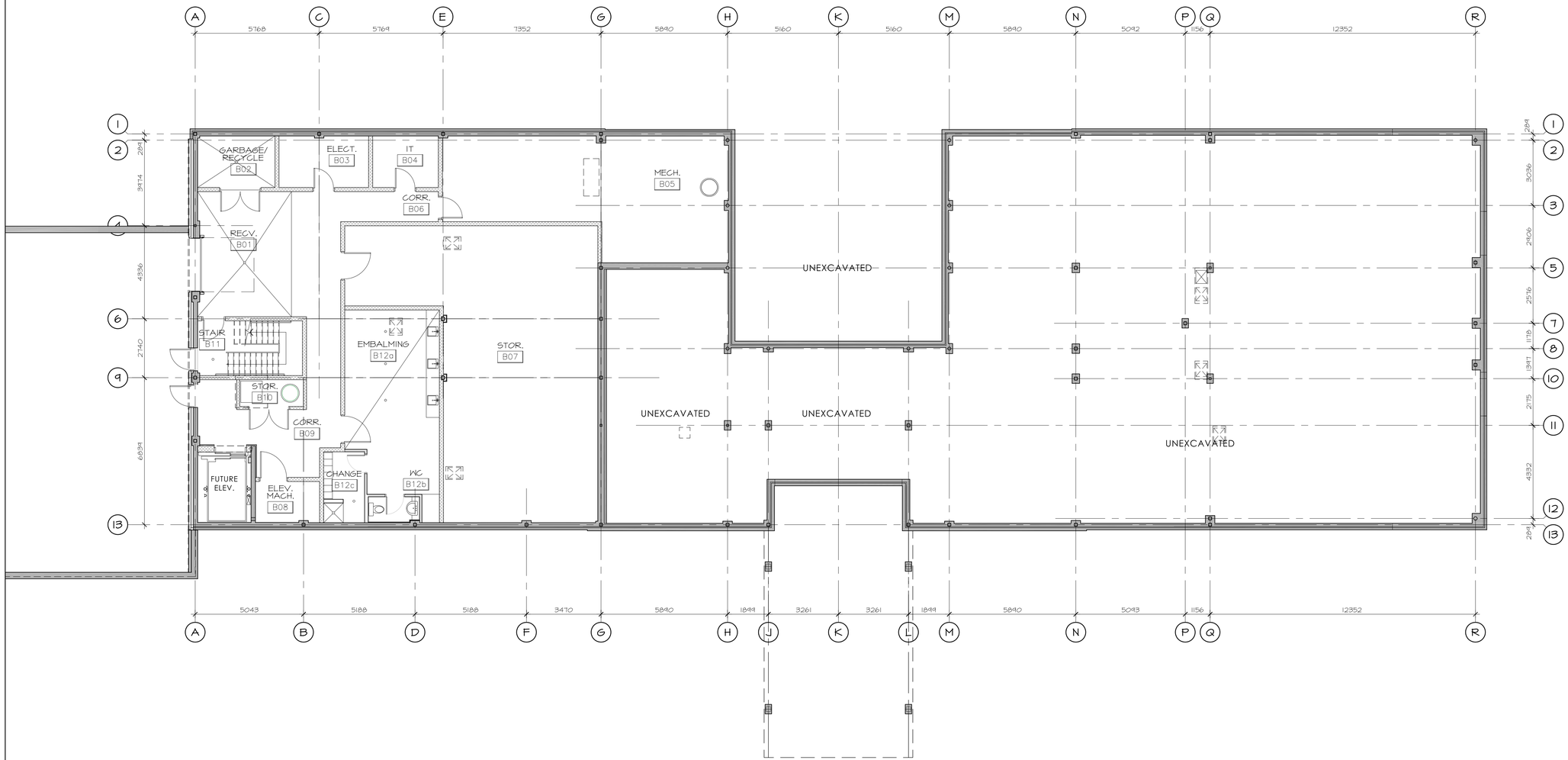
DRAWING TITLE:
GROUND FLOOR PLAN

DRAWN BY:	DATE:	SCALE:
BB	17/12/10	1:100

PROJECT: 1513

DRAWING NO.: A2.02

REVISION NO.:



Highland Park Cemetery

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Hobin Architecture Incorporated
63 Parmilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com

HOBIN ARCHITECTURE

PROJECT/LOCATION:
HIGHLAND PARK REMEMBERANCE
2037 McGEE SIDE ROAD

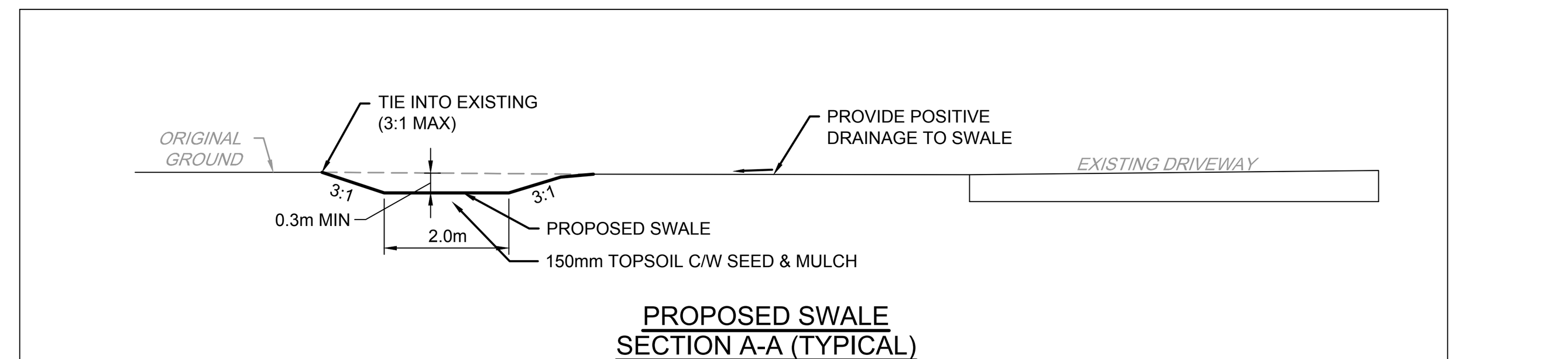
DRAWING TITLE:
BASEMENT FLOOR PLAN

DRAWN BY:	DATE:	SCALE:
BB	18/01/02	1:100

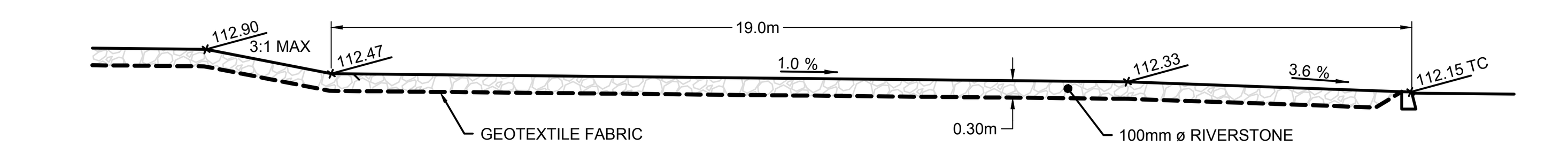
PROJECT: 1513

DRAWING NO.: A2.01

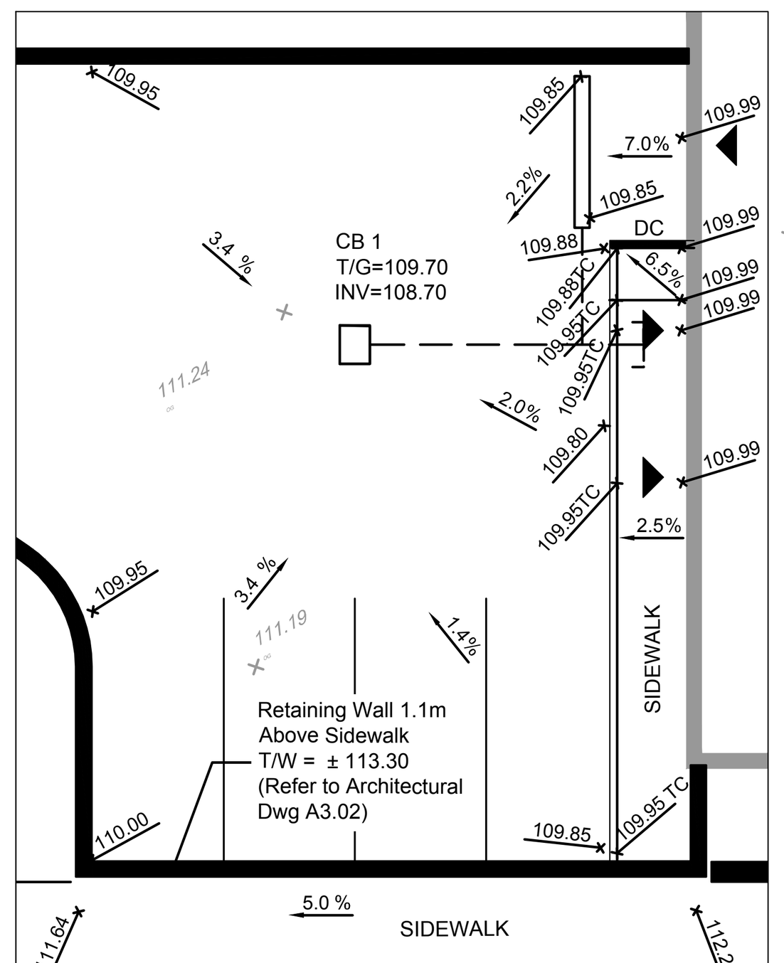
REVISION NO.:



PROPOSED SWALE
SECTION A-A (TYPICAL)
SCALE=1:100



RAIN GARDEN CROSS SECTION B-B
SCALE=1:100



INSET DETAIL
SCALE=1:150

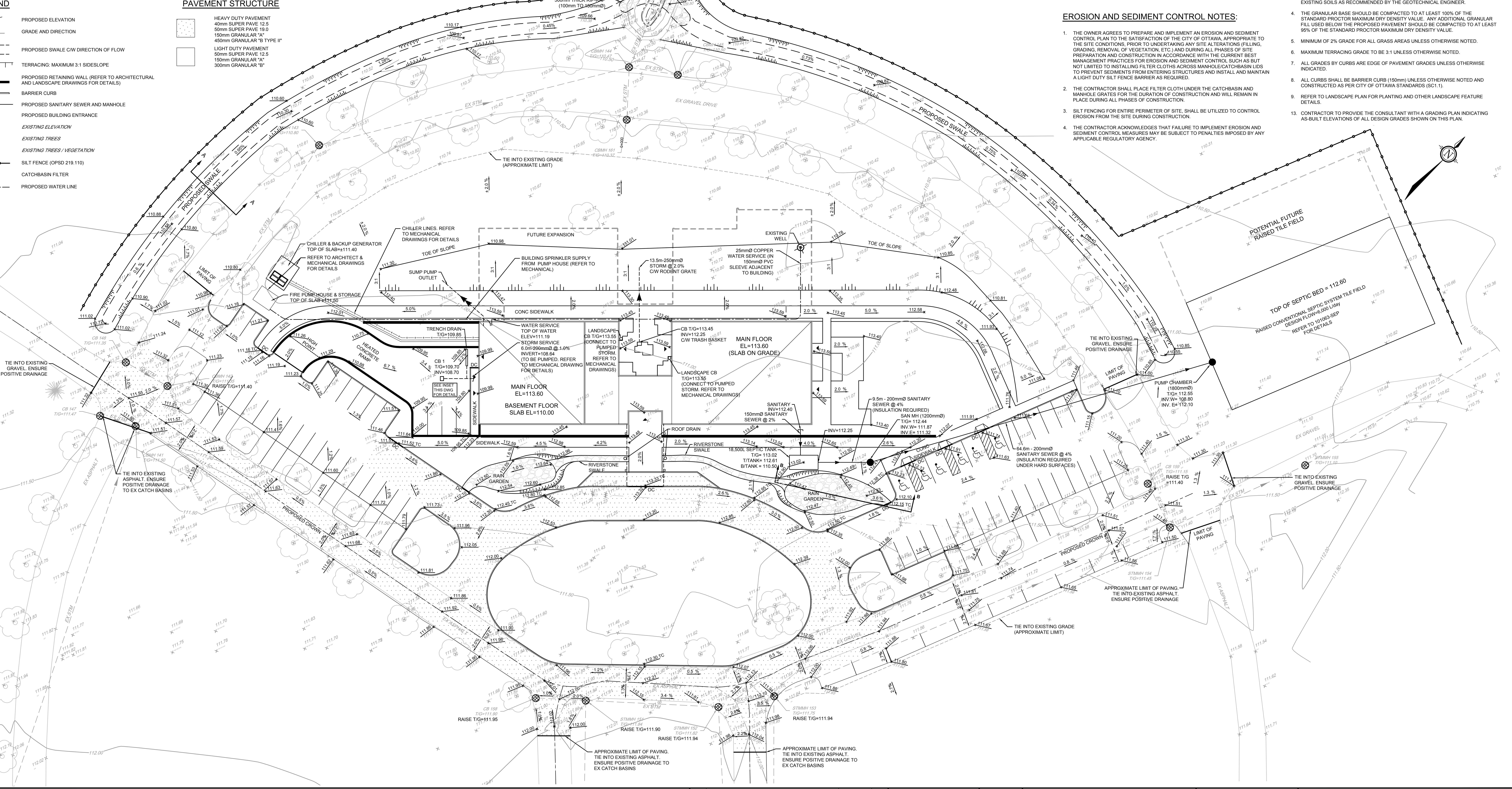
LEGEND

- PROPOSED ELEVATION
- GRADE AND DIRECTION
- PROPOSED SWALE C/W DIRECTION OF FLOW
- TERRACING: MAXIMUM 3:1 SIDESLOPE
- PROPOSED RETAINING WALL (REFER TO ARCHITECTURAL AND LANDSCAPE DRAWINGS FOR DETAILS)
- BARRIER CURB
- PROPOSED SANITARY SEWER AND MANHOLE
- PROPOSED BUILDING ENTRANCE
- *EXISTING ELEVATION*
- *EXISTING TREES*
- *EXISTING TREES / VEGETATION*
- SILT FENCE (OPSD 219.110)
- CATCHBASIN FILTER
- PROPOSED WATER LINE

PAVEMENT STRUCTURE

HEAVY DUTY PAVEMENT
40mm SUPER PAVE 12.5
50mm SUPER PAVE 19.0
150mm GRANULAR "A"
450mm GRANULAR "B TYPE II"

LIGHT DUTY PAVEMENT
50mm SUPER PAVE 12.5
150mm GRANULAR "A"
300mm GRANULAR "B"



GENERAL NOTES

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA, OTTAWA SEPTIC SYSTEM OFFICE (OSSO), MISSISSIPPI VALLEY CONSERVATION AUTHORITY (MVCA) AND THE MINISTRY OF THE ENVIRONMENT, CLIMATE AND PARKS (MECP) BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $2,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
9. REFER TO STORMWATER MANAGEMENT REPORT(R-2019-086) PREPARED BY NOVATECH, DATED JUNE 2019.
10. PROVIDE LINE/PARKING PAINTING.
11. TOPOGRAPHIC SURVEY PROVIDED BY NOVATECH.
12. MAINTAIN A MINIMUM COVER OF 2.4m OVER WATER SERVICE CONNECTION FROM WELL TO BUILDING.

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
SANITARY MANHOLE (1200Ø)	701.010	OPSD
SANITARY MANHOLE (1800Ø)	701.012	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A)		
COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

EROSION AND SEDIMENT CONTROL NOTES:

1. THE OWNER AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO INSTALLING FILTER CLOTHS ACROSS MANHOLE/CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.
2. THE CONTRACTOR SHALL PLACE FILTER CLOTH UNDER THE CATCHBASIN AND MANHOLE GRATES FOR THE DURATION OF CONSTRUCTION AND WILL REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION.
3. SILT FENCING FOR ENTIRE PERIMETER OF SITE, SHALL BE UTILIZED TO CONTROL EROSION FROM THE SITE DURING CONSTRUCTION.
4. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

KEY PLAN
N.T.S.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

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.

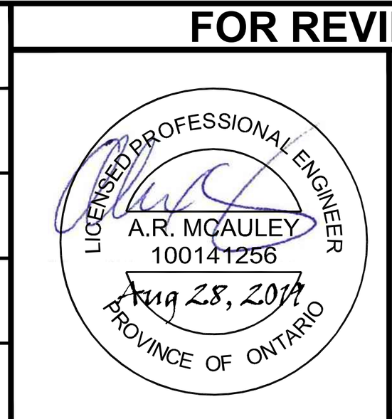
C:\temp\AcPublish_3224\101063-GR.dwg, GR, Aug 28, 2019 - 3:13pm, arongve

No.	REVISION	DATE	BY
4	REVISED PER COMMENTS	AUG 28/19	AAR
3	ISSUED FOR SITEPLAN APPLICATION	JUNE 03/19	ARM
2	ISSUED FOR COORDINATION	MAY 23/19	ARM
1	ISSUED FOR COORDINATION	MAY 02/19	ARM

SCALE
1:300
1:300
0 3 6 9 12

DESIGN LSC
CHECKED ARM
DRAWN LLW
CHECKED SMG
APPROVED ARM

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

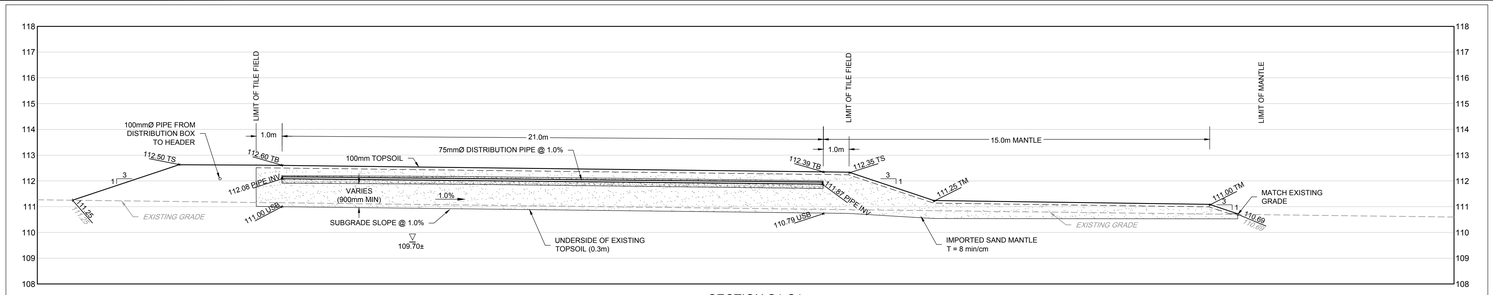
LOCATION
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

DRAWING NAME
GRADING AND SERVICING PLAN

PROJECT No. 101063
REV REV # 4
DRAWING No. 101063-GR

D07-12-19-0112

PLANB1.DWG - 1000mmx707mm



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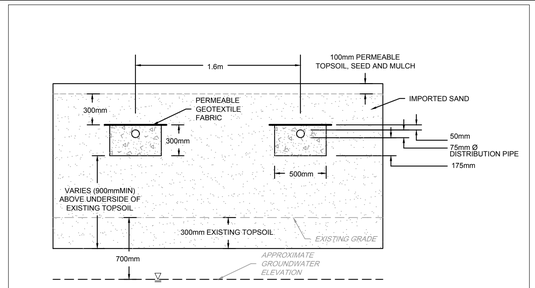

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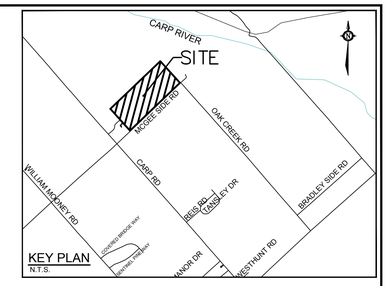

LEGEND

- 127.55 / 126.75 — PROPOSED ELEVATION / *EXISTING ELEVATION*
- 110.31 TS — PROPOSED TOP OF SLOPE ELEVATION
- 110.45 TB — PROPOSED TOP OF BED ELEVATION
- 109.15 TM — PROPOSED TOP OF MANTLE ELEVATION
- 108.80 INV — PROPOSED INVERT
- 108.52 USB — PROPOSED UNDERSIDE OF BED ELEVATION
- TERRACING: MAXIMUM 3:1 SIDESLOPE
- 2.0% — GRADE AND DIRECTION
- PROPOSED SANITARY SEWER AND MANHOLE

GENERAL NOTES

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA, OTTAWA SEPTIC SYSTEM OFFICE (OSSO), MISSISSIPPI VALLEY CONSERVATION AUTHORITY (MVCA) AND THE MINISTRY OF THE ENVIRONMENT, CLIMATE AND PARKS (MECP) BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $2,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
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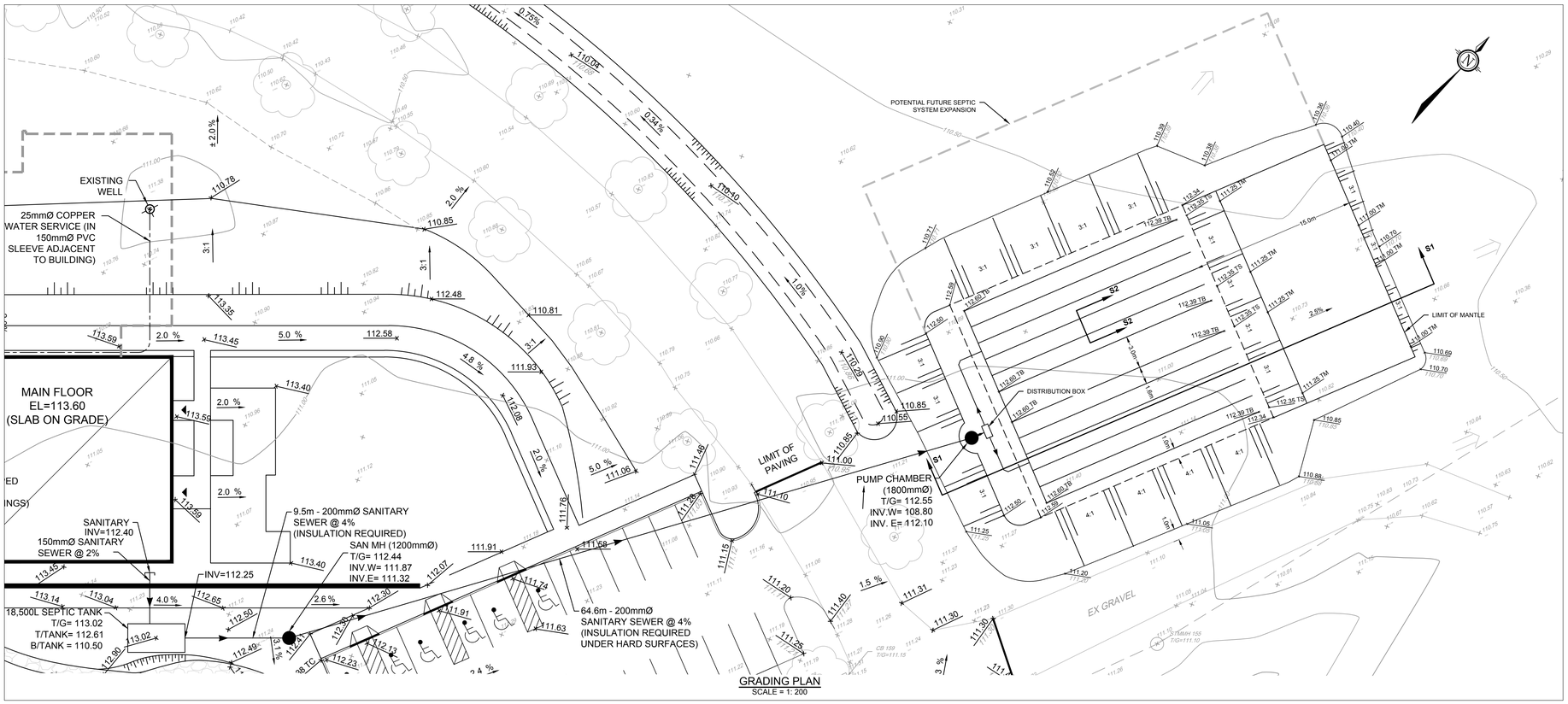
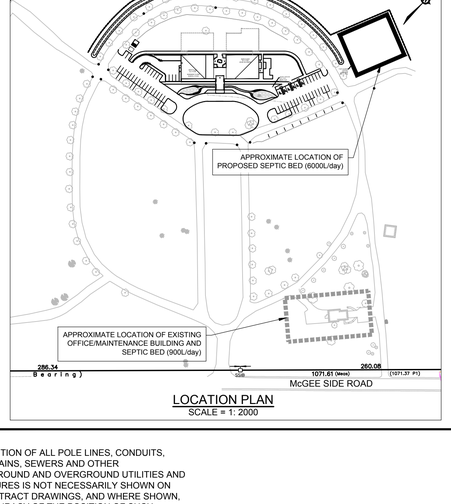
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
9. PROVIDE LINE/PARKING PAINTING.
10. TOPOGRAPHIC SURVEY PROVIDED BY NOVATECH.

SEPTIC SYSTEM NOTES

1. THE PROPOSED SEPTIC SYSTEM CONSISTS OF A SEPTIC TANK, MANHOLE, GRAVITY SEWER, LIFT PUMP AND AN ABSORPTION TRENCH LEACHING BED WHICH HAS BEEN DESIGNED BASED ON A SEWAGE FLOW OF 6000 L/DAY.
2. INSTALLATION IS TO BE IN ACCORDANCE WITH CURRENT ONTARIO BUILDING CODE REQUIREMENTS AND THE ENGINEER'S REPORT PREPARED BY NOVATECH, DATED MAY 2019.
3. ALL BENDS IN THE PIPE FROM THE BUILDING TO THE HEADER ARE TO BE 22.5 OR 45.0 DEGREES.
4. THE FOLLOWING SETBACKS ARE REQUIRED:
   - -TILE FIELD TO ANY DRILLED WELL = 18.0m (min)
   - -TILE TO PROPERTY LINE = 6.0m (min)
   - -SEPTIC TANK TO ANY DRILLED WELL= 15.0m (min)
   - -SEPTIC TANK TO BUILDING= 1.5m (min)
5. TANK SIZE = 18,500L
6. THE SEPTIC TANK IS TO BE FITTED WITH AN EFFLUENT FILTER IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
7. TANK LIDS ARE TO BE LEFT ACCESSIBLE FOR PUMPING.
8. A MANTLE IS REQUIRED IN THE DIRECTION OF THE SURFACE DRAINAGE FLOW. IMPORTED SAND MATERIAL IS REQUIRED. THE IMPORTED SAND, WHICH IS TO BE USED TO CONSTRUCT THE SEPTIC SYSTEM INCLUDING THE MANTLE, IS TO HAVE A PERCOLATION RATE OF 8 MIN/CM, WITH LESS THAN 8% SILT, TESTED AND APPROVED BEFORE PLACEMENT.
9. CONSTRUCTION TRAFFIC AND MATERIALS ARE TO BE KEPT AWAY FROM THE SEPTIC SYSTEM, INCLUDING THE MANTLE.
10. SEPTIC SYSTEM ELEVATIONS ARE NOT TO BE REVISED WITHOUT THE WRITTEN PERMISSION OF NOVATECH
11. NOVATECH'S DESIGN AND INSPECTION SERVICES DO NOT RELIEVE THE SEPTIC SYSTEM INSTALLER OF THE RESPONSIBILITY FOR GUARANTEEING WORKMANSHIP AND MATERIALS.
12. THE SEPTIC SYSTEM HAS BEEN DESIGNED TO TREAT DOMESTIC WASTE ONLY. THE FOLLOWING ARE NOT TO BE CONNECTED TO THE SEPTIC SYSTEM.
    - -WATER SOFTENER
    - -SUMP PUMP
    - -EAVESTROUGHS/ROOF DRAINS
    - -EMBALMING WASTE
    - -REFRIGERATION OR CONDENSING UNIT
13. INSTALLATION OF SEPTIC SYSTEM TO BE INSPECTED BY OTTAWA SEPTIC SYSTEM OFFICE (OSSO) AND NOVATECH
14. THE CONTRACTOR IS RESPONSIBLE FOR SURVEYING ASBUILT ELEVATIONS AND PROVIDING THE REQUIRED ASBUILT INFORMATION AND DRAWING(S) TO THE OSSO.



GRADING PLAN
SCALE = 1: 200



LOCATION PLAN
SCALE = 1: 2000

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	REVISED PER COMMENTS	AUG 28/19	AAR
1	ISSUED WITH SEPTIC SYSTEM DESIGN BRIEF	JUNE 3/19	ARM

SCALE 1:200

1:200
0 2 4 6 8

DESIGN LAB
CHECKED ARM
DRAWN LKS
CHECKED LAB
APPROVED SMG

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

LOCATION
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

DRAWING NAME
SEPTIC SYSTEM PLAN

PROJECT No. 101063
REV REV # 2
DRAWING No. 101063-SEP

D07-12-19-0112

Appendix C

Stormwater Management Calculations / Modelling

Highland Park Cemetery (101063)
Manning's Equation for Outlet Ditches

NOVATECH
Engineers, Planners & Landscape Architects

Parameter	Units	West Ditch Capacity		East Ditch Capacity		Outlet Ditch Capacity	
		Min Slope	Max Slope	Min Slope	Max Slope	Min Slope	Max Slope
Depth	m	0.30	0.30	0.30	0.30	1.50	1.25
Bottom Width	m	2.00	2.00	2.00	2.00	1.00	1.00
Side slope (L)	1 to X	3.0	3.0	3.0	3.0	3.0	3.0
Side slope (R)	1 to X	3.0	3.0	3.0	3.0	3.0	3.0
Top Width (L)	m	0.90	0.90	0.90	0.90	4.50	3.75
Top Width (R)	m	0.90	0.90	0.90	0.90	4.50	3.75
Top Width (total)	m	3.80	3.80	3.80	3.80	10.00	8.50
Area	m^2	0.870	0.870	0.870	0.870	8.250	5.938
Perimeter	m	3.90	3.90	3.90	3.90	10.49	8.91
R=A/P	m	0.22	0.22	0.22	0.22	0.79	0.67
n	-	0.045	0.045	0.045	0.045	0.045	0.045
Slope	m/m	0.0045	0.0128	0.0034	0.0100	0.0025	0.0200
V	**m/s**	**0.55**	**0.93**	**0.48**	**0.82**	**0.95**	**2.40**
Q	**m^3/s**	**0.48**	**0.80**	**0.41**	**0.71**	**7.81**	**14.24**

**Manning's equation for flat bottom ditch (refer to Drawing 101063-GR).*

Highland Park Cemetery (101063)
Infiltration Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Storage Provided for Infiltration and Retention Time

Location	Dimensions of Infiltration Systems				Retnetion Time		
	Height (m)	Bottom Area (m^2)	Assumed Void Ratio	Storage Volume (m^3)	Percolation Rate[1] (mm/hr)	Infiltration Rate (L/s)	Retention Time (hours)
Ammended Topsoil in Outlet Ditches	0.15	400	25%	15.0	1.0	0.11	37.5

[1] *Percolation rate for silty clay soils estimated by Gemtec.*

Location	Drainage Area to Infiltration Systems	Infiltration Criteria		Annual Infiltration			
		Annual Infiltration Requirement[1]	Volume to be Infiltrated Annually[2]	Infiltration Depth	% of Annual Rainfall (515mm) Infiltrated[3]	Amount of Annual Rainfall Infiltrated	Volume of Rainfall Infiltrated / Year
	(ha)	(mm/year)	(m^3/year)	(mm)	(%)	(mm/year)	(m^3/year)
Ammended Topsoil in Outlet Ditches	1.00	73	730	1.5	19%	95.9	959

[1] *Annual infiltration requirement from Carp River Subwatershed Study (Dec. 2004); for low recharge areas.*

[2] *Volume to be infiltrated = 73mm / year x total development area (1.00 ha).*

[3] *Based on 30-years (1971 - 2000) of daily climate data (May - October).*

Alex McAuley

From: Bryan Bonell <bbonell@hobinarc.com>
Sent: Friday, August 23, 2019 2:15 PM
To: Alex McAuley
Subject: Fwd: FW: Highland Park Visitation Centre - Infiltration Rate

Hi Alex,

Please see comments below from Gemtec.

Regards,

Bryan Bonell

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7

t 613-238-7200 x109
f 613-235-2005
e bbonell@hobinarc.com

hobinarc.com

-------- Forwarded Message --------
Subject:FW: Highland Park Visitation Centre – Infiltration Rate
Date: Fri, 23 Aug 2019 18:01:38 +0000
From: John Cholewa <johnathan.cholewa@gemtec.ca>
To:bbonell@hobinarc.com <bbonell@hobinarc.com>
CC: Andrius Paznekas <andrius.paznekas@gemtec.ca>

Hi Bryan,

Our comments on the infiltration rate are provided below.

GEMTEC
Consulting Engineers and Scientists

John Cholewa, Ph.D., P.Eng.
Geotechnical Engineer
Ottawa, ON
tel: 613.836.1422 x224 / toll-free: 1.877.243.6832
mobile: 613.229.7044 / fax: 613.836.9731

From: Andrius Paznekas <andrius.paznekas@gemtec.ca>
Sent: Friday, August 23, 2019 1:37 PM

To: John Cholewa <johnathan.cholewa@gemtec.ca>
Subject: Re: Highland Park Visitation Centre - Infiltration Rate

Good afternoon,

I have looked at the available information regarding the infiltration rates at the Highland Park Visitation Centre. My background assumptions are that the swales will be graded to approximately 0.50 metres below existing ground surface and the finished grade of the rain gardens will be approximately 1.0 metre above existing ground surface.

The site is primarily underlain by silty clay at depths ranging from approximately 0.8 to 2.0 metres (swales) and approx. 2.0m to 2.75 metres (rain gardens).

Estimated infiltration rates:

Silty clay = 1.0 mm/hour

Sandy Silt (i.e. clay loam) = 2.3 mm/hour

Glacial Till (i.e. sandy loam) = 26 mm/hour

Based on the grain size distribution curves available, the applied infiltration rate of 20 mm/hour is much greater than the silty clay or sandy silt at the site. If the near surface soils are removed (0.8 to 2.75 metres thick), the underlying glacial till may be able to provide infiltration at a rate of 20 mm/hour.

In-situ infiltration testing or additional grain size analyses of representative samples would be required in order to provide more accurate infiltration rates.

Regards,

Andrius

Andrius Paznekas, M.Sc.
Environmental Scientist
Ottawa, ON
tel: 613.836.1422 x237 / toll-free: 1.877.243.6832
mobile: 613.295.8425 / fax: 613.836.9731

From: Bryan Bonell <bbonell@hobinarc.com>
Sent: Monday, August 19, 2019 4:40 PM
To: John Cholewa <johnathan.cholewa@gemtec.ca>
Subject: Fwd: Highland Park Visitation Centre - Infiltration Rate

Hi John,

We have received the initial comments from the City on our Site Plan Control Submission. Please see the comments below from the site servicing consultant about some additional information the City has requested with respect to the infiltration rate assumed by Novatech.

Are you able to provide this information?

Thanks,
Bryan Bonell

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
t 613-238-7200 x109
f 613-235-2005
e bbonell@hobinarc.com

hobinarc.com

-------- Forwarded Message --------
Subject: Highland Park Visitation Centre
Date: Mon, 19 Aug 2019 19:27:21 +0000
From: Alex McAuley <a.mcauley@novatech-eng.com>
To: Bryan Bonell <bbonell@hobinarc.com>
CC: Danny Vaughan <d.vaughan@novatech-eng.com>, Susan Gordon <s.gordon@novatech-eng.com>

Bryan,
As discussed, one of the City's comments is that the existing soil infiltration rate was not provided in the Geotechnical Report. The geotechnical engineer will need to either provide this value, or confirm the rate Novatech used in our report. In the past, Gemtec has prepared a brief letter in support of the infiltration values used by Novatech (sample attached).

We are proposing to infiltrate some of the stormwater runoff via two 'rain gardens' at the front (south) of the building, and two swales around the perimeter of the existing roadway to the north. The attached Grading and Servicing Plan (101063-GR3, rev 3) has been marked up to indicate the areas where infiltration is proposed. Novatech estimated a percolation rate for the native silty sand soils of 20 mm/hr.

Please let us know if you or Gemtec has any questions.

Thank you,

Alex McAuley, P.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 Ext: 292 | Cell: 613.261.9166 | Fax: 613.254.5867

Government of Canada Gouvernement du Canada

Canada

Climate

Canadian Climate Normals 1971-2000 Station Data

The minimum number of years used to calculate these Normals is indicated by a code for each element. A "+" beside an extreme date indicates that this date is the first occurrence of the extreme value. Values and dates in bold indicate all-time extremes for the location.

Data used in the calculation of these Normals may be subject to further quality assurance checks. This may result in minor changes to some values presented here.

OTTAWA CDA * ONTARIO					
Latitude:	45°23'00.000" N	Longitude:	75°43'00.000" W	Elevation:	79.20 m
Climate ID:	6105976	WMO ID:		TC ID:	WCG

* This station meets WMO standards for temperature and precipitation.

▼ Temperature

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-10.5	-8.6	-2.4	6.0	13.6	18.4	21.0	19.7	14.7	8.2	1.5	-6.6	6.3	A
Standard Deviation	2.9	2.7	2.5	1.9	1.8	1.3	1.1	1.1	1.2	1.6	1.7	3.3	0.8	A
Daily Maximum (°C)	-6.1	-3.9	2.1	10.9	19.1	23.8	26.4	25.0	19.7	12.6	4.9	-2.9	11.0	A
Daily Minimum (°C)	-14.8	-13.2	-7.0	1.1	8.0	13.0	15.5	14.3	9.7	3.7	-1.9	-10.3	1.5	A
Extreme Maximum (°C)	11.7	12.2	25.6	31.2	35.0	36.7	37.8	**37.8**	36.7	29.4	23.3	16.1		
Date (yyyy/dd)	1932/14	1953/21	1945/28	1990/27	1921/21	1921/22	1913/04	**1917/01**	1931/11	1891/03	1961/03	1951/07		
Extreme Minimum (°C)	-37.8	-38.3	-36.7	-20.6	-7.2	0.0	3.3	1.7	-4.4	-12.8	-23.9	**-38.9**		
Date (yyyy/dd)	1925/19	1934/17	1938/04	1923/01	1902/10	1910/04	1942/10	1934/30	1947/28	1933/26	1925/30	**1933/29**		

▼ Precipitation

Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	22.9	16.1	33.6	59.7	80.9	91.2	88.9	87.6	86.8	76.2	60.5	28.8	733.2	A
Snowfall (cm)	49	41	32	7	0	0	0	0	0	3	18	52	203	A

Precipitation (mm)	64.2	51.6	64.9	67.7	81.0	91.2	88.9	87.6	86.8	79.1	77.0	74.1	914.2	A
Average Snow Depth (cm)	21	25	20	2	0	0	0	0	0	0	1	11	7	A
Median Snow Depth (cm)	21	25	20	1	0	0	0	0	0	0	1	10	7	A
Snow Depth at Month-end (cm)	23	26	9	0	0	0	0	0	0	0	4	16	7	A
Extreme Daily Rainfall (mm)	40.1	38.4	41.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	49.0	73.2		
Date (yyyy/dd)	1995/ 15	1997/ 21	1980/ 21	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1907/ 07	1933/ 31		
Extreme Daily Snowfall (cm)	**56**	46	48	33	19	0	0	0	0	22	53	38		
Date (yyyy/dd)	**1894/ 29**	1895/ 08	1947/ 02	1970/ 02	1907/ 04	1890/ 01	1890/ 01	1890/ 01	1890/ 01	1933/ 24	1912/ 25	1973/ 20		
Extreme Daily Precipitation (mm)	55.9	45.7	48.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	53.3	73.2		
Date (yyyy/dd)	1894/ 29	1895/ 08	1962/ 12	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1912/ 25	1933/ 31		
Extreme Snow Depth (cm)	53	**97**	89	66	8	0	0	0	0	18	30	51		
Date (yyyy/dd)	1971/ 30	**1971/ 24**	1971/ 12	1971/ 01	1963/ 11	1961/ 01	1961/ 01	1961/ 01	1961/ 01	1997/ 27	1995/ 28	1970/ 25		

▼ Days with Maximum Temperature

Days with Maximum Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
<= 0 °C	23.3	19.8	10.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	5.8	19.1	79.7	A
> 0 °C	7.7	8.5	20.1	29.1	31.0	30.0	31.0	31.0	30.0	31.0	24.2	11.9	285.5	A
> 10 °C	0.0	0.1	3.0	15.3	29.5	30.0	31.0	31.0	29.5	20.5	5.4	0.4	195.6	A
> 20 °C	0.0	0.0	0.1	2.6	12.8	24.1	29.8	27.4	13.6	2.6	0.1	0.0	113.2	A
> 30 °C	0.0	0.0	0.0	0.0	0.7	2.3	4.3	2.5	0.5	0.0	0.0	0.0	10.3	A
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	A

▼ Days with Minimum Temperature

Days with Minimum Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
> 0 °C	1.0	1.1	4.5	17.5	30.3	30.0	31.0	31.0	29.5	23.6	10.5	1.8	211.9	A

<= 2 °C	30.9	27.9	29.5	18.5	2.5	0.1	0.0	0.0	1.5	12.3	24.3	30.4	177.9	A
<= 0 °C	30.0	27.2	26.5	12.5	0.7	0.0	0.0	0.0	0.5	7.4	19.5	29.2	153.4	A
< -2 °C	29.0	25.6	21.9	7.0	0.2	0.0	0.0	0.0	0.0	2.7	13.1	26.2	125.7	A
< -10 °C	21.8	18.7	10.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.9	15.2	67.9	A
< -20 °C	8.6	5.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	18.9	A
< - 30 °C	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	A

▼ Days with Rainfall

Days with Rainfall														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 mm	3.9	3.3	6.3	10.8	13.4	12.9	12.4	12	14.1	13.7	10.7	5.1	118.5	A
>= 5 mm	1.5	1.1	2.1	4	5.3	5.2	5.1	4.9	5.3	4.7	3.7	2.1	45	A
>= 10 mm	0.73	0.47	1	1.9	2.7	3.1	3.1	2.6	2.8	2.3	1.9	1.1	23.9	A
>= 25 mm	0.23	0.07	0.20	0.30	0.37	0.80	0.70	0.83	0.63	0.47	0.40	0	5	A

▼ Days With Snowfall

Days With Snowfall														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 cm	14.8	10.6	8.2	2.7	0.17	0	0	0	0	1.1	5.5	13.4	56.6	A
>= 5 cm	3.4	2.7	2.6	0.37	0	0	0	0	0	0.10	1.2	3.6	13.9	A
>= 10 cm	0.80	0.93	0.83	0.17	0	0	0	0	0	0.07	0.40	1.4	4.6	A
>= 25 cm	0	0.13	0	0	0	0	0	0	0	0	0.03	0.07	0.23	A

▼ Days with Precipitation

Days with Precipitation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 mm	16.6	12.2	12.4	12.4	13.4	12.9	12.4	12.0	14.1	14.2	14.7	16.1	163.4	A
>= 5 mm	4.3	3.0	4.3	4.6	5.3	5.2	5.1	4.9	5.3	4.9	4.7	5.2	57.0	A
>= 10 mm	1.4	1.5	1.9	2.2	2.7	3.1	3.1	2.6	2.8	2.4	2.4	2.3	28.5	A
>= 25 mm	0.2	0.2	0.2	0.3	0.4	0.8	0.7	0.8	0.6	0.5	0.4	0.1	5.3	A

▼ Days with Snow Depth

Days with Snow Depth														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 1 cm	30.3	28	25.7	5.4	0.04	0	0	0	0	0.40	5.9	23.8	119.5	A
>= 5 cm	28.2	27.6	23.5	3.6	0	0	0	0	0	0.13	3.7	20.3	107.1	A
>= 10 cm	24.2	24.3	20.5	2.6	0	0	0	0	0	0.03	1.6	13.8	87	A
>= 20 cm	15.6	16.4	12.8	1.5	0	0	0	0	0	0	0.17	5.3	51.7	A

▼ Degree Days

Degree Days														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Above 24 °C	0	0	0	0	0.2	2.7	6.9	3.2	0.5	0	0	0	13.4	A

Above 18 °C	0	0	0	0.9	13	51	99.8	71.6	16.4	0.5	0	0	253	A
Above 15 °C	0	0	0	3.8	37.3	114.2	186.1	147.7	46.2	3.4	0	0	538.6	A
Above 10 °C	0	0	0.6	19.8	125.9	253.7	340.6	299.7	148.4	31.6	2.7	0	1222.8	A
Above 5 °C	0.1	0.3	8	76	266.3	403.2	495.6	454.7	291.1	115.3	21.1	0.8	2132.4	A
Above 0 °C	4.7	6.9	43.7	188.6	420.7	553.2	650.6	609.7	441	254.2	85.7	12.1	3270.9	A
Below 0 °C	329.8	249.1	118.9	8.5	0	0	0	0	0	0.3	39.8	217.5	963.9	A
Below 5 °C	480.2	383.8	238.2	46	0.7	0	0	0	0.1	16.5	125.2	361.2	1651.7	A
Below 10 °C	635.1	524.9	385.8	139.7	15.2	0.5	0	0	7.4	87.7	256.8	515.4	2568.5	A
Below 15 °C	790.1	666.2	540.2	273.7	81.6	11	0.5	3	55.3	214.5	404.1	670.4	3710.6	A
Below 18 °C	883.1	751	633.2	360.8	150.3	37.8	7.2	20	115.4	304.6	494.1	763.4	4520.8	A

▼ Soil Temperature

Soil Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
at 5 cm depth (AM obs) (°C)	-0.2	-0.7	-0.2	3.0	11.1	16.6	19.1	18.2	14.2	8.3	3.5	0.5	7.8	A
at 5 cm depth (PM obs) (°C)	-0.2	-0.6	-0.0	5.2	14.4	20.2	23.0	21.8	17.0	10.3	4.1	0.5	9.6	A
at 10 cm depth (AM obs) (°C)	0.0	-0.5	-0.1	3.2	11.2	16.7	19.2	18.4	14.6	8.8	3.8	0.8	8.0	A
at 10 cm depth (PM obs) (°C)	0.0	-0.4	0.0	4.7	13.6	19.4	22.1	21.1	16.6	10.2	4.2	0.8	9.4	A
at 20 cm depth (AM obs) (°C)	0.5	-0.1	0.3	3.4	11.5	17.0	19.6	19.0	15.3	9.7	4.6	1.4	8.5	A
at 20 cm depth (PM obs) (°C)	0.5	-0.0	0.3	4.1	12.6	18.3	21.0	20.2	16.2	10.2	4.8	1.4	9.1	A
at 50 cm depth (AM obs) (°C)	1.1	0.3	0.3	2.5	9.8	15.0	17.8	17.8	15.2	10.4	5.6	2.2	8.2	A
at 100 cm depth (AM obs) (°C)	2.9	2.0	1.6	2.5	7.6	12.3	15.2	16.2	15.0	11.7	7.8	4.5	8.3	A
at 150 cm depth (AM obs) (°C)	5.0	3.9	3.3	3.5	6.8	10.7	13.6	15.0	14.8	12.7	9.7	6.7	8.8	C
at 300 cm depth (AM obs) (°C)	7.0	5.9	5.1	4.6	5.7	8.1	10.4	12.1	12.9	12.3	10.7	8.7	8.6	A

▼ Evaporation

Evaporation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Lake Evaporation (mm)	0	0	0	0	3.6	4.3	4.5	3.7	2.4	1.4	0	0	0	C

▼ Bright Sunshine

Bright Sunshine														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Total Hours	101.2	129.8	159.8	189.4	230.3	253.3	276.8	246.7	171.5	136.7	83.6	82.0	2061.1	C
Days with measureable	21.6	22.3	24.7	25.5	27.9	28.6	30.2	29.7	26.5	25.8	20.9	19.7	303.4	C

% of possible daylight hours	35.7	44.3	43.3	46.8	50.0	54.1	58.4	56.5	45.5	40.2	29.1	30.1	44.5	C
Extreme Daily	8.9	10.4	11.6	13.5	14.9	**15.2**	15.0	14.0	12.7	10.6	9.6	8.1		A
Date (yyyy/dd)	1981/31	1974/26	1987/24	1974/26	1997/27	**1979/25**	1978/01	1978/05	1991/01	1976/01	1985/01	1979/30		

▼ Radiation

Radiation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Extreme Global - RF1 (MJ/m2)	11.4	16.7	22.6	27.9	31.3	32.5	30.8	28.8	23.6	17.2	11.7	8.7		
Date (yyyy/dd)	1994/31	1994/27	1994/30	1986/23	1990/30	1987/20	1996/01	1987/01	1991/01	1992/01	1985/01	1989/01		
Extreme Net - RF4 (MJ/m2)	2.6	1.8	11.8	15.3	17.7	19.3	19.3	15.7	12.5	7.8	3.7	1.7		
Date (yyyy/dd)	1988/31	1986/28	1996/31	1993/14	1987/15	1987/17	1997/16	1995/07	1996/01	1995/01	1988/03	1987/10		

Legend

- A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for **either** temperature **or** precipitation)
- B = At least 25 years
- C = At least 20 years
- D = At least 15 years

Date modified: 2014-07-09

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Time of Concentration Calculations

(Uplands Overland Flow Method)

	Subcatchment Parameters			Overland Flow[1]				Concentrated Flow[2]				Overall	
Area ID	Area (ha)	CN (HSG C/D)	Ia (mm)	Length (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Length (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Time of Concentration (min)	Min Time of Concentration[3] (min)
Existing Conditions													
EX01	8.88	79	6.8	100	0.5%	0.20	8.33	400	0.5%	0.32	20.83	29	29
Proposed Conditions													
A01	7.50	79	6.8	100	0.5%	0.20	8.33	350	0.5%	0.32	18.23	27	27
A02	0.37	77	7.6	50	0.5%	0.20	4.17	150	0.5%	0.32	7.81	12	12
B03	0.43	77	7.6	50	2.0%	0.40	2.08	100	1.0%	0.46	3.62	6	10
C03	0.45	77	7.6	50	2.0%	0.40	2.08	100	1.0%	0.46	3.62	6	10

[1] *Cultivated staight row*

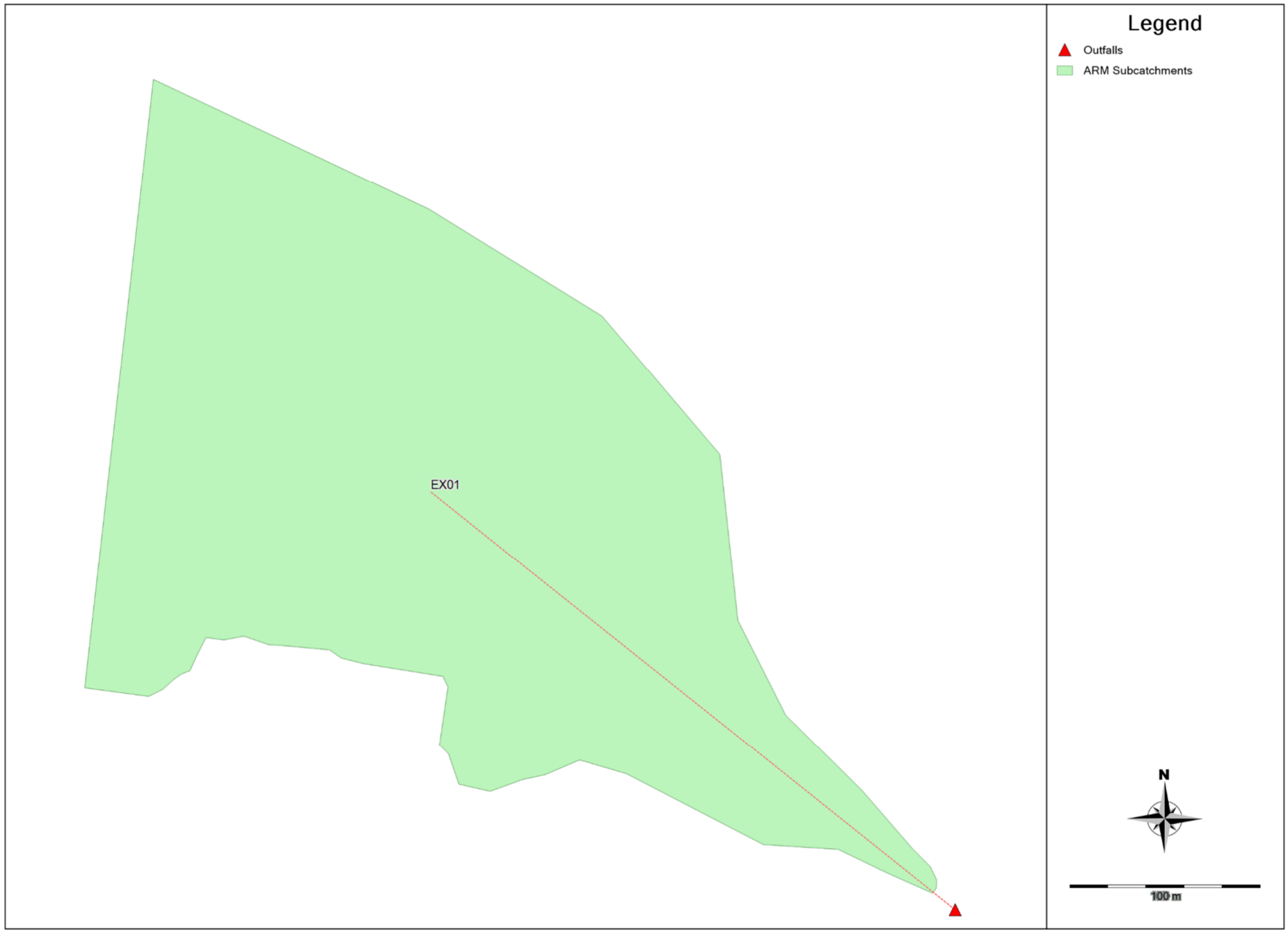
[2] *Grassed waterways*

[3] *Minimum 10-minutes*

Highland Park Cemetery (101063)
PCSWMM Model Schematic – Pre-Development

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic (Subcatchment IDs)

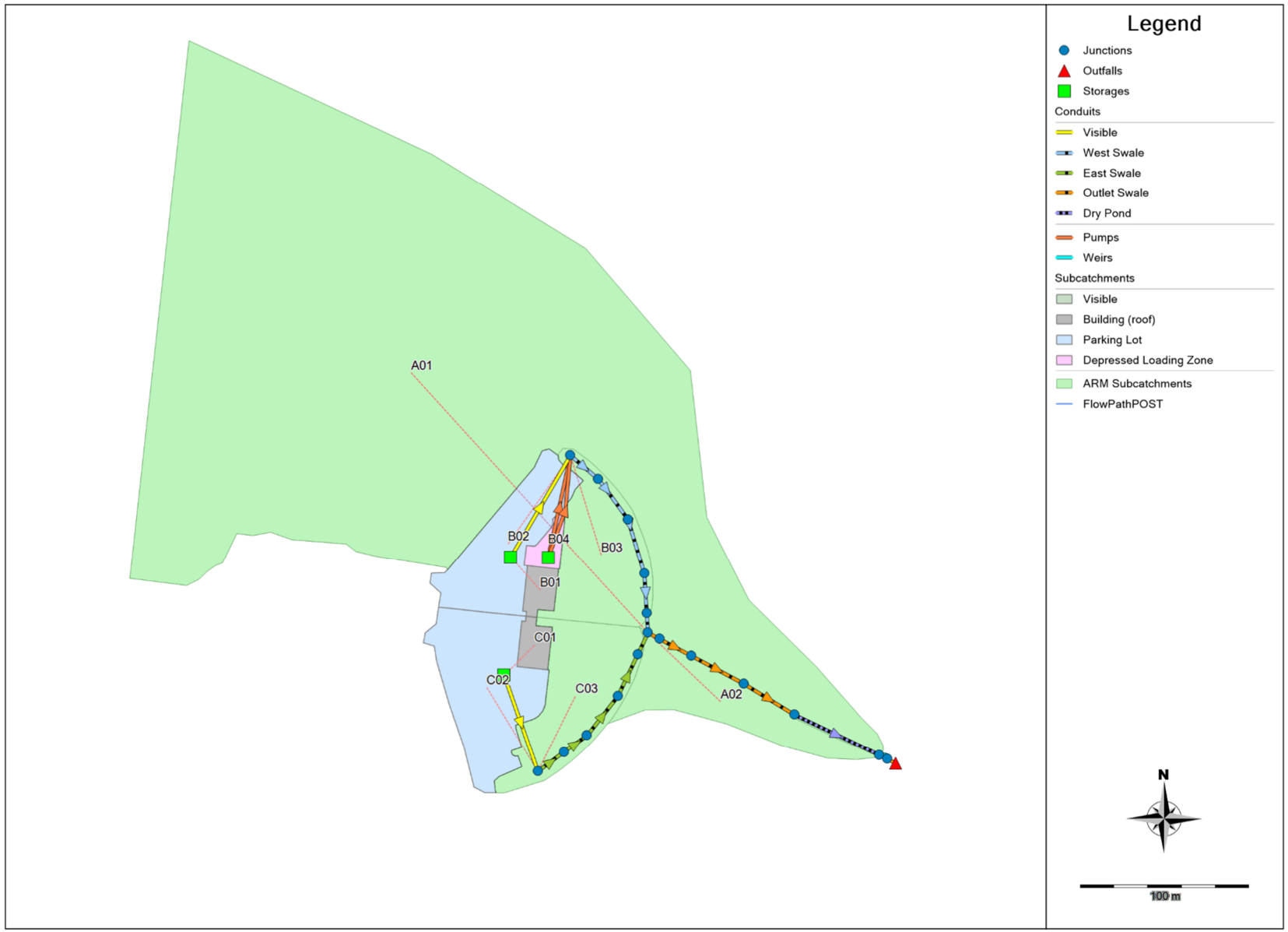


Date: 2019-05-31
M:\2001\101063\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematic(PRE).docx

Highland Park Cemetery (101063)
PCSWMM Model Schematic – Post-Development

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic (Subcatchment IDs)



Date: 2019-05-31
M:\2001\101063\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematic(POST).docx

```
ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM BETA VERSION 7.2.2780
---------------------------------------------------------------

This is a *BETA* version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:                 4/16/2019 00:00
Simulation end time:                   4/17/2019 00:00
Runoff wet weather time steps:         300 seconds
Report time steps:                     60 seconds
Number of data points:                 1441


*****************************
Unit Hydrographs Runoff Method
*****************************

-------------------------------------------------------------------------------------------------------------------------
                                                                    Area   Time of Concentration  Time to Peak    Time after Pea
Subcatchment         Runoff Method             Raingage             (ha)   (min)                 (min)           (min)
-------------------------------------------------------------------------------------------------------------------------
EX01                 Nash IUH                  Raingage             8.88   29                    19.33           125.67


******************
ARM Runoff Summary
******************

-------------------------------------------------------------------------------------
                     Total       Total       Total       Total       Peak        Runoff
                     Precip      Losses      Runoff      Runoff      Runoff      Coeff
Subcatchment         (mm)        (mm)        (mm)        10^6 ltr    LPS         (fraction)
-------------------------------------------------------------------------------------
EX01                 93.91       44.837      49.054      4.356       821.39      0.522



EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------


*************
Element Count
*************
```

```
Number of rain gages ...... 1
Number of subcatchments ... 0
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
-----------------------------------------------------------------------
Raingage             S12hr-100yr                  INTENSITY   30 min.


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
-----------------------------------------------------------------------------
OF1                  OUTFALL        107.90      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Surcharge Method ......... EXTRAN
Starting Date ............ 04/16/2019 00:00:00
```

```
Ending Date ..... 04/17/2019 00:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:01:00


**************************        Volume        Volume
Flow Routing Continuity       hectare-m      10^6 ltr
**************************    ---------     ---------
Dry Weather Inflow .......          0.000         0.000
Wet Weather Inflow .......          0.000         0.000
Groundwater Inflow .......          0.000         0.000
RDII Inflow ..............          0.000         0.000
External Inflow ..........          0.436         4.356
External Outflow .........          0.436         4.356
Flooding Loss ............          0.000         0.000
Evaporation Loss .........          0.000         0.000
Exfiltration Loss ........          0.000         0.000
Initial Stored Volume ....          0.000         0.000
Final Stored Volume ......          0.000         0.000
Continuity Error (%) .....          0.000


Analysis begun on:  Fri May 31 10:58:08 2019
Analysis ended on:  Fri May 31 10:58:08 2019
Total elapsed time: < 1 sec
```

```
ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM BETA VERSION 7.2.2780
--------------------------------------------------------------

This is a *BETA* version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:                  04/16/2019 00:00:00
Simulation end time:                    04/17/2019 00:00:00
Runoff wet weather time steps:          300 seconds
Report time steps:                      60 seconds
Number of data points:                  1441


******************************
Unit Hydrographs Runoff Method
******************************

-----------------------------------------------------------------------------------------------------------------------------
                                                                    Area   Time of Concentration  Time to Peak    Time after Pe
Subcatchment         Runoff Method             Raingage             (ha)   (min)                  (min)           (min)
-----------------------------------------------------------------------------------------------------------------------------
A01                  Nash IUH                  Raingage             7.56   27                     18              117
A02                  Nash IUH                  Raingage             0.37   12                     8               47
C03                  Nash IUH                  Raingage             0.45   10                     6.67            38.33
B03                  Nash IUH                  Raingage             0.43   10                     6.67            38.33


******************
ARM Runoff Summary
******************

-------------------------------------------------------------------------------------------
                     Total       Total       Total       Total       Peak        Runoff
                     Precip      Losses      Runoff      Runoff      Runoff      Coeff
Subcatchment         (mm)        (mm)        (mm)        10^6 ltr    LPS         (fraction)
-------------------------------------------------------------------------------------------
A01                  93.91       44.837      49.048      3.708       730.677     0.522
A02                  93.91       47.977      45.514      0.168       44.604      0.485
C03                  93.91       47.977      45.089      0.203       56.232      0.48
B03                  93.91       47.977      45.093      0.194       53.733      0.48


WARNING ARM01: Computed UH depth for ARM subcatchment C03 is not unity. Consider reducing wet weather time step.
WARNING ARM01: Computed UH depth for ARM subcatchment B03 is not unity. Consider reducing wet weather time step.
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

WARNING 02: maximum depth increased for Node Outlet_Structure01
WARNING 02: maximum depth increased for Node West_Swale01

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 5
Number of nodes ........... 21
Number of links ........... 22
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                               Data       Recording
Name                 Data Source                               Type       Interval
----------------------------------------------------------------------------------
Raingage             S12hr-100yr                               INTENSITY   30 min.


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
B01                        0.05     33.33    100.00    0.5000 Raingage             West_Infil
B02                        0.37    140.00     93.00    0.5000 Raingage             West_Swale01
B04                        0.05     30.00     95.00    0.5000 Raingage             Pump_Storage
C01                        0.05     33.33    100.00    0.5000 Raingage             East_Infil
C02                        0.48     80.00     93.00    0.5000 Raingage             East_Swale01


************
Node Summary
************
                                          Invert      Max.    Ponded    External
Name                 Type                  Elev.     Depth      Area    Inflow
```

Dry_Pond01	JUNCTION	107.96	1.45	0.0
East_Swale01	JUNCTION	110.29	1.00	0.0
East_Swale02	JUNCTION	110.10	1.00	0.0
East_Swale03	JUNCTION	110.04	1.00	0.0
East_Swale04	JUNCTION	109.82	1.00	0.0
East_Swale05	JUNCTION	109.62	1.00	0.0
Outlet_Structure01	JUNCTION	107.75	1.45	0.0
Outlet_Structure02	JUNCTION	107.72	1.48	0.0
Outlet_Swale01	JUNCTION	109.00	1.50	0.0
Outlet_Swale02	JUNCTION	108.63	1.00	0.0
Outlet_Swale03	JUNCTION	108.18	1.02	0.0
Outlet_Swale04	JUNCTION	108.05	1.15	0.0
West_Swale01	JUNCTION	110.72	1.00	0.0
West_Swale02	JUNCTION	110.58	1.00	0.0
West_Swale03	JUNCTION	110.30	1.00	0.0
West_Swale04	JUNCTION	109.87	1.00	0.0
West_Swale05	JUNCTION	109.66	1.00	0.0
Out-Site	OUTFALL	107.70	1.00	0.0
East_Infil	STORAGE	110.84	0.50	0.0
Pump_Storage	STORAGE	109.70	0.30	0.0
West_Infil	STORAGE	111.27	0.50	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
Control_Pipe	Outlet_Structure01	Outlet_Structure02	CONDUIT	7.0	0.4286	0.0130
Dry_Pond01	Dry_Pond01	Outlet_Structure01	CONDUIT	50.0	0.4200	0.0450
East_Infil	East_Infil	East_Swale01	CONDUIT	5.0	1.0001	0.0150
East_Swale01	East_Swale01	East_Swale02	CONDUIT	19.3	0.9845	0.0450
East_Swale02	East_Swale02	East_Swale03	CONDUIT	16.8	0.3571	0.0450
East_Swale03	East_Swale03	East_Swale04	CONDUIT	29.8	0.7383	0.0450
East_Swale04	East_Swale04	East_Swale05	CONDUIT	27.4	0.7299	0.0450
East_Swale05	East_Swale05	Outlet_Swale01	CONDUIT	14.3	0.8392	0.0450
Outlet_Swale01	Outlet_Swale01	Outlet_Swale02	CONDUIT	8.0	4.6300	0.0450
Outlet_Swale02	Outlet_Swale02	Outlet_Swale03	CONDUIT	22.0	2.0459	0.0450
Outlet_Swale03	Outlet_Swale03	Outlet_Swale04	CONDUIT	35.0	0.3714	0.0450
Outlet_Swale04	Outlet_Swale04	Dry_Pond01	CONDUIT	35.0	0.2571	0.0450
Site_Outlet	Outlet_Structure02	Out-Site	CONDUIT	4.0	0.5000	0.0450
West_Infil	West_Infil	West_Swale01	CONDUIT	5.0	1.0001	0.0150
West_Swale01	West_Swale01	West_Swale02	CONDUIT	21.5	0.6512	0.0450
West_Swale02	West_Swale02	West_Swale03	CONDUIT	30.0	0.9334	0.0450
West_Swale03	West_Swale03	West_Swale04	CONDUIT	33.5	1.2837	0.0450
West_Swale04	West_Swale04	West_Swale05	CONDUIT	23.7	0.8861	0.0450
West_Swale05	West_Swale05	Outlet_Swale01	CONDUIT	11.5	1.3914	0.0450
Pump1	Pump_Storage	West_Swale01	TYPE3 PUMP			
Pump2	Pump_Storage	West_Swale01	TYPE3 PUMP			
Control_Weir	Outlet_Structure01	Outlet_Structure02	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
Control_Pipe	CIRCULAR	0.30	0.07	0.07	0.30	1	63.31
Dry_Pond01	Dry_Pond	1.45	19.32	0.99	18.95	1	27670.07
East_Infil	RECT_OPEN	0.20	0.60	0.18	3.00	1	1258.57
East_Swale01	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	7848.71
East_Swale02	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	4727.29
East_Swale03	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	6796.71
East_Swale04	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	6758.26
East_Swale05	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	7246.36
Outlet_Swale01	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	17020.72
Outlet_Swale02	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	11314.36
Outlet_Swale03	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	4820.91
Outlet_Swale04	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	4011.23
Site_Outlet	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	5593.42
West_Infil	RECT_OPEN	0.20	0.60	0.18	3.00	1	1258.57
West_Swale01	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	6383.21
West_Swale02	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	7642.18
West_Swale03	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	8962.30
West_Swale04	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	7446.18
West_Swale05	TRAPEZOIDAL	1.00	5.00	0.60	8.00	1	9330.86

****
Transect Summary
****

Transect Dry_Pond
Area:

0.0016	0.0035	0.0057	0.0081	0.0108
0.0151	0.0236	0.0365	0.0533	0.0712
0.0893	0.1077	0.1263	0.1452	0.1644
0.1838	0.2035	0.2235	0.2437	0.2642
0.2849	0.3059	0.3272	0.3487	0.3705

```
            0.3925     0.4149     0.4374     0.4603     0.4833
            0.5067     0.5303     0.5542     0.5783     0.6027
            0.6274     0.6523     0.6775     0.7029     0.7286
            0.7546     0.7808     0.8073     0.8340     0.8610
            0.8883     0.9158     0.9436     0.9717     1.0000
Hrad:
            0.0268     0.0500     0.0711     0.0906     0.1090
            0.0678     0.0639     0.0705     0.0870     0.1144
            0.1414     0.1680     0.1943     0.2201     0.2457
            0.2709     0.2958     0.3204     0.3447     0.3688
            0.3925     0.4160     0.4393     0.4623     0.4851
            0.5077     0.5301     0.5523     0.5742     0.5960
            0.6176     0.6390     0.6603     0.6814     0.7023
            0.7230     0.7437     0.7641     0.7845     0.8047
            0.8247     0.8447     0.8645     0.8842     0.9038
            0.9232     0.9426     0.9618     0.9810     1.0000
Width:
            0.0620     0.0711     0.0803     0.0895     0.0987
            0.2250     0.3758     0.5265     0.6235     0.6327
            0.6419     0.6511     0.6603     0.6694     0.6786
            0.6878     0.6970     0.7062     0.7154     0.7245
            0.7337     0.7429     0.7521     0.7613     0.7704
            0.7796     0.7888     0.7980     0.8072     0.8164
            0.8255     0.8347     0.8439     0.8531     0.8623
            0.8715     0.8806     0.8898     0.8990     0.9082
            0.9174     0.9265     0.9357     0.9449     0.9541
            0.9633     0.9725     0.9816     0.9908     1.0000


************************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
************************************************************

***************
Analysis Options
***************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
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  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 04/16/2019 00:00:00
Ending Date .............. 04/17/2019 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.094        93.910
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.004         3.948
Surface Runoff ...........         0.089        88.979
Final Storage ............         0.001         1.319
Continuity Error (%) .....        -0.357


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.089         0.886
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.427         4.273
External Outflow .........         0.514         5.138
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.002         0.021
Continuity Error (%) .....         0.000


**************************
```

```
Time-Step Critical Elements
***************************
Link Control_Pipe (72.29%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.86 sec
Average Time Step           :     2.61 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :    -0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.00


**************************
Subcatchment Runoff Summary
**************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
B01	93.91	0.00	0.00	0.00	94.20	0.00	94.20	0.05	11.16	1.003
B02	93.91	0.00	0.00	4.43	86.19	2.18	88.37	0.33	81.60	0.941
B04	93.91	0.00	0.00	3.15	87.98	1.57	89.56	0.04	10.18	0.954
C01	93.91	0.00	0.00	0.00	94.20	0.00	94.20	0.05	11.16	1.003
C02	93.91	0.00	0.00	4.47	86.17	2.13	88.30	0.42	105.83	0.940

```
******************
Node Depth Summary
******************
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Dry_Pond01	JUNCTION	0.36	1.09	109.05	0 06:50	1.09
East_Swale01	JUNCTION	0.02	0.14	110.43	0 06:30	0.14
East_Swale02	JUNCTION	0.03	0.18	110.28	0 06:30	0.18
East_Swale03	JUNCTION	0.03	0.15	110.19	0 06:30	0.15
East_Swale04	JUNCTION	0.03	0.15	109.97	0 06:30	0.15
East_Swale05	JUNCTION	0.03	0.16	109.78	0 06:31	0.16
Outlet_Structure01	JUNCTION	0.49	1.30	109.05	0 06:50	1.30
Outlet_Structure02	JUNCTION	0.10	0.29	108.01	0 06:50	0.29
Outlet_Swale01	JUNCTION	0.05	0.24	109.24	0 06:33	0.24
Outlet_Swale02	JUNCTION	0.09	0.43	109.06	0 06:49	0.43
Outlet_Swale03	JUNCTION	0.25	0.87	109.05	0 06:50	0.87
Outlet_Swale04	JUNCTION	0.32	1.00	109.05	0 06:50	1.00
West_Swale01	JUNCTION	0.03	0.14	110.86	0 06:30	0.14
West_Swale02	JUNCTION	0.02	0.14	110.72	0 06:30	0.14
West_Swale03	JUNCTION	0.02	0.12	110.42	0 06:30	0.12
West_Swale04	JUNCTION	0.02	0.13	110.00	0 06:31	0.13
West_Swale05	JUNCTION	0.03	0.13	109.79	0 06:31	0.13
Out-Site	OUTFALL	0.06	0.22	107.92	0 06:50	0.22
East_Infil	STORAGE	0.27	0.31	111.15	0 06:15	0.31
Pump_Storage	STORAGE	0.04	0.24	109.94	0 06:35	0.24
West_Infil	STORAGE	0.27	0.31	111.58	0 06:15	0.31

```
******************
Node Inflow Summary
******************
```

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Dry_Pond01	JUNCTION	0.00	838.95	0 06:40	0	5.14	-0.068
East_Swale01	JUNCTION	162.04	173.21	0 06:30	0.627	0.662	-0.005
East_Swale02	JUNCTION	0.00	173.00	0 06:30	0	0.662	-0.000
East_Swale03	JUNCTION	0.00	172.57	0 06:30	0	0.662	-0.006
East_Swale04	JUNCTION	0.00	172.15	0 06:30	0	0.662	0.005
East_Swale05	JUNCTION	0.00	171.68	0 06:30	0	0.662	0.009
Outlet_Structure01	JUNCTION	0.00	781.36	0 06:47	0	5.14	0.096
Outlet_Structure02	JUNCTION	0.00	772.82	0 06:50	0	5.14	0.000
Outlet_Swale01	JUNCTION	764.14	1002.39	0 06:33	3.88	5.14	-0.003
Outlet_Swale02	JUNCTION	0.00	1002.43	0 06:33	0	5.14	-0.024
Outlet_Swale03	JUNCTION	0.00	1002.34	0 06:33	0	5.14	-0.003
Outlet_Swale04	JUNCTION	0.00	932.78	0 06:33	0	5.14	0.008

West_Swale01	JUNCTION	135.32	149.49	0	06:30	0.521	0.6	-0.007
West_Swale02	JUNCTION	0.00	149.23	0	06:30	0	0.6	-0.002
West_Swale03	JUNCTION	0.00	148.77	0	06:30	0	0.6	0.002
West_Swale04	JUNCTION	0.00	148.35	0	06:30	0	0.6	0.002
West_Swale05	JUNCTION	0.00	148.00	0	06:31	0	0.6	0.005
Out-Site	OUTFALL	0.00	772.82	0	06:50	0	5.14	0.000
East_Infil	STORAGE	11.16	11.16	0	06:15	0.0471	0.0471	-0.006
Pump_Storage	STORAGE	10.18	10.18	0	06:30	0.0412	0.0412	-0.003
West_Infil	STORAGE	11.16	11.16	0	06:15	0.0471	0.0471	-0.003

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
East_Infil	0.010	88	0	0	0.012	100	0 06:04	11.16
Pump_Storage	0.002	10	0	0	0.012	64	0 06:35	3.00
West_Infil	0.008	90	0	0	0.009	100	0 06:04	11.16

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	LPS	LPS	10^6 ltr
Out-Site	85.68	156.32	772.82	5.138
System	85.68	156.32	772.82	5.138

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
Control_Pipe	CONDUIT	212.59	0 06:50	3.02	3.36	0.98
Dry_Pond01	CHANNEL	781.36	0 06:47	0.18	0.03	0.82
East_Infil	CONDUIT	11.16	0 06:15	0.33	0.01	0.06
East_Swale01	CONDUIT	173.00	0 06:30	0.44	0.02	0.16
East_Swale02	CONDUIT	172.57	0 06:30	0.42	0.04	0.16
East_Swale03	CONDUIT	172.15	0 06:30	0.47	0.03	0.15
East_Swale04	CONDUIT	171.68	0 06:30	0.45	0.03	0.16
East_Swale05	CONDUIT	171.36	0 06:31	0.58	0.02	0.12
Outlet_Swale01	CONDUIT	1002.43	0 06:33	1.33	0.06	0.32
Outlet_Swale02	CONDUIT	1002.34	0 06:33	0.73	0.09	0.65
Outlet_Swale03	CONDUIT	932.78	0 06:33	0.50	0.19	0.94
Outlet_Swale04	CONDUIT	838.95	0 06:40	0.49	0.21	1.00
Site_Outlet	CONDUIT	772.82	0 06:50	1.10	0.14	0.25
West_Infil	CONDUIT	11.16	0 06:15	0.33	0.01	0.06
West_Swale01	CONDUIT	149.23	0 06:30	0.44	0.02	0.14
West_Swale02	CONDUIT	148.77	0 06:30	0.50	0.02	0.13
West_Swale03	CONDUIT	148.35	0 06:30	0.50	0.02	0.12
West_Swale04	CONDUIT	148.00	0 06:31	0.48	0.02	0.13
West_Swale05	CONDUIT	147.83	0 06:31	0.63	0.02	0.10
Pump1	PUMP	3.00	0 06:01		1.00	
Pump2	PUMP	0.00	0 00:00		0.00	
Control_Weir	WEIR	560.23	0 06:50			0.69

****
Flow Classification Summary
****

	Adjusted	---------- Fraction of Time in Flow Class ----------

Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
Control_Pipe	1.00	0.04	0.00	0.00	0.11	0.85	0.00	0.00	0.00	0.00
Dry_Pond01	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.65	0.00
East_Infil	1.00	0.35	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00
East_Swale01	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.94	0.00
East_Swale02	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
East_Swale03	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.76	0.00
East_Swale04	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.92	0.00
East_Swale05	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
Outlet_Swale01	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.93	0.00
Outlet_Swale02	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.84	0.00
Outlet_Swale03	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.70	0.00
Outlet_Swale04	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.65	0.00
Site_Outlet	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00
West_Infil	1.00	0.33	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00
West_Swale01	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.49	0.00
West_Swale02	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.48	0.00
West_Swale03	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.93	0.00
West_Swale04	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.89	0.00
West_Swale05	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
Control_Pipe	0.01	6.38	0.01	6.50	0.01
Outlet_Swale04	0.01	0.01	0.61	0.01	0.01

****
Pumping Summary
****

Pump	Percent Utilized	Number of Start-Ups	Min Flow LPS	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Low	% Time Off Curve High
Pump1	48.45	1	0.00	1.30	3.00	0.041	0.11	0.0	100.0
Pump2	0.00	0	0.00	0.00	0.00	0.000	0.00	0.0	0.0

Analysis begun on: Fri May 31 10:40:17 2019
Analysis ended on: Fri May 31 10:40:18 2019
Total elapsed time: 00:00:01

Drawings

CONSULTANTS:

PROPERTY OWNER:
PINECREST REMEMBRANCE SERVICES LTD.
2500 BASELINE ROAD
OTTAWA, ON K2C 3H9
(613) 831-7122

ARCHITECT:
HOBIN ARCHITECTURE INCORPORATED
63 PAMILLA STREET
OTTAWA ON K1S 3K7
613-238-7200

SITE SERVICING:
NOVATECH ENGINEERING CONSULTANTS LTD.
SUITE 200
240 MICHAEL COWPLAND DRIVE
OTTAWA, ON K2M 1P6
(613) 254-9643

LANDSCAPE
CATHERINE H. KIRK
LANDSCAPE ARCHITECT
1374 CONCESSION 10
FORMOSA ON N0G 1W0
(519) 623-9324

SOILS & ENVIRONMENTAL:
GEMTEC CONSULTING ENGINEERS & SCIENTISTS
32 STEACIE DRIVE
OTTAWA, ONTARIO, K2K 2A9
(613) 836-1422

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110 COLONNADE ROAD, UNIT #10
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MECHANICAL:
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SUITE 460 - 505 MARCH ROAD
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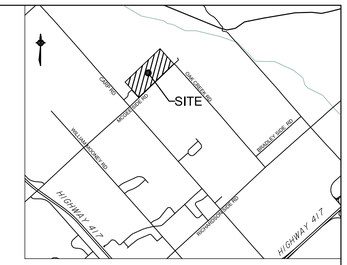
(613) 254-5566

ELECTRICAL:
WSP
2611 QUEENSVIEW DR.
OTTAWA ON K2B 8K2
(613) 690-3752

STRUCTURAL:
DAIDO STRUCTURAL ENGINEERS
#11 - 300 EARL GREY DRIVE
SUITE 213
OTTAWA ON K2T 1C1
(613) 302-8472



LOCATION PLAN

EX. GRAVEL ROADWAY

EX. GRAVEL ROADWAY

+/- 313.093 TO EDGE OF DRAINAGE DITCH

EX. GRAVEL ROADWAY

GENERATOR & TANK ON CONC. PAD

CHILLER ON CONC. PAD

PROPANE TANK ON CONC. PAD

FIRE PUMP & WATER RESERVOIR SEE 6 & 7 ON A4.01

SEE CIVIL DWGS FOR EXTENT OF PAVING

NOTE: REFER ALSO TO BUILDING SECTIONS AND ELEVATIONS FOR TOP AND BOTTOM OF RETAINIG WALL ELEVATIONS

SUMP PUMP OUTLET

LINE OF FUTURE SECOND PHASE

LINE OF FUTURE SECOND PHASE

2 A3.01 FUTURE PATIO/GARDEN

1 A3.02

CONCRETE SIDEWALK

LANDSCAPE RETAINING WALL

CONCRETE SIDEWALK

CONCRETE SIDEWALK

RETAINING WALL

GARBAGE/ RECYCLING ROOM

LAND CB COURT YARD (SEE LANDSCAPE)

CB

4 A4.01

LAND CB

RECEIVING AT BASEMENT LEVEL

CONCRETE SIDEWALK

MAINTENANCE EDGE

2 A3.02

HEATED RAMP

RETAINING WALL

TRENCH DRAIN

F.H.

3 A3.02

CONC. SIDEWALK

PATIO/ GARDEN (SEE LANDSCAPE)

END OF CONC. CURB

SANITARY SEWER

TACTILE WALKING SURFACE INDICATOR

CURB RAMP

A.C.

A.C.

CONCRETE SIDEWALK

SEE CIVIL DWGS FOR EXTENT OF PAVING

ASPHALT PAVING

TREES TO BE REMOVED/ RELOCATED

FIRE DEPT. CONN

MAIN ENTRANCE

LANDSCAPE WALL

LANDSCAPED AREA

LANDSCAPED AREA

LANDSCAPE WALL

CONCRETE SIDEWALK

LANDSCAPE AREA AROUND TREES

ASPHALT PAVING - SEE CIVIL DWGS

RETAINING WALL

1 A3.01

PROPOSED WELL

4 A4.02

3 A3.01

DEPRESSED CURB

CANOPY ABOVE

SEPTIC TANK

SAN MH

DROP OFF / LAYBY

CONT. ROLL OVER CURB

F.R.

FIRE DEPARMENT ACCESS

FIRE DEPARMENT ACCESS

F.R.

R = 29780

R = 29780

F.R.

4800

LANDSCAPE STEPS

EDGE OF ASPHALT (HEAVY DUTY)

F.R.

TREE TO BE REMOVED/ RELOCATED

F.R.

F.R.

F.R.

F.R.

SEE CIVIL DWGS FOR EXTENT OF NEW PAVING

BOLLARDS

LINE OF EX. GRAVEL ROAD

ASPHALT PAVING OVER EX. GRAVEL - SEE CIVIL DWGS

NEW ASPHALT PAVING

LINE OF EX. GRAVEL ROAD

SCALE 0m 2m 4m 10m / 1m 3m 5m

LEGAL SURVEY INFORMATION TAKEN FROM:

PLAN OF SURVEY OF

PART OF LOT 11
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF HUNTLEY
CITY OF OTTAWA
FARLEY, SMITH & DENIS SURVEYING LTD. 2018

TOPOLOGICAL SURVEY INFORMATION TAKEN FROM:

GRADING AND SERVICING PLAN
2037 McGEE SIDE ROAD, CITY OF OTTAWA
PINECREST REMEMBRANCE SERVICES
HIGHLAND PARK REMEMBRANCE

NOVATECH ENGINEERING

A1.01 Site Plan

Highland Park Cemetery

NOTES:
1. SEE LANDSCAPE DRAWING FOR EXISTING AND NEW VEGETATION.
2. SEE SITE SERVICING AND GRADING DRAWING FOR EXISTING AND NEW GRADES AND SITE SERVICES.

LEGEND:

DC DEPRESSED CURB (To be constructed as per paragraphs 3.8.3.2(2) (3) and (4) of the Ontario Building Code 2006)

A.C. ACCESSIBLE PARKING SIGN - TO CITY OF OTTAWA STANDARDS

F.R. "FIRE ROUTE - NO PARKING" SIGN - TO CITY OF OTTAWA STANDARDS

L.Z. "LOADING ZONE - NO PARKING" SIGN - (LOADING/DROP OFF)

TONED AREA INDICATES EXTENT OF 6.0m WIDE FIRE DEPT. ACCESS ROUTE C/W 12.0 m CENTRELINE RADIUS. PROVIDE HEAVY DUTY ASPHALT PAVING FOR FULL WIDTH OF ASPHALT DRIVE AISLE

ACCESSIBLE PARKING SPACE C/W SYMBOL PAINTED ON ASPHALT

no.	date	revision
7	NOV. 20/19	RE-ISSUED - SITE PLAN CTRL
6	AUG. 29/19	RE-ISSUED - SITE PLAN CTRL
5	JUN. 24/19	ISSUED FOR BUDGETING
4	JUNE 17/19	ISSUED - SITE PLAN CONTROL
3	MAY 1/19	ISSUED FOR INFORMATION
2	JAN. 8/19	ISSUED FOR INFORMATION
1	AUG. 31/18	ISSUED FOR COSTING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

ONTARIO ASSOCIATION OF ARCHITECTS
LICENCE
3049

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com
HOBIN ARCHITECTURE

PROJECT/LOCATION:
HIGHLAND PARK REMEMBERANCE
2037 McGEE SIDE RD

DRAWING TITLE:
SITE PLAN

DRAWN BY:	DATE:	SCALE:
BB	17/12/07	1:250

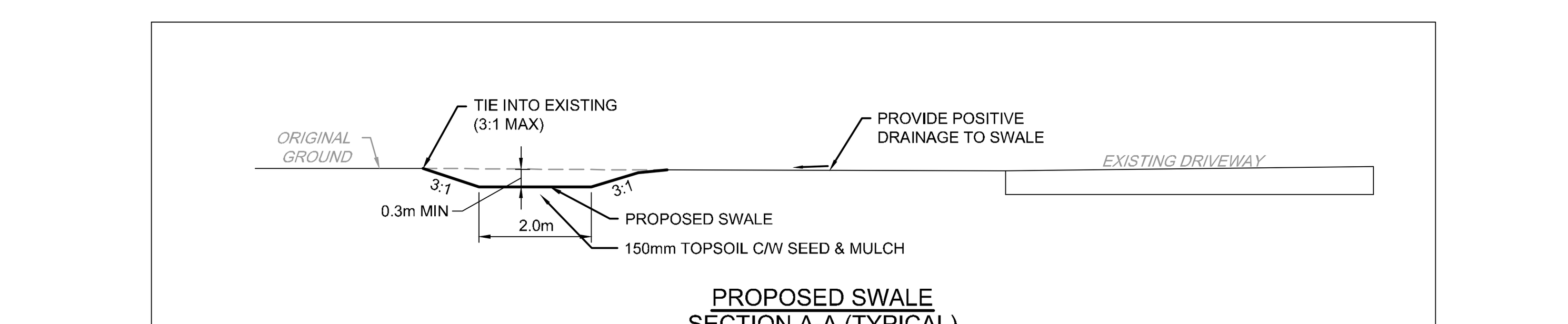
PROJECT NORTH / TRUE NORTH

PROJECT: 1513

DRAWING NO.: A1.02

REVISION NO.:

FILE No. D07-12-19-0112



PROPOSED SWALE
SECTION A-A (TYPICAL)
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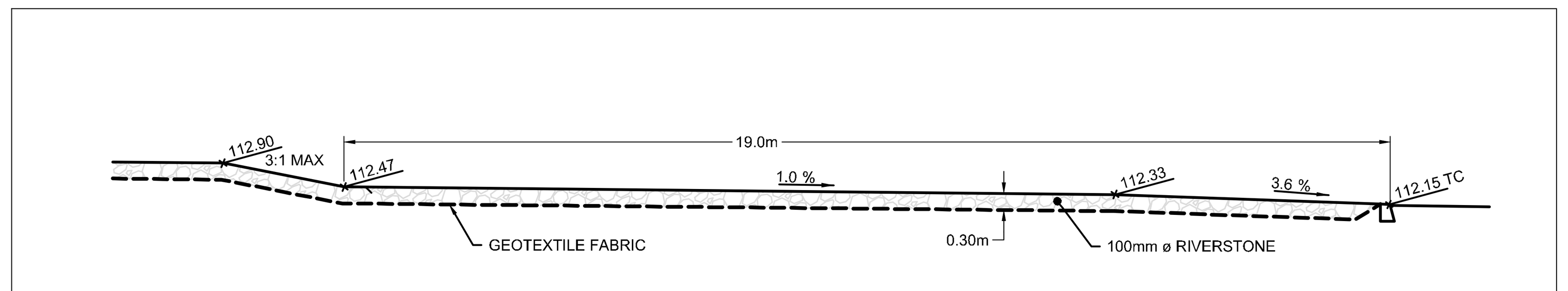

RAIN GARDEN CROSS SECTION B-B
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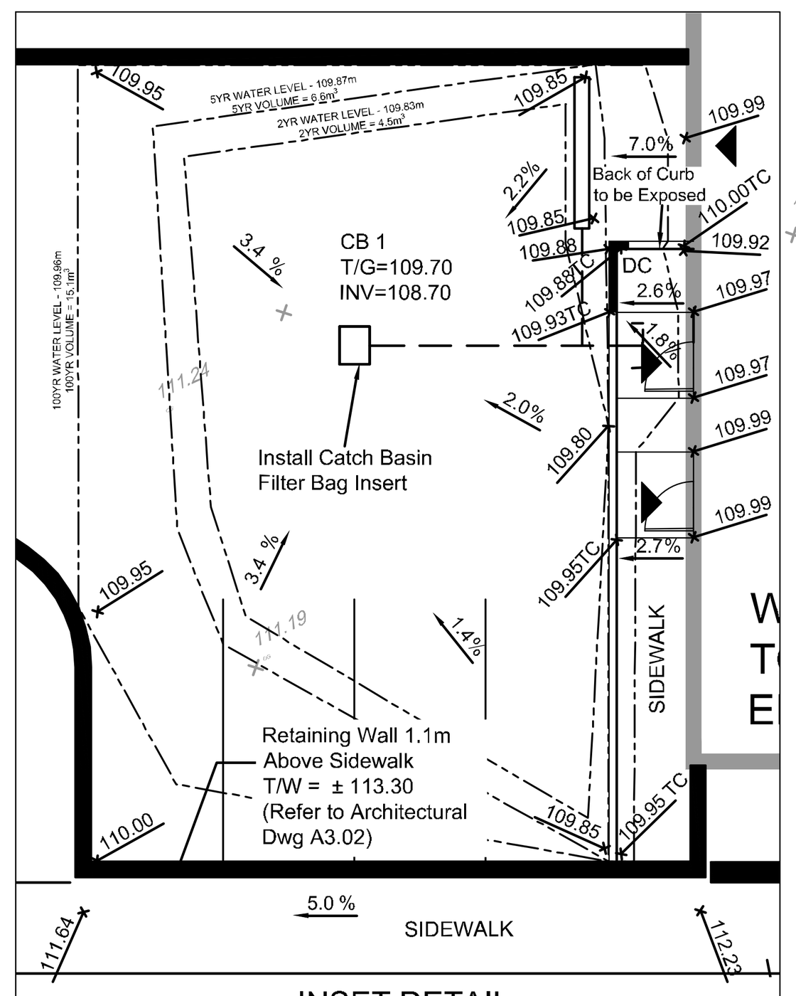


INSET DETAIL
SCALE=1:150

GENERAL NOTES

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA, OTTAWA SEPTIC SYSTEM OFFICE (OSSO), MISSISSIPPI VALLEY CONSERVATION AUTHORITY (MVCA) AND THE MINISTRY OF THE ENVIRONMENT, CLIMATE AND PARKS (MECP) BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $2,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
9. REFER TO STORMWATER MANAGEMENT REPORT(R-2019-086) PREPARED BY NOVATECH, DATED JUNE 2019.
10. PROVIDE LINE/PARKING PAINTING.
11. TOPOGRAPHIC SURVEY PROVIDED BY NOVATECH.
12. MAINTAIN A MINIMUM COVER OF 2.4m OVER WATER SERVICE CONNECTION FROM WELL TO BUILDING.

SEWER NOTES:

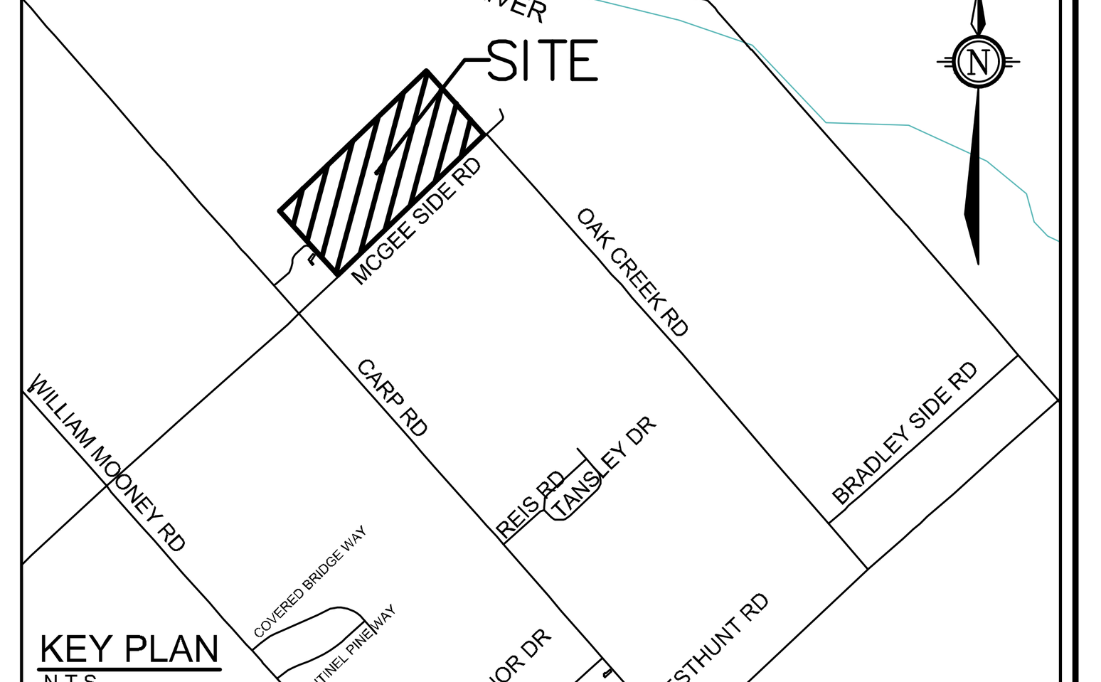
1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
SANITARY MANHOLE (1200Ø)	701.010	OPSD
SANITARY MANHOLE (1800Ø)	701.012	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A) COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

EROSION AND SEDIMENT CONTROL NOTES:

1. THE OWNER AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO INSTALLING FILTER CLOTHS ACROSS MANHOLE/CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.
2. THE CONTRACTOR SHALL PLACE GEOTEXTILE OR FILTER BAG UNDER THE CATCHBASIN AND MANHOLE GRATES FOR THE DURATION OF CONSTRUCTION AND WILL REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION.
3. SILT FENCING FOR ENTIRE PERIMETER OF SITE, SHALL BE UTILIZED TO CONTROL EROSION FROM THE SITE DURING CONSTRUCTION.
4. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.



KEY PLAN
N.T.S.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

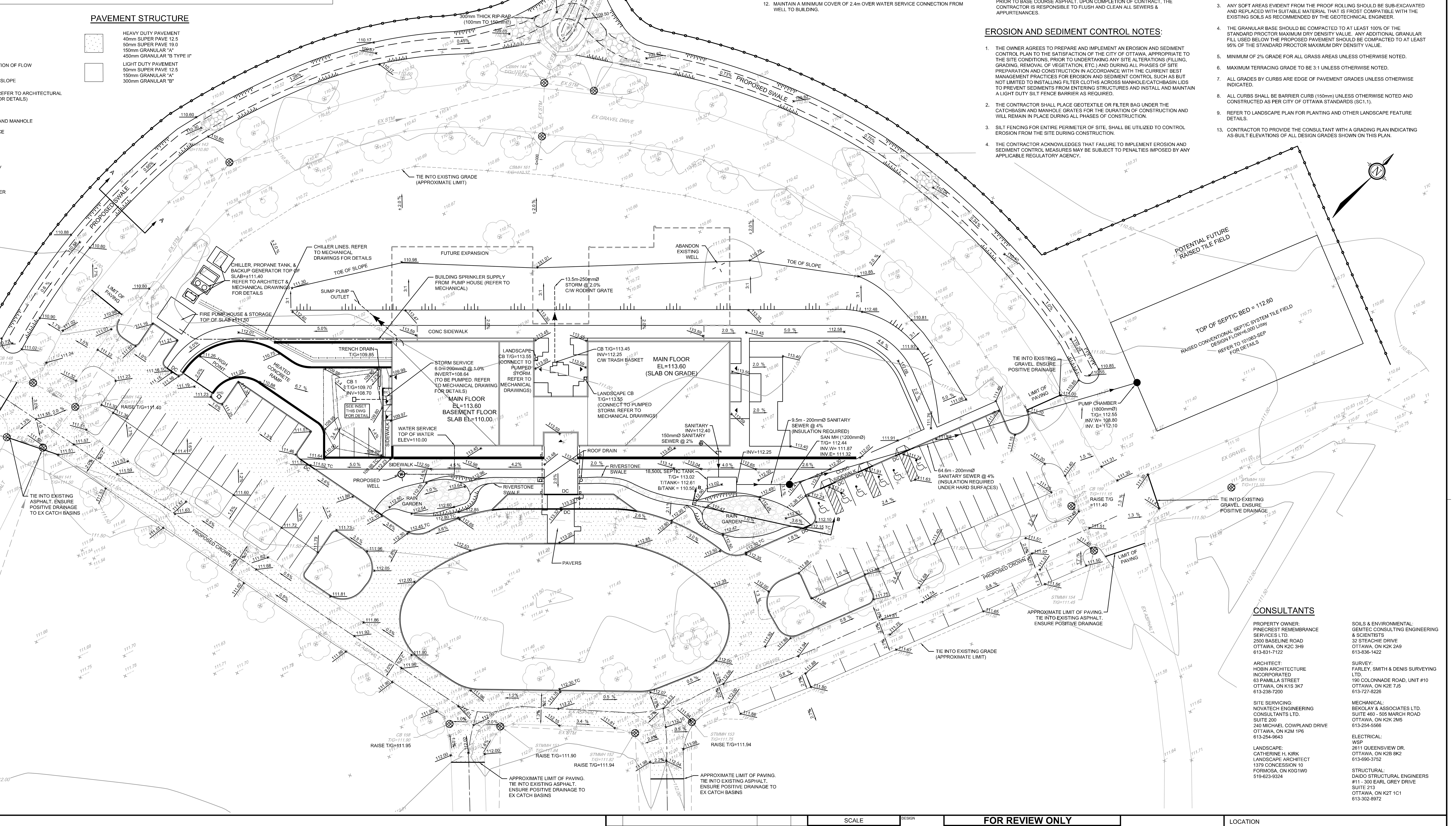
LEGEND

- 72.35 — PROPOSED ELEVATION
- 2.0% — GRADE AND DIRECTION
- PROPOSED SWALE C/W DIRECTION OF FLOW
- TERRACING: MAXIMUM 3:1 SIDESLOPE
- PROPOSED RETAINING WALL (REFER TO ARCHITECTURAL AND LANDSCAPE DRAWINGS FOR DETAILS)
- BARRIER CURB
- PROPOSED SANITARY SEWER AND MANHOLE
- PROPOSED BUILDING ENTRANCE
- x 72.12 — *EXISTING ELEVATION*
- *EXISTING TREES*
- *EXISTING TREES / VEGETATION*
- SILT FENCE (OPSD 219.110)
- CATCHBASIN GEOTEXTILE FILTER
- PROPOSED WATER LINE
- PERMANENT ROCK FLOW CHECK DAM AS PER OPSD 219.210

PAVEMENT STRUCTURE

HEAVY DUTY PAVEMENT
40mm SUPER PAVE 12.5
50mm SUPER PAVE 19.0
150mm GRANULAR "A"
450mm GRANULAR "B TYPE II"

LIGHT DUTY PAVEMENT
50mm SUPER PAVE 12.5
150mm GRANULAR "A"
300mm GRANULAR "B"



CONSULTANTS

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613-690-3752

STRUCTURAL:
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#11 - 300 EARL GREY DRIVE
SUITE 213
OTTAWA, ON K2T 1C1
613-302-8972

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.

M:\2001\101063\CAD\design\101063-GR.dwg, GR, Nov 20, 2019 - 10:36am, arongve

No.	REVISION	DATE	BY
5	REVISED PER COMMENTS	NOV 18/19	AAR
4	REVISED PER COMMENTS	AUG 28/19	AAR
3	ISSUED FOR SITEPLAN APPLICATION	JUNE 03/19	ARM
2	ISSUED FOR COORDINATION	MAY 23/19	ARM
1	ISSUED FOR COORDINATION	MAY 02/19	ARM

SCALE: 1:300

DESIGN: LSC
CHECKED: ARM
DRAWN: LLW
CHECKED: SMG
APPROVED: ARM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
100141256
Nov 18/2019
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

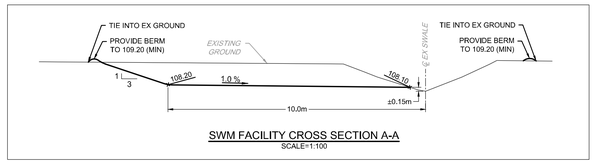
LOCATION
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

DRAWING NAME
GRADING AND SERVICING PLAN

PROJECT No. 101063
REV: REV # 5
DRAWING No. 101063-GR

D07-12-19-0112

PLANB1.DWG - 1000mmx707mm



SWM FACILITY CROSS SECTION A-A
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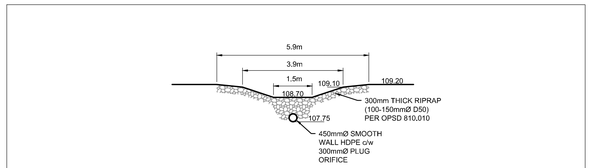

OUTLET STRUCTURE B-B
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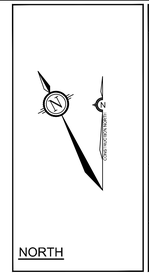
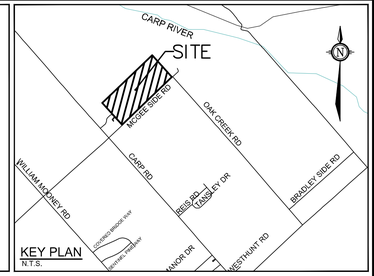
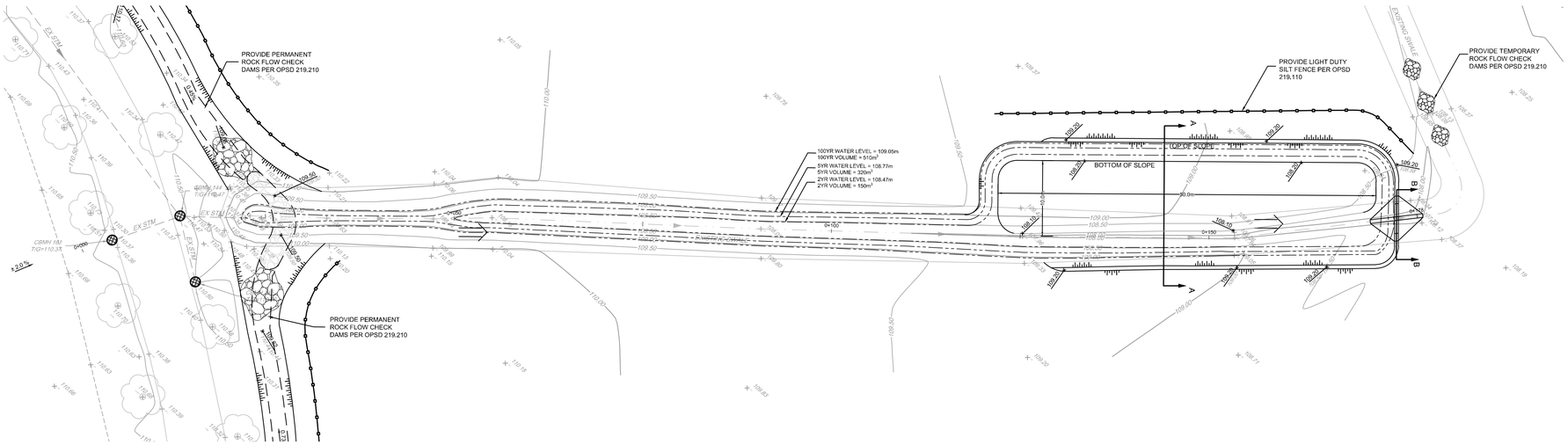
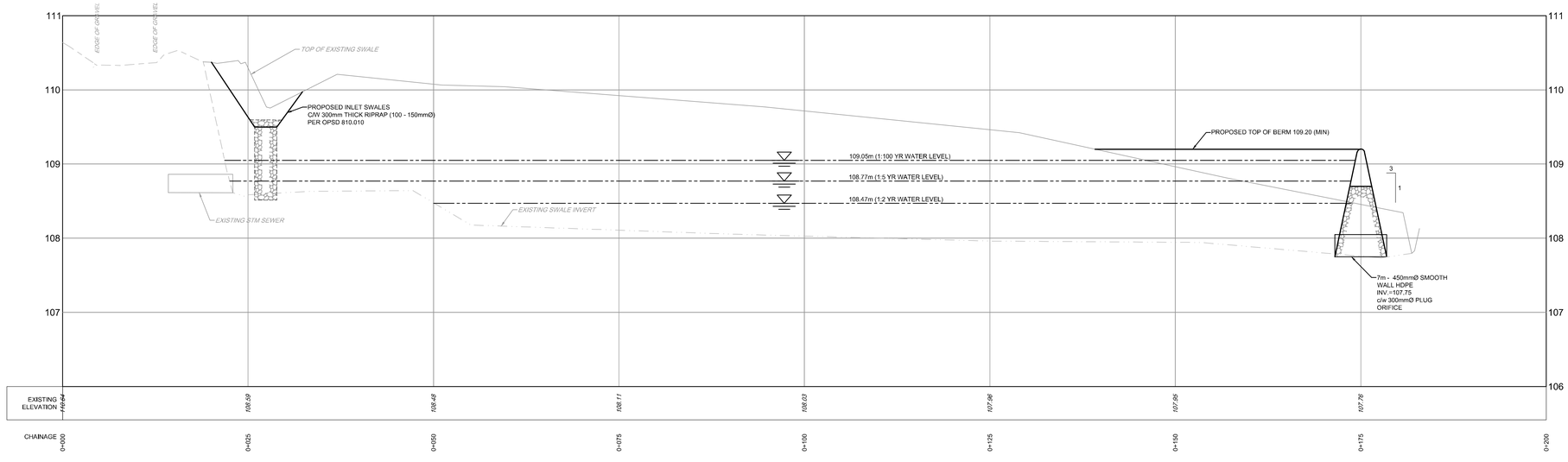






LEGEND

- PROPOSED ELEVATION
- GRADE AND DIRECTION
- PROPOSED SWALE C/W DIRECTION OF FLOW
- TERRACING: MAXIMUM 3:1 SIDESLOPE
- *EXISTING ELEVATION*
- *EXISTING TREES*
- *EXISTING TREES / VEGETATION*
- SILT FENCE (OPSD 219.110)
- ROCK FLOW CHECK DAM (OPSD 219.210) TEMPORARY AND PERMANENT



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ORIFICE DETAIL
SCALE=1:50

NOTE:
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No.	REVISION	DATE	BY
3	REVISED PER COMMENTS	Nov 18/19	AAR
2	REVISED PER COMMENTS	AUG 28/19	AAR
1	ISSUED FOR SITE PLAN APPLICATION	JUNE 03/19	ARM

SCALE
1:300
1:300
0 3 6 9 12

DESIGN LSC
CHECKED ARM
DRAWN LLW
CHECKED SMG
APPROVED ARM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
100141256
Nov 18, 2019
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
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

DRAWING NAME
OUTLET PLAN AND PROFILE

PROJECT No. 101063
REV REV # 3
DRAWING No. 101063-PP1

D07-12-19-0112

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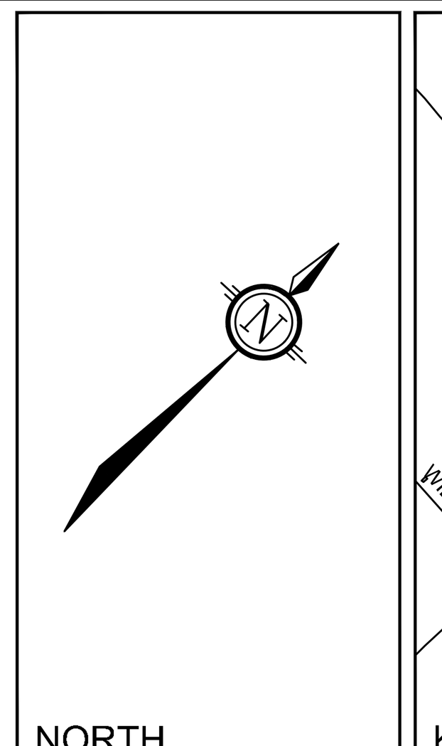

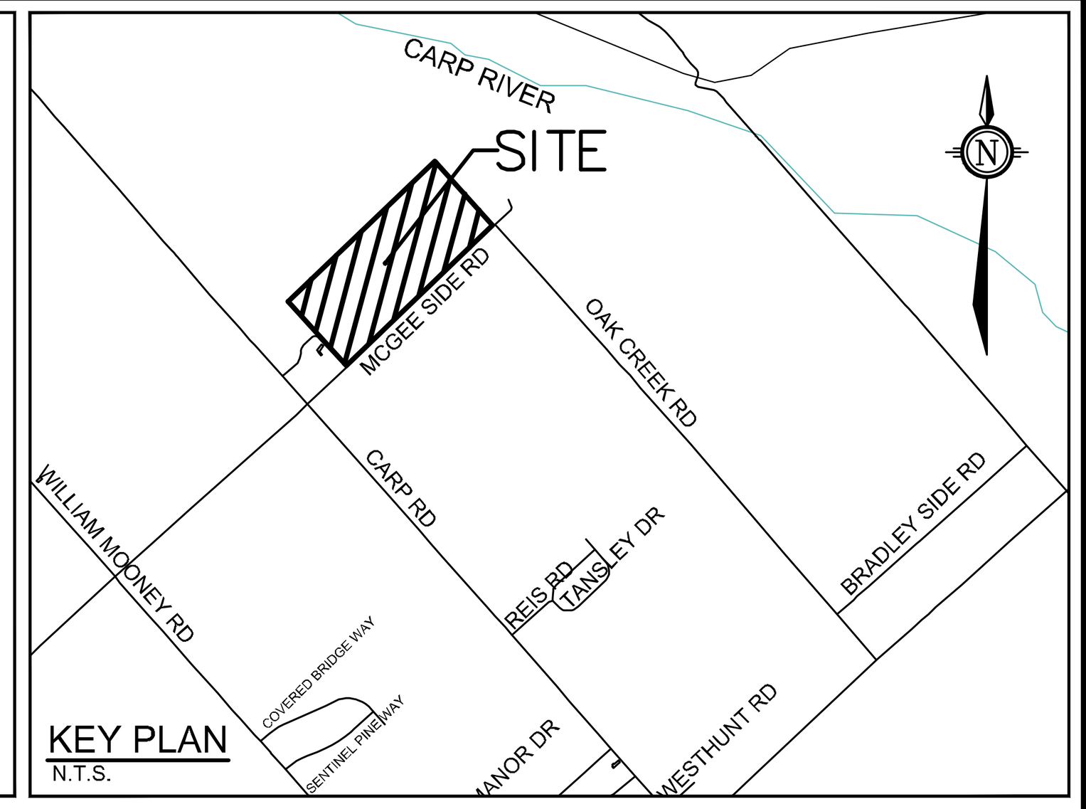

LEGEND

- 15.1 — DRAINAGE AREA (hectares)
- EX1 — ID
- 0.25 — RUNOFF COEFFICIENT (C) OR SCS RUNOFF CURVE NUMBER (CN)
- STORM DRAINAGE AREA
- MH 100 — EXISTING STORM SEWER AND MANHOLE
- DIRECTION OF FLOW
- EXISTING OVERLAND FLOW DIRECTION

CONSULTANTS

PROPERTY OWNER:
PINECREST REMEMBRANCE SERVICES LTD.
2500 BASELINE ROAD
OTTAWA, ON K2C 3H9
613-831-7122

ARCHITECT:
HOBIN ARCHITECTURE INCORPORATED
63 PAMILLA STREET
OTTAWA, ON K1S 3K7
613-238-7200

SITE SERVICING:
NOVATECH ENGINEERING CONSULTANTS LTD.
SUITE 200
240 MICHAEL COWPLAND DRIVE
OTTAWA, ON K2M 1P6
613-254-9643

LANDSCAPE:
CATHERINE H. KIRK
LANDSCAPE ARCHITECT
1379 CONCESSION 10
FORMOSA, ON K0G1W0
519-623-9324

SOILS & ENVIRONMENTAL:
GEMTEC CONSULTING ENGINEERING & SCIENTISTS
32 STEACHIE DRIVE
OTTAWA, ON K2K 2A9
613-836-1422

SURVEY:
FARLEY, SMITH & DENIS SURVEYING LTD.
190 COLONNADE ROAD, UNIT #10
OTTAWA, ON K2E 7J5
613-727-8226

MECHANICAL:
BEKOLAY & ASSOCIATES LTD.
SUITE 460 - 505 MARCH ROAD
OTTAWA, ON K2K 2M5
613-254-5566

ELECTRICAL:
WSP
2611 QUEENSVIEW DR.
OTTAWA, ON K2B 8K2
613-690-3752

STRUCTURAL:
DAIDO STRUCTURAL ENGINEERS
#11 - 300 EARL GREY DRIVE
SUITE 213
OTTAWA, ON K2T 1C1
613-302-8972

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No.	REVISION	DATE	BY
2	REVISED PER COMMENTS	NOV 18/19	AAR
2	REVISED PER COMMENTS	AUG 28/19	AAR
1	ISSUED FOR SITE PLAN APPLICATION	JUNE 3/19	ARM

SCALE: 1:1000

1:1000 (0 10 20 30 40)

DESIGN: LSC
CHECKED: ARM
DRAWN: LLW
CHECKED: SMG
APPROVED: ARM

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A.R. MCAULEY
100141256
Nov 18/2019
PROVINCE OF ONTARIO

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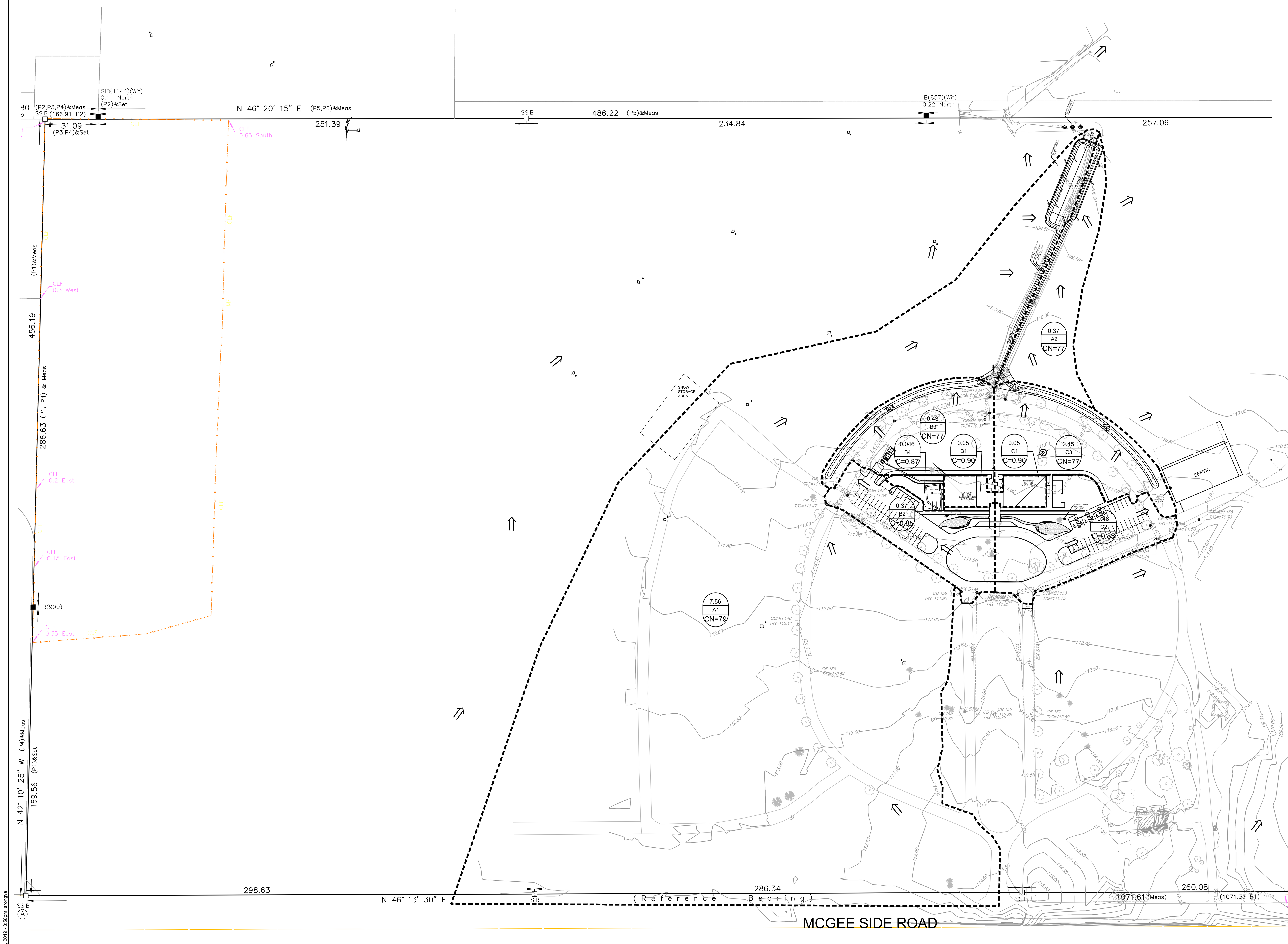
LOCATION
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

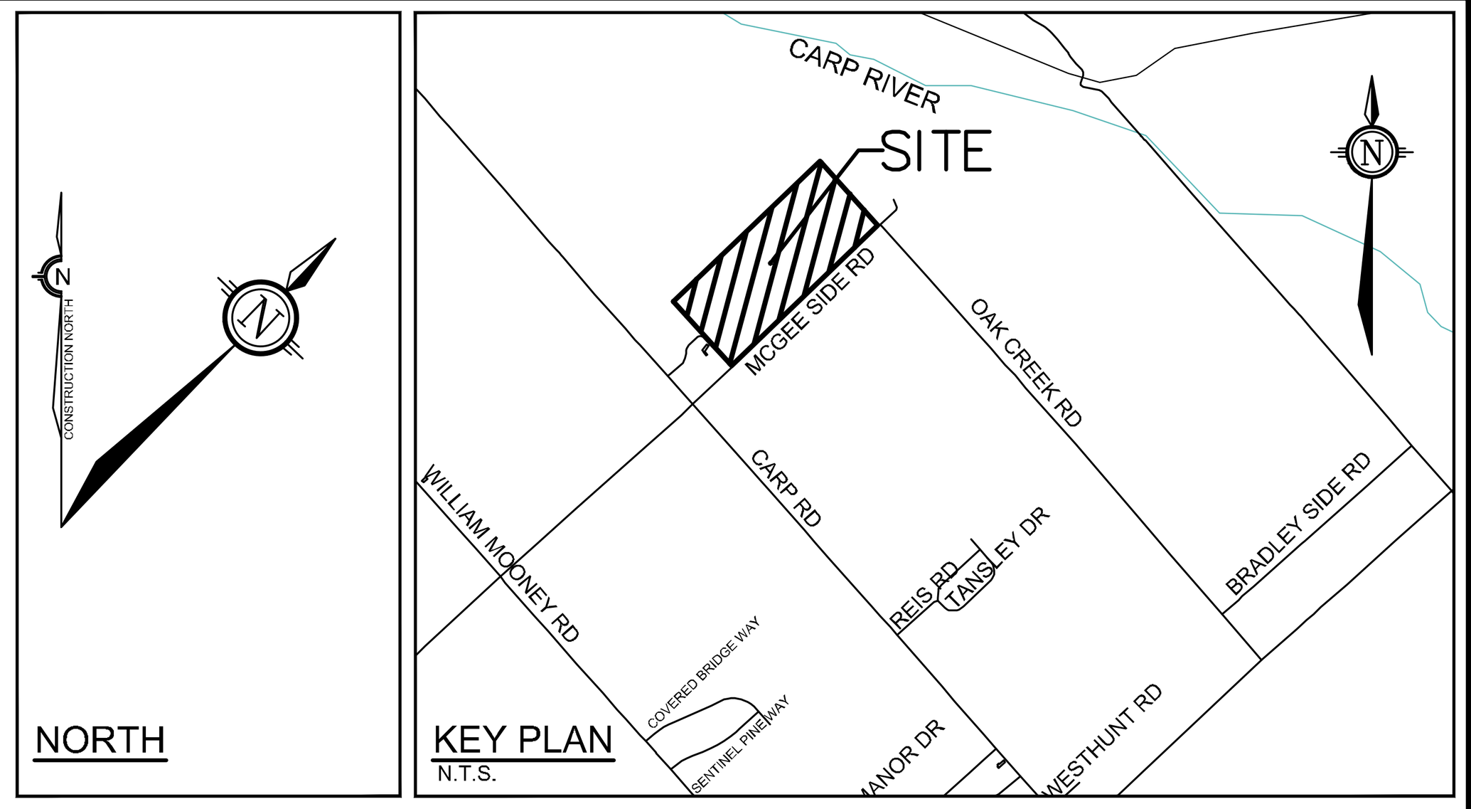
DRAWING NAME
PRE - DEVELOPMENT STORM DRAINAGE AREA PLAN

PROJECT No. 101063
REV: REV # 3
DRAWING No. 101063-PRE

D07-12-19-0112

PLANB1.DWG - 1000mmx707mm





LEGEND

- 2.02 / A1 / 0.6 — DRAINAGE AREA (hectares); ID; RUNOFF COEFFICIENT (C) OR SCS RUNOFF CURVE NUMBER (CN)
- STORM DRAINAGE AREA
- MH 100 — EXISTING STORM SEWER AND MANHOLE
- DIRECTION OF FLOW
- PROPOSED OVERLAND FLOW DIRECTION

CONSULTANTS

PROPERTY OWNER:
PINECREST REMEMBRANCE SERVICES LTD.
2500 BASELINE ROAD
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613-831-7122

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No.	REVISION	DATE	BY
4	REVISED PER COMMENTS	NOV 18/19	AAR
3	REVISED PER COMMENTS	AUG 28/19	AAR
2	ISSUED FOR SITE PLAN APPLICATION	JUNE 3/19	ARM
1	ISSUED FOR DISCUSSION	APR 22/19	ARM

SCALE 1:1000

DESIGN LSC · CHECKED ARM · DRAWN LLW · CHECKED SMG · APPROVED ARM

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LICENSED PROFESSIONAL ENGINEER — A.R. MCAULEY — 100141256 — Nov 18/2019 — PROVINCE OF ONTARIO

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LOCATION
2037 McGEE SIDE ROAD, CITY OF OTTAWA
HIGHLAND PARK REMEMBRANCE

DRAWING NAME
POST - DEVELOPMENT STORM DRAINAGE AREA PLAN

PROJECT No. 101063
REV: REV # 4
DRAWING No. 101063-POST

D07-12-19-0112