

---

**LOON CALL KENNEDY FARM DEVELOPMENT  
TOWN OF MEAFORD  
FUNCTIONAL SERVICING REPORT**

---



Prepared by:

Pinestone Engineering Ltd.  
Muskoka Office  
110 Kimberley Avenue  
Bracebridge, Ontario P1L 1Z8

Phone: 705-645-8853  
Fax: 705-645-7262  
Email: [pinestone@pel.ca](mailto:pinestone@pel.ca)  
Web: [www.pel.ca](http://www.pel.ca)

Revised – January 2021  
19-11471M – rev. 1

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Background.....	1
1.2	Purpose and Scope .....	1
<b>2.0</b>	<b>REFERENCE REPORTS.....</b>	<b>1</b>
<b>3.0</b>	<b>EXISTING CONDITIONS .....</b>	<b>1</b>
3.1	General.....	1
3.2	Topography.....	3
3.3	Site Geology .....	3
3.4	Drainage Conditions .....	3
<b>4.0</b>	<b>PROPOSED DEVELOPMENT.....</b>	<b>4</b>
<b>5.0</b>	<b>SANITARY SEWERS .....</b>	<b>4</b>
5.1	Existing Infrastructure .....	4
5.2	Proposed Servicing Strategy .....	6
<b>6.0</b>	<b>Watermain.....</b>	<b>6</b>
6.1	Existing Infrastructure .....	6
6.2	Proposed Servicing Strategy .....	9
<b>7.0</b>	<b>STORM WATER MANAGEMENT .....</b>	<b>11</b>
7.1	Design Criteria .....	11
7.2	Design Storms .....	11
7.3	Drainage Catchments .....	12
7.4	Storm Water Management Plan.....	14
7.5	SWM Model Results .....	16
7.6	Seepage Areas .....	17
<b>8.0</b>	<b>EROSION AND SEDIMENT CONTROL.....</b>	<b>17</b>
8.1	During Construction .....	17
8.2	Monitoring and Maintenance.....	18
8.3	Contingency Plan.....	18
<b>9.0</b>	<b>UTILITIES .....</b>	<b>18</b>
<b>10.0</b>	<b>SUMMARY AND CONCLUSIONS.....</b>	<b>19</b>

## APPENDICES

- Appendix A – Soils Mapping
- Appendix B – Sanitary and Water Servicing Information
- Appendix C – MIDUSS Model Results
- Appendix D – Storm Water Management Design Information
- Appendix E – Drawings

## **1.0 INTRODUCTION**

### **1.1 Background**

M1 Development Inc. is proposing to develop a residential subdivision on a property located at the north end of the Town of Meaford and known as the Kennedy Farm. The property is approximately 14.0 ha and is legally described as Part Lots 4 and 14 Plan 541, Part Lot 1 Plan 16R10913 and Part Lot 1 Plan 16R5037 in the Town of Meaford.

The property is bounded by Provincial Highway #26 to the south, residential development to the east and north, and existing agricultural uses to the west.

The site location is illustrated on Figure 1.

### **1.2 Purpose and Scope**

Pinestone Engineering Ltd (PEL) has been retained by the developer to prepare a functional servicing report (FSR) in support of a zoning amendment and draft plan of subdivision. The report describes the proposed servicing and storm water quality and quantity control strategy for the site.

## **2.0 REFERENCE REPORTS**

The following reports and studies have been used for reference in the preparation of this Servicing and Storm Water Management Plan:

- i) *Ministry of the Environment and Energy's Storm Water Management Planning and Design Manual, March 2003.*
- ii) *Sediment Control Planning Central Region Group, prepared by the Ministry of Natural Resources.*
- iii) *Ministry of the Environment's Design Guidelines for Drinking Water Systems, 2008.*
- iv) *Municipality of Meaford Engineering Standards, April 2019*

## **3.0 EXISTING CONDITIONS**

### **3.1 General**

The property is currently in agricultural use and development on the site includes a residential home and several outbuildings. The western portions of the site are tree covered and there is a ravine which runs along the north property boundary.



A single driveway access into the property is provided from Highway #26, which runs along the property's southern frontage.

A 150mm dia. municipal watermain extends across the eastern portion of the property's Highway #26 frontage. There is no municipal sanitary service to the property.

The existing conditions are illustrated on drawing EX-1 included in Appendix E.

### **3.2 Topography**

The topography across the site is generally mild, with gradients in the 1% - 2% range. The site generally falls from the west to the east.

Elevations on the site range between 190.0m ASL and 200.0m ASL

### **3.3 Site Geology**

Geotechnical and Hydrogeological investigations were conducted in the spring of 2020 by Palmer Environmental. Copies of these reports have been submitted under separate cover.

The investigation showed the soil stratigraphy below the topsoil and a 0.3m to 1.1m layer of fill to be a mix of silty clay, silty sand and clay till. Groundwater was only encountered in the south west corner of the site.

Due to the fine grained nature of the encountered soils, the soils were found to have low permeability. Infiltration features are therefore not feasible as part of the storm water management plan.

Adjustment of the curve numbers for the pervious component of the lands have been carried out in the computer model to represent Type C soils.

Borehole logs are included in Appendix A.

### **3.4 Drainage Conditions**

Drainage generated on site drains overland in the form of sheet flow from west to the north-east, towards the Algonquin Drive residential subdivision and eventually to Georgian Bay. There is a well defined ravine at the north end of the property along Centreville Creek which captures drainage from the surrounding area, including portions of the subject property and directs the run-off to Georgian Bay.

## **4.0 PROPOSED DEVELOPMENT**

The proposed subdivision includes a mix of single detached units and row townhouses. The development is proposed to be constructed in phases, with the phases to be determined by market demand.

The developer is proposing a “flex” zoning which would allow the mix of unit types as market conditions dictate. The development proposal under consideration is illustrated in Figure 2. The plan respects the environmental constraints and buffers established in the Environmental Impact Study prepared by Michalski Nielsen and Associates. For the purposes of analyzing the water and sewage demands for the development, a maximum of 245 units has been used, per the current development plan.

Drainage from the majority of the site will be conveyed to a wet pond storm water management facility located in the SWM block at the north end of the development. Drainage from the rear yards of the most easterly lots will continue to flow overland to the east as in the existing condition.

Site vehicular access will be provided directly from Highway #26 near the west limit of the property. A secondary emergency access, which will normally be gated, is proposed to Highway #26 at the east end of the site. The internal municipal roads will be constructed to the current Municipality of Meaford urban standard, with a 20.0m right-of-way, 8.5m carriage-way, concrete curb and gutter, streetlights, sidewalk on one side of the roadway, and storm sewers to collect and convey drainage to the municipal storm water management facility.

A Traffic Impact Study for the development has been prepared by JD Engineering. That study has recommended a left turn lane on Highway #26 at the proposed intersection once development on the site exceeds 100 units. That report is being submitted for review under separate cover.

Municipal water and sewer servicing will be extended along Highway #26 and into the site at the location of the emergency access block, near the east limit of the property.

## **5.0 SANITARY SEWERS**

### **5.1 Existing Infrastructure**

There is an existing 200mm dia. PVC municipal sanitary sewer located within an easement extending from Alberly Court to Highway #26. This sewer will be extended across Highway #26 to provide service to the site, entering the property at the proposed emergency access block. It is proposed that the sanitary sewer be extended within the north boulevard for Highway #26 to minimize traffic disruption during construction. An MTO permit will be required for this work.

The Municipality of Meaford has advised that upgrades to downstream sanitary infrastructure including a pipe syphon under the Bighead River may be required to provide adequate system capacity for the entire development. The Municipality is planning to undertake a review of potential capacity constraints in order to determine which external





PLANTING NOTES:

- ALL LANDSCAPE AREAS TO HAVE 150mm-300mm OF TOPSOIL REINSTATED AND TO BE SEED WITH GRASS. GRASS TO BE 40% KENTUCKY BLUEGRASS, 40% CREEPING RED FESCUE, 20% PERENNIAL RYEGRASS (OSC SEED MIX 7060, OR EQUIVALENT), AT AN APPLICATION RATE OF 5 LBS PER 100 SQUARE FEET, GENERALLY TO BE APPLIED AS HYDROSEED/HYDROMULCH
- TREE SPECIES PLANTED TO BE A COMBINATION OF:
  - Sugar maple (*Acer saccharum*) 45 mm WB
  - Red maple (*Acer rubrum*) 45 mm WB
  - Red oak (*Quercus rubra*) 45 mm WB
  - Balsam poplar (*Populus balsamifera*) 45 mm WB
  - Balsam fir (*Abies balsamea*) 175 cm WB
  - White spruce (*Picea glauca*) 175 cm WB
  - White pine (*Pinus strobus*) 175 cm WB



PINESTONE ENGINEERING LIMITED | www.pel.ca

CLIENT/PROJECT

LOON CALL  
MEAFORD PROPERTY - M-1

DRAWING TITLE

LOT CONCEPT PLAN WITH PLANTING

SEAL

PROJECT NO.

19-11471-M

DRAWING NO.

FIGURE 2

NORTH ARROW



NOTES

- LEGAL INFORMATION FROM REGISTERED PLANS 16R-5037 AND 16R-10813
- AERIAL PHOTO INFORMATION FROM COUNTY OF GREY-BRUCE GIS. LOCATION AND SCALE OF PHOTO IS APPROXIMATE. YEAR OF IMAGE IS 2015.

LEGEND

- VEGETATION PRESERVATION AREA
- ASPHALT SURFACE
- PROPOSED TREE PLANTED IN FRONT YARD OF EVERY LOT
- 1.8m HIGH WOODEN PRIVACY FENCE
- PHASE LINE
- REGULATORY LIMIT OF GSCA
- FRENCH DRAIN
- CATCHBASIN
- 1.5m SIDEWALK
- 3m x 10m CLUSTER OF SHRUBS AND TREES SPACED AT 5m



infrastructure improvements may need to be addressed with the development of the property on a Phase by Phase basis. The Municipality has indicated a current allocation for the Kennedy Farm Property of 40 units.

Figure 3 illustrates the existing sanitary sewer network in the Municipality of Meaford.

## **5.2 Proposed Servicing Strategy**

The proposed site development will be serviced by gravity sanitary sewers installed within the proposed municipal roads within the subdivision. Sanitary sewers will need to be extended along Ford Avenue and Highway #26 from their current terminus at the intersection of Grandview Dr. and Ford Ave. to the east limit of the development. The proposed peak sanitary design flow for the development were calculated using the following design criteria per MECP:

- 0.0052 L/c/s for average residential flow for new development
- 3.5 people per unit
- Residential peaking factor using the Harmon Formula
- Infiltration rate of 0.28 l/s/ha

The proposed peak design flow for the ultimate build out of the subdivision (245 lots) was determined to be 19.78 L/sec. A copy of the preliminary sanitary sewer design sheet is included in Appendix B and the sanitary catchment boundary plan is illustrated on Figure 4.

For the purpose of the preliminary review, additional connections along Highway #26 have not been contemplated. Residual capacity of approximately 13 L/sec would be available in the new sewers connecting to the Albery Court easement sewer for future development to the west, assuming a minimum pipe slope of 1.0%

Based on documentation provided by the Municipality of Meaford and their consultants, there is sufficient capacity in the downstream sewer system from Albery Court to support the calculated peak flows.

Sanitary servicing within the development will be municipally owned and maintained, and an MECP Environmental Compliance Approval will be required. The new sewer system will be constructed in accordance with the Municipality of Meaford's engineering standards.

A copy of the preliminary sanitary sewer design sheet is included in Appendix B

## **6.0 WATERMAIN**

### **6.1 Existing Infrastructure**

There is an existing 150mm AC watermain extending along Highway #26 to the property within the northern boulevard. A 250mm dia. ductile iron (DI) watermain crossing of the







highway immediately adjacent the existing driveway access was installed in 2012 in anticipation of the existing watermain being upgraded.

The Municipality of Meaford, through their consultant Ainley Consulting Engineers and Planners, have undertaken an analysis to review system pressures in the existing and ultimate build out condition under three (3) scenarios as follows:

- Maintain existing 150mm dia. watermain to service the development
- Upgrade to a 200mm dia. watermain along Highway #26 from Grandview Dr.
- Upgrade to a 250mm dia. watermain along Highway #26 from Grandview Dr.

The analysis determined that under the ultimate, full development scenario for the Kennedy property pressures in the south west corner of the development would be marginally lower than the 350 kPa (50 psi) identified by MECP as preferred, but above the recommended minimum of 275 kPa (40 psi) with both the existing 150mm dia watermain and 200mm dia. watermain scenarios. Upgrading to a 250mm dia. watermain along Highway #26 would ensure all pressures would be maintained above 350 kPa.

With regard to fire flows, Ainley recommends upgrading the existing 150mm dia. watermain to either a 200mm or 250mm watermain and that providing two connections into the development site would be preferred to ensure sufficient fire flows.

Figure 5 illustrates the existing watermain network in the Municipality of Meaford. The Ainley analysis is included in Appendix B

## **6.2 Proposed Servicing Strategy**

In the initial phases of development, the property will be serviced by the existing 150mm dia. watermain on Highway #26, through connections into the property at the main entrance road and the emergency access road. A looped connection will be provided increased fire protection and redundancy for maintenance. A new 250mm dia. PVC watermain will be extended from Ford Ave. to the site along Highway #26 in the north boulevard once demand from build out necessitates the improvement.

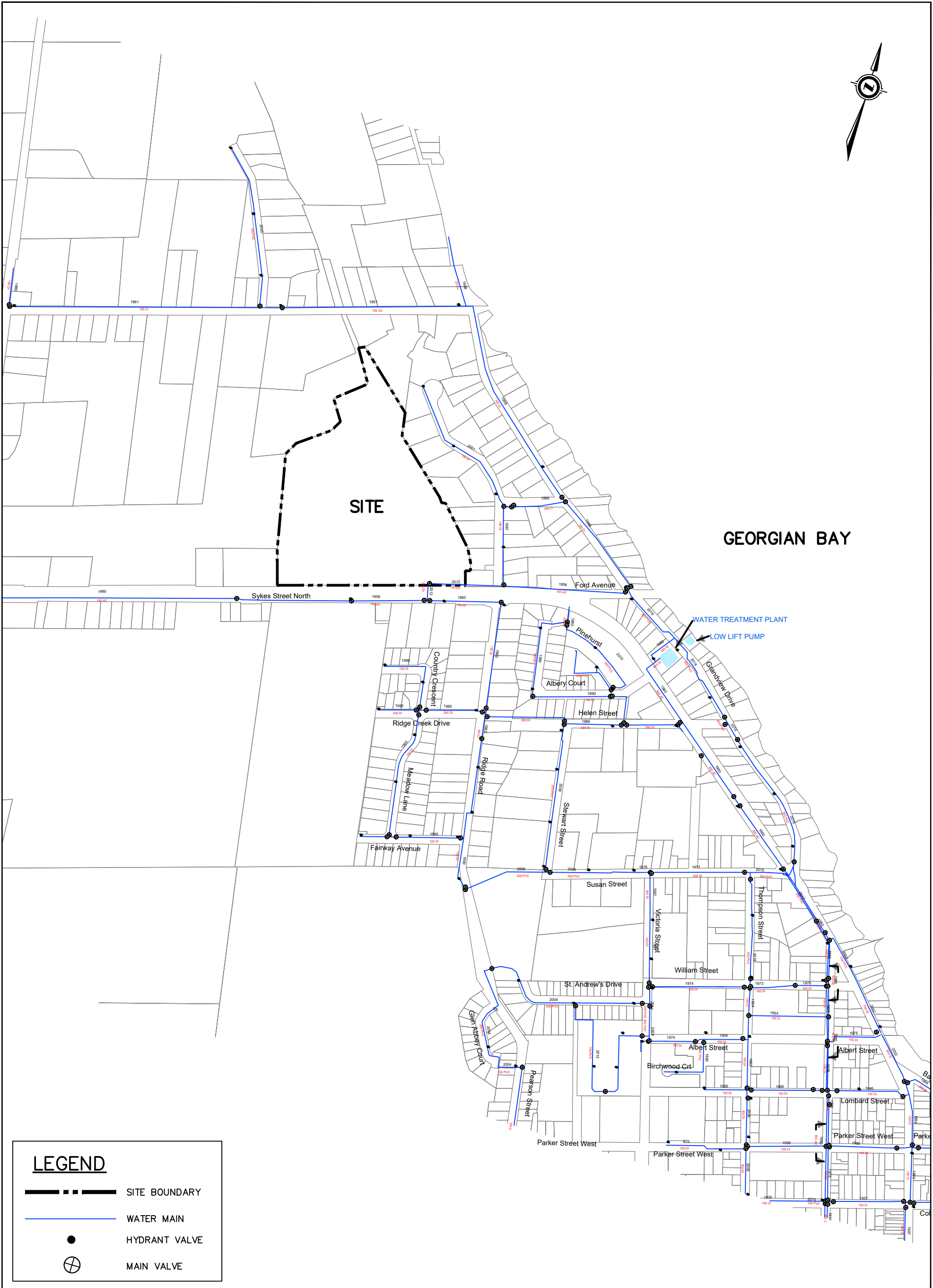
Each single unit will be serviced by a 25mm dia. polyethylene water service from the internal watermain, which will be 200mm diameter and located within the internal subdivision roads in a location conforming with the Municipal road standard.

Depth of bury will be 1.8m minimum and pipe embedment and backfill will be in accordance with OPSD 802.010. A minimum 2.5m horizontal or 0.5m vertical pipe separation will be maintained between sanitary sewers and watermain.

Water servicing within the development boundary will be municipally owned and maintained and an MECP approval will be required. The new system will be designed and constructed in accordance with the Municipality of Meaford's engineering standards.

From the Ainley analysis, the maximum day and peak hourly water demands calculations were based on the following criteria:





- average per capita flow of 300 litres/day
- a population density of at 2.4 persons/unit
- Maximum day flow factor of 1.67

Based on the criteria listed above and a maximum total of 245 units, the average day and maximum day flow is 2.04 L/sec and 3.40 L/sec respectively. Public hydrants will provide fire protection for the proposed development.

## 7.0 STORM WATER MANAGEMENT

### 7.1 Design Criteria

Based on the guidelines for sensitive receiving outlets outlined in the current MOECP SWM Planning and Design Manual (MOE,2003), the design criteria for this site is as follows:

- Peak Flow attenuation to pre-development levels for all storm events up to the 100 year event for drainage directed to the ravine at the north end of the site. Conveyance of post development peak flows in excess of the 100 year flow safely from the site.
- Water quality enhancement to an 'enhanced' level of protection through the use of accepted control techniques such as detention storage, enhanced grass swales, level spreaders, infiltration facilities, and oil / grit removers.
- Preparation of a detailed erosion and sediment control and construction mitigation plan to be implemented as part of the construction program.

### 7.2 Design Storms

For the purposes of our preliminary storm water management analysis, we have therefore selected the following design storms as part of our evaluation:

- 5 year design storm
- 25 year design storm
- 100 year design storm
- Regional event

Rainfall intensity - duration frequency (IDF) values for the Owen Sound area were entered into an equation that expresses the time relationship intensity for specific frequency, in the form of:

$$i = \frac{a}{(t+b)^c}$$

where:  $i$  = intensity, mm/hr.  
 $t$  = Time of concentration, minutes  
 $a, b, c$  = constants developed to fit published IDF curves

The storm events were applied to the hydrologic model. Derivation of the design storm hyetographs were based on the "Chicago" 3 hour distribution using the intensity, duration, frequency (IDF) data.

The design storm parameters are outlined in Table 1, below:

**Table 1  
Design Storm Parameters  
Chicago Rainfall Distribution**

Rainfall Event	Parameter			Duration (min)
	A	B	C	
5 Yr	1234.576	8.297	0.851	180
25 Yr	1750.276	8.303	0.862	180
100 Yr	2171.754	8.303	0.867	180

### 7.3 Drainage Catchments

One (1) pre-development and two (2) post development catchments have been delineated in order to estimate the corresponding peak runoff rates for the site. The pre-development catchment areas represent the existing conditions of the site. The post development catchment represents the proposed grading concept for the site.

The pre-development and post-development catchment parameters are listed in Table 2.

**Table 2  
Sub-catchment Parameters**

Catchments	Area (ha)	% Impervious	Slope	SCS Impervious Curve #	SCS Pervious Curve #
<b>Pre-Development</b>					
101 – Pre-development Site Drainage	12.4	0	1.5%	98	77
<b>Post Development</b>					
201- Proposed Development Drainage to Pond	11.20	46.8	1.5%	98	77
202 – Proposed Development Drainage Uncontrolled	0.93	0	3.0%	98	77

The post-development catchment boundaries for the site are illustrated on Figure 6.

Table 3, below outlines the calculated pre-development and post development peak run-off rates (without SWM controls) during the 5, 25 and 100-year design storm events.





201  
11.20

POST-DEVELOPMENT CATCHMENT BOUNDARY  
POST-DEVELOPMENT CATCHMENT NUMBER  
POST-DEVELOPMENT CATCHMENT AREA(Ha.)



LOON CALL  
M-1 DEVELOPMENT  
POST-DEVELOPMENT  
CATCHMENT PLAN

PROJECT NO. 19-11471-M  
SCALE: 1:2000 DATE: JANUARY 2021

FIGURE 6

**Table 3  
MIDUSS Run-off Rates**

	<b>5Yr</b>	<b>25Yr</b>	<b>100Yr</b>
<b>Total Pre-development Peak Runoff Rate – Catchment 101 (m<sup>3</sup>/sec)</b>	<b>0.133</b>	<b>0.310</b>	<b>0.501</b>
<b>Total Post Development Peak Runoff Rate – Catchment 201 &amp; 202 (m<sup>3</sup>/sec)</b>	<b>1.148</b>	<b>1.769</b>	<b>2.510</b>

Based on the results of the hydrological modelling, runoff rates will increase as a result of the development on the site.

MIDUSS input/output calculations are included in Appendix C.

#### **7.4 Storm Water Management Plan**

Drainage from catchment 201 will be controlled to attenuate flows to pre-development conditions.

Drainage from catchment 201 will be directed to a 5092m<sup>3</sup> wet pond constructed on the north property limit. Grading within the subdivision will direct water to the pond through storm water sewers. The pond facility will attenuate peak flows up to the 100 year storm event to pre-development peak flows. The ponding area is proposed to be approximately 0.45ha.

Drainage from the pond will outlet to grade and be conveyed to grade south of the existing watercourse (Centreville Creek) north of the property via a proposed enhanced rip-rap swale. The drainage eventually discharges to Georgian Bay. A level spreader at the outlet will be used to minimize erosion at the outlet. With post development run-off controlled to pre-development levels, the existing conveyance features will be adequate to convey site drainage. The extended detention storage requirements for wet pond type facilities according to receiving water body sensitivity are outlined in Table 3.2 of the MOE SWM Planning and Design Manual.

Based on the contributing drainage area of 11.2 ha and 46.8% imperviousness, the total storage volume required in the SWM pond is 1899 cubic meters (11.2 ha x 169.5cu.m / ha), with 1450 cu.m of permanent pool storage required, and 449 cu.m of detention storage required. The pond as designed provides 1968 cu.m of permanent pool storage (of which 488 cu.m. are provided in the forebay) and 5092 cu.m of live detention storage. Draw-down calculations for the extended detention storage component are included in Appendix D.

The stage-storage-discharge characteristics for the SWM pond are outlined in Table 4, below.

**Table 4  
Stage-Storage-Discharge**

<b>Elevation (m)</b>	<b>Discharge Rate (m<sup>3</sup>/s)</b>	<b>Permanent Storage (m<sup>3</sup>)</b>	<b>Live Storage (m<sup>3</sup>)</b>	<b>Notes</b>
193.50	0	0	0	Bottom of Forebay
194.00	0	74	0	Bottom of Pond
195.00	0	1968	0	125mm dia Orifice / Permanent Pool
195.10	0.00340	1968	264	
195.20	0.01170	1968	539	
195.30	0.01594	1968	825	
195.40	0.01927	1968	1122	
195.50	0.02211	1968	1429	
195.60	0.02462	1968	1747	300mm dia. Secondary Outlet Pipe
195.70	0.03321	1968	2076	
195.80	0.05124	1968	2415	
195.90	0.07510	1968	2766	
196.00	0.1210	1968	3127	
196.10	0.1426	1968	3498	Weir
196.20	0.3173	1968	3881	
196.30	0.6502	1968	4274	
196.40	1.117	1968	4678	
196.50	1.717	1968	5092	Top of Berm



The Storm Water Management Planning and Design Manual (MOE, 2003) recommends a number of suitable water quality enhancement techniques such as detention storage, enhanced grass swales, level spreaders, infiltration facilities, and oil/grit removers.

Water quality enhancement of post development run-off from Catchment 201 will be achieved through the implementation of a “treatment train” of approved measures, as follows:

- Provision of over 1968 cubic meters of permanent storage and 5092 cubic meters of live storage in the SWM facility
- Rip-rap enhanced swale and level spreader at pond outlet to prevent migration of sediment
- Maintenance of lot line vegetation to filter runoff
- Suitable construction mitigation measures to be utilized during the site development

## **7.5 SWM Model Results**

Using the MIDUSS hydrologic model, pre-development and post development run-off hydrographs were generated for the site in response to the 5, 10, 25, and 100 year design storm events. Modelling results are shown in Table 5. The MIDUSS files are included in Appendix C.

**Table 5  
SWM Model Results**

	<b>5yr Storm</b>	<b>25yr Storm</b>	<b>100yr Storm</b>
<b>Total pre-development flow – Catchment 101 (m<sup>3</sup>/s)</b>	<b>0.133</b>	<b>0.310</b>	<b>0.501</b>
Post development pond outlet flow - Catchment 201 (m <sup>3</sup> /s)	0.036	0.102	0.183
Post development uncontrolled flow – catchment 202 (m <sup>3</sup> /s)	0.030	0.065	0.105
<b>Total post development flow with SWM (m<sup>3</sup>/s)</b>	<b>0.066</b>	<b>0.167</b>	<b>0.288</b>
Maximum Live Storage Volume (m <sup>3</sup> )	2137	2977	3587
Maximum Pond Elevation (m)	195.72	195.96	196.12

## **7.6 Seepage Areas**

The Hydrogeological report noted a small groundwater seepage area at the south west corner of the property. In order to encourage infiltration in this isolated area, french drains will be proposed to be constructed in the rear yards adjacent the limit of trees to be retained.

## **8.0 EROSION AND SEDIMENT CONTROL**

Sedimentation and erosion control measures are required during construction and until such a time that site development has been completed, the internal driveway has been paved and vegetation established.

The use of various siltation control measures will be implemented to protect the adjacent properties and receiving storm sewer from migrating sediments.

These works include but may not be limited to:

- Installation of siltation fencing along the disturbed construction area.
- Filter cloth and stone placement over catch basins until the parking lot and driveway are paved and vegetation is established.
- Installation of rock check dams in swales / ditches.
- Installation of construction mud mat at site entrances.

A detailed sedimentation control plan will be provided during the Site Plan Application stage.

### **8.1 During Construction**

Prior to carrying out site grading the siltation barriers and mud mat noted above shall be in place.

The storm sewer works will not be permitted to outlet to the municipal sewers until the site has been stabilized.

Other temporary installations of silt fence or other appropriate measures may be required during grading to minimize silt migration from the site. The measures will need to be removed, replaced and relocated as required during the construction period until the site works have been completed and vegetation established.

During construction all stockpiled material will be placed up-gradient of the siltation controls.

If site works are to continue through the winter and spring the engineer shall be contacted by the owner to review the measures in place with the contractor on a regular basis to ensure that the facilities are adequate and in good working order.

All reasonable methods to control erosion and sedimentation are to be taken during construction.

## **8.2 Monitoring and Maintenance**

It is the responsibility of the contractor and owner to maintain the siltation control devices until suitable grass cover has been established.

A regular review of the facilities by the contractor shall be carried out during the construction period to ensure that the facilities are being properly maintained, and if necessary replaced. Inspection reports are to be completed weekly and distributed to the owner, contractor, and Town.

The contractor should inspect the siltation devices immediately after each rainfall. Damaged devices should be repaired immediately and additional devices installed if necessary.

Silt should be removed from the fencing when deposits reach approximately 250mm above original ground.

## **8.3 Contingency Plan**

Should the erosion control measures fail and sediment migrate beyond the limits of the control works, the following tasks are required to be completed:

- The Municipality of Meaford and Ministry of the Environment should be notified of the event. The area will be assessed and cleaned up to the satisfaction of the agencies.
- Additional sedimentation facilities be installed in the area of the migration and down gradient to contain the sediment.
- The Ministry of Natural Resources should be contacted in the event that sediment reaches any adjacent water bodies.

## **9.0 UTILITIES**

Overhead hydro and buried cable television, natural gas and telephone services are immediately available to the site from Highway #26. Both Hydro One and Enbridge Gas will need to determine if any upgrades to their existing infrastructure will be required as the development proceeds on a phase by phase basis.



Internal streetlighting will be installed in accordance with the Municipality of Meaford's Engineering Standards guide, including LED fixtures and decorative poles.

## **10.0 SUMMARY AND CONCLUSIONS**

The findings of this report are summarized as follows:

- The existing 150mm dia. Watermain on Highway #26 is not sufficient to service the proposed development at full build out as system pressures would be marginally lower than the Ministry of Environment guidelines. A 250mm dia. Watermain will be extended along Highway #26 from the intersection of Ford Avenue to improve service the site once demand requires the improvement. The initial phases of development can be serviced from the exiting 150mm dia. watermain
- A sanitary sewer will be extended along Highway #26 from the existing municipal system near Albery Court. The entire site will be able to discharge by gravity to the proposed sanitary sewer extension and no pump stations will be required. The Town of Meaford is undertaking a review of existing system capacities and will identify deficiencies in the existing sewer network that will need to be addressed in order to service the development.
- The comparison of pre-development and post development storm water flow rates indicate that peak flows will increase during major storm events as a result of the increased impervious area.
- It is understood that peak flow attenuation is required. A wet pond storage facility will be constructed adjacent to the north perimeter of the property. The pond will provide 5092 cu.m. of storage to attenuate peak flows up to the 100 year storm event.
- Storm water quality enhancement can be achieved using a “treatment train” of quality control techniques including provision of over 1968 cubic meters of permanent pool storage in the SWM facility, enhanced swales to promote cleansing and infiltration, and suitable construction mitigation measures to be utilized during the site development.
- Suitable measures can be implemented during construction to protect the adjacent properties from migrating sediments.

It is recommended that:

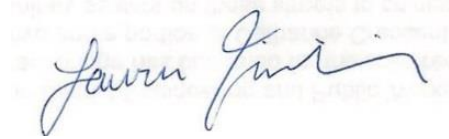
- 1) This report and drawings be submitted to the Municipality of Meaford to support planning approvals for the development.
- 2) The construction mitigation measures outlined in this report are utilized as a guideline for construction mitigation management on this site.

**LOON CALL KENNEDY FARM DEVELOPMENT – TOWN OF MEAFORD  
FUNCTIONAL SERVICING REPORT – REVISED JANUARY 2021**

---

All of which is respectfully submitted.

**PINESTONE ENGINEERING LTD.**



Lauren Trividic, P.Eng.



Tim Harvey, P.Eng.



## **APPENDIX A**

### **Soils**



# **Soil Engineers Ltd.**

CONSULTING ENGINEERS

**GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE**

90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL (416) 754-8515 · FAX (905) 881-8335

**BARRIE**  
TEL: (705) 721-7863  
FAX: (705) 721-7864

**MISSISSAUGA**  
TEL: (905) 542-7605  
FAX: (905) 542-2769

**OSHAWA**  
TEL: (905) 440-2040  
FAX: (905) 725-1315

**NEWMARKET**  
TEL: (905) 853-0647  
FAX: (905) 881-8335

**GRAVENHURST**  
TEL: (705) 684-4242  
FAX: (705) 684-8522

**PETERBOROUGH**  
TEL: (905) 440-2040  
FAX: (905) 725-1315

**HAMILTON**  
TEL: (905) 777-7956  
FAX: (905) 542-2769

December 23, 2019

Reference No. 1911-M113

LC Development Group  
909 Davenport Road, 2<sup>nd</sup> Floor  
Toronto, Ontario  
M6G 2B7

Attention: Mr. Angus Knowles

**Re: Test Pit Investigation Report  
Proposed New Subdivision  
206105 Highway 26  
Town of Meaford**

Dear Sir,

As requested, we visited the site on November 19, 2019 to carry out a Test Pit Investigation for an assessment of the subsurface conditions and to determine the engineering properties of the disclosed soils. Our findings and recommendations are presented herein.

The field work consisted of 17 (Seventeen) test pits dug by an excavator to depths ranging from 1.2 m to 4.0 m +/- throughout the proposed development.

Inspection of the test pits revealed from the prevailing ground surface an organic layer 15 to 30 cm in thickness underlain by a stratum of stiff to very stiff sandy silt till and clayey silt extending to the maximum excavation depths.

Possible bedrock was encountered in Test Pit 2 at a depth of 1.6 m below the prevailing ground surface.

Also, the sandy silt, clayey silt stratum becomes very stiff at a depth of 1.2 throughout the test pits.

No ground water seepage encountered within all the test pits, all remained dry upon completion.





### **Foundations and Slab-On-Grade**

Based on the test pit findings, it is recommended that the normal spread and strip footings can be placed on the sound natural soil, or engineered fill. As a guide a Maximum Allowable Soil Pressure of 150 kPa (SLS) can be used for the design of normal spread and strip footings.

The footings must meet the requirements specified in the latest Ontario Building Code.

The footing subgrade must be inspected by either a geotechnical engineer, or a geotechnical technician under the supervision of geotechnical engineer, or a building inspector who has geotechnical knowledge, to ensure the subgrade conditions are compatible with the foundation design requirements.

Perimeter subdrains encased in fabric filter should be installed and connected to a positive outlet and the foundation walls should be dampproofed.

Foundations exposed to weathering and in unheated area should have at least 1.6 m of earth cover for protection against frost action or they must be properly insulated.

### **Engineered Fill**

The organics must be removed from the entire building footprint extending 1.0 m beyond the buildings perimeter. Any new material for raising the grade should consist of inorganic earth fill and must be compacted to at least 98% of its Maximum Standard Proctor dry density up to the proposed underside of footing elevation or slab elevations.

Prior to placement of engineered fill, the subgrade must be inspected by either a geotechnical engineer, or a geotechnical technician under the supervision of geotechnical engineer, to ensure the subgrade conditions are compatible with the foundation design requirements.

The normal spread and strip footings must be properly reinforced and designed by a qualified designer, architect or structural engineer.



### **Underground Services**

The subgrade for the underground services should consist of natural soils or compacted organic-free earth fill.

A Class 'B' bedding is recommended for the design of the underground services. The bedding material for the underground services should consist of 20-mm Crusher-Run Limestone/Granite, or equivalent.

### **Pavement Design**

The site will be graded for development. The final subgrade may consist of sandy silt and clayey silts with a mixture of rock. The recommended pavement design is presented herein;

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL-3
Asphalt Binder	50	HL-4 or HL-8
Granular Base	150	Granular 'A' or equivalent
Granular Sub-Base	400	Granular 'B' or equivalent

We trust this report is explicit; however, should any queries arise, please do not hesitate to contact us.

Yours very truly,  
**SOIL ENGINEERS LTD.**

Mika Fager, Geo.Tech.  
Branch Manager - Gravenhurst

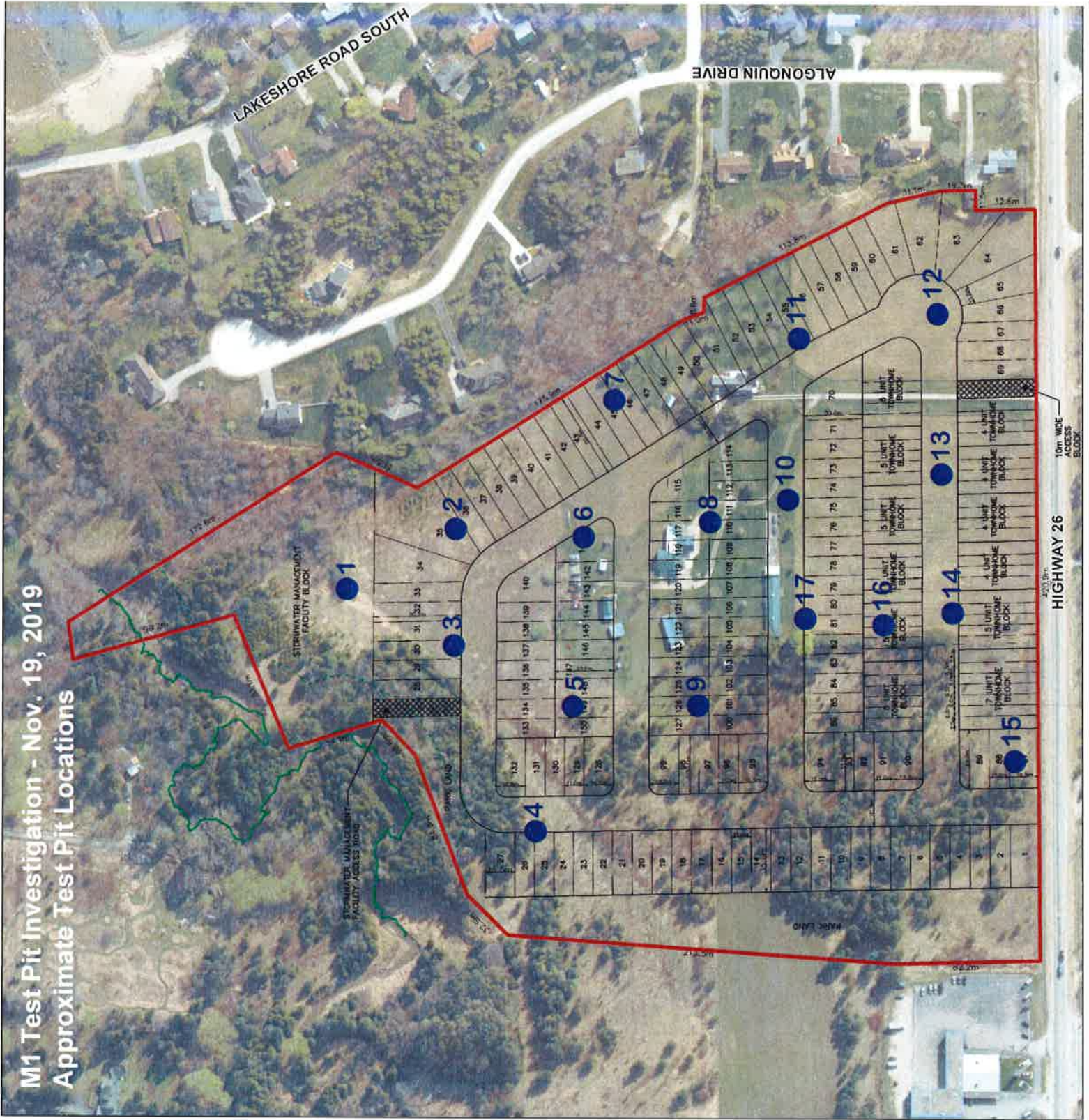
**M1 Test Pit Investigation -- November 19, 2019**

[illegible]



# M1 Test Pit Investigation - Nov. 19, 2019

## Approximate Test Pit Locations





**APPENDIX B**

**Sanitary and Water Servicing Information**

LOON CALL MEAFORD PROPERTY				SANITARY SEWER DESIGN SHEET  ENGINEERING AND PUBLIC WORKS						Design Parameters						<div><div><div></div></div><div>PEL</div><div>PINESTONE ENGINEERING LTD.</div></div>																
Meaford										Drainage Area Plan No: SAN - 1																Average Daily Flow Residential 0.0052 L/s/c						Mannings "n" 0.0130 Min. Velocity 0.60 m/sec Max. Velocity 3.0 m/sec Residential Harmon Peaking Factor (F)
Project Number: 19-11471 Date: January 19, 2021 Design By: LT Checked By: TH File: Z:\Project Documents\11471M Loon Call Meaford\FSR\January 2021 update\11471 Prelim Sanitary Sewer Design Sheet (LT)				Commercial 1.5 L/s/ha Industrial 1.0 L/s/ha Inst. / School 2.5 L/s/ha																						Residential Areas Infiltration 0.28 L/s/ha						
LOCATION				RESIDENTIAL AREAS and POPULATION						SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN									
STREET	AREA NO.	MANHOLE LOCATION		AREA	UNITS	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	HECTARES AND FLOW OF EACH ZONING												TOTALS C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY
		FROM MH	TO MH							2.50 L/s/ha			1.50 L/s/ha			1.00 L/s/ha																
										AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW														
				ha	3.5pp/unit	1000s	1000s		L/sec	ha	ha	L/sec	ha	ha	L/sec	ha	ha	L/sec	L/sec	ha	ha	L/sec	L/sec	m	%	mm	L/sec.	m/s	m/s			
	315	15	12	0.89	15.00	0.053	0.053	4.310374	1.1767											0.89	0.89	0.2492	1.4259	56.0	0.80	200	29.3209	0.934	0.483			
	312	12	13	0.74	18.00	0.063	0.116	4.225916	2.5381											0.74	1.63	0.4564	2.9945	90.0	0.80	200	29.3209	0.934	0.600			
	313	13	14	1.09	27.00	0.095	0.210	4.14024	4.5211											1.09	2.72	0.7616	5.2827	90.0	0.80	200	29.3209	0.934	0.707			
	314	14	2	0.70	17.00	0.060	0.270	4.097939	5.7429											0.70	3.42	0.9576	6.7005	73.0	0.70	200	27.4272	0.873	0.721			
	311	12	9	0.80	15.00	0.053	0.053	4.310374	1.1767											0.80	0.80	0.2240	1.4007	88.0	0.80	200	29.3209	0.934	0.480			
	316	9	10	0.20	4.00	0.014	0.067	4.288024	1.4828											0.20	1.00	0.2800	1.7628	69.0	0.80	200	29.3209	0.934	0.513			
	309	10	11	1.23	36.00	0.126	0.193	4.154042	4.1582											1.23	2.23	0.6244	4.7826	120.0	0.90	200	31.0995	0.990	0.717			
	310	11	4	0.10	0.00	0.000	0.193	4.154042	4.1582											0.10	2.33	0.6524	4.8106	53.0	0.80	200	29.3209	0.934	0.689			
	308	9	8	0.73	19.00	0.067	0.067	4.288024	1.4828											0.73	0.73	0.2044	1.6872	80.0	0.80	200	29.3209	0.934	0.506			
	307	8	7	0.35	8.00	0.028	0.095	4.250214	2.0886											0.35	1.08	0.3024	2.3910	22.0	0.50	200	23.1802	0.738	0.476			
	306	7	6	0.60	15.00	0.053	0.147	4.193864	3.2058											0.60	1.68	0.4704	3.6762	72.0	0.50	200	23.1802	0.738	0.539			
	305	6	5	1.47	35.00	0.123	0.270	4.097939	5.7429											1.47	3.15	0.8820	6.6249	120.0	0.50	200	23.1802	0.738	0.637			
	304	5	4	0.70	11.00	0.039	0.308	4.073561	6.5242											0.70	3.85	1.0780	7.6022	86.0	0.50	200	23.1802	0.738	0.661			
	303	4	3	0.36	6.00	0.021	0.522	3.964751	10.7516											0.36	6.54	1.8312	12.5828	35.0	0.50	200	23.1802	0.738	0.753			
	302	3	2A	0.90	13.00	0.046	0.567	3.945512	11.6329											0.90	7.44	2.0832	13.7161	91.0	0.50	200	23.1802	0.738	0.769			
	301	2A	2	0.53	6.00	0.021	0.588	3.936974	12.0377											0.53	7.97	2.2316	14.2693	32.0	0.50	200	23.1802	0.738	0.776			
		2	1	0.00	0.00	0.000	0.837	3.848653	16.7409											0.00	10.86	3.0408	19.7817	79.0	0.50	200	23.1802	0.738	0.829			
		1	1A	0.00	0.00	0.000	0.837	3.848653	16.7409											0.00	10.86	3.0408	19.7817	110.0	2.60	200	52.8590	1.683	1.562			
		1A	IB	0.00	0.00	0.000	0.837	3.848494	16.7502											0.00	10.86	3.0408	19.7910	103.0	1.00	200	32.7818	1.044	1.093			
		1B	EX	0.00	0.00	0.000	0.837	3.848653	16.7409											0.00	10.86	3.0408	19.7817	41.0	1.00	200	32.7818	1.044	1.092			

March 9, 2020

File No. 120024

Municipality of Meaford  
21 Trowbridge Street West  
Meaford ON  
N4L 1Y1

Attn: **Tori Perejmybida**  
**Director of Infrastructure Services**

Ref: **Kennedy Property (206105 Highway 26)**  
**Review of Available Pressures and Fire Flows**

**Dear Ms. Perejmybida:**

Per your January 27, 2020 request we have completed a review of the theoretical pressures and available fire flows at the proposed Kennedy property development. Our analysis includes a comparison of the pressures within the area of interest under average day demand (ADD), maximum day demand (MDD), peak hour (PH) and maximum day demand plus available fire flow (MDD + FF) under the following conditions:

- Existing 150mm diameter watermain on Highway 26
- Watermain on Highway 26 replaced with 200mm diameter watermain from the entrance to the Kennedy Property to Grandview Drive
- Watermain on Highway 26 replaced with 250mm diameter watermain from the entrance to the Kennedy Property to Grandview Drive

This analysis was completed using the Municipality of Meaford WaterGEMS water supply and distribution model, updated to 2013 Existing Conditions. All scenarios were modelled under both existing and ultimate build out conditions. The conditions for all scenarios are as follows:

- Internal watermain servicing is based the proposed road layout shown on Pinestone Engineering Ltd. drawing SP-1 (Drawing Loon Call Meaford Property M-1, Lot Concept Sketch, Project No. 19-11471-M, Drawing SP-1)
  - Watermain is not included on the sketch. It was assumed that the watermain would follow the proposed road layout.
  - It was assumed that the internal watermain servicing would be 150mm diameter.
  - Connections for internal watermain to the trunk watermain on Highway 26 are not indicated on the drawing. The following potential servicing scenarios were reviewed:
    - One connection, located at the proposed entrance to the site, to the trunk watermain on Highway 26
    - One connection, located at the emergency access to the site, to the trunk watermain on Highway 26
    - Two connections, located at the emergency access to the site and at the proposed entrance to the site, to the trunk watermain on Highway 26

- Elevations are estimated based on existing watermain in the model and also topographic information included in the Grey County GIS.
- Demands for the proposed development are consistent with future demands used in the Municipality of Meaford WaterGEMS water model updated as part of the Municipality of Meaford Water and Wastewater Servicing Master Plan. The demands were developed based on historic data
  - A population density of 2.4 people per unit was used throughout the model. The demand for existing and future residential properties was applied as a unit demand. The future unit residential average day demand used was 720 L/unit/day (300L/cap/day x 2.4 ppu = 720 L/unit/day). For maximum day demand, the maximum day factor (MDF) used for proposed development was 1.6707. This is the MDF used in the 2013 existing model.

### Existing System Conditions Plus the Proposed Kennedy Property Development

A review of pressures within the area of interest under ADD, MDD, PH and MDD + FF was completed under existing system conditions (updated to the end of 2013) plus the proposed Kennedy Property development . Under the above noted conditions the following is a summary of the theoretical pressures and available fire flows:

	Existing 150mm Diameter Watermain			Replace the 150mm Diameter Watermain on Highway 26 from Grandview Drive to the proposed Kennedy Property Development with a 200mm Diameter Watermain			Replace the 150mm Diameter Watermain on Highway 26 from Grandview Drive to the proposed Kennedy Property Development with a 250mm Diameter Watermain		
	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site
Pressure (kPa)									
ADD	360 – 395	360 – 395	360 – 400	365 - 405	365 - 405	370 – 405	370 – 405	370 – 405	370 – 405
MDD	355 – 390	355 – 390	355 – 390	360 – 395	360 – 395	360 – 395	360 – 395	360 – 395	360 – 395
PH	330 – 365	330 – 365	340 – 375	345 - 380	345 - 380	345 – 385	350 – 385	350 – 385	350 – 385
Fire Flow (L/s)									
	27 - 34	45 - 65	61 - 71	45 - 50	60 - 80	70 - 95	55 - 70	65 - 95	73 - 140

These pressures are within the range recommended in the MECP Design Guidelines for normal operating conditions (Per the MECP Design Guidelines for Drinking Water Systems 2008, Chapter 10, Section 10.2 Hydraulic Design, 10.2.2.1 Maximum and Minimum Operating Pressures: The normal operating pressure in the distribution system should be approximately 350 to 480 kPa and not less than 275kPa. The maximum pressures in the distribution system should not exceed 700 kPa to avoid damage to household plumbing and unnecessary water and



energy consumption). With the existing 150mm diameter watermain and also with 200mm diameter watermain on Highway 26 the pressures at the south west corner of the site are marginally lower than 350kPa, but above the recommended minimum of 275kPa. With 250mm diameter watermain the pressures within all areas of the proposed development are within the MECP recommended range.

With respect to theoretical available fire flows, under existing conditions with the existing 150mm diameter watermain on Highway 26 acceptable fire flows could be achieved at the site with two connections from the watermain on Highway 26 to the proposed site. Two connections to the site is also considered to be a best practice, as it provides redundancy and better water flow. Replacing the existing 150mm diameter watermain on Highway 26 with 200mm or 250mm diameter watermain will allow for much higher fire flows to the proposed site, and would be recommended as a long term planned upgrade.

### Ultimate Build Out Conditions

A review of pressures within the area of interest under ADD, MDD, PH and MDD + FF was completed under ultimate build out system conditions. Under the above noted conditions the following is a summary of the theoretical pressures and available fire flows:

	Existing 150mm Diameter Watermain			Replace the 150mm Diameter Watermain on Highway 26 from Grandview Drive to the proposed Kennedy Property Development with a 200mm Diameter Watermain			Replace the 150mm Diameter Watermain on Highway 26 from Grandview Drive to the proposed Kennedy Property Development with a 250mm Diameter Watermain		
	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site	One watermain into the site, located at the proposed driveway	One watermain into the site, located at the proposed Emergency Access	Two watermains connections to the site
Pressure (kPa)									
ADD	350 – 385	350 – 385	355 - 390	355 – 390	355 – 390	355 – 390	355 – 390	355 – 390	355 – 390
MDD	340 – 375	340 – 375	340 – 380	345 – 380	345 – 380	345 – 380	345 – 380	345 – 380	350 – 385
PH	320 – 355	325 – 355	325 - 360	330 – 365	330 – 365	330 - 370	335 - 370	335 - 370	335 - 370
Fire Flow (L/s)									
	22 - 32	40 - 60	44 - 63	46 - 60	55 - 90	68 - 100	66 - 80	75 - 105	95 - 105

These pressures are within the range recommended in the MECP Design Guidelines for normal operating conditions (Per the MECP Design Guidelines for Drinking Water Systems 2008, Chapter 10, Section 10.2 Hydraulic Design, 10.2.2.1 Maximum and Minimum Operating Pressures: The normal operating pressure in the distribution system should be approximately 350 to 480 kPa and not less than 275kPa. The maximum pressures in the distribution system should not exceed 700 kPa to avoid damage to household plumbing and unnecessary water and

energy consumption). The pressure at the south west end of the proposed development are marginally lower than 350kPa as a result of elevation.

A review of theoretical available fire flows indicates that replacing the 150mm diameter watermain on Highway 26 with 200mm or 250mm diameter watermain and providing two connections from the watermain on Highway 26 to the proposed development will ensure sufficient fire flow is available at the proposed development.

Please do not hesitate to contact the undersigned if you have any questions with respect to this submission.

Yours truly

**AINLEY & ASSOCIATES LIMITED**



Heidi Ferris, P.Eng.  
Project Engineer

Encl.  
c.c.

**APPENDIX C**

**MIDUSS Model Results**



```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Nov 2020\MIDUSS"
"          Output filename:                    5YR_PRE.out"
"          Licensee name:                      Windows User"
"          Company                            "
"          Date & Time last used:              2020-11-30 at 2:11:02 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          360.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1      Chicago storm"
"          1234.576 Coefficient A"
"          8.297   Constant B"
"          0.851   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          134.692   mm/hr"
"          Total depth                42.929   mm"
"          6  005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          101    101 - MEAFORD PROPERTY PRE-DEVELOPMENT "
"          0.000  % Impervious"
"          12.230 Total Area"
"          400.000 Flow length"
"          1.500  Overland Slope"
"          12.230 Pervious Area"
"          400.000 Pervious length"
"          1.500  Pervious slope"
"          0.000  Impervious Area"
"          0.000  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.262  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```



"	0.131	0.000	0.000	0.000 c.m/sec"
"	Catchment 101	Pervious	Impervious	Total Area "
"	Surface Area	12.230	0.000	12.230 hectare"
"	Time of concentration	105.226	0.003	105.226 minutes"
"	Time to Centroid	223.616	82.930	223.616 minutes"
"	Rainfall depth	42.929	42.929	42.929 mm"
"	Rainfall volume	5250.17	0.01	5250.18 c.m"
"	Rainfall losses	31.698	8.945	31.698 mm"
"	Runoff depth	11.230	33.984	11.230 mm"
"	Runoff volume	1373.48	0.00	1373.48 c.m"
"	Runoff coefficient	0.262	0.000	0.262 "
"	Maximum flow	0.131	0.000	0.131 c.m/sec"
" 40	HYDROGRAPH Add Runoff "			
"	4	Add Runoff "		
"	0.131	0.131	0.000	0.000"
" 38	START/RE-START TOTALS 101"			
"	3	Runoff Totals on EXIT"		
"	Total Catchment area		12.230	hectare"
"	Total Impervious area		0.000	hectare"
"	Total % impervious		0.000"	
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                      Z:\Project Documents\
"                      11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                      5YR_POST.out"
"          Licensee name:                      Windows User"
"          Company                      "
"          Date & Time last used:                      2021-01-20 at 10:14:16 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          360.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          1234.576  Coefficient A"
"          8.297  Constant B"
"          0.851  Exponent C"
"          0.375  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                      134.692  mm/hr"
"          Total depth                      42.929  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"          1  Triangular SCS"
"          2  Proportional to %"
"          1  SCS method"
"          201  201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800  % Impervious"
"          11.200  Total Area"
"          400.000  Flow length"
"          1.500  Overland Slope"
"          5.958  Pervious Area"
"          400.000  Pervious length"
"          1.500  Pervious slope"
"          5.242  Impervious Area"
"          351.880  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000  Pervious SCS Curve No."
"          0.262  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.875  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"

```

"	0.518	Impervious Initial abstraction"			
"	1.118	0.000	0.000	0.000	c.m/sec"
"	Catchment 201	Pervious	Impervious	Total Area	"
"	Surface Area	5.958	5.242	11.200	hectare"
"	Time of concentration	105.226	9.657	33.903	minutes"
"	Time to Centroid	223.616	97.611	129.578	minutes"
"	Rainfall depth	42.929	42.929	42.929	mm"
"	Rainfall volume	2557.86	2250.15	4808.01	c.m"
"	Rainfall losses	31.698	5.374	19.378	mm"
"	Runoff depth	11.230	37.555	23.550	mm"
"	Runoff volume	669.15	1968.47	2637.62	c.m"
"	Runoff coefficient	0.262	0.875	0.549	"
"	Maximum flow	0.064	1.111	1.118	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	1.118	1.118	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"	1.118	0.000	0.000	0.000	"
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.261	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"	0.030	0.000	0.000	0.000	c.m/sec"
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.930	0.000	0.930	hectare"
"	Time of concentration	24.545	0.001	24.545	minutes"
"	Time to Centroid	125.546	82.936	125.546	minutes"
"	Rainfall depth	42.929	42.929	42.929	mm"

"	Rainfall volume	399.24	0.00	399.24	c.m"
"	Rainfall losses	31.710	8.923	31.710	mm"
"	Runoff depth	11.219	34.005	11.219	mm"
"	Runoff volume	104.33	0.00	104.33	c.m"
"	Runoff coefficient	0.261	0.000	0.261	"
"	Maximum flow	0.030	0.000	0.030	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.030	0.030	0.000	0.000"
" 38	START/RE-START TOTALS 202"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			12.130	hectare"
"	Total Impervious area			5.242	hectare"
"	Total % impervious			43.212"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                    5YR_SWM.out"
"          Licensee name:                     Windows User"
"          Company                             "
"          Date & Time last used:              2021-01-20 at 10:19:29 AM"
31          TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32          STORM Chicago storm"
"          1      Chicago storm"
"          1234.576 Coefficient A"
"          8.297   Constant B"
"          0.851   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          134.692   mm/hr"
"          Total depth                42.929   mm"
"          6  005hyd Hydrograph extension used in this file"
33          CATCHMENT 201"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          201    201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800  % Impervious"
"          11.200  Total Area"
"          400.000 Flow length"
"          1.500   Overland Slope"
"          5.958   Pervious Area"
"          400.000 Pervious length"
"          1.500   Pervious slope"
"          5.242   Impervious Area"
"          351.880 Impervious length"
"          1.500   Impervious slope"
"          0.250   Pervious Manning 'n'"
"          77.000  Pervious SCS Curve No."
"          0.262   Pervious Runoff coefficient"
"          0.100   Pervious Ia/S coefficient"
"          7.587   Pervious Initial abstraction"
"          0.015   Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.875   Impervious Runoff coefficient"
"          0.100   Impervious Ia/S coefficient"

```



```

"      0.518    Impervious Initial abstraction"
"      1.118      0.000      0.000      0.000 c.m/sec"
"      Catchment 201      Pervious      Impervious      Total Area  "
"      Surface Area      5.958      5.242      11.200      hectare"
"      Time of concentration 105.226      9.657      33.903      minutes"
"      Time to Centroid      223.616      97.611      129.578      minutes"
"      Rainfall depth      42.929      42.929      42.929      mm"
"      Rainfall volume      2557.86      2250.15      4808.01      c.m"
"      Rainfall losses      31.698      5.374      19.378      mm"
"      Runoff depth      11.230      37.555      23.550      mm"
"      Runoff volume      669.15      1968.47      2637.62      c.m"
"      Runoff coefficient      0.262      0.875      0.549      "
"      Maximum flow      0.064      1.111      1.118      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      1.118      1.118      0.000      0.000"
" 54      POND DESIGN"
"      1.118      Current peak flow      c.m/sec"
"      0.141      Target outflow      c.m/sec"
"      2637.6      Hydrograph volume      c.m"
"      16.      Number of stages"
"      195.000      Minimum water level      metre"
"      196.500      Maximum water level      metre"
"      195.000      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      195.000      0.000      0.000"
"      195.100      0.00340      264.000"
"      195.200      0.01170      539.000"
"      195.300      0.01594      825.000"
"      195.400      0.01927      1122.000"
"      195.500      0.02211      1429.000"
"      195.600      0.02462      1747.000"
"      195.700      0.03321      2076.000"
"      195.800      0.05124      2415.000"
"      195.900      0.07510      2766.000"
"      196.000      0.1210      3127.000"
"      196.100      0.1426      3498.000"
"      196.200      0.3173      3881.000"
"      196.300      0.6502      4274.000"
"      196.400      1.117      4678.000"
"      196.500      1.717      5092.000"
"      1.      WEIRS"
"      Crest      Weir      Crest      Left      Right"
"      elevation coefficie      breadth sideslope sideslope"
"      196.100      0.900      3.000      3.000      3.000"
"      2.      ORIFICES"
"      Orifice      Orifice      Orifice      Number of"
"      invert coefficie      diameter      orifices"
"      195.000      0.630      0.1250      1.000"

```

"	195.600	0.630	0.3000	1.000"	
"	Peak outflow		0.036	c.m/sec"	
"	Maximum level		195.718	metre"	
"	Maximum storage		2136.839	c.m"	
"	Centroidal lag		17.276	hours"	
"	1.118	1.118	0.036	0.000 c.m/sec"	
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	1.118	0.036	0.036	0.000"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"	1.118	0.000	0.036	0.000"	
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.261	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"	0.030	0.000	0.036	0.000 c.m/sec"	
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.930	0.000	0.930	hectare"
"	Time of concentration	24.545	0.001	24.545	minutes"
"	Time to Centroid	125.546	82.936	125.546	minutes"
"	Rainfall depth	42.929	42.929	42.929	mm"
"	Rainfall volume	399.24	0.00	399.24	c.m"
"	Rainfall losses	31.710	8.923	31.710	mm"
"	Runoff depth	11.219	34.005	11.219	mm"
"	Runoff volume	104.33	0.00	104.33	c.m"
"	Runoff coefficient	0.261	0.000	0.261	"
"	Maximum flow	0.030	0.000	0.030	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.030	0.030	0.036	0.000"	
" 38		START/RE-START TOTALS 202"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		12.130	hectare"	
"		Total Impervious area		5.242	hectare"	
"		Total % impervious		43.212"		
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Nov 2020\MIDUSS"
"          Output filename:                    25YR_PRE.out"
"          Licensee name:                      Windows User"
"          Company                            "
"          Date & Time last used:              2020-11-30 at 2:12:28 PM"
31          TIME PARAMETERS"
"          5.000  Time Step"
"          360.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32          STORM Chicago storm"
"          1      Chicago storm"
"          1750.276 Coefficient A"
"          8.303   Constant B"
"          0.862   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity                    185.501   mm/hr"
"          Total depth                          57.451   mm"
"          6  025hyd Hydrograph extension used in this file"
33          CATCHMENT 101"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          101    101 - MEAFORD PROPERTY PRE-DEVELOPMENT "
"          0.000  % Impervious"
"          12.230 Total Area"
"          400.000 Flow length"
"          1.500  Overland Slope"
"          12.230 Pervious Area"
"          400.000 Pervious length"
"          1.500  Pervious slope"
"          0.000  Impervious Area"
"          0.000  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.344  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"	0.295	0.000	0.000	0.000 c.m/sec"
"	Catchment 101	Pervious	Impervious	Total Area "
"	Surface Area	12.230	0.000	12.230 hectare"
"	Time of concentration	79.119	0.002	79.119 minutes"
"	Time to Centroid	193.853	81.875	193.853 minutes"
"	Rainfall depth	57.451	57.451	57.451 mm"
"	Rainfall volume	7026.30	0.01	7026.31 c.m"
"	Rainfall losses	37.678	10.522	37.678 mm"
"	Runoff depth	19.773	46.929	19.773 mm"
"	Runoff volume	2418.27	0.01	2418.27 c.m"
"	Runoff coefficient	0.344	0.000	0.344 "
"	Maximum flow	0.295	0.000	0.295 c.m/sec"
" 40	HYDROGRAPH Add Runoff "			
"	4	Add Runoff "		
"	0.295	0.295	0.000	0.000"
" 38	START/RE-START TOTALS 101"			
"	3	Runoff Totals on EXIT"		
"	Total Catchment area		12.230	hectare"
"	Total Impervious area		0.000	hectare"
"	Total % impervious		0.000"	
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                      Z:\Project Documents\
"                      11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                      25YR_POST.out"
"          Licensee name:                      Windows User"
"          Company                      "
"          Date & Time last used:                      2021-01-20 at 10:15:29 AM"
31          TIME PARAMETERS"
"          5.000  Time Step"
"          360.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
32          STORM Chicago storm"
"          1  Chicago storm"
"          1750.276  Coefficient A"
"          8.303  Constant B"
"          0.862  Exponent C"
"          0.375  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                      185.501  mm/hr"
"          Total depth                      57.451  mm"
"          6  025hyd  Hydrograph extension used in this file"
33          CATCHMENT 201"
"          1  Triangular SCS"
"          2  Proportional to %"
"          1  SCS method"
"          201  201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800  % Impervious"
"          11.200  Total Area"
"          400.000  Flow length"
"          1.500  Overland Slope"
"          5.958  Pervious Area"
"          400.000  Pervious length"
"          1.500  Pervious slope"
"          5.242  Impervious Area"
"          351.880  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000  Pervious SCS Curve No."
"          0.344  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.907  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"

```



"	0.518	Impervious Initial abstraction"			
"		1.704	0.000	0.000	0.000 c.m/sec"
"		Catchment 201	Pervious	Impervious	Total Area "
"		Surface Area	5.958	5.242	11.200 hectare"
"		Time of concentration	79.119	8.413	29.728 minutes"
"		Time to Centroid	193.853	94.793	124.656 minutes"
"		Rainfall depth	57.451	57.451	57.451 mm"
"		Rainfall volume	3423.19	3011.37	6434.56 c.m"
"		Rainfall losses	37.678	5.368	22.557 mm"
"		Runoff depth	19.773	52.083	34.894 mm"
"		Runoff volume	1178.17	2730.00	3908.17 c.m"
"		Runoff coefficient	0.344	0.907	0.607 "
"		Maximum flow	0.144	1.692	1.704 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		1.704	1.704	0.000	0.000"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		1.704	0.000	0.000	0.000"
" 33		CATCHMENT 202"			
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.344	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.065	0.000	0.000	0.000 c.m/sec"
"		Catchment 202	Pervious	Impervious	Total Area "
"		Surface Area	0.930	0.000	0.930 hectare"
"		Time of concentration	18.455	0.001	18.455 minutes"
"		Time to Centroid	116.478	81.880	116.478 minutes"
"		Rainfall depth	57.451	57.451	57.451 mm"

"	Rainfall volume	534.30	0.00	534.30	c.m"
"	Rainfall losses	37.697	10.496	37.697	mm"
"	Runoff depth	19.755	46.956	19.755	mm"
"	Runoff volume	183.72	0.00	183.72	c.m"
"	Runoff coefficient	0.344	0.000	0.344	"
"	Maximum flow	0.065	0.000	0.065	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.065	0.065	0.000	0.000"
" 38	START/RE-START TOTALS 202"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			12.130	hectare"
"	Total Impervious area			5.242	hectare"
"	Total % impervious			43.212"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                    25YR_SWM.out"
"          Licensee name:                     Windows User"
"          Company                             "
"          Date & Time last used:              2021-01-20 at 10:21:36 AM"
31          TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32          STORM Chicago storm"
"          1      Chicago storm"
"          1750.276 Coefficient A"
"          8.303   Constant B"
"          0.862   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          185.501   mm/hr"
"          Total depth                57.451   mm"
"          6  025hyd  Hydrograph extension used in this file"
33          CATCHMENT 201"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          201    201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800  % Impervious"
"          11.200  Total Area"
"          400.000 Flow length"
"          1.500   Overland Slope"
"          5.958   Pervious Area"
"          400.000 Pervious length"
"          1.500   Pervious slope"
"          5.242   Impervious Area"
"          351.880 Impervious length"
"          1.500   Impervious slope"
"          0.250   Pervious Manning 'n'"
"          77.000  Pervious SCS Curve No."
"          0.344   Pervious Runoff coefficient"
"          0.100   Pervious Ia/S coefficient"
"          7.587   Pervious Initial abstraction"
"          0.015   Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.907   Impervious Runoff coefficient"
"          0.100   Impervious Ia/S coefficient"

```

```

"      0.518  Impervious Initial abstraction"
"      1.704      0.000      0.000      0.000 c.m/sec"
"      Catchment 201      Pervious      Impervious      Total Area  "
"      Surface Area      5.958      5.242      11.200      hectare"
"      Time of concentration 79.119      8.413      29.728      minutes"
"      Time to Centroid 193.853      94.793      124.656      minutes"
"      Rainfall depth 57.451      57.451      57.451      mm"
"      Rainfall volume 3423.19      3011.37      6434.56      c.m"
"      Rainfall losses 37.678      5.368      22.557      mm"
"      Runoff depth 19.773      52.083      34.894      mm"
"      Runoff volume 1178.17      2730.00      3908.17      c.m"
"      Runoff coefficient 0.344      0.907      0.607      "
"      Maximum flow 0.144      1.692      1.704      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      1.704      1.704      0.000      0.000"
" 54      POND DESIGN"
"      1.704      Current peak flow      c.m/sec"
"      0.141      Target outflow      c.m/sec"
"      3908.2      Hydrograph volume      c.m"
"      16.      Number of stages"
"      195.000      Minimum water level      metre"
"      196.500      Maximum water level      metre"
"      195.000      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      195.000      0.000      0.000"
"      195.100      0.00340      264.000"
"      195.200      0.01170      539.000"
"      195.300      0.01594      825.000"
"      195.400      0.01927      1122.000"
"      195.500      0.02211      1429.000"
"      195.600      0.02462      1747.000"
"      195.700      0.03321      2076.000"
"      195.800      0.05124      2415.000"
"      195.900      0.07510      2766.000"
"      196.000      0.1210      3127.000"
"      196.100      0.1426      3498.000"
"      196.200      0.3173      3881.000"
"      196.300      0.6502      4274.000"
"      196.400      1.117      4678.000"
"      196.500      1.717      5092.000"
"      1.      WEIRS"
"      Crest      Weir      Crest      Left      Right"
"      elevation coefficie      breadth sideslope sideslope"
"      196.100      0.900      3.000      3.000      3.000"
"      2.      ORIFICES"
"      Orifice      Orifice      Orifice      Number of"
"      invert coefficie      diameter      orifices"
"      195.000      0.630      0.1250      1.000"

```

"	195.600	0.630	0.3000	1.000"	
"	Peak outflow		0.102	c.m/sec"	
"	Maximum level		195.959	metre"	
"	Maximum storage		2977.263	c.m"	
"	Centroidal lag		14.953	hours"	
"	1.704	1.704	0.102	0.000 c.m/sec"	
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	1.704	0.102	0.102	0.000"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"	1.704	0.000	0.102	0.000"	
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.344	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"	0.065	0.000	0.102	0.000 c.m/sec"	
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.930	0.000	0.930	hectare"
"	Time of concentration	18.455	0.001	18.455	minutes"
"	Time to Centroid	116.478	81.880	116.478	minutes"
"	Rainfall depth	57.451	57.451	57.451	mm"
"	Rainfall volume	534.30	0.00	534.30	c.m"
"	Rainfall losses	37.697	10.496	37.697	mm"
"	Runoff depth	19.755	46.956	19.755	mm"
"	Runoff volume	183.72	0.00	183.72	c.m"
"	Runoff coefficient	0.344	0.000	0.344	"
"	Maximum flow	0.065	0.000	0.065	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.065	0.065	0.102	0.000"	
" 38		START/RE-START TOTALS 202"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		12.130	hectare"	
"		Total Impervious area		5.242	hectare"	
"		Total % impervious		43.212"		
" 19		EXIT"				



```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10 Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Nov 2020\MIDUSS"
"          Output filename:                    100YR_PRE.out"
"          Licensee name:                      Windows User"
"          Company                            "
"          Date & Time last used:              2020-11-30 at 2:13:48 PM"
31      TIME PARAMETERS"
"          5.000 Time Step"
"          360.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32      STORM Chicago storm"
"          1 Chicago storm"
"          2171.754 Coefficient A"
"          8.303 Constant B"
"          0.867 Exponent C"
"          0.375 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                    227.198 mm/hr"
"          Total depth                          69.443 mm"
"          6 100hyd Hydrograph extension used in this file"
33      CATCHMENT 101"
"          1 Triangular SCS"
"          2 Proportional to %"
"          1 SCS method"
"          101 101 - MEAFORD PROPERTY PRE-DEVELOPMENT "
"          0.000 % Impervious"
"          12.230 Total Area"
"          400.000 Flow length"
"          1.500 Overland Slope"
"          12.230 Pervious Area"
"          400.000 Pervious length"
"          1.500 Pervious slope"
"          0.000 Impervious Area"
"          0.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.400 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          7.587 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

"	0.479	0.000	0.000	0.000 c.m/sec"
"	Catchment 101	Pervious	Impervious	Total Area "
"	Surface Area	12.230	0.000	12.230 hectare"
"	Time of concentration	67.251	0.002	67.251 minutes"
"	Time to Centroid	179.168	81.323	179.168 minutes"
"	Rainfall depth	69.443	69.443	69.443 mm"
"	Rainfall volume	8492.91	0.01	8492.92 c.m"
"	Rainfall losses	41.666	11.789	41.666 mm"
"	Runoff depth	27.777	57.655	27.777 mm"
"	Runoff volume	3397.11	0.01	3397.12 c.m"
"	Runoff coefficient	0.400	0.000	0.400 "
"	Maximum flow	0.479	0.000	0.479 c.m/sec"
" 40	HYDROGRAPH Add Runoff "			
"	4	Add Runoff "		
"	0.479	0.479	0.000	0.000"
" 38	START/RE-START TOTALS 101"			
"	3	Runoff Totals on EXIT"		
"	Total Catchment area		12.230	hectare"
"	Total Impervious area		0.000	hectare"
"	Total % impervious		0.000"	
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                    100YR_POST.out"
"          Licensee name:                      Windows User"
"          Company                            "
"          Date & Time last used:              2021-01-20 at 10:16:35 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          360.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1      Chicago storm"
"          2171.754 Coefficient A"
"          8.303   Constant B"
"          0.867   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity                227.198   mm/hr"
"          Total depth                      69.443   mm"
"          6  100hyd Hydrograph extension used in this file"
" 33      CATCHMENT 201"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          201    201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800 % Impervious"
"          11.200 Total Area"
"          400.000 Flow length"
"          1.500  Overland Slope"
"          5.958  Pervious Area"
"          400.000 Pervious length"
"          1.500  Pervious slope"
"          5.242  Impervious Area"
"          351.880 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.400  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.918  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"

```

"	0.518	Impervious Initial abstraction"			
"		2.405	0.000	0.000	0.000 c.m/sec"
"		Catchment 201	Pervious	Impervious	Total Area "
"		Surface Area	5.958	5.242	11.200 hectare"
"		Time of concentration	67.251	7.723	27.441 minutes"
"		Time to Centroid	179.168	93.342	121.772 minutes"
"		Rainfall depth	69.443	69.443	69.443 mm"
"		Rainfall volume	4137.71	3639.94	7777.66 c.m"
"		Rainfall losses	41.666	5.695	24.832 mm"
"		Runoff depth	27.777	63.749	44.612 mm"
"		Runoff volume	1655.06	3341.45	4996.50 c.m"
"		Runoff coefficient	0.400	0.918	0.642 "
"		Maximum flow	0.233	2.379	2.405 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		2.405	2.405	0.000	0.000"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		2.405	0.000	0.000	0.000"
" 33		CATCHMENT 202"			
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.399	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.105	0.000	0.000	0.000 c.m/sec"
"		Catchment 202	Pervious	Impervious	Total Area "
"		Surface Area	0.930	0.000	0.930 hectare"
"		Time of concentration	15.687	0.000	15.687 minutes"
"		Time to Centroid	111.971	81.327	111.970 minutes"
"		Rainfall depth	69.443	69.443	69.443 mm"

"	Rainfall volume	645.82	0.00	645.82	c.m"
"	Rainfall losses	41.721	11.759	41.721	mm"
"	Runoff depth	27.722	57.684	27.722	mm"
"	Runoff volume	257.82	0.00	257.82	c.m"
"	Runoff coefficient	0.399	0.000	0.399	"
"	Maximum flow	0.105	0.000	0.105	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.105 0.105 0.000 0.000"				
" 38	START/RE-START TOTALS 202"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		12.130	hectare"	
"	Total Impervious area		5.242	hectare"	
"	Total % impervious		43.212"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                    100YR_SWM.out"
"          Licensee name:                      Windows User"
"          Company                            "
"          Date & Time last used:              2021-01-20 at 10:20:28 AM"
31          TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32          STORM Chicago storm"
"          1      Chicago storm"
"          2171.754 Coefficient A"
"          8.303   Constant B"
"          0.867   Exponent C"
"          0.375   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity                    227.198   mm/hr"
"          Total depth                          69.443   mm"
"          6  100hyd Hydrograph extension used in this file"
33          CATCHMENT 201"
"          1      Triangular SCS"
"          2      Proportional to %"
"          1      SCS method"
"          201    201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800 % Impervious"
"          11.200 Total Area"
"          400.000 Flow length"
"          1.500  Overland Slope"
"          5.958  Pervious Area"
"          400.000 Pervious length"
"          1.500  Pervious slope"
"          5.242  Impervious Area"
"          351.880 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.400  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          7.587  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.918  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"

```



```

"      0.518  Impervious Initial abstraction"
"      2.405      0.000      0.000      0.000 c.m/sec"
"      Catchment 201      Pervious      Impervious      Total Area  "
"      Surface Area      5.958      5.242      11.200      hectare"
"      Time of concentration 67.251      7.723      27.441      minutes"
"      Time to Centroid      179.168      93.342      121.772      minutes"
"      Rainfall depth      69.443      69.443      69.443      mm"
"      Rainfall volume      4137.71      3639.94      7777.66      c.m"
"      Rainfall losses      41.666      5.695      24.832      mm"
"      Runoff depth      27.777      63.749      44.612      mm"
"      Runoff volume      1655.06      3341.45      4996.50      c.m"
"      Runoff coefficient      0.400      0.918      0.642      "
"      Maximum flow      0.233      2.379      2.405      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      2.405      2.405      0.000      0.000"
" 54      POND DESIGN"
"      2.405      Current peak flow      c.m/sec"
"      0.141      Target outflow      c.m/sec"
"      4996.5      Hydrograph volume      c.m"
"      16.      Number of stages"
"      195.000      Minimum water level      metre"
"      196.500      Maximum water level      metre"
"      195.000      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      195.000      0.000      0.000"
"      195.100      0.00340      264.000"
"      195.200      0.01170      539.000"
"      195.300      0.01594      825.000"
"      195.400      0.01927      1122.000"
"      195.500      0.02211      1429.000"
"      195.600      0.02462      1747.000"
"      195.700      0.03321      2076.000"
"      195.800      0.05124      2415.000"
"      195.900      0.07510      2766.000"
"      196.000      0.1210      3127.000"
"      196.100      0.1426      3498.000"
"      196.200      0.3173      3881.000"
"      196.300      0.6502      4274.000"
"      196.400      1.117      4678.000"
"      196.500      1.717      5092.000"
"      1.      WEIRS"
"      Crest      Weir      Crest      Left      Right"
"      elevation coefficie      breadth sideslope sideslope"
"      196.100      0.900      3.000      3.000      3.000"
"      2.      ORIFICES"
"      Orifice      Orifice      Orifice      Number of"
"      invert coefficie      diameter      orifices"
"      195.000      0.630      0.1250      1.000"

```

"	195.600	0.630	0.3000	1.000"	
"	Peak outflow		0.183	c.m/sec"	
"	Maximum level		196.123	metre"	
"	Maximum storage		3587.233	c.m"	
"	Centroidal lag		13.080	hours"	
"	2.405	2.405	0.183	0.000 c.m/sec"	
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	2.405	0.183	0.183	0.000"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"	2.405	0.000	0.183	0.000"	
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	2	Proportional to %"			
"	1	SCS method"			
"	202	202 - UNCONTROLLED LANDSCAPE AREA"			
"	0.000	% Impervious"			
"	0.930	Total Area"			
"	50.000	Flow length"			
"	3.000	Overland Slope"			
"	0.930	Pervious Area"			
"	50.000	Pervious length"			
"	3.000	Pervious slope"			
"	0.000	Impervious Area"			
"	0.000	Impervious length"			
"	3.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	77.000	Pervious SCS Curve No."			
"	0.399	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	7.587	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.000	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"	0.105	0.000	0.183	0.000 c.m/sec"	
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.930	0.000	0.930	hectare"
"	Time of concentration	15.687	0.000	15.687	minutes"
"	Time to Centroid	111.971	81.327	111.970	minutes"
"	Rainfall depth	69.443	69.443	69.443	mm"
"	Rainfall volume	645.82	0.00	645.82	c.m"
"	Rainfall losses	41.721	11.759	41.721	mm"
"	Runoff depth	27.722	57.684	27.722	mm"
"	Runoff volume	257.82	0.00	257.82	c.m"
"	Runoff coefficient	0.399	0.000	0.399	"
"	Maximum flow	0.105	0.000	0.105	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.105	0.105	0.183	0.000"	
" 38		START/RE-START TOTALS 202"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		12.130	hectare"	
"		Total Impervious area		5.242	hectare"	
"		Total % impervious		43.212"		
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February 7, 2010"
"          10 Units used:                      ie METRIC"
"          Job folder:                        Z:\Project Documents\
"                  11471M Loon Call Meaford\SWM Report Dec 2020\MIDUSS"
"          Output filename:                   Timmins_Regional_SWM.out"
"          Licensee name:                     Windows User"
"          Company                           "
"          Date & Time last used:             2021-01-20 at 10:40:56 AM"
" 31      TIME PARAMETERS"
"          60.000 Time Step"
"          900.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Historic"
"          5 Historic"
"          720.000 Duration"
"          12.000 Rainfall intensity values"
"                  15.000    20.000    10.000    3.000    5.000"
"                  20.000    43.000    20.000    23.000    13.000"
"                  13.000    8.000"
"          Maximum intensity                   43.000    mm/hr"
"          Total depth                       193.000    mm"
"          6 100hyd Hydrograph extension used in this file"
" 33      CATCHMENT 201"
"          1 Triangular SCS"
"          2 Proportional to %"
"          1 SCS method"
"          201 201 - MEAFORD PROPERTY PROPOSED SUBDIVISION DEVELOPMENT TO SWM
FACILITY "
"          46.800 % Impervious"
"          11.200 Total Area"
"          400.000 Flow length"
"          1.500 Overland Slope"
"          5.958 Pervious Area"
"          400.000 Pervious length"
"          1.500 Pervious slope"
"          5.242 Impervious Area"
"          351.880 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          77.000 Pervious SCS Curve No."
"          0.679 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          7.587 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.957 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

"	0.752	0.000	0.000	0.000 c.m/sec"
"	Catchment 201	Pervious	Impervious	Total Area "
"	Surface Area	5.958	5.242	11.200 hectare"
"	Time of concentration	95.853	14.866	51.009 minutes"
"	Time to Centroid	570.468	427.448	491.275 minutes"
"	Rainfall depth	193.000	193.000	193.000 mm"
"	Rainfall volume	1.1500	1.0116	2.1616 ha-m"
"	Rainfall losses	62.036	8.287	36.881 mm"
"	Runoff depth	130.964	184.713	156.119 mm"
"	Runoff volume	0.7803	0.9682	1.7485 ha-m"
"	Runoff coefficient	0.679	0.957	0.809 "
"	Maximum flow	0.409	0.545	0.752 c.m/sec"
" 40	HYDROGRAPH Add Runoff "			
"	4	Add Runoff "		
"	0.752	0.752	0.000	0.000"
" 54	POND DESIGN"			
"	0.752	Current peak flow	c.m/sec"	
"	0.141	Target outflow	c.m/sec"	
"	17485.3	Hydrograph volume	c.m"	
"	16.	Number of stages"		
"	195.000	Minimum water level	metre"	
"	196.500	Maximum water level	metre"	
"	195.000	Starting water level	metre"	
"	0	Keep Design Data: 1 = True; 0 = False"		
"		Level Discharge	Volume"	
"	195.000	0.000	0.000"	
"	195.100	0.00340	264.000"	
"	195.200	0.01170	539.000"	
"	195.300	0.01594	825.000"	
"	195.400	0.01927	1122.000"	
"	195.500	0.02211	1429.000"	
"	195.600	0.02462	1747.000"	
"	195.700	0.03321	2076.000"	
"	195.800	0.05124	2415.000"	
"	195.900	0.07510	2766.000"	
"	196.000	0.1210	3127.000"	
"	196.100	0.1426	3498.000"	
"	196.200	0.3173	3881.000"	
"	196.300	0.6502	4274.000"	
"	196.400	1.117	4678.000"	
"	196.500	1.717	5092.000"	
"	1.	WEIRS"		
"		Crest Weir	Crest Left Right"	
"		elevation coefficie	breadth sideslope sideslope"	
"		196.100 0.900	3.000 3.000 3.000"	
"	2.	ORIFICES"		
"		Orifice Orifice	Orifice Number of"	
"		invert coefficie	diameter orifices"	
"		195.000 0.630	0.1250 1.000"	
"		195.600 0.630	0.3000 1.000"	

"	Peak outflow	0.739	c.m/sec"
"	Maximum level	196.319	metre"
"	Maximum storage	4352.365	c.m"
"	Centroidal lag	13.006	hours"
"	0.752 0.752 0.739 0.000	c.m/sec"	
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.752 0.739 0.739 0.000	"	
" 40	HYDROGRAPH Start - New Tributary"		
"	2 Start - New Tributary"		
"	0.752 0.000 0.739 0.000	"	
" 33	CATCHMENT 202"		
"	1 Triangular SCS"		
"	2 Proportional to %"		
"	1 SCS method"		
"	202 202 - UNCONTROLLED LANDSCAPE AREA"		
"	0.000 % Impervious"		
"	0.930 Total Area"		
"	50.000 Flow length"		
"	3.000 Overland Slope"		
"	0.930 Pervious Area"		
"	50.000 Pervious length"		
"	3.000 Pervious slope"		
"	0.000 Impervious Area"		
"	0.000 Impervious length"		
"	3.000 Impervious slope"		
"	0.250 Pervious Manning 'n' "		
"	77.000 Pervious SCS Curve No."		
"	0.673 Pervious Runoff coefficient"		
"	0.100 Pervious Ia/S coefficient"		
"	7.587 Pervious Initial abstraction"		
"	0.015 Impervious Manning 'n' "		
"	98.000 Impervious SCS Curve No."		
"	0.000 Impervious Runoff coefficient"		
"	0.100 Impervious Ia/S coefficient"		
"	0.518 Impervious Initial abstraction"		
"	0.071 0.000 0.739 0.000	c.m/sec"	
"	Catchment 202 Pervious Impervious Total Area "		
"	Surface Area 0.930 0.000 0.930	hectare"	
"	Time of concentration 22.358 0.001 22.358	minutes"	
"	Time to Centroid 491.375 406.592 491.375	minutes"	
"	Rainfall depth 193.000 193.000 193.000	mm"	
"	Rainfall volume 1794.90 0.00 1794.90	c.m"	
"	Rainfall losses 63.190 24.313 63.190	mm"	
"	Runoff depth 129.810 168.687 129.810	mm"	
"	Runoff volume 1207.23 0.00 1207.23	c.m"	
"	Runoff coefficient 0.673 0.000 0.673	"	
"	Maximum flow 0.071 0.000 0.071	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "		
"	4 Add Runoff "		



"	0.071	0.071	0.739	0.000"
" 38	START/RE-START TOTALS 202"			
"	3 Runoff Totals on EXIT"			
"	Total Catchment area		12.130	hectare"
"	Total Impervious area		5.242	hectare"
"	Total % impervious		43.212"	
" 19	EXIT"			

**APPENDIX D**

**Storm Water Management Design Information**



**MEAFORD PROPERTY - M-1**  
**STORMWATER MANAGEMENT**  
 Bracebridge, Ontario



Project Number: 19-11471M  
 Date: February 26, 2020  
 Design By: LT  
 File: Z:\Project Documents\11471M Loon Call Meaford\SWM\Draw-Down Calculation (Regression Analysis).xls

**FALLING HEAD DRAWDOWN CALCULATION**  
**MOEE SWM Planning and Design Manual, 2003**

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_o} \quad \text{Equation 4.11}$$

where

t = 115954 s	drawdown time
32.2 hr	
A <sub>p</sub> = 3126.72 m <sup>2</sup>	surface area of the pond
C = 0.63	discharge coefficient
d = 125 mm	diameter of the orifice
A <sub>o</sub> = 0.01227 m <sup>2</sup>	cross-sectional area of the orifice
g = 9.81 m/s <sup>2</sup>	gravitational acceleration constant
h <sub>1</sub> = 195.500 m	starting water elevation above the orifice
h <sub>2</sub> = 195.000 m	ending water elevation above the orifice
h = 0.5 m	maximum water elevation above the orifice
C <sub>2</sub> = 1073.68	slope coefficient from the area-depth linear regression
C <sub>3</sub> = 2589.88	intercept from the area-depth linear regression

	ELEVATION <i>m</i>	STAGE <i>m</i>	AREA <i>m</i> <sup>2</sup>	COMMENTS
1	195.000	0	2590.0	
2	195.100	0.1	2697.0	
3	195.200	0.2	2805.0	
4	195.300	0.3	2912.0	
5	195.400	0.4	3019.0	
6	195.600	0.6	3234.0	
7	195.800	0.8	3449.0	
				<b>DRAWDOWN TIME:</b> 115954 s 32.2 hr

**Regression Output:**

m <sub>1</sub> =	1073.68	slope coefficient from the area-depth linear regression
b =	2589.88	intercept from the area-depth linear regression
se <sub>1</sub> =	0.40	standard error for coefficient m <sub>1</sub>
se <sub>b</sub> =	0.17	standard error for constant b
R <sup>2</sup> =	1.0000	coefficient of determination
se <sub>y</sub> =	0.28	standard error of the y estimate
F =	7120771.43	F statistic
df =	5	degrees of freedom
SS <sub>reg</sub> =	550048	regression sum of squares
SS <sub>resid</sub> =	0	residual sum of squares

## Design Chart 1.08: Hydrologic Soil Groups

### - Based on Surficial Geology Maps

Map Ref.No.	Soil Type or Texture	Hydrologic Soil Group (Tentative)
	<u>Ground Moraine</u>	
1a	Usually sandy till, stony, varying depth. (Most widespread type in Shield).	Usually B (shallow); may be A or AB
1b	Clayey till, varying depth.	BC-C
	<u>End or Interlobate Moraine</u>	
2a	Sand & stones, deep. (May be rough topography).	A
2b	Sand & stones capped by till, deep.	A-C depending on type of till.
2c	Sand & stones, deep. (Smoother topography).	A
	<u>Kames &amp; Eskers</u>	
3a	Sand & stones, deep. (May be rough topography).	A
3b	Sand & stones capped by till, deep.	A-C depending on type of till.
3c	Sand & stones, deep. (Smoother topography).	A
	<u>Lacustrine</u>	
4a	Clay & silt, in lowlands.	BC-C
4b	Fine sand, in lowlands.	AB-B
4c	Sand, in lowlands.	AB
4d	Sand (deltas & valley trains).	A-AB
	<u>Outwash</u>	
5	Sand, some gravel, deep.	A
	<u>Aeolian</u>	
6	Very fine sand & silt, shallow. (Loess)	B
	<u>Bedrock</u>	
7	Bare bedrock (normally negligible areas).	Varies according to rock type.

Source: Ministry of Natural Resources - MNR

**Design Chart 1.08: Hydrologic Soil Groups (Continued)****- Based on Soil Texture**

<u>Sands, Sandy Loams and Gravels</u>	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
<u>Medium to Coarse Loams</u>	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
<u>Medium Textured Loams</u>	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
<u>Silt Loams, Some Loams</u>	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
<u>Clays, Clay Loams, Silty Clay Loams</u>	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Source: U.S. Department of Agriculture (1972)

**Design Chart 1.09: Soil/Land Use Curve Numbers**

Land Use	Treatment or Practice	Hydrologic Condition <sup>4</sup>	Hydrologic Soil Group			
			A	B	C	D
Fallow	Straight row	---	77	86	91	94
Row crops	"	Poor	72	81	88	91
	"	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	"	Good	65	75	82	86
	" and terraced	Poor	66	74	8	82
	" " "	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	" and terraced	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded legumes <sup>2</sup> or rotation meadow	Straight row	Poor	66	77	85	89
		Good	58	72	81	85
	Contoured	Poor	64	75	83	85
		Good	55	69	78	83
	" and terraced	Poor	63	73	80	83
		Good	51	67	76	80
Pasture or range	Contoured	Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
		Poor	47	67	81	88
		Fair	25	59	75	83
		Good	6	35	70	79
Meadow		Good	30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		---	59	74	82	86
		---	72	82	87	89
		---	74	84	90	92

For average antecedent soil moisture condition (AMC II)

<sup>2</sup> Close-drilled or broadcast.

<sup>4</sup> The hydrologic condition of cropland is good if a good crop rotation practice is used; it is poor if one crop is grown continuously.

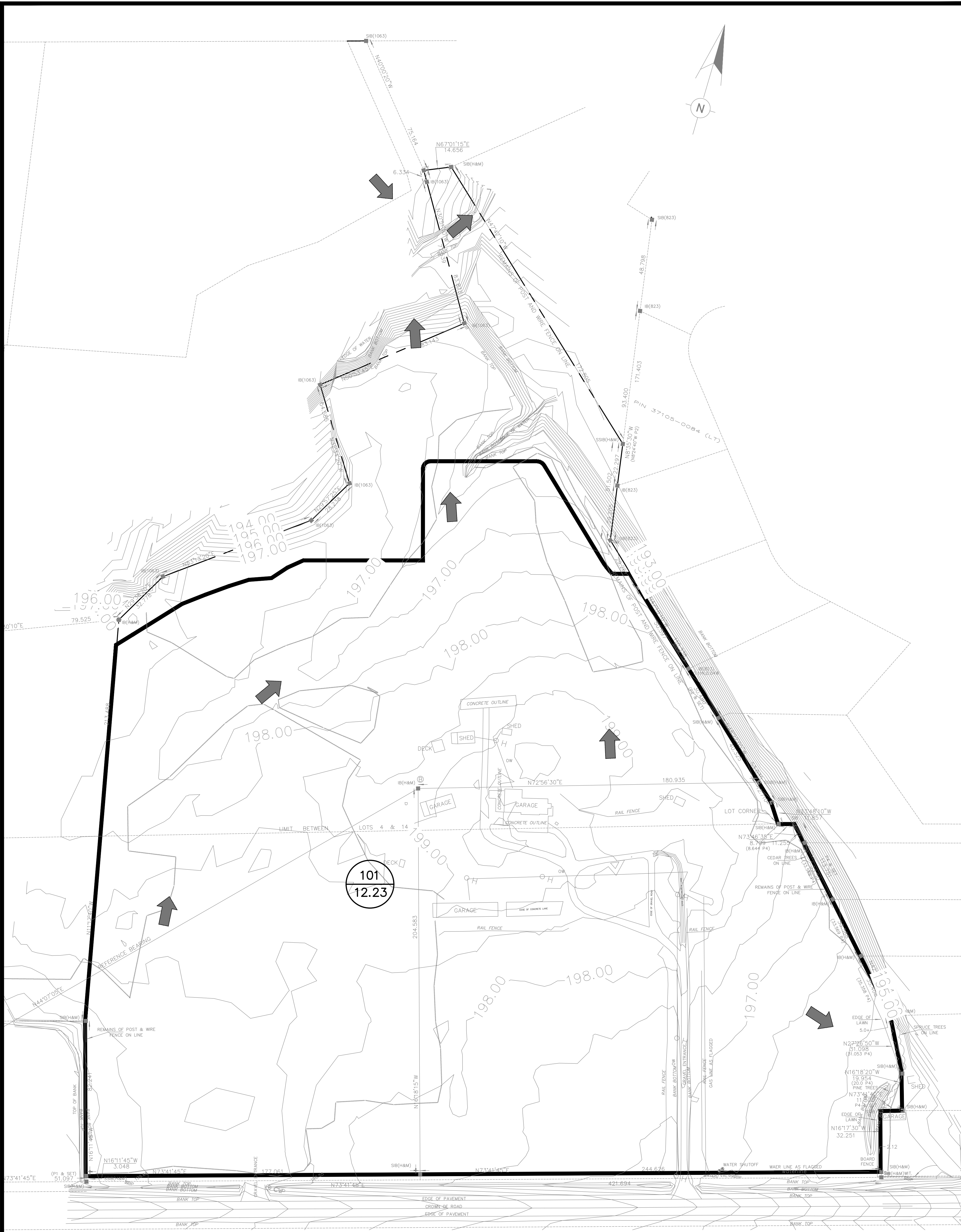
Source: U.S. Department of Agriculture (1972)

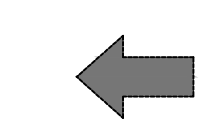
## **APPENDIX E**

### **Drawings**






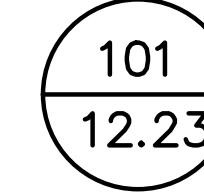




DIRECTION OF OVERLAND FLOW



PRE-DEVELOPMENT CATCHMENT BOUNDARY



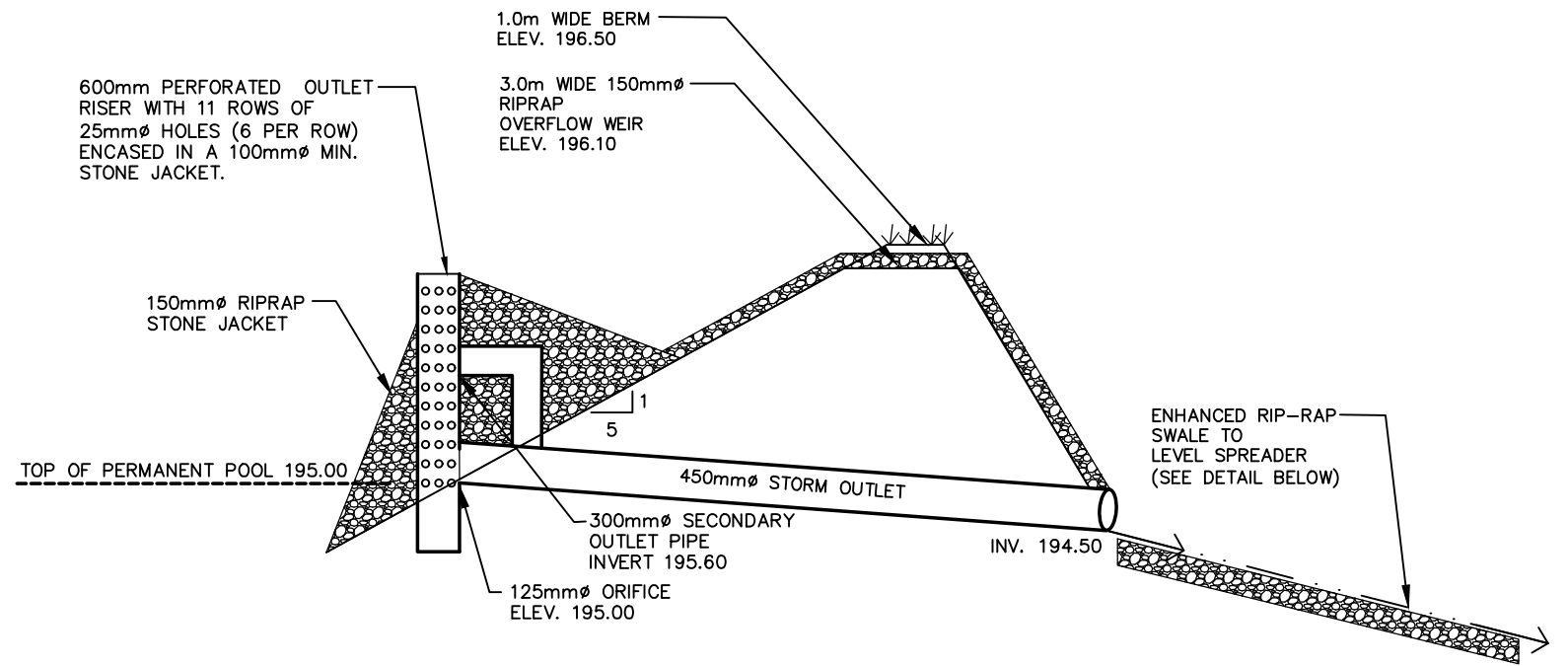
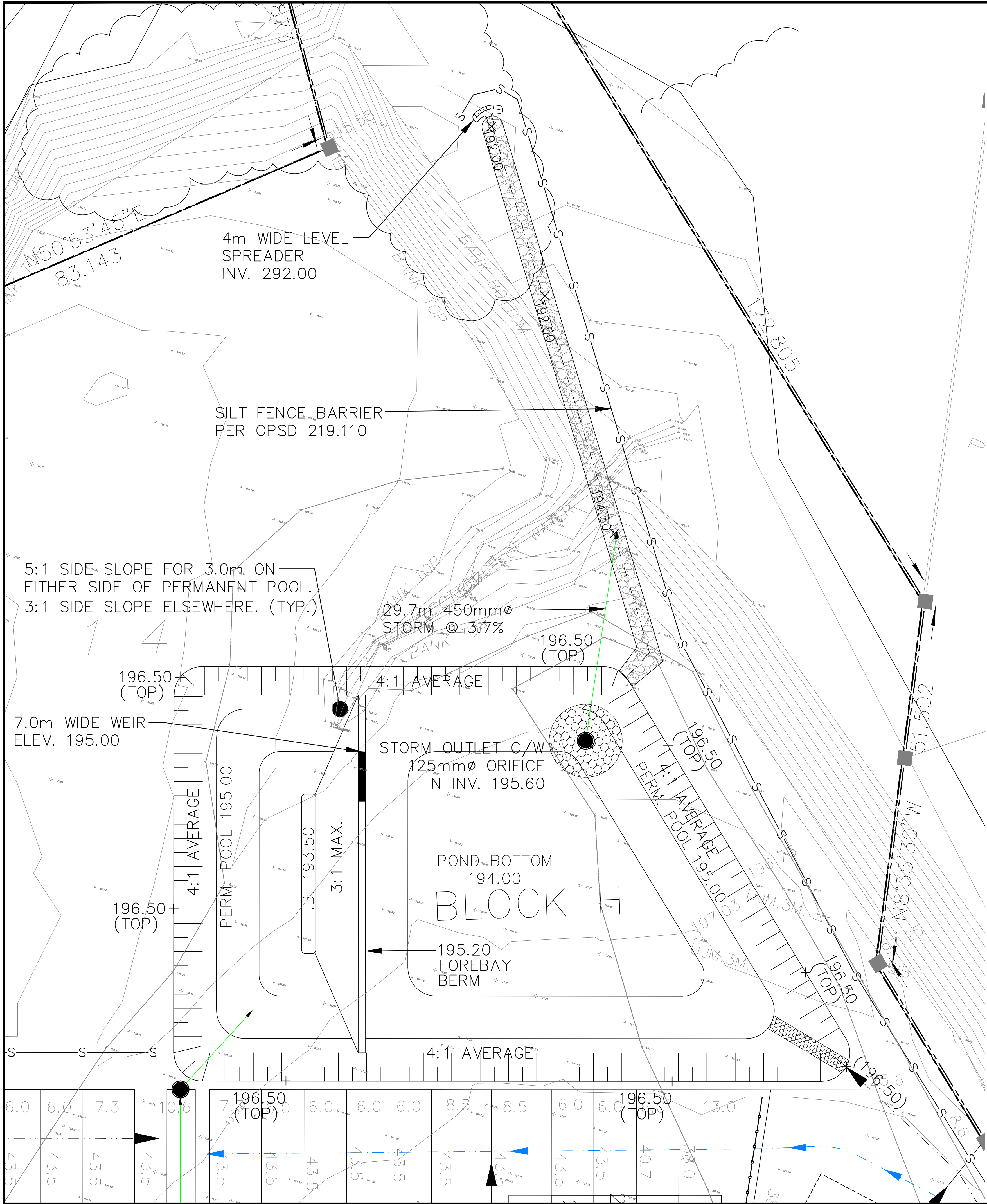
PRE-DEVELOPMENT CATCHMENT NUMBER  
PRE-DEVELOPMENT CATCHMENT AREA(Ha.)

 <div><b>PEL</b> PINESTONE ENGINEERING LIMITED   www.pel.ca</div>	LOON CALL M-1 DEVELOPMENT		PROJECT NO. 19-11471-M	
	EXISTING CONDITIONS		SCALE: 1:1000	DATE: DEC. 2020
			EX-1	

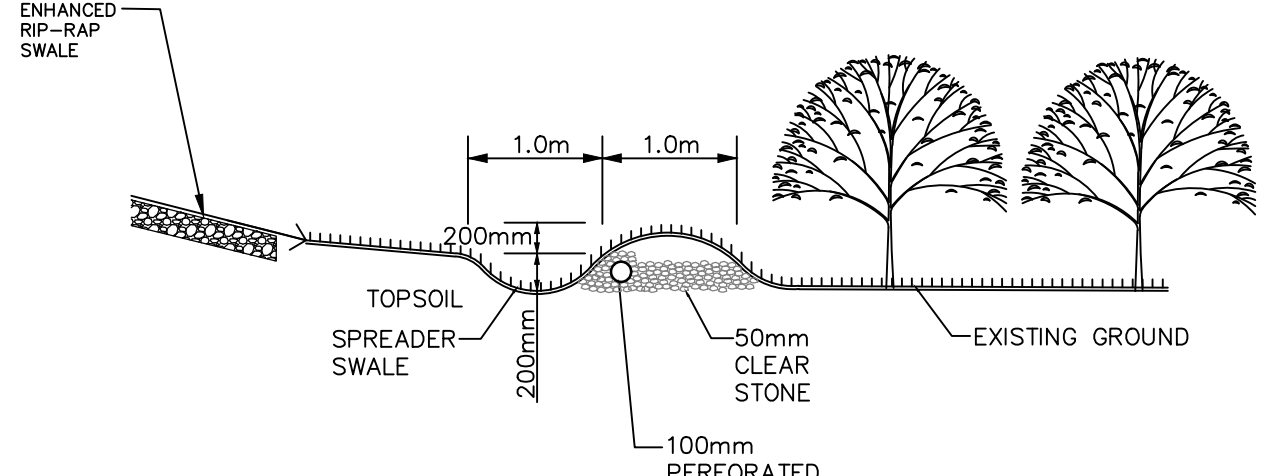




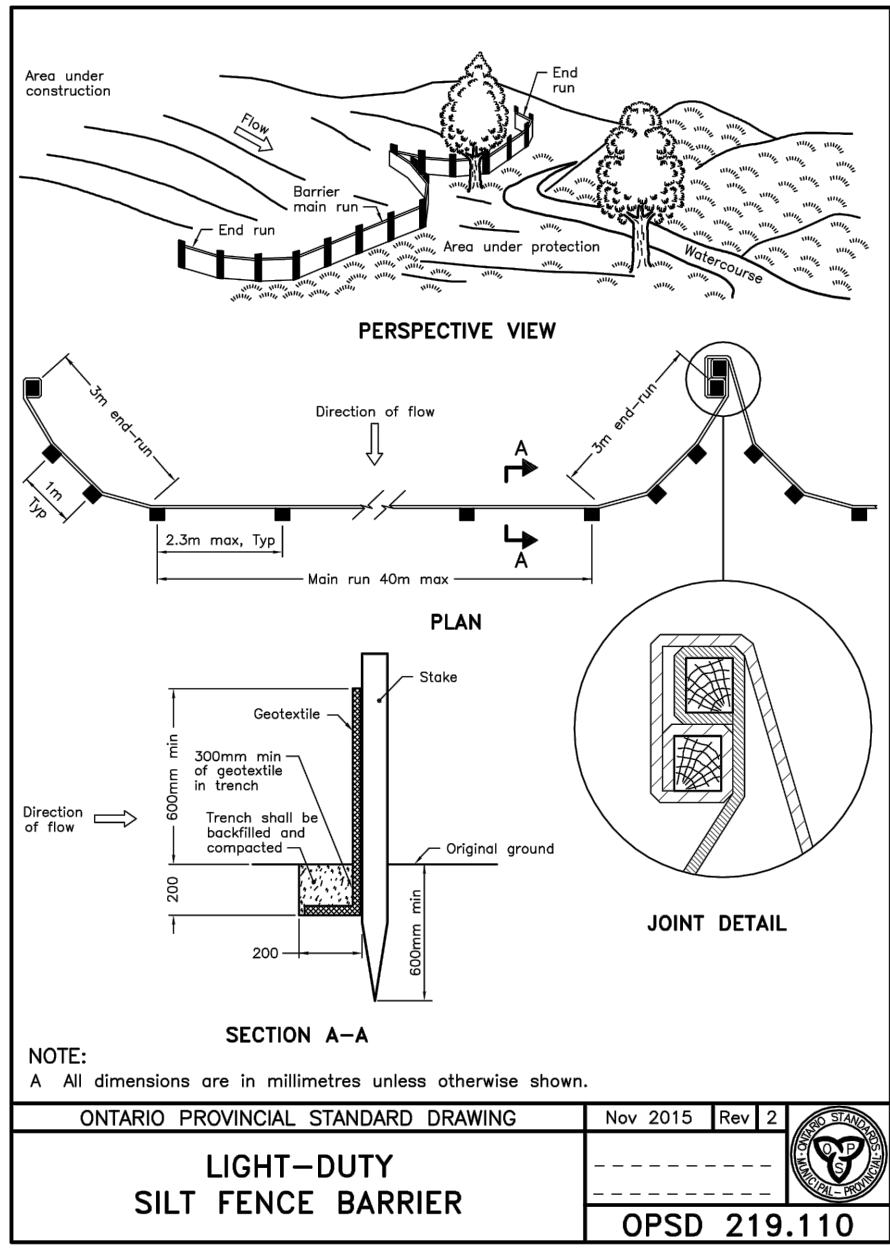




STORM OUTLET DETAIL  
N.T.S.



LEVEL SPREADER DETAIL  
N.T.S.



NOTE:  
A All dimensions are in millimetres unless otherwise shown.

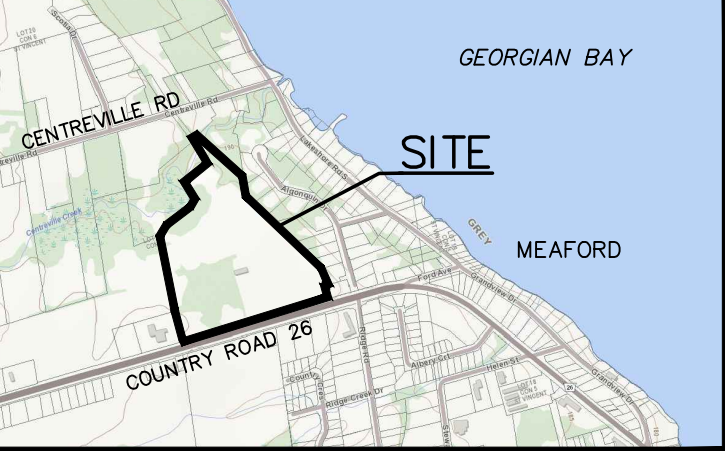
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER		
OPSD 219.110		



The position of existing above ground and underground utilities and facilities are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities and facilities is not guaranteed. Before starting work, the contractor shall confirm the exact location of all existing utilities and facilities, and shall assume all liability for damage to them.

Drawings shall not be used for construction unless sealed and signed. All work to be performed in accordance with the Occupational Health & Safety Act 1990.

Any errors and/or omissions shall be reported to Pinestone Engineering Ltd. without delay.

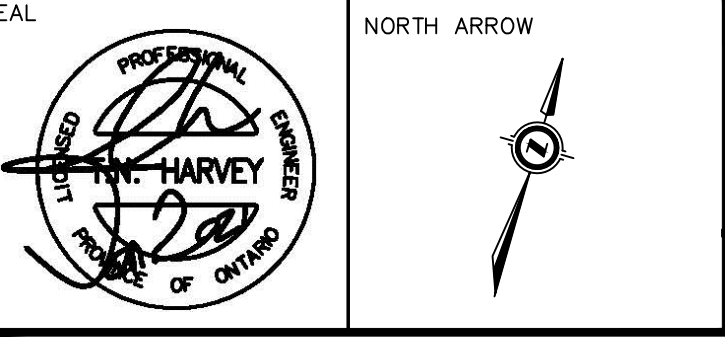


KEY MAP  
NOTES

1. TOPOGRAPHIC MAPPING FROM NORTHWAY PHOTO MAP DERIVED FROM 1993 AERIAL PHOTOGRAPHY.

LEGEND	
— 221.0 —	CONTOUR
○	EXISTING HYDRO POLE
—	EXISTING TREELINE
* 220.00	PROPOSED ELEVATION
* (220.00)	PROPOSED SWALE ELEVATION
* 220.00 EX.	EXISTING ELEVATION
S — S	SILT FENCE
■	RIP-RAP
—	DITCH CENTERLINE

NO.	YY.MM.DD	REVISION	BY



	DESIGN BY:	L.T.
	DRAWN BY:	G.N.
	CHECKED:	L.T.
	DATE:	JANUARY 2021
SCALE:		1:300

CLIENT/PROJECT

LOON CALL  
M-1 DEVELOPMENT  
MEAFORD, ONTARIO

DRAWING TITLE

STORMWATER MANAGEMENT  
POND DETAILS

PROJECT NO.	DRAWING NO.	REVISION
19-11471-M	SWM-1	0