FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

LONG POINT ROAD SUBDIVISION

TOWN OF THE BLUE MOUNTAINS
COUNTY OF GREY

PREPARED FOR:

TERRA BROOK HOMES

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
40 HURON STREET, SUITE 301
COLLINGWOOD, ONTARIO
L9Y 4R3

FEBRUARY 2021

CFCA FILE NO. 1988-5783

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.1	Sept 24, 2018	Issued for First Submission
Rev.2	Feb. 19, 2021	Issued for First Submission - Draft Plan Version #8

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Terra Brook Homes to prepare a Functional Servicing & Preliminary Stormwater Management Report in support of a Zoning By-Law Amendment and Draft Plan of Subdivision Application consisting of 22 single detached lots. The proposed development is comprised of two properties, legally described as Plan 529 PT Lot 85 RP;16R2186 Parts 4 & 8, and Plan 529 PT Lot 85 RP;16R2186 Parts 5 & 9 in the Town of The Blue Mountains, County of Grey. The location of the proposed development and the proposed Draft Plan are included as **Figure 1** and **Figure 2**, respectively.

The proposed development, consisting of 22 lots, will be serviced with municipal sanitary, storm, and watermain infrastructure located within the municipal right-of-way (ROW). Preliminary servicing details have been reflected on the Preliminary Sanitary Routing and Water Distribution Plan included in this report as **Figure 3**. Grading details have been reflected on the Preliminary Site Drainage Plan included in this report as **Figure 4**.

This report has been prepared to document details associated with the functional servicing and stormwater management design for the proposed development. Contained in this report is a description of the existing site (Section 2.0); the water servicing strategy (Section 3.0); the sanitary servicing strategy (Section 4.0); the drainage & stormwater management strategy (Section 5.0); proposed utilities (Section 6.0); sediment and erosion control plan (Section 7.0) and a concluding discussion (Section 8.0).

2.0 SITE DESCRIPTION

The Subject Property is approximately 2.2 ha and is located in a residential area in the Town of The Blue Mountains, north of Highway 26 and adjacent to Long Point Road.

The Subject Property is bounded by:

- Residential properties to the north
- A residential property to the south
- A municipal drainage easement to the west
- Long Point Road to the east

Currently the site is undeveloped and fully treed. The site is relatively flat, with the grades generally descending from southeast to northwest. The site drains into a municipal drain west of the property, which conveys flows approximately 1 km north of the site where it discharges to Georgian Bay.

The site is currently zoned Residential/Recreational Area per the Town of The Blue Mountains Official Plan, which specifies a maximum single detached density of 10 units/ha. Therefore, 22 units on 2.2 ha is in conformance will this zoning requirement.

A subsurface characterization program prepared by Wilson Associates (July 5, 2018) was completed for the site to identify the seasonal high water table as well as determine the underlying soil profile. Within the investigation, three (3) boreholes were advanced across the site. The boreholes revealed that the site is underlain by a thin layer of fine sand with some silt deposit and sand with some gravel and clay glacial till. In addition, monitoring wells were installed within each of the boreholes. The monitoring wells revealed that groundwater levels within the summer range between 0.58m and 0.81m below grade and 0.03m and 0.43m below grade in the spring (Wilson Associates, May 2019). The results of the subsurface investigation have been provided in **Appendix A**.

3.0 WATER SERVICING

The following subsections provide an analysis of the water servicing and fire protection strategy proposed for the Long Point Road Development.

3.1 EXISTING INFRASTRUCTURE

Per As-Constructed Drawings (FM5 – FM7, Ainley 2006) an existing 150mm diameter watermain is located within the Long Point Road right-of-way. Town staff, through previously issued comments, confirmed that this watermain is owned and operated by the Town of The Blue Mountains. As-Constructed drawings have been provided in **Appendix B**.

3.2 PROPOSED WATER SERVICING STRATEGY

The development will be serviced via connection to the existing watermain on Long Point Road. This watermain is owned and operated by the Town of The Blue Mountains. Consultation with the Town was undertaken to confirm that there is sufficient capacity to provide the required water pressures and flows to meet the calculated water demand. Sizing of this watermain will need to be confirmed in the detailed design stage.

3.3 DESIGN WATER DEMAND

The Town of The Blue Mountains Design Criteria (The Blue Mountains Engineering Standards, April 2009) were referenced to calculate water demand flows for the proposed development. A per capita water demand of 450 L/C/day was used with an occupancy density of 2.3 persons/unit. The maximum peak day factor of 2.0 and peak hour factor of 4.50 were applied to the average daily demand flow of 0.26 L/sec to obtain max daily demand and peak hour demand flows. A summary of the results is presented in **Table 1** below and detailed calculations have been provided in **Appendix C**.

Table 1: Estimated Design Water Demand

Standard	**Average Daily Demand** (L/sec)	**Maximum Daily Demand** (L/sec)	**Peak Hourly Demand** (L/sec)
Town of The Blue Mountains	0.26	0.53	1.19

3.4 FIRE FLOW DEMAND

The Fire Underwriters Survey (FUS) and Ontario Building Code (OBC) methods were used to estimate the fire flow requirements for the proposed development. All buildings are assumed to fall into building Class C with an estimated gross floor area (GFA) of 410 sq. m. **Table 2** summarizes the fire flow and duration requirements under both OBC and FUS approaches.

Table 2: Estimated Fire Demand Flows

Method	**Demand Flow** (L/sec)	**Duration** (h)
OBC	45	1.25
FUS	67	1.5

The FUS method resulted in a more conservative demand flow for the subdivision. The FUS method specifies a required demand fire flow of 67 L/sec for a duration of 1.5 hours for the development. **Appendix C** contains the FUS and OFM calculations.

4.0 SANITARY SERVICING

The following subsections provide an analysis of the sanitary servicing strategy for the proposed Long Point Road Development.

4.1 EXISTING INFRASTRUCTURE

Per As-Constructed Drawing (N²81042/43-SW5, July 1984), a sanitary manhole labelled "MH#69" is located approximately 140m west of the Highway 26 and Osler Bluff Road intersection. This manhole connects to a gravity sanitary sewer system which conveys flow to the Craigleith sewage pumping station. Flow from this point is conveyed to the existing wastewater treatment plant located north of the proposed development on Long Point Road via two parallel sanitary high pressure forcemains. The As-Constructed Drawing has been provided in **Appendix B**.

4.2 SANITARY DEMAND

Sanitary design flow calculations were completed in accordance with the Town of The Blue Mountains Design Criteria (The Blue Mountains Engineering Standards, April 2009). A per capita sewage flow of 450 L/C/day was used with an occupancy density of 2.3 persons/unit. Infiltration flow of 0.23 L/sec/ha and a peaking factor 4.3 were applied to the sewage flow rate to obtain the total estimated design sewage flow for the Subject Property. A summary of the design flows is presented in **Table 3** below and detailed calculations have been provided in **Appendix C**.

Table 3: Estimated Sanitary Design Flows (22 Units)

Standard	**Average Flow** (L/sec)	**Peaking Factor**	**Peak Flow** (L/sec)	**Infiltration Flow** (L/sec)	**Total Estimated Design Flow** (L/sec)
Town of The Blue Mountains	0.26	4.3	1.12	0.51	1.64

The proposed sanitary system will be sized to convey a peak sanitary flow of 1.64 L/sec for the development.

4.3 PROPOSED SANITARY SERVICING STRATEGY

Connection to the existing high-pressure forcemains located on Long Point Road was eliminated as a potential servicing strategy for this development, as the cost to construct a sanitary pump station for this small of a development was deemed not feasible. As a result, the development will be serviced via connection to existing gravity sanitary sewer located on Highway 26.

The Town has indicated that there is available residual capacity within the Highway 26 sewer to service the site. Internal to the site, a low-pressure sewer system is proposed to collect wastewater and drain to the Highway 26 gravity sanitary system.

At this time, it is anticipated that the low pressure forcemain can be installed along Long Point Road via directional drilling. Utilizing this methodology would minimize roadway restorations requirements along Long Point Road. Consultation with the Town during detailed design would be required to determine a corridor for the forcemain within the existing municipal right-of-way.

It is acknowledged through received comments that an alternative alignment within the municipal drain easement through a change of use easement would not be supported by the Town.

5.0 DRAINAGE & STORMWATER MANAGEMENT

Management of stormwater and site drainage for the proposed development will proceed in conformance with the standards provided by the Town of The Blue Mountains, Grey Sauble Conservation Authority (GSCA) and Ministry of the Environment, Conservation and Parks (MECP).

A stormwater management strategy and accompanying recommendations regarding the proposed development have been included below.

- Safe Stormwater Conveyance
  - Safe conveyance of post-development peak flows for all storms up to and including the 100-year event to Georgian Bay.

- Water Quality Control
  - "Enhanced Protection" per MECP

- Development Standard
  - Urban cross section within 20-meter right-of-way
  - Lot grading at 2% optimum
  - Minor/major drainage system to convey frequent rainfall/runoff events

5.1 EXISTING DRAINAGE

The soil type identified on the site is Granby well sorted sandy washout (Soil Map of Simcoe County, North Sheet, Soil Survey Report No. 29), which is classified as Hydrologic Soil Group B (Design Chart H2-6A, MTO Drainage Manual, 1985). This soil type has been generally confirmed in the Geotechnical Report by Wilson Associates, which identified onsite soils as predominantly glaciolacustrine sand overlying sandy silt till. Drainage from the site is predominately sheet flow from the southeast to the northwest and discharges into a municipal drain located at the west limits of the site.

The municipal drain conveys flows north to a culvert that crosses Brophy's Lane. North of Brophy's Lane, stormwater traverses the Town of The Blue Mountains wastewater treatment facility lands where it discharges into a small pond northwest of the treatment facility's main entrance. Town staff have advised that this pond is an aesthetic feature with no stormwater quality or quantity features. The pond discharges to a drainage channel flowing north down the Long Point Road west ditch to Georgian Bay.

5.2 PROPOSED DRAINAGE

The proposed development consists of an urban cross section roadway complete with curb and gutter with an internal storm sewer system. Front yards will be graded to direct runoff towards the ROW where they will be collected by catchbasins and transported through the storm sewer network. During major storm events, excess flows will be safely conveyed via an overland flow route located within Block 25. Rear yards will slope to the back of the lots where swales will transport flows west to the municipal drain. The proposed drainage configuration for the site is presented in **Figure 4**.

Due to the site's proximity to Georgian Bay, quantity control is not recommended for this site. Uncontrolled release of storm flows allows runoff from the site to travel safely to the bay prior to peak flow periods in the municipal drain. This will reduce flow requirements in the new drain and provide safe conveyance of flows to Georgian Bay.

5.3 STORMWATER QUANTITY CONVEYANCE

Given the small area of the proposed development property, the analysis of on-site quantity control requirements was performed using the Rational Method, per industry standard. A composite runoff coefficient for the existing and proposed site conditions was calculated using values found in the Town of The Blue Mountains Design Standards (The Blue Mountains Engineering Standards, April 2009) and MTO Standards (MTO Drainage Management Manual, 1997). **Table 4** illustrates the determination of pre and post-development runoff coefficients.

Table 4: Pre and Post-Development Conditions Composite Runoff Coefficient

	Pre-Development			Post-Development		
Land Use	**Area (ha)**	**Runoff Coefficient***	**A x C**	**Area (ha)**	**Runoff Coefficient***	**A x C**
Catchment	**PRE-1 (Front Yards and ROW)**			**POST-1 (Front Yards and ROW)**		
Asphalt	0.00	0.90	0.0	0.25	0.90	0.23
Roof	0.00	0.90	0.0	0.03	0.90	0.08
Lawn	0.15	0.30	0.05	0.40	0.30	0.14
Woodland	0.53	0.25	0.13	0	0.25	0.0
Composite	0.68	0.26	**0.18**	0.68	0.55	**0.37**
Catchment	**PRE-2 (Rear Yards)**			**POST-2 (Rear Yards)**		
Asphalt	0.0	0.90	0.0	0.10	0.90	0.09
Roof	0.0	0.90	0.0	0.49	0.90	0.44
Lawn	0.0	0.30	0.0	0.93	0.30	0.28
Woodland	1.52	0.25	0.38	0	0.25	0
Composite	1.52	0.25	**0.38**	1.52	0.53	**0.81**

The calculated composite runoff coefficients were used in the Rational Method calculations. Rainfall events were modelled using Town of The Blue Mountains IDF data, and a 15-minute time of concentration. Refer to **Appendix D** for the peak flow results. Note that runoff coefficients for the 25 year and 100-year storms were adjusted per the MTO Standard methodology. The results of the analysis are presented in **Table 5**. Detailed calculations have been provided in **Appendix D**.

Table 5: Rational Method Storage Volume Results

Storm	Existing (m^3/sec)			Proposed (m^3/sec)			Difference (m^3/sec)
	Front (Pre-1)	**Back (Pre -2)**	**Total**	**Front (Post-1)**	**Back (Post -2)**	**Total**	
5-year	0.04	0.08	0.12	0.08	0.18	0.26	0.14
25-year	0.06	0.13	0.19	0.13	0.27	0.40	0.21
100-year	0.08	0.18	0.26	0.17	0.37	0.54	0.28

As the site is within close proximity to Georgian Bay, peak flows are to be released uncontrolled into the municipal drain. It was found that the increase in flows generated from the site for the 5, 25 and 100-year storm events were between 170 L/sec to 270 L/sec. Future upgrades to the municipal drain should account for these flows.

5.4 STORMWATER QUALITY CONTROL

A preliminary screening of the most practical stormwater water quality measures to implement on-site was undertaken. Due to the small size of the site, an oil and grit separator (OGS) unit is the most practical quality control measure. The OGS will be located on-line with the site storm system, downstream of the last catchbasin as depicted in **Figure 4**.

To achieve an "enhanced" treatment level required by the MECP, a Stormceptor EF04 was selected. Refer to **Table 6** below for a detailed breakdown of the performance of the proposed OGS. Sizing calculations for the OGS have been provided in **Appendix D**.

Table 6: Stormceptor Oil/Grit Sizing Criteria

Catchment	Contributing Drainage Area (ha)	Stormceptor Oil/Grit Separator Unit	Total Suspended Solids Removal (%)	Total Annual Runoff Volume Treated (%)
Internal Sewer	0.48	EF 04	86	>90

Once the OGS is installed, and operating accordingly to the manufacturer's specifications, and assumed by the Town, Town staff will be required to inspect and service the unit on a regular basis per the guidelines outlined in the Operations and Maintenance Manual provided in **Appendix E**, to ensure long term efficiency.

6.0 UTILITIES

The site is proposed to be serviced with natural gas, telephone, cable TV and hydro. We understand these utilities are available in the Long Point Road right-of-way adjacent the proposed development. Coordination with the aforementioned utilities will be undertaken during the detailed design phases to confirm utility design capacity and connection locations.

7.0 SEDIMENT AND EROSION CONTROLS DURING CONSTRUCTION

Sediment and erosion controls will be installed prior to the commencement of any construction activities and will be maintained until the site is stabilized or as directed by the Site Engineer and/or the Town of The Blue Mountains. A Grading & Sediment Erosion Control Plan will be prepared as part of the detailed design package to identify the location of the recommended control features. Controls will be inspected after each significant rainfall event and maintained in proper working condition. A summary of proposed controls to be implemented is included below.

- Silt Fencing

Silt fence will be installed where required to intercept sheet flow. Heavy duty silt fence will be located around the downstream side of the work zone limits. It should be noted that additional silt fencing may be added based on field decisions by the Site Engineer and Contractor prior to, during and following construction.

- Mud Mat

A mud mat will be installed at the entrance to the construction zone in order to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network.

- Dust Suppression

During construction activities, the Contractor will ensure that measures for dust suppression are provided as required.

8.0 CONCLUSIONS & RECOMMENDATIONS

Based on the foregoing we conclude that the proposed Long Point Road Residential Development can be adequately serviced.

1. Access to the site will be provided by way of roadway connections to Long Point Road.
2. A Preliminary site drainage plan has been completed to demonstrate that overland flow routes to the municipal drain can be achieved.
3. The development will be serviced via an internal low-pressure forcemain sanitary sewer system that will outlet to the existing Highway 26 gravity sanitary sewer.
4. Domestic water supply for the development will be provided via a connection to the existing Town of The Blue Mountain watermain within the Long Point Road right-of-way. System pressures, flows and external improvements will be confirmed with the Town of The Blue Mountain as development approvals proceed.
5. Utilities are available to service the site.

Therefore, we recommend approval of the Planning Applications for the site from the perspective of engineering servicing requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Kurt Vendrig, E.I.T
Land Development

C.F. CROZIER & ASSOCIATES INC.

Brendan Hummelen, P.Eng.
Project Engineer

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APPENDIX A

Subsurface Characterization Program
(Wilson Associates)

Ian D. Wilson Associates Ltd.
since 1974

Tel: 519.233.3500
Fax: 519.233.3501

P. O. Box 299
Clinton, Ontario
N0M 1L0

July 5, 2018

Wilson Associates
Consulting Hydrogeologists

Ms. Brittany Robertson, P.Eng.
C.F. Crozier & Associates
40 Huron Street
Suite 301
Collingwood, ON
L9Y 4R3

Dear Ms. Robertson:

Re: Subsurface Characterization Program
Proposed Long Point Road Subdivision, Blue Mountains

It is proposed to develop a ±22-lot urban residential subdivision on a ±2.2ha parcel of land located within Part of Lots 20 and 21, Concession 1, Geographic Township of Collingwood, Town of Blue Mountains (Plan 529, Part Lot 85, RP16R2186, Parts 4, 5, 8 & 9). Figure 1 shows the layout of the site and surroundings.

It is understood that full municipal servicing will be available for the proposed subdivision.

As requested, a subsurface investigation was completed to identify the seasonal high watertable level, the soil profile and the bedrock surface level, and was conducted through the installation of three exploratory boreholes on June 7, 2018. An initial site reconnaissance was conducted May 18, 2018.

SITE SETTING AND GEOLOGICAL SETTING

The proposed subdivision is located on a ±2.2ha parcel of land located on the west side of Long Point Road, approximately 200m north of Highway 26. Frontage along Long Point Road is approximately 93m, and the depth of the site is approximately 237m. The site is currently mainly forested, and is undeveloped.

According to imagery provided by on-line Grey County Maps as well as topographical information provided by Ontario Base Mapping, the site exhibits a very shallow relief with an overall slope to the north. A northwards- flowing improved drainage course is mapped to be situated approximately in the middle of the site, as well as along the western edge of the site. Mapped wetlands are located to the west and the east of the site. Lands surrounding the site are undeveloped forest to the west, mainly forested rural residential lots to the north and south, and residential properties to the east along Long Point Road.

According to the Ontario Geological Survey Map P.919 "Quaternary Geology of the Collingwood-Nottawasaga Area", the upper soils in the vicinity of the site will consist of glaciolacustrine sand overlying sandy silt till and/or limestone bedrock.

The bedrock beneath the site consists of limestone of the Simcoe Group.

According to local historical water well records completed prior to the local supply of municipal water (i.e. late 1960's to early 1970's, copies attached), the overburden in the vicinity of the site is in the range of 3.7m to 8.5m deep. All historical well records in the vicinity of the site report obtaining groundwater from the limestone bedrock aquifer beneath the site. The overburden is locally of insufficient thickness to have provided a viable, secure source of groundwater for domestic use.

SUBSURFACE ASSESSMENT

Three boreholes were completed within accessible areas of the subject property on June 7, 2018. The boreholes were completed using a track-mounted power auger machine equipped with continuous flight hollow-stem augers and conventional soil sampling equipment. The boreholes were completed to the bedrock surface (4.6m at BH1 and BH3, 4.9m at BH2) and were instrumented as 5.1cm-diameter monitoring wells. Drilling conditions were observed through auger feedback on a continuous basis. Overburden formation samples were collected using conventional split-spoon technique and from auger cuttings, and were field-identified at regular depth intervals. Selected representative samples were retained for subsequent laboratory analysis.

Logs of the borehole installations are attached. Copies of the water well records for the monitoring well installations are also attached. The approximate locations of the boreholes are shown on attached Figure 1.

Two representative overburden formation samples were selected for laboratory analysis, these being from the surficial sands and the underlying sandy silt till. The following table provides a summary of the analyses:

Sample	Depth (m)	Grain-Size Distribution				Estimated Coefficient of Permeability (cm/sec)	Estimated T-time (minutes/ cm)
		Clay%	Silt%	Sand%	Gravel%		
BH1 S1	0.3 - 0.8	0	12	88	0	$2x10^{-3}$	10
BH3 S2	1.5 - 2.0	13	37	34	16	$7x10^{-6}$	40

Note: The above coefficients of permeability and T-times are estimates based on field observation, grain-size analysis, experience with similar soils and guidelines published under the Ontario Building Code.

In summary, soil conditions are generally consistent with local Quaternary Geology mapping, with a thin fine sand with some silt deposit overlying a silt and sand with some gravel and clay glacial till. The bedrock surface was encountered at 4.6m to 4.9m below grade.

Copies of the grain-size curves are attached.

WATERTABLE

Monitoring wells were installed in the three boreholes for subsequent observation of the watertable surface. Water levels were observed in the monitoring wells on June 28, 2018.

The following tables summarize the water level observations, including the depth groundwater was first observed in the three boreholes during drilling.

Monitoring Well	Depth to First Groundwater in Open Borehole (m) June 7, 2018	Monitoring Well Observations June 28, 2018	
		Water Level (m below top of pipe)	Water Level (m below grade)
BH1	0.3	1.66	0.68
BH2	0.3	1.47	0.58
BH3	0.6	1.90	0.81

Consistent with the geological setting of the site, shallow groundwater conditions are present over the entire property. The observed early summer groundwater levels range between 0.58m and 0.81m below grade. Based on the setting and observations during the May 18, 2018 reconnaissance, it is anticipated that high spring water levels will be at or near current grade.

SUMMARY

1. The soil profile over the property consists of with a thin fine sand with some silt deposit overlying a silt and sand with some gravel and clay glacial till.

2. The bedrock surface is situated 4.6m to 4.9m below current grade.

3. Groundwater levels observed June 28, 2018 ranged between 0.58m and 0.81m below grade. Based on the setting and observations during an earlier spring reconnaissance, it is anticipated that high spring water levels will be at or near current grade.

Should you have any questions or require further detail, please do not hesitate to contact this office.

Yours sincerely,
IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.

Grey County

Map Title

Legend

- Parcels
- Large Scale Roads
  - Provincial Highway
  - County Road
  - Township Road
  - Seasonal Road

APPROXIMATE LOCATIONS OF EXPLORATORY BOREHOLES

LONG POINT ROAD SUBDIVISION

FIGURE 1

SCALE: AS SHOWN

.08 0 0.04 0.08 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Printed: May 22, 2018

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

BOREHOLE VISUAL LOGS - Long Point Road Subdivision

BH1

Date: June 7, 2018
UTM Coordinates: NAD 83, Zone 17, 556204E, 4930427N
Collar Elevation: ±180m above sea level (per OBM)
Depth: 4.7m

Visual Log:

0m - 0.2m	black TOPSOIL
0.2m - 1.7m	grey to dark grey, soft, dry to wet (~0.3m) fine SAND with some silt
1.7m - 4.6m	grey, very compact, wet SILT and SAND till with some gravel and clay, sand seams near base
4.6m - 4.7m	carbonate bedrock

- 5.1cm-diameter PVC monitoring well installed to base of borehole. 1.5m of #10 slot PVC screen at base. Imported sand 2.4m to 4.7m. Bentonite set grade to 2.4m.
- Water Level 0.68m below grade June 28, 2018.
- Sample 1 - 0.3m to 0.8m
  Clay - 0%
  Silt - 12%
  Sand - 88%
  Gravel - 0%

BH2

Date: June 7, 2018
UTM Coordinates: NAD 83, Zone 17, 556043E, 4930410N
Collar Elevation: ±180m above sea level (per OBM)
Depth: 4.9m

Visual Log:

0m - 0.3m	black TOPSOIL
0.3m - 1.5m	grey to dark grey, soft, wet (~0.3m) fine SAND with some silt
1.5m - 4.6m	grey, very compact, wet SILT and SAND till with some gravel and clay, sand seams near base
4.6m - 4.9m	carbonate bedrock

- 5.1cm-diameter PVC monitoring well installed to base of borehole. 1.5m of #10 slot PVC screen at base. Imported sand 2.4m to 4.9m. Bentonite set grade to 2.4m.
- Water Level 0.58m below grade June 28, 2018.

BOREHOLE VISUAL LOGS - Long Point Road Subdivision

BH3

Date:	June 7, 2018
UTM Coordinates:	NAD 83, Zone 17, 556148E, 4930396N
Collar Elevation:	±181m above sea level (per OBM)
Depth:	4.9m

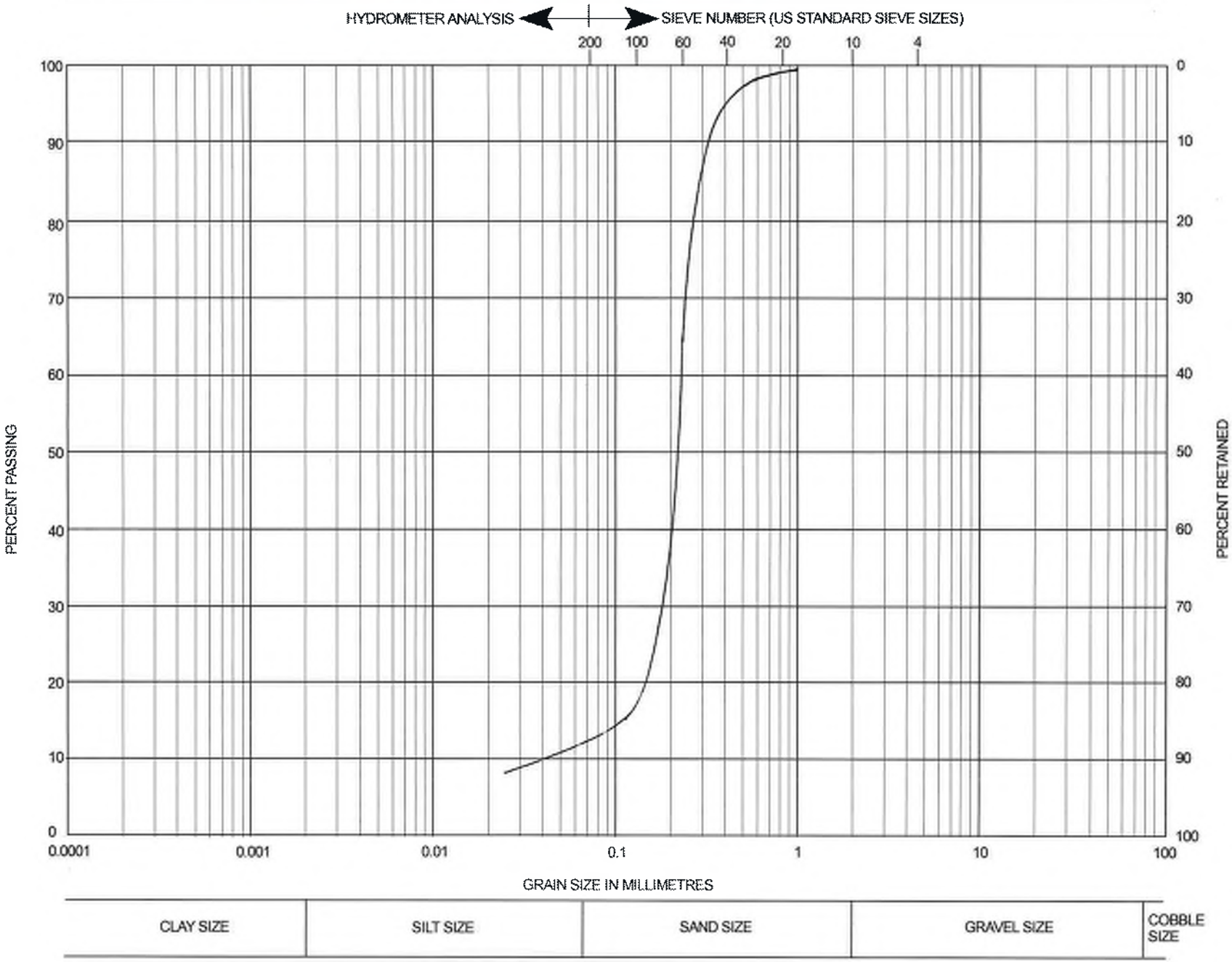
Visual Log:

0m - 0.3m	black TOPSOIL
0.3m - 1.5m	grey to dark grey, soft, dry to wet (~0.6m) fine SAND with some silt
1.5m - 4.9m	grey, very compact, wet SILT and SAND till with some gravel and clay, sand seams near base
4.9m	rock refusal

- 5.1cm-diameter PVC monitoring well installed to base of borehole. 1.5m of #10 slot PVC screen at base. Imported sand 2.4m to 4.9m. Bentonite set grade to 2.4m.
- Water Level 0.81m below grade June 28, 2018.
- Sample 2 - 1.5m to 2.0m
  Clay - 13%
  Silt - 37%
  Sand - 34%
  Gravel - 16%

GRAIN SIZE DISTRIBUTION CHART

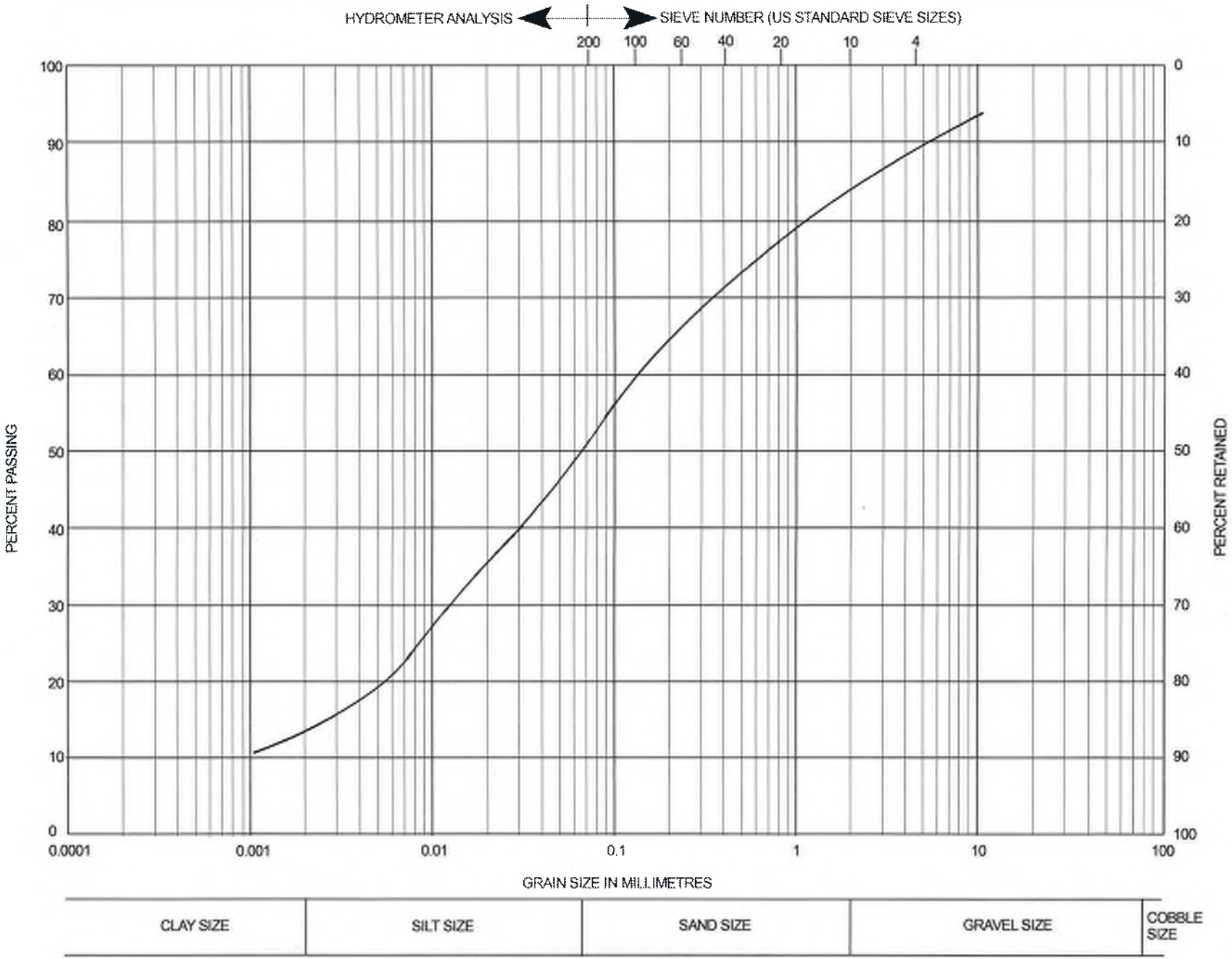
PROJECT / SAMPLE Long Point Road Subdivision - BH1, S1 - 0.3m to 0.8m



IAN D. WILSON ASSOCIATES LIMITED

GRAIN SIZE DISTRIBUTION CHART

PROJECT / SAMPLE Long Point Road Subdivision - BH3, S2 - 1.5m to 2.0m



IAN D. WILSON ASSOCIATES LIMITED

ON-SITE BOREHOLE WELL RECORDS

Ontario Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A247422

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TONY	LESIAK	Tlesiak@[illegible]	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
7 PINEHURST CR.	ETOBICOKE	ON	[illegible]	416 2334192

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
LONG POINT RD	Geo Twp of Collingwood	PT 20, 21	1

County/District/Municipality	City/Town/Village	Province	Postal Code
GREY COUNTY	Town of Blue Mountains / Collingwood	Ontario	

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 17	556204	4930437	Plan 529 PT LOT 85 RP	16R21860 PTS 4,5,8,9

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	WET SAND			0	5
GREY	SILT TILL	GRAVEL	DENSE.	5	15
	LIME STONE.		HARD.	15	16

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
16	8	SILICA SAND	
8	1	HYDRATED Bentonite	
1	0	CONCRETE.	

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☑ Other, specify direct

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☑ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2"	PVC	3/16	11	+3
4"	STEEL CASING	1/8	1	+3

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☑ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
2"	PVC	010	16	11

Map of Well Location

Please provide a map below following instructions on the back.

see attached

Water Details

Water found at Depth	Kind of Water
5 (m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	16	8

Well Contractor and Well Technician Information

LONDON SOIL TEST LTD.
712078 Southgate Sdrd. 71, RR #6
Dundalk, ON N0C 1B0
519-455-5777 info@londonsoil.com

Well Contractor's Licence No. 7190

Municipality

Address

Bus. Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name) WATTS MIKE

Well Technician's Licence No. A1471 Signature of Technician and/or Contractor [signature] Date Submitted [illegible]

Comments:

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered Y Y Y Y M M D D

Date Work Completed [illegible]

Ministry Use Only Audit No. Z285305 Received

0506E (2014/11) Well Owner's Copy


201821109 98
Point Rd
Long Point Rd
Long Point Rd
Long Point Rd
BH1
A247432
Z285305
Google
Map data ©2018 Google

Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A247423

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed ☐ Well Owner
TONY	LESIAK	TLesiak@rogers.com	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
7 PINEHURST CR.	ETOBICOKE	ON	M9A 3A4	416-233-4422

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Long Point RD	Geo. Twp of Glenelg	PT 30 31	1

County/District/Municipality	City/Town/Village	Province	Postal Code
GREY COUNTY	Town of Blue Collar Woods, Municipality	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	516049	4930410	PLAN 529 PT LOT 85 RP	16R2186 Parts 4,5,8,9

Overburden and Bedrock Material/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	SAND		WET.	0	5
GREY	SILT TILL	GRAVEL	DENSE.	5	15
GREY	LIME STONE BEDROCK		HARD.	15	

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
15	8	SILICA SAND	
8	1	HYDRATED Bentonite	
1	0	CONCRETE.	

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☒ Other, specify Auger

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2"	PVC	3/40	10	13
4"	STEEL STICK UP CASING	1/8	1	+3

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☒ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
2"	PVC	.010	15	10

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
5		
		Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
		Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	15	8

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☒ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		5		
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.

Comments: See attached

Well Contractor and Well Technician Information

Business Name of Well Contractor: LONDON SOIL TEST LTD.
712078 Southgate Sdrd. 71, RR #6
Dundalk, ON N0C 1B0
519-455-5777 info@londonsoil.com

Well Contractor's Licence No. 7190

Municipality

Name of Well Technician (Last Name, First Name): WATTS, MIKE

Well Technician's Licence No. 7171

Signature of Technician and/or Contractor

Date Submitted

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered

Date Work Completed

Ministry Use Only

Audit No: Z285303

Received

05088 (2014/11)

Well Owner's Copy


201821109 98
BH2
Long Point Rd
Long Point Rd
Long Point Rd
Long Point Rd
A247423
Z285303
Google
Map data ©2018 Google

Ontario Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker and/or Print Below)* A247431

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Tony	Lesiak	tlesiak@[illegible]	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
7 Pinehurst Cr.	Etobicoke	ON	[illegible]	416 [illegible]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Lone Point Rd.	Geo. Twp of Collingwood	19 20 & 21	1

County/District/Municipality	City/Town/Village	Province	Postal Code
Grey County	Town of Blue Mountains / Collingwood	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	561618	4930396	Plan 529 Pt Lot 85 RP	16R21860 Pts 4,5,8 & 9

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Sand		Wet.	0	5
Grey	Silt Till	Gravel	Hard	5	16
	Bedrock			16	

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
16	8	Silica Sand	
8	1	Hydrated Bentonite	
1	0	Concrete.	

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, *specify*

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	5		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, *specify* Auger

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☒ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2"	PVC	3/16	11	+3
4"	Steel casing	1/8	1	+3

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
2"	PVC	.010	16	11

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, *specify* ☐ Other, *specify*

Map of Well Location

Please provide a map below following instructions on the back.

see attached

Water Details

Water found at Depth	Kind of Water
5 (m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	16	8

Well Contractor and Well Technician Information

LONDON SOIL TEST LTD.
712078 Southgate Sdrd. 71, RR #6
Dundalk, ON N0C 1B0
519-455-5777 info@londonsoil.com

Well Contractor's Licence No. 7190

Municipality

E-mail Address

Bus. Telephone No. *(inc. area code)*

Name of Well Technician (Last Name, First Name): Watts Mike

Well Technician's Licence No. T2747

Signature of Technician and/or Contractor: [signature]

Date Submitted: 2018 [illegible]

Comments:

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered Y Y Y Y M M D D

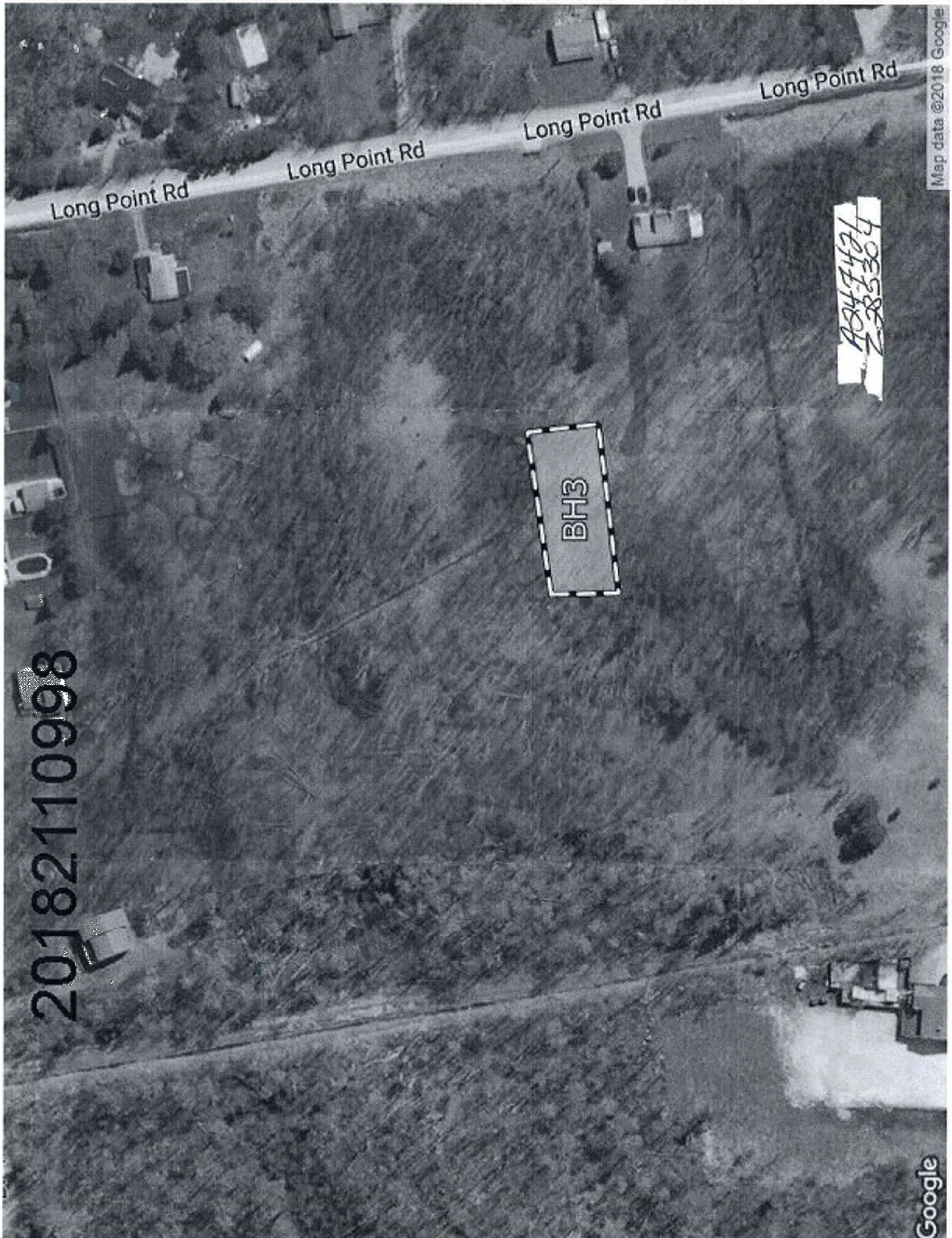
Date Work Completed 2018 [illegible]

Ministry Use Only

Audit No. Z285304

Received

0506E (2014/11) **Well Owner's Copy** © Queen's Printer for Ontario, 2014


Long Point Rd
Long Point Rd
Long Point Rd
Long Point Rd
BH3
Map data ©2018 Google
Google
20182110998

Well Owner Information Package

Protect your health and our shared groundwater

Now that you have a well on your property, you are legally responsible for the proper maintenance and abandonment (plugging and sealing) of your well.

A poorly maintained or improperly abandoned well could result in contaminated well water and groundwater, and it could affect your health.

The following tips will help you protect your well:

- Test the quality of your well water on a regular basis and look for changes in the water's appearance (e.g. colour, taste, odour)
- Keep surface water and foreign materials (e.g. insects and mice) from entering the well by securing the well cap in place and checking your well regularly for signs of rust and wear, cracks, holes or gaps in the well's structure
- If materials get in your well, safely remove them
- Keep ponded water, vehicles, pet waste, salt and fertilizer away from the well
- Make sure the ground around your well slopes away from your well
- Ensure the well is accessible for future repairs and maintain the minimum above ground height (typically 40 cm above the surface)
- Check for and identify abnormal sounds. They could indicate wear on the well's pump, waterlines or electrical cables or other issues
- Check the pump's efficiency. If the pump is continually running or losing pressure, it may be a sign of a crack or hole in the waterlines
- Ensure your septic tank system works and is pumped out regularly to prevent contamination of your well water

For information on testing the quality of your well water, visit:

- publichealthontario.ca (search "water testing") to request a drinking water sample collection kit for free bacterial testing
- ontario.ca/page/list-licensed-laboratories to find a licensed laboratory for chemical testing (note: laboratories charge a fee for this service)

Inspecting your well can be dangerous work. If you are not familiar with wells, let an experienced and licensed well technician do the work.

Ontario

Before inspecting a well, make sure to:

- Shut off the power supply to the pump
- Assess the structure of the well and nearby ground to make sure they are stable before approaching the well
- Carefully remove the well cap and take all necessary precautions to make sure people and animals cannot fall into the well

If you no longer use your well or aren't maintaining it for future use as a well, it must be properly abandoned (plugged and sealed).

If you have a water quality or quantity problem or your well is in need of repair, upgrade or abandonment, see the licensed well contractor list on ontario.ca/findwellcontractors.

For more information on properly maintaining or abandoning your well:

- visit ontario.ca/propertywells
- call 1-888-396-9355 (WELL)
- email wellshelpdesk@ontario.ca

For more information on your legal obligations, the Wells Regulation (under the Ontario Water Resources Act) is available at ontario.ca/laws.

Oct. 15, 2017

Ontario

OFF-SITE HISTORICAL WELL RECORDS

UTM 17 Z 556108 E
R 4929980 N
Elev. 0258 0
Basin 21 Grey

41A/9

GROUND WATER BRANCH
25 № 290
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District: Grey
Township, ~~Village, Town or City~~: Collingwood
Con.: I Lot: 21
Date completed: 18 (day) Nov. (month) 1961 (year)

[redacted] Address

Casing and Screen Record	
Inside diameter of casing	4"
Total length of casing	15
Type of screen	–
Length of screen	–
Depth to top of screen	–
Diameter of finished hole	4"

Pumping Test	
Static level	8
Test-pumping rate	2 G.P.M.
Pumping level	10'
Duration of test pumping	1 HR.
Water clear or cloudy at end of test	Clear
Recommended pumping rate	2 G.P.M.
with pump setting of	35 feet below ground surface

Well Log / **Water Record**

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
FINE SAND	0	17		
LIMESTONE	17	38	35	FRESH

For what purpose(s) is the water to be used? COTTAGE

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm: C. [illegible]

Address: R.R. 2 Collingwood ONT.

Licence Number: 577

Name of Driller or Borer: Same

Address

Date: /62

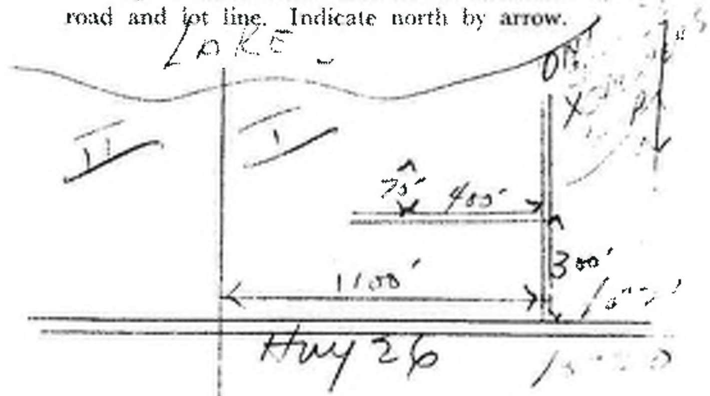
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



UTM | 17 | 5 5 6 1 0 0 |
| 4 R | 4 9 3 0 0 0 |
ev. | 15 R | 0 5 9 0 |
asin | 2 2 | | |

Water management in Ontario

The Ontario Water Resources Commission Act

WATER WELL RECORD

JB

250 2574

41A 9 W

County or District GREY
Township, Village, Town or City COLLINGWOOD
Con. 1 Lot #22
Date completed 23 (day) June (month) 69 (year)
Address ~~C~~ TOWNLINE (COLLINGWOOD)

[redacted]

Casing and Screen Record

Inside diameter of casing 6"
Total length of casing 23'
Type of screen ✓
Length of screen ✓
Depth to top of screen ✓
Diameter of finished hole 6"

Pumping Test

Static level 4'
Test-pumping rate 10 G.P.M.
Pumping level 25'
Duration of test pumping 1 hr
Water clear or cloudy at end of test clear
Recommended pumping rate 10 G.P.M.
with pump setting of 25' feet below ground surface

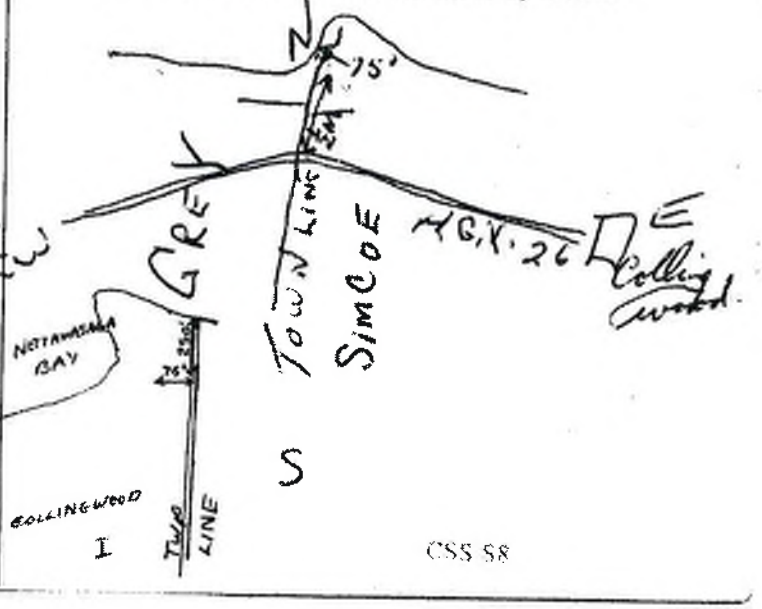
Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
(some Large stones) Stony Clay	0	14		
layers of grey shale	14	23		
grey limestone	23	28	28	fresh.

For what purpose(s) is the water to be used? Cottage
Is well on upland, in valley, or on hillside? hillside
Drilling or Boring Firm Ken Mighton & Sons
Address Craigmore
Licence Number 3404
Name of Driller or Borer Terry & Ken Mighton
Address Craigmore
Date 6 July 69
Kenneth H. Mighton
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7

OWRC COPY Long Point

CSS 58

The Ontario Water Resources Commission Act

WATER WELL RECORD

41A9 C

Water management in Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2503251 | 25003 | CON. 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
GREY	COLLINGWOOD	1	021

[redacted] R.#3 COLLINGWOOD, ONT.

DATE COMPLETED: DAY 02 MO JAN YR 70

[redacted] 30290 | RC 4 | ELEVATION 0595 | RC 5 | BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
BL.	TOPSOIL			0	1
BR.	SAND	CLAY & STONES		1	7
BL.	CLAY	SAND & STONES		7	17
DARK.	SHALE	CLAY	LAYERS.	17	23
	BEDROCK.	———	DARK LIMESTONE	23	33'6"

31 | 0001802 | 0007609051? | 0017805029? | 0023 1705T | 0034 26

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0033	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
04"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	STD.	0	0023
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0034
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) — | DIAMETER INCHES | LENGTH FEET

MATERIAL AND TYPE — | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE: 0003 GPM

DURATION OF PUMPING: 01 HOURS 00 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
-01 FEET	FEET	FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: / GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP

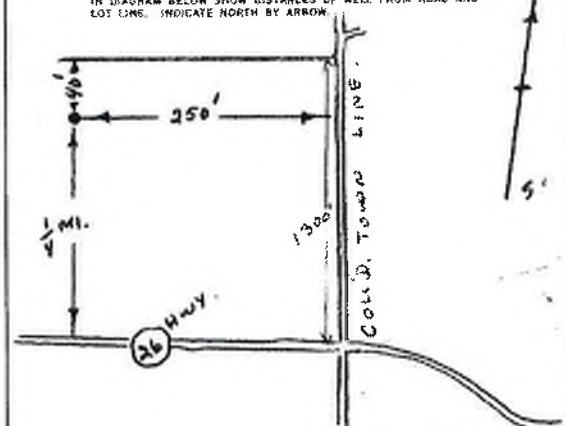
RECOMMENDED PUMP SETTING: 020 FEET

RECOMMENDED PUMPING RATE: 0002 GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



FAINT SULPHUR & IRON SMELL.

DRILLERS REMARKS:

FINAL STATUS OF WELL	
1 ☒ WATER SUPPLY	5 ☐ ABANDONED, INSUFFICIENT SUPPLY
2 ☐ OBSERVATION WELL	6 ☐ ABANDONED, POOR QUALITY
3 ☐ TEST HOLE	7 ☐ UNFINISHED
4 ☐ RECHARGE WELL	

WATER USE 01	
1 ☒ DOMESTIC	5 ☐ COMMERCIAL
2 ☐ STOCK	6 ☐ MUNICIPAL
3 ☐ IRRIGATION	7 ☐ PUBLIC SUPPLY
4 ☐ INDUSTRIAL	8 ☐ COOLING OR AIR CONDITIONING
☐ OTHER	9 ☐ NOT USED

METHOD OF DRILLING	
1 ☒ CABLE TOOL	6 ☐ BORING
2 ☐ ROTARY (CONVENTIONAL)	7 ☐ DIAMOND
3 ☐ ROTARY (REVERSE)	8 ☐ JETTING
4 ☐ ROTARY (AIR)	9 ☐ DRIVING
5 ☐ AIR PERCUSSION	

CONTRACTOR

NAME OF WELL CONTRACTOR: F. WRIGHT & SON — LICENCE NUMBER: 3605

ADDRESS: 140 - 6th ST. COLLINGWOOD — 5510

NAME OF DRILLER OR BORER: R. WRIGHT — LICENCE NUMBER: 3605

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE: DAY 19 MO JAN YR 70

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 5510 | DATE RECEIVED: 130870

DATE OF INSPECTION | INSPECTOR: P/L

REMARKS: P 526 / 85 / CSS 58

OWRC COPY

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

41 A/94

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2504485 | 25003 | JAN 1911

COUNTY OR DISTRICT: GREY | TOWNSHIP, BOROUGH, CITY, TOWN OR VILLAGE: Collingwood | CON. BLOCK, TRACT, SURVEY: 1 Plan 529 | LOT: 021

[redacted] CRAIGLEITH | DATE COMPLETED: 16 12 73

2504485 17 556164 4930352 4 600 5 22 OCT 17, 1975 69

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	SAND clay			0	6
Brown	stony clay			6	12
Grey	shale			12	18
Grey	Limestone		Very Hard.	18	56

OWRC P.7

31 | 32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
	1 ☐ FRESH 2 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	TO
6¼				06
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SLOT NO.	DIAMETER (INCHES)	LENGTH (FEET)
MATERIAL AND TYPE	DEPTH TO TOP (FEET)	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE	(CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ Pump 2 ☐ Bailer

PUMP RATE: GPM | DURATION OF PUMPING: HOURS MINUTES

STATIC LEVEL: FEET | WATER LEVEL END OF PUMPING: FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY

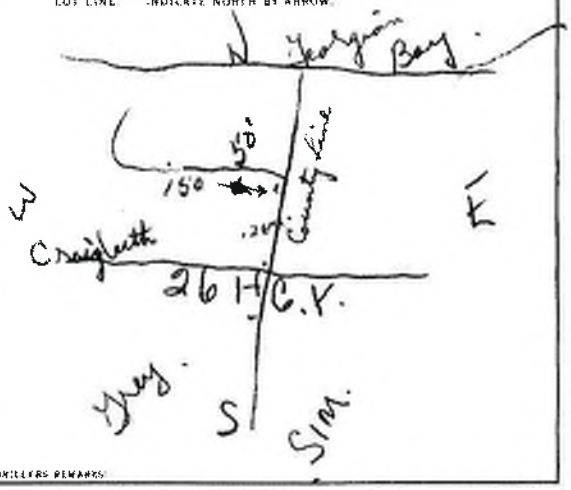
10 MINUTES	20 MINUTES	30 MINUTES	40 MINUTES
FEET	FEET	FEET	FEET

FLOWING GIVE RATE: GPM | PUMP INTAKE SET AT: FEET | WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING: FEET | RECOMMENDED PUMPING RATE: GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☒ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED 10 ☐ OTHER

METHOD OF DRILLING

1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ [illegible] 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: KEN MIGHTON & Son | LICENCE NUMBER: 3602

ADDRESS: STAYNER.

NAME OF DRILLER OR BORER: LARRY & KEN MIGHTON | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Kenneth A. Mighton | SUBMISSION DATE: DAY MO YR

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 3602 | DATE RECEIVED: 160174

DATE OF INSPECTION: 26, 9, 74 | INSPECTOR: F/P

REMARKS:

CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-051

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario ✓ 41A/9W

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(11) 2504867 | MUNICIP. 25003 | CON. CON | 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
GREY [redacted]	COLLINGWOOD	1	021 PT

[redacted] RR 3 COLLINGWOOD

DATE COMPLETED: DAY 24 MO. 10 YR. 74

[redacted]	RC	ELEVATION	RC	BASIN CODE
0352	4	595	5	22

APR 06, 1976

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	TOP SOIL		SANDY	0	1
BROWN	SAND	GRAVEL		1	6
GREY	CLAY	GRAVEL STONES		6	28
GREY	SHALE			28	63

OWRC N-5

(31) 0001600228 | 0006628111 | 0028205111 2 | 0063217

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 6¼	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE		~~REMOVED~~	
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER | PUMPING RATE GPM | DURATION OF PUMPING HOURS MINS

STATIC LEVEL | WATER LEVEL END OF PUMPING | WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY: 15 MINUTES, 30 MINUTES, 45 MINUTES, 60 MINUTES (FEET)

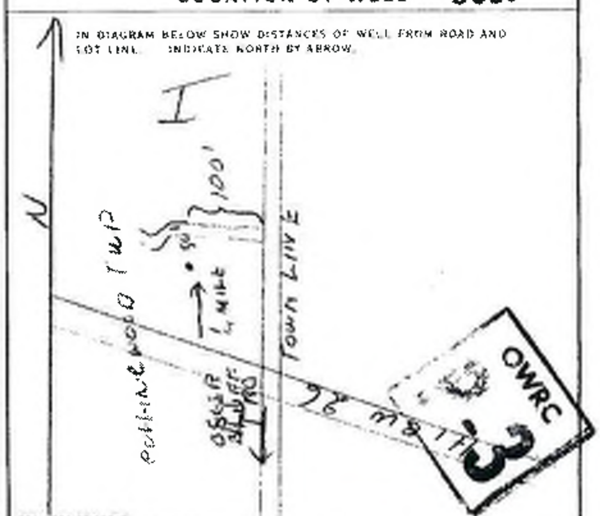
IF FLOWING, GIVE RATE GPM | PUMP INTAKE SET AT FEET | WATER AT END OF TEST 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING FEET | RECOMMENDED PUMPING RATE GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL 5630

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



OWRC 3

DRILLERS REMARKS

FINAL STATUS OF WELL: 5

1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☒ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING: 1

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: DAWSON M SEWELL | LICENCE NUMBER: 4716

ADDRESS: RR1 DUNTROON

NAME OF DRILLER OR BORER: SAME | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Dawson M Sewell | SUBMISSION DATE: DAY 27 MO. 11 YR. 74

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 4716 | DATE RECEIVED: 071174

DATE OF INSPECTION: June 24/75 | INSPECTOR: J.B.

REMARKS: P.B. | P L | WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Ministry of the Environment
Ontario

#17

The Ontario Water Resources Act

WATER WELL RECORD

41A/NW

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(11) 2507761 | MUNICIP 25003 | CON 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON, BLOCK, TRACT, SURVEY, ETC.	LOT
Grey	Collingwood	1 (Part	021 20)

[redacted] ox 30/S 226 RR#2 Collingwood | DATE COMPLETED: DAY 04 MO 08 YR 82

[redacted] 30400 | 5 | ELEVATION 0600 | 5 | BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BLACK	TOP SOIL			0	2
GREY	CLAY	STONES		2	13
GREY	CLAY	FINE SAND		13	22
BROWN	MEDIUM SAND	CLAY		22	23½
BROWN	LIMESTONE		HARD	23½	30

(31) 0002802 | 0013205l2 | 0022205l08 | 0024609l05 | 0030615l73

(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0024	1 ☐ FRESH 3 ☑ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
23½	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 6¼	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	23'8" 0024
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE		23'8" 0024	0030
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET | MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

(61) PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER | PUMPING RATE 001 GPM | DURATION OF PUMPING 02 HRS 00 MINS

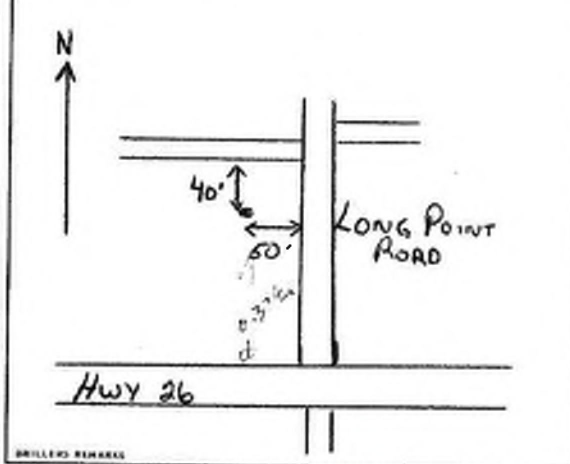
STATIC LEVEL 004 FEET | WATER LEVEL END OF PUMPING 028 FEET | WATER LEVELS DURING 1 ☐ PUMPING 2 ☑ RECOVERY: 15 MINUTES 024 FEET

IF FLOWING GIVE RATE GPM | PUMP INTAKE SET AT FEET | WATER AT END OF TEST 1 ☐ CLEAR 2 ☑ CLOUDY

RECOMMENDED PUMP TYPE ☑ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING 029 FEET | RECOMMENDED PUMPING RATE 001 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL 1: 1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE 01: 1 ☑ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING 1: 1 ☑ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Dawson M Sewell | LICENCE NUMBER 4716

ADDRESS: RR#3 Duntroon

NAME OF DRILLER OR BORER: Charlie Lowe | LICENCE NUMBER

SIGNATURE OF CONTRACTOR: Dawson M Sewell | SUBMISSION DATE DAY ___ MO ___ YR ___

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 4716 | DATE RECEIVED 011082

DATE OF INSPECTION 83 | INSPECTOR

REMARKS: WP CSS.S8 P/P

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FORM NO. 0506-4-77 FORM 7

Ian D. Wilson Associates Ltd.
since 1974

Tel: 519.233.3500
Fax: 519.233.3501

P. O. Box 299
Clinton, Ontario
N0M 1L0

Wilson Associates

Consulting Hydrogeologists

May 10, 2019

Ms. Brittany Robertson, P.Eng.
C.F. Crozier & Associates
40 Huron Street
Suite 301
Collingwood, ON
L9Y 4R3

Dear Ms. Robertson:

Re: Update of Subsurface Characterization Program
Follow-Up Watertable Observations
Proposed Long Point Road Subdivision, Blue Mountains

It is proposed to develop a ±22-lot urban residential subdivision on a ±2.2ha parcel of land located within Part of Lots 20 and 21, Concession 1, Geographic Township of Collingwood, Town of Blue Mountains (Plan 529, Part Lot 85, RP16R2186, Parts 4, 5, 8 & 9).

A subsurface investigation was completed to identify the seasonal high watertable level, the soil profile and the bedrock surface level, and was conducted through the installation of three exploratory boreholes/monitoring wells on June 7, 2018. The results of the 2018 investigation are summarized in the Wilson Associates Report dated July 6, 2018. Figure 1 (attached) shows the location of the site, borehole locations and inferred direction of shallow groundwater flow in June 2018.

To address concerns from the Municipality regarding the characterization of the high watertable surface, two additional sets of water level observations were undertaken December 13, 2018 (after a wet autumn period) and April 10, 2019 (immediately after final snowmelt).

The following table summarizes all water level observations to date.

		BH1	BH2	BH3
Approximate Ground Surface Elevation* (m above sea level)		179.8	180.1	180.7
Approximate Top of Casing Elevation* (m above sea level)		180.78	180.99	181.79
June 28, 2018	Water Level (m below grade)	0.68	0.58	0.81
	Approximate Water Level Elevation* (m above sea level)	179.12	179.52	179.89
December 13, 2018	Water Level (m below grade)	0.16	0.59	0.13
	Approximate Water Level Elevation* (m above sea level)	179.64	179.51	180.57

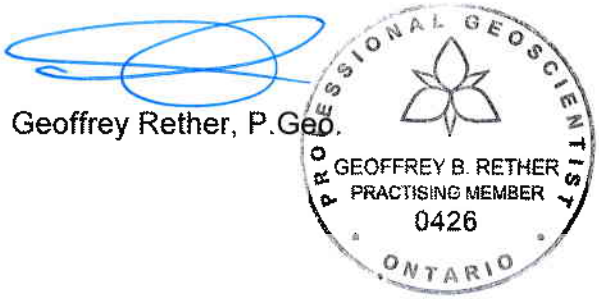
April 10, 2019	Water Level (m below grade)	0.05	0.43	0.03
	Approximate Water Level Elevation* (m above sea level)	179.75	179.67	180.67

Note: * Ground surface elevation is approximate, and was derived from survey mapping provided by C.F. Crozier & Associates for the property.

As indicated in the July 6, 2018 Report, it was anticipated that high spring water levels will be at or near current grade. The above monitoring data are consistent with this opinion.

Should you have any questions or require further detail, please do not hesitate to contact this office.

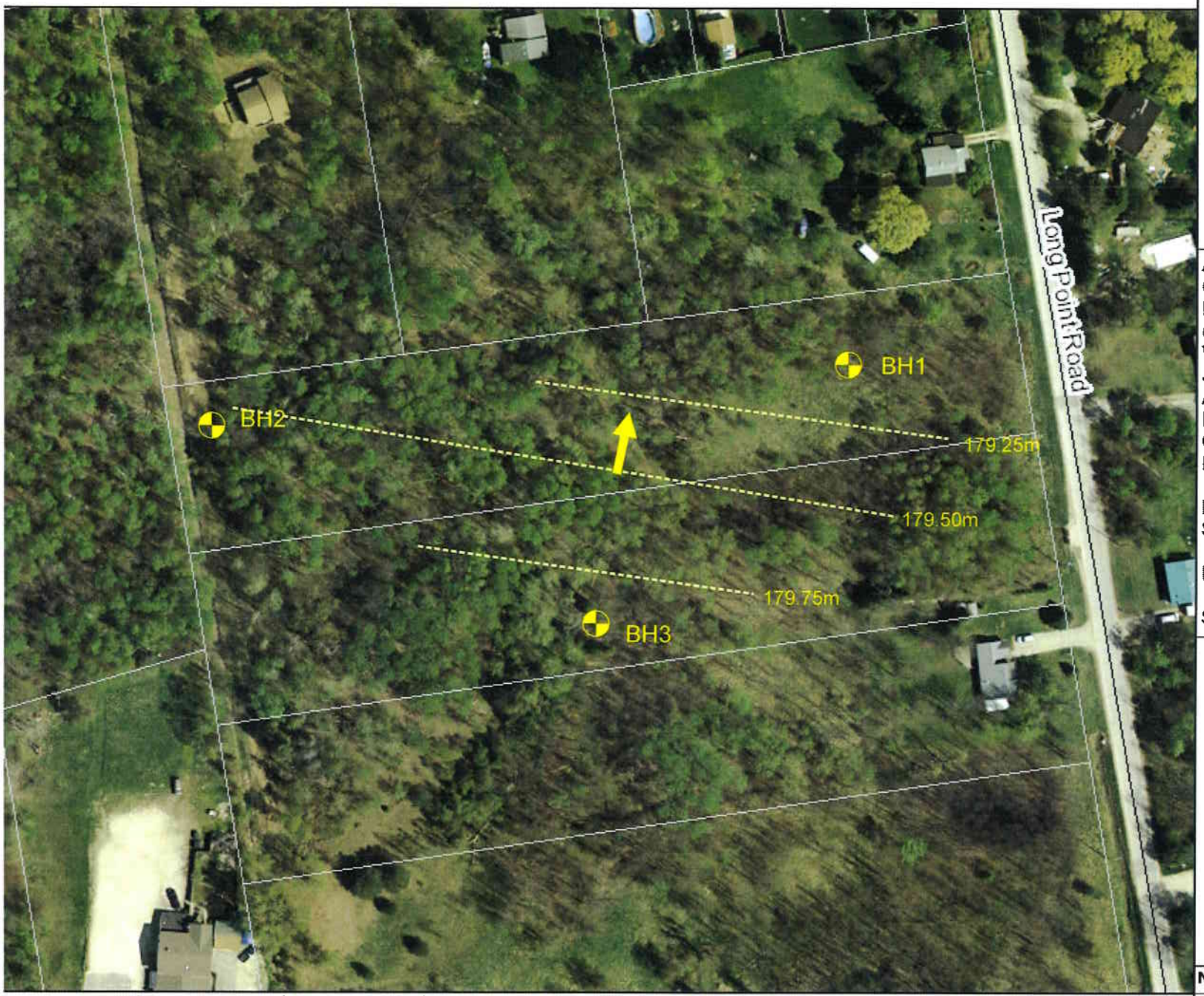
Yours sincerely,
IAN D. WILSON ASSOCIATES LIMITED



Geoffrey Rether, P.Geo.

Grey County

Map Title



Legend

- Parcels
- Large Scale Roads
  - Provincial Highway
  - County Road
  - Township Road
  - Seasonal Road

APPROXIMATE LOCATIONS OF EXPLORATORY BOREHOLES, APPROXIMATE (see report) CONTOURS OF THE WATERTABLE SURFACE ON JUNE 28, 2018, AND APPROXIMATE (see report) INFERRED DIRECTION OF SHALLOW GROUDNWATER FLOW

LONG POINT ROAD SUBDIVISION

FIGURE 1

SCALE: AS SHOWN

.08 0 0.04 0.08 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

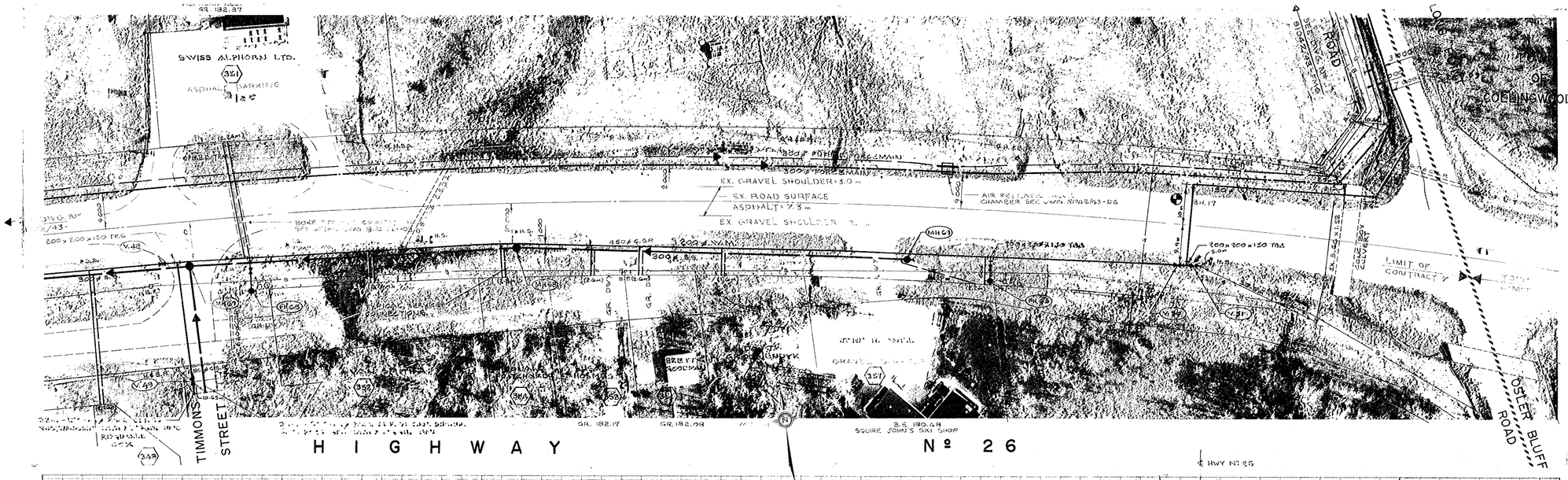
Printed: May 22, 2018

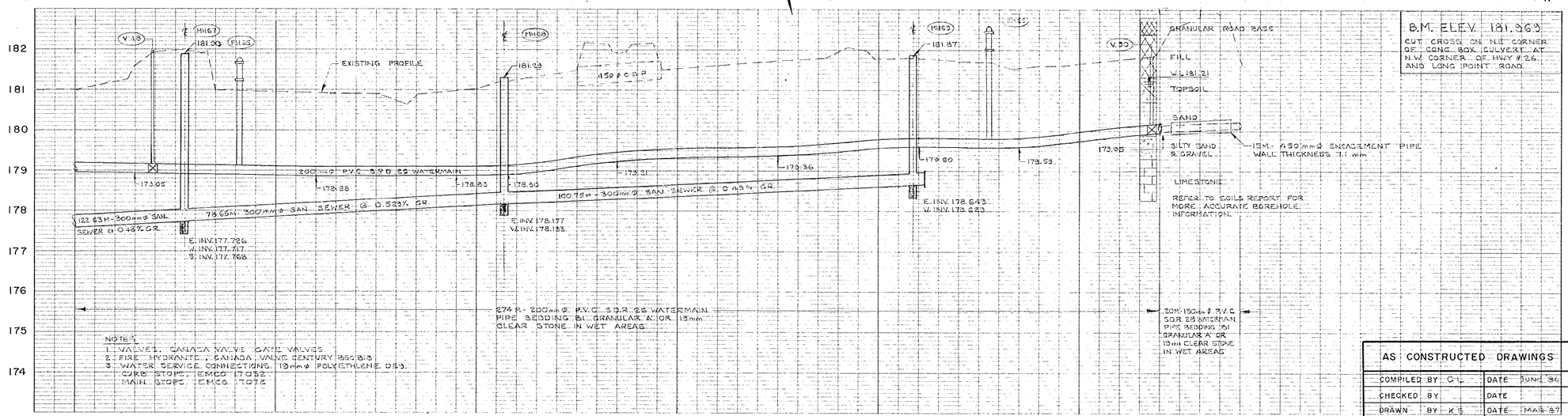
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

APPENDIX B

As-Constructed Drawings





B.M. ELEV. 181.369
CUT CROSS ON N.E. CORNER OF CONC. BOX CULVERT AT N.W. CORNER OF HWY #26 AND LONG POINT ROAD.

NOTES:
1. VALVES: CANADA VALVE GATE VALVES
2. FIRE HYDRANTS: CANADA VALVE CENTURY B50/B18
3. WATER SERVICE CONNECTIONS: 19mm ø POLYETHELENE PIPE
CURB STOPS: EMCO 170B2
MAIN STOPS: EMCO 1078

AS CONSTRUCTED DRAWINGS

COMPILED BY	C.L.	DATE	JUNE '84
CHECKED BY		DATE	
DRAWN BY	K.S.	DATE	MAR '84
CHECKED BY	R.M.	DATE	MAR '84

CHAINAGE	1+200	28.74	50	+300	07.39	50	+400	08.14	50
EXISTING ℄ ELEV.	180.33		180.82		180.83	181.50		181.76	181.63

Notes:

LEGEND

GR 199.89	Ground Elevation 199.89		Watermain
BE 197.57	Basement Elevation 197.57	B	Buried Bell Cable
	Basement Elevation Right of Centre Line	G	Gasmain
	Basement Elevation Left of Centre Line		Existing Watermain
	Borehole		Sanitary Sewer
			Forcemain

NO.	REVISIONS	DATE	INITIAL
2	SECOND SUBMISSION	MAR. '85	C.K.K.
1	DRAWING REDRAFTED	JULY 1984	C.K.K.

Approved

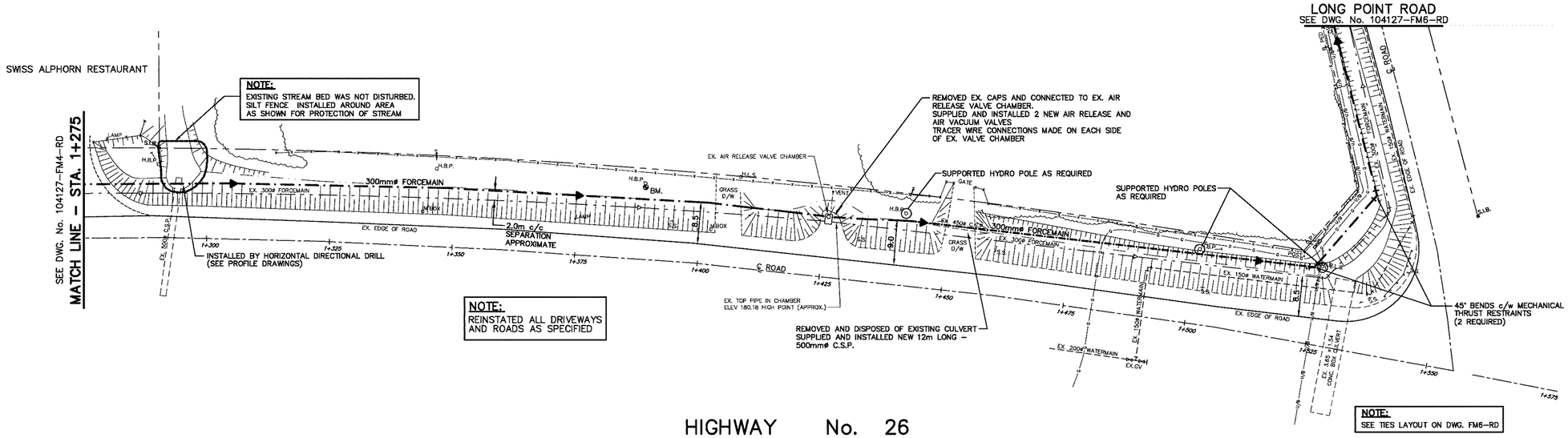
RECOGNIZED PROFESSIONAL ENGINEER C. K. KENT PROVINCE OF ONTARIO

TOWNSHIP OF COLLINGWOOD
(CRAIGLEITH CAMPERDOWN AREA)
ONTARIO MINISTRY OF THE ENVIRONMENT
DIRECT GRANT PROJECTS Nº 3-0174 & 7-0242

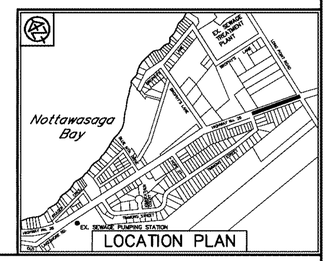
PLAN AND PROFILE
HWY. Nº 26 - STA. 1+200 TO STA. 1+490

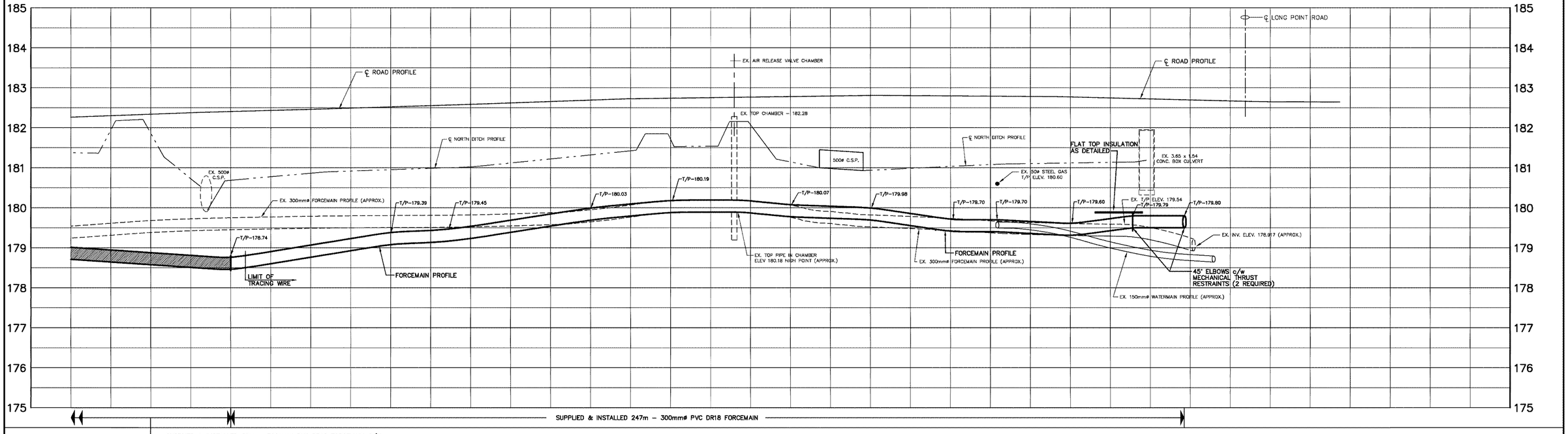
Ainley and Associates Ltd.
Consulting Engineers and Planners
Collingwood — Barrie — Belleville

SCALE: HORZ. 1:500 VERT. 1:50	METRIC	CONTRACT 7	
DESIGN WBL	CHECKED C.K.K.	DWG. Nº 81042/43-SW5	
DRAWN G.M./D.O.	DATE JULY 1984		



B.M. ELEV. 181.817
R.R. SPIKE IN SOUTH FACE H.B.P. No. 1460
ON NORTH SIDE OF HWY. No. 26





SUPPLIED & INSTALLED 89m – 300mmø PVC DR18 FORCEMAIN C/W COBRA-LOK COUPLINGS BY DIRECTIONAL DRILLING
NOTE: NO TRACING WIRE FROM STA. 1+209 TO 1+305 BECAUSE THE WIRE BROKE WHILE PULLING PIPE

SUPPLIED & INSTALLED 247m – 300mmø PVC DR18 FORCEMAIN

CHAINAGE (PLOT 1=0.5)	GR.ELEV.@ ℄ ROAD
1+275	182.34
1+300	182.46
1+325	182.49
1+350	182.52
1+375	182.65
1+400	182.72
1+425	182.78
1+450	182.81
1+475	182.81
1+500	182.8
1+525	182.76
1+550	182.66
1+575	182.64

LEGEND
- PROPERTY LINE
- U/G BURIED BELL CABLE
- G BURIED GAS MAIN
- EXISTING WATER MAIN AND VALVE
- EXISTING SANITARY SEWER & M.H.
- EXISTING SEWAGE FORCEMAIN
- PROPOSED SEWAGE FORCEMAIN

NOTE : 1) LOCATIONS OF UTILITIES ARE APPROXIMATE.

RECORD DRAWING

COMPILED BY: D.S.	DATE: SEPT. 2006
CHECKED BY: L.S.	DATE: NOV. 2006
DRAWN BY: P.C.S.	DATE: NOV. 2006
CHECKED BY: R.M.	DATE: DEC. 2006

NO.	REVISIONS	DATE	INITIAL
	REVISED AS RECORD DRAWING	DEC. 2006	R.M.

RECORD DRAWING
NOTICE TO USERS

Information contained on this drawing may have changed since the completion of construction. Further, this drawing may contain information provided by others. While Ainley & Associates Limited believes this information to be reliable and correct as of the completion of construction, no warranty is provided as to its accuracy and/or completeness. As such, Ainley & Associates Limited shall not be responsible for any errors or omissions which may result from incorporation of the information herein.

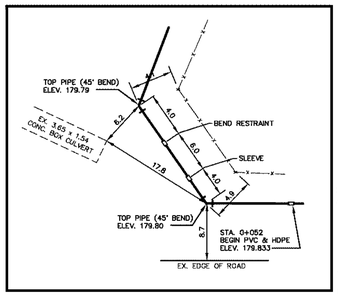
SCALE:	HORIZ. 1=500 VERT. 1=50
DESIGN:	N.M.S./R.M.
DRAWN:	E.K./P.C.S.
CHECKED:	M.W.A.
DATE:	APR. 2006

TOWN OF THE BLUE MOUNTAINS
CRAIGLEITH AREA
CONTRACT No. TBM–2006–3
DUPLICATE FORCEMAIN

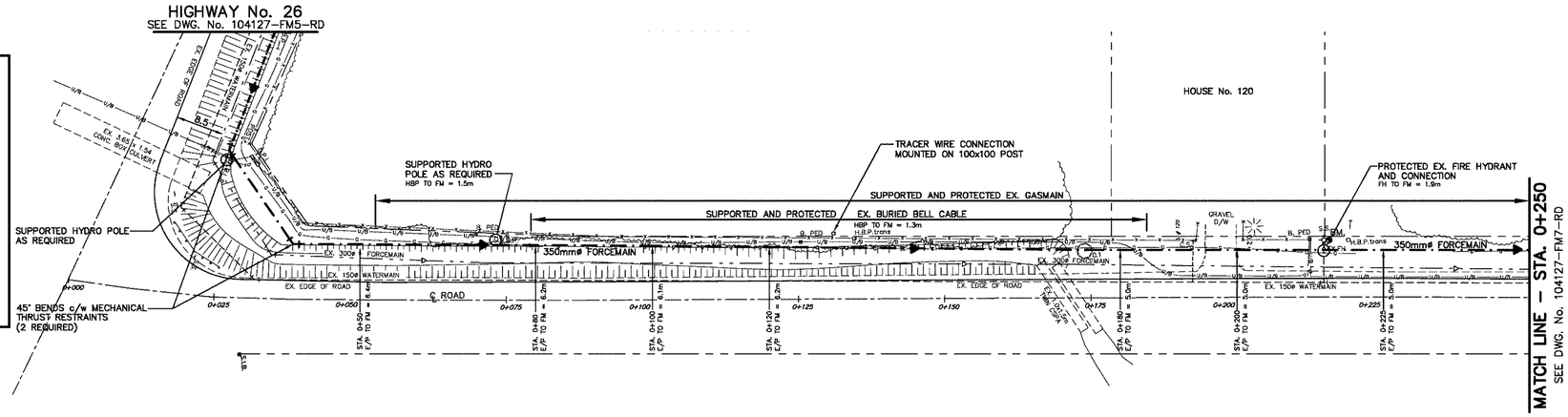
PLAN & PROFILE
HIGHWAY No. 26
STA. 1+275 TO LONG POINT POINT ROAD

Ainley GROUP — CONSULTING ENGINEERS PLANNERS

AAL–104127 | DWG. FM5–RD

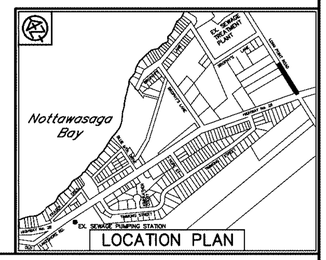


TIES LAYOUT

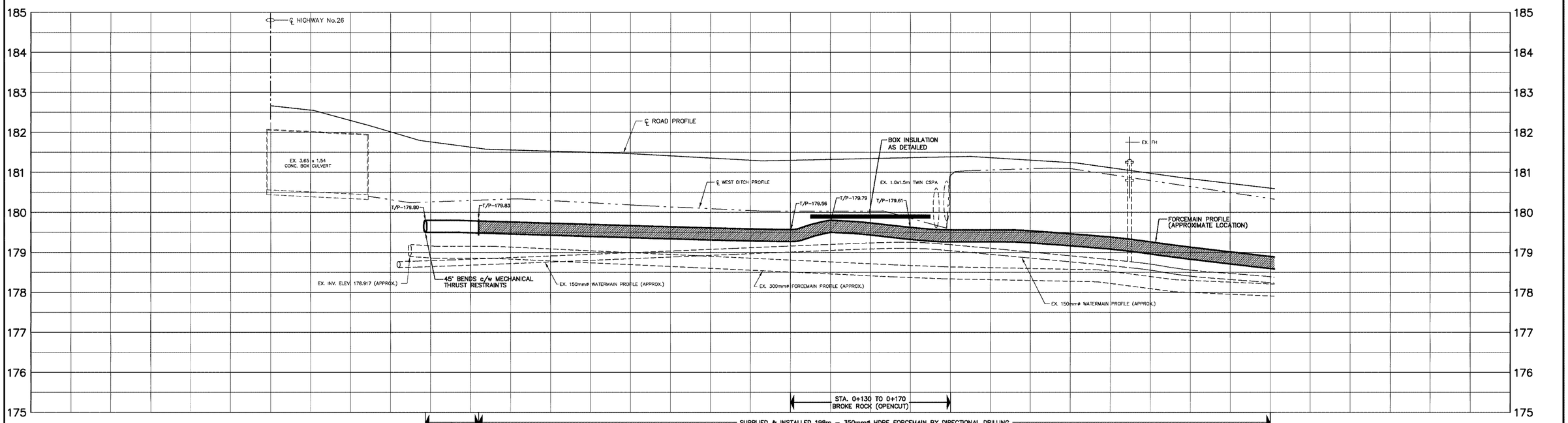


NOTE:
REINSTATED ALL DRIVEWAYS AND ROADS AS SPECIFIED

LONG POINT ROAD



B.M. ELEV. 181.761
TOP NUT OF FIRE HYDRANT
ON WEST SIDE OF LONG POINT ROAD
IN FRONT OF HOUSE No. 120



CHAINAGE (PLOT 1=0.5)	0+000	0+025	0+050	0+075	0+100	0+125	0+150	0+175	0+200	0+225	0+250
GR.ELEV.@ ℄ ROAD	182.66	182.26	181.54	181.51	181.44	181.26	181.33	181.39	181.24	180.92	180.62

LEGEND
- PROPERTY LINE
- U/G BURIED BELL CABLE
- G BURIED GAS MAIN
- EXISTING WATER MAIN AND VALVE
- EXISTING SANITARY SEWER & M.H.
- EXISTING SEWAGE FORCEMAIN
- PROPOSED SEWAGE FORCEMAIN

NOTE : 1) LOCATIONS OF UTILITIES ARE APPROXIMATE.

RECORD DRAWING

COMPILED BY: D.S.	DATE: SEPT. 2006
CHECKED BY: L.S.	DATE: NOV. 2006
DRAWN BY: P.C.S.	DATE: NOV. 2006
CHECKED BY: R.M.	DATE: DEC. 2006

NO.	REVISIONS	DATE	INITIAL
	REVISED AS RECORD DRAWING	DEC. 2006	R.M.

RECORD DRAWING
NOTICE TO USERS

Information contained on this drawing may have changed since the completion of construction. Further, this drawing may contain information provided by others. While Ainley & Associates Limited believes this information to be reliable and correct as of the completion of construction, no warranty is provided as to its accuracy and/or completeness. As such, Ainley & Associates Limited shall not be responsible for any errors or omissions which may result from incorporation of the information herein.

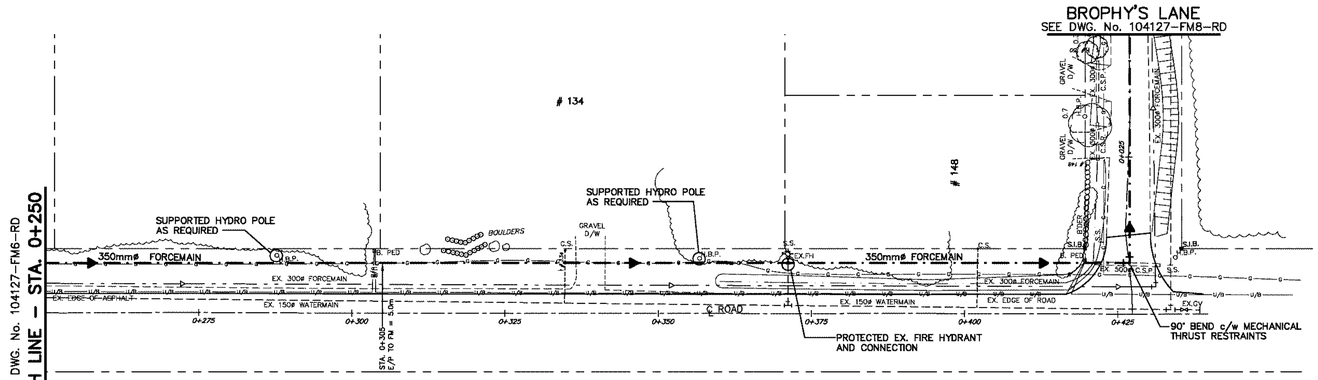
SCALE:	HORIZ. 1=500 VERT. 1=50
DESIGN:	N.M.S./R.M.
DRAWN:	E.K./P.C.S.
CHECKED:	M.W.A.
DATE:	APR. 2006

TOWN OF THE BLUE MOUNTAINS
CRAIGLEITH AREA
CONTRACT No. TBM-2006-3
DUPLICATE FORCEMAIN

PLAN & PROFILE
LONG POINT ROAD
HIGHWAY No. 26 TO STA. 0+250

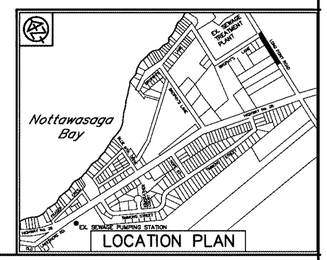
Ainley GROUP — CONSULTING ENGINEERS PLANNERS

AAL-104127 | DWG. FM6-RD

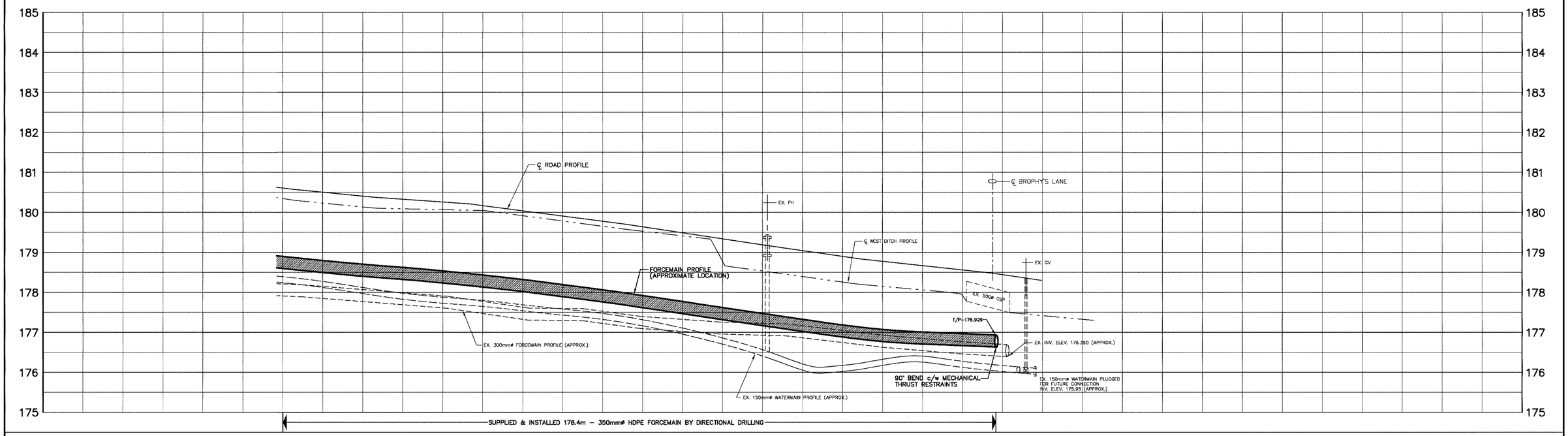


NOTE:
REINSTATED ALL DRIVEWAYS AND ROADS AS SPECIFIED

LONG POINT ROAD



B.M. ELEV. 181.761
TOP NUT OF FIRE HYDRANT
ON WEST SIDE OF LONG POINT ROAD
IN FRONT OF HOUSE No. 120



GR.ELEV.@ ℄ ROAD	180.62	180.36	180.16	178.82	178.48	179.12	178.78	178.49	178.26
CHAINAGE	0+250	0+275	0+300	0+325	0+350	0+375	0+400	0+425	0+439

PLOT 1=0.5

LEGEND
- PROPERTY LINE
- U/B — BURIED BELL CABLE
- G — BURIED GAS MAIN
- EXISTING WATER MAIN AND VALVE
- EXISTING SANITARY SEWER & M.H.
- EXISTING SEWAGE FORCEMAIN
- PROPOSED SEWAGE FORCEMAIN

NOTE : 1) LOCATIONS OF UTILITIES ARE APPROXIMATE.

RECORD DRAWING

COMPILED	BY: D.S.	DATE: SEPT. 2006	
CHECKED	BY: L.S.	DATE: NOV. 2006	
DRAWN	BY: P.C.S.	DATE: NOV. 2006	
CHECKED	BY: R.M.	DATE: DEC. 2006	

NO.	REVISIONS	DATE	INITIAL
	REVISED AS RECORD DRAWING	DEC. 2006	R.M.

RECORD DRAWING
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SCALE:	HORIZ. 1=500 VERT. 1=50
DESIGN:	N.M.S./R.M.
DRAWN:	E.K./P.C.S.
CHECKED:	M.W.A.
DATE:	APR. 2008

TOWN OF THE BLUE MOUNTAINS
CRAIGLEITH AREA
CONTRACT No. TBM-2006-3
DUPLICATE FORCEMAIN

PLAN & PROFILE
LONG POINT ROAD
STA. 0+250 TO BROPHY'S LANE

Ainley GROUP — CONSULTING ENGINEERS PLANNERS

AAL-104127 | DWG. FM7-RD

APPENDIX C

Domestic Water and Sanitary Flow Calculations

CROZIER
CONSULTING ENGINEERS

File: 1988-5783
Date: 2021.02.19
By: JL'A
Check By: KV

LONG POINT ROAD - WATER DEMAND CALCULATIONS

Developed Site Area		2.20	ha
Number of Residential Units		22	units
Person Per Residential Unit	*(Town of the Blue Mountains Development Standards)*	2.3	persons/unit
Residential Population		51	persons
Domestic Water Design Flows			
Residential	*(Town of the Blue Mountains Development Standards)*	450	L/C-day
Total Domestic Water Design Flows			
Average Residential Daily Flow	*(Town of the Blue Mountains Development Standards)*	0.26	L/sec
Max Day Peak Factor	*(Town of the Blue Mountains Development Standards)*	2.00	
Max Day Demand Flow		0.53	L/sec
Peak Hour Factor	*(Town of the Blue Mountains Development Standards)*	4.50	
Peak Hour Flow		1.19	L/sec
Fire Flow Demand (per FUS and OBC)		67	L/sec
Design Flow (per FUS and OBC)		*67.53*	L/sec

Long Point Road
Fire Protection Volume Calculation
CFCA File: 1988-5783

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings		Wood Frame Construction	
2	number of floors	1.5	C
207	sq.m. floor area	413	sq.m. total floor area
100%	Floor 1		
100%	Floor 2		
413	sq.m. total floor area		

Therefore F= 7,000 L/min (rounded to nearest 1000 L/min)

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings	0% reduction

0 L/min reduction

Therefore UPDATED F= 7,000 L/min (rounded to nearest 1000 L/min)

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Sprinkler System Assume 0% reduction

0 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) esposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name	**Distance**		
Front	32	5%	350
Left	1.8	25%	1750
Right	1.8	25%	1750

3,850 L/min Surcharge

Determine Required Fire Flow

No.1	7,000	
No. 2	0	reduction
No. 3	0	reduction
No. 4	3,850	surcharge
Required Flow:	**4,000 L/min**	
Rounded to nearest 1000l/min:	**4,000 L/min**	or 66.7 L/s
		1,057 USGPM

Determine Required Fire Storage Volume

Flow from above 4,000 L/min

Required duration 1.50 hours

Therefore: 360,000 Litres or
360 cu.m. is the required fire storage volume.

Required Duration of Fire Flow	
Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)
K = water supply coefficient
V = total building volume in cubic metres
S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 23.0 Group C/D building with combustible construction (Table 1)
V = 1240 413 By 3m height
S_{TOT} = 2 S_{TOT} Need Not Exceed 2.0

Q = 57040 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **2700 L/min**

45 L/s

File: 1988-5783
Date: 2021.02.19
By: JL'A
Check By: KV

LONG POINT ROAD - SANITARY DEMAND CALCULATIONS

Developed Site Area		2.20	ha
Number of Residential Units		22	units
Person Per Residential Unit	*(Town of The Blue Mountains Development Standards)*	2.30	persons/unit
Residential Population		51	persons
Sanitary Design Flows			
Residential	*(Town of The Blue Mountains Development Standards)*	450	L/C-day
Infiltration (typical)		0.23	L/s/ha
Total Sanitary Design Flows			
Average Daily Residential Flow		0.26	L/sec
Max Day Peak Factor	*(Harmon Formula)*	4.3	
Infiltration		0.51	L/sec
Total Daily Peak Flow	*(Town of The Blue Mountain Development Standards)*	***1.64***	**L/sec**

APPENDIX D

Quality Control Measures & Stormwater Flow Calculations

CROZIER
CONSULTING ENGINEERS

PROJECT: Long Point Road Development
PROJECT No.: 1988-5783
FILE: Rational Method - Peak Flow
DATE: 2021.02.19
DESIGN: JL'A

RATIONAL METHOD - LONG POINT ROAD (Internal Sewer - Catchments 1A/1B)

Rational Method Q=0.0028*C*i*A (cms)
Intensity i=A/ (Tc+b)^c (mm/hr)

Frequency	TOWN OF THE BLUE MOUNTAINS SPECIFIED IDF	
Storm Return	Coef. A	Coef. B
2	22.3	-0.714
5	29.1	-0.724
10	33.6	-0.729
25	39.3	-0.734
50	43.5	-0.736
100	47.7	-0.738

Pre Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.48	0.26	15.0	60.00	0.02
5	0.48	0.26	15.0	79.39	0.03
10	0.48	0.26	15.0	92.31	0.03
25	0.48	0.29	15.0	108.72	0.04
50	0.48	0.31	15.0	120.67	0.05
100	0.48	0.33	15.0	132.69	0.06

Post-Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.48	0.55	15.0	60.00	0.04
5	0.48	0.55	15.0	79.39	0.06
10	0.48	0.55	15.0	92.31	0.07
25	0.48	0.61	15.0	108.72	0.09
50	0.48	0.66	15.0	120.67	0.11
100	0.48	0.69	15.0	132.69	0.12

CROZIER
CONSULTING ENGINEERS

PROJECT: Long Point Road Development
PROJECT No.: 1988-5783
FILE: Rational Method - Peak Flow
DATE: 2021.02.19
DESIGN: JL'A

RATIONAL METHOD - LONG POINT ROAD (To Longpoint)

Rational Method Q=0.0028*C*i*A (cms)
Intensity i=A/ (Tc+b)^c (mm/hr)

Frequency	TOWN OF THE BLUE MOUNTAINS SPECIFIED IDF	
Storm Return	Coef. A	Coef. B
2	22.3	-0.714
5	29.1	-0.724
10	33.6	-0.729
25	39.3	-0.734
50	43.5	-0.736
100	47.7	-0.738

Pre Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.2	0.26	15.0	60.00	0.01
5	0.2	0.26	15.0	79.39	0.01
10	0.2	0.26	15.0	92.31	0.01
25	0.2	0.29	15.0	108.72	0.02
50	0.2	0.31	15.0	120.67	0.02
100	0.2	0.33	15.0	132.69	0.02

Post-Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.2	0.55	15.0	60.00	0.02
5	0.2	0.55	15.0	79.39	0.02
10	0.2	0.55	15.0	92.31	0.03
25	0.2	0.61	15.0	108.72	0.04
50	0.2	0.66	15.0	120.67	0.04
100	0.2	0.69	15.0	132.69	0.05

CROZIER CONSULTING ENGINEERS

PROJECT: Long Point Road Development
PROJECT No.: 1988-5783
FILE: Rational Method - Peak Flow
DATE: 2021.02.19
DESIGN: JL'A

RATIONAL METHOD - LONG POINT ROAD

Rational Method Q=0.0028*C*i*A (cms)
Intensity i=A/ (Tc+b)^c (mm/hr)

Frequency -	TOWN OF THE BLUE MOUNTAINS SPECIFIED IDF	
Storm Return	Coef. A	Coef. B
2	22.3	-0.714
5	29.1	-0.724
10	33.6	-0.729
25	39.3	-0.734
50	43.5	-0.736
100	47.7	-0.738

Pre Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	1.52	0.25	15.0	60.00	0.06
5	1.52	0.25	15.0	79.39	0.08
10	1.52	0.25	15.0	92.31	0.10
25	1.52	0.28	15.0	108.72	0.13
50	1.52	0.30	15.0	120.67	0.15
100	1.52	0.31	15.0	132.69	0.18

Post-Development Peak Flows:

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	1.52	0.53	15.0	60.00	0.14
5	1.52	0.53	15.0	79.39	0.18
10	1.52	0.53	15.0	92.31	0.21
25	1.52	0.58	15.0	108.72	0.27
50	1.52	0.64	15.0	120.67	0.33
100	1.52	0.66	15.0	132.69	0.37

APPENDIX E

Operation & Maintenance Manuals

Stormceptor EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

02/19/2021

Province:	Ontario
City:	Town of The Blue Mountain
Nearest Rainfall Station:	OWEN SOUND MOE
NCDC Rainfall Station Id:	6132
Years of Rainfall Data:	40

Site Name:	Long Point Road

Drainage Area (ha):	0.48
Runoff Coefficient 'c':	0.37

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	6.11
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	540.00
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Long Point Road
Project Number:	1988-5783
Designer Name:	Rebecca Alexander
Designer Company:	C.F. Crozier & Associates
Designer Email:	ralexander@cfcrozier.ca
Designer Phone:	905-875-0026
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	86
EFO6	90
EFO8	92
EFO10	92
EFO12	93

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 86

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

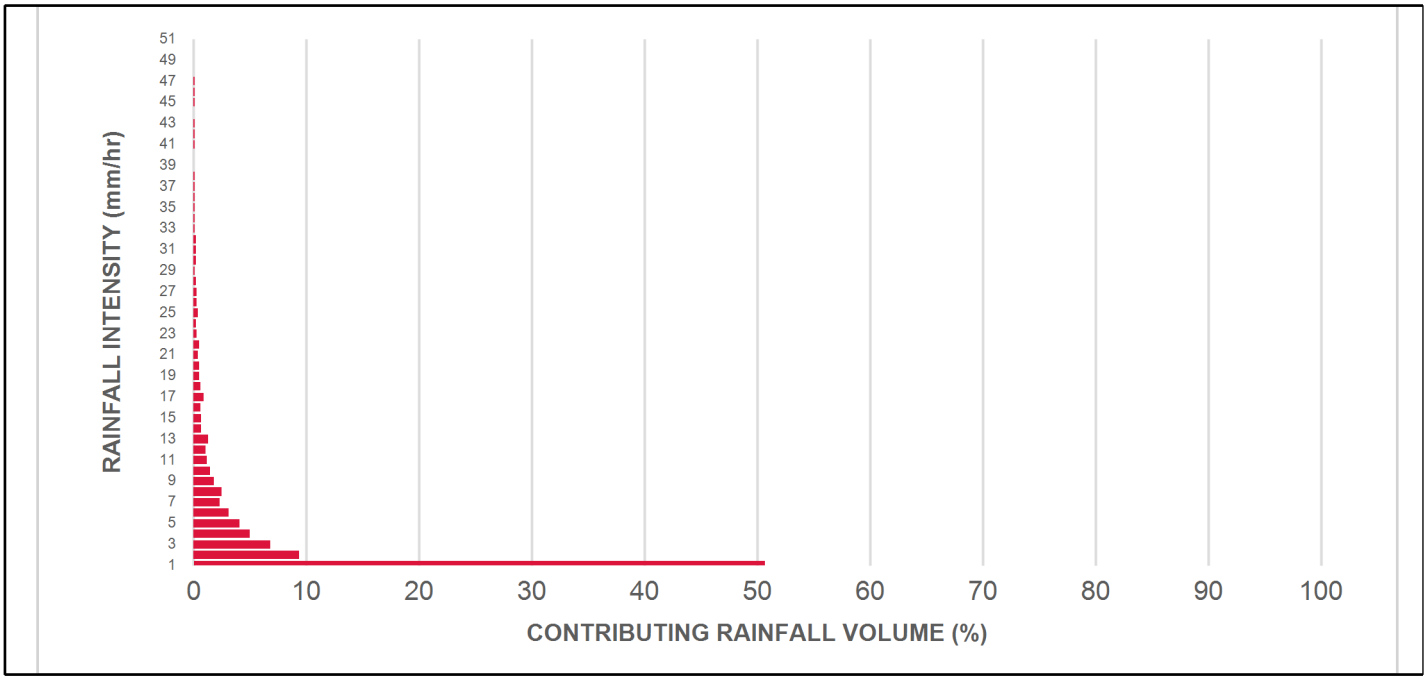
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

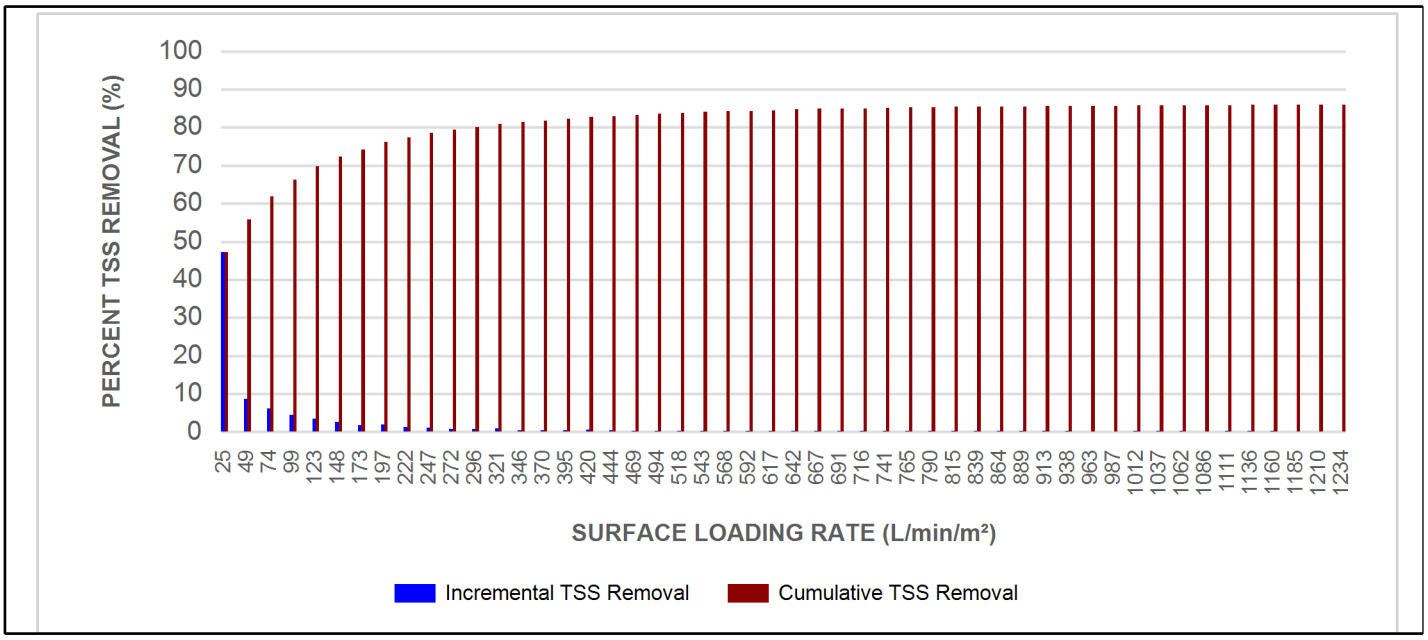
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	50.7	50.7	0.49	30.0	25.0	93	47.2	47.2
2	9.4	60.1	0.99	59.0	49.0	92	8.6	55.8
3	6.8	66.9	1.48	89.0	74.0	90	6.1	61.9
4	5.0	71.9	1.97	118.0	99.0	88	4.4	66.3
5	4.1	76.0	2.47	148.0	123.0	85	3.5	69.8
6	3.1	79.1	2.96	178.0	148.0	83	2.6	72.3
7	2.3	81.4	3.46	207.0	173.0	79	1.8	74.2
8	2.5	83.9	3.95	237.0	197.0	77	1.9	76.1
9	1.8	85.7	4.44	267.0	222.0	74	1.3	77.4
10	1.5	87.2	4.94	296.0	247.0	72	1.1	78.5
11	1.2	88.4	5.43	326.0	272.0	70	0.8	79.4
12	1.1	89.5	5.92	355.0	296.0	68	0.7	80.1
13	1.3	90.8	6.42	385.0	321.0	65	0.8	80.9
14	0.7	91.5	6.91	415.0	346.0	63	0.4	81.4
15	0.7	92.2	7.41	444.0	370.0	61	0.4	81.8
16	0.6	92.8	7.90	474.0	395.0	59	0.4	82.2
17	0.9	93.7	8.39	504.0	420.0	57	0.5	82.7
18	0.6	94.3	8.89	533.0	444.0	57	0.3	83.0
19	0.5	94.8	9.38	563.0	469.0	56	0.3	83.3
20	0.5	95.3	9.87	592.0	494.0	55	0.3	83.6
21	0.4	95.7	10.37	622.0	518.0	55	0.2	83.8
22	0.5	96.2	10.86	652.0	543.0	54	0.3	84.1
23	0.3	96.5	11.36	681.0	568.0	53	0.2	84.2
24	0.2	96.7	11.85	711.0	592.0	52	0.1	84.3
25	0.4	97.1	12.34	741.0	617.0	52	0.2	84.5

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	97.4	12.84	770.0	642.0	52	0.2	84.7
27	0.3	97.7	13.33	800.0	667.0	52	0.2	84.9
28	0.2	97.9	13.82	829.0	691.0	52	0.1	85.0
29	0.1	98.0	14.32	859.0	716.0	51	0.1	85.0
30	0.2	98.2	14.81	889.0	741.0	51	0.1	85.1
31	0.2	98.4	15.31	918.0	765.0	51	0.1	85.2
32	0.2	98.6	15.80	948.0	790.0	51	0.1	85.3
33	0.1	98.7	16.29	978.0	815.0	51	0.1	85.4
34	0.1	98.8	16.79	1007.0	839.0	51	0.1	85.4
35	0.1	98.9	17.28	1037.0	864.0	51	0.1	85.5
36	0.1	99.0	17.77	1066.0	889.0	51	0.1	85.5
37	0.1	99.1	18.27	1096.0	913.0	50	0.1	85.6
38	0.1	99.2	18.76	1126.0	938.0	50	0.1	85.6
39	0.0	99.2	19.26	1155.0	963.0	50	0.0	85.6
40	0.0	99.2	19.75	1185.0	987.0	50	0.0	85.6
41	0.1	99.3	20.24	1215.0	1012.0	50	0.1	85.7
42	0.1	99.4	20.74	1244.0	1037.0	50	0.1	85.7
43	0.1	99.5	21.23	1274.0	1062.0	49	0.0	85.8
44	0.0	99.5	21.72	1303.0	1086.0	49	0.0	85.8
45	0.1	99.6	22.22	1333.0	1111.0	49	0.0	85.8
46	0.1	99.7	22.71	1363.0	1136.0	49	0.0	85.9
47	0.1	99.8	23.21	1392.0	1160.0	48	0.0	85.9
48	0.0	99.8	23.70	1422.0	1185.0	48	0.0	85.9
49	0.0	99.8	24.19	1452.0	1210.0	48	0.0	85.9
50	0.0	99.8	24.69	1481.0	1234.0	48	0.0	85.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

RAINFALL DATA FROM OWEN SOUND MOE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

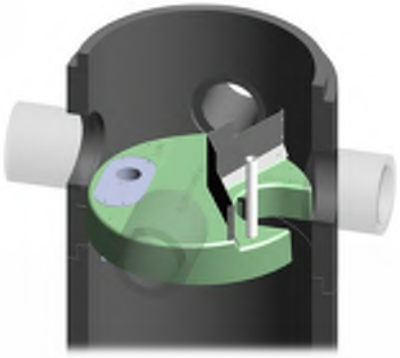
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

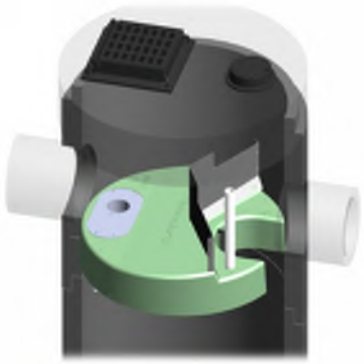
DESIGN FLEXIBILITY

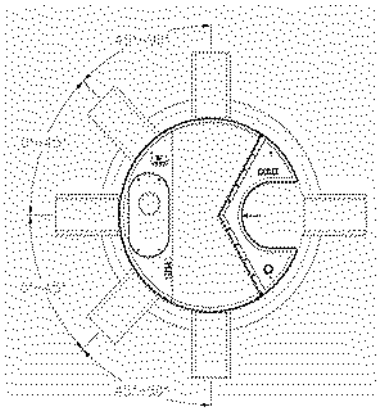
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

Owner's Manual

Stormceptor is protected by one or more of the following patents:

Canadian Patent No. 2,137,942
Canadian Patent No. 2,175,277
Canadian Patent No. 2,180,305
Canadian Patent No. 2,180,338
Canadian Patent No. 2,206,338
Canadian Patent No. 2,327,768
U.S. Patent No. 5,753,115
U.S. Patent No. 5,849,181
U.S. Patent No. 6,068,765
U.S. Patent No. 6,371,690
U.S. Patent No. 7,582,216
U.S. Patent No. 7,666,303
Australia Patent No. 693.164
Australia Patent No. 707,133
Australia Patent No. 729,096
Australia Patent No. 779,401
Australia Patent No. 2008,279,378
Australia Patent No. 2008,288,900
Indonesia Patent No. 0007058
Japan Patent No. 3581233
Japan Patent No. 9-11476
Korean Patent No. 0519212
Malaysia Patent No. 118987
New Zealand Patent No. 314,646
New Zealand Patent No. 583,008
New Zealand Patent No. 583,583
South African Patent No. 2010/00682
South African Patent No. 2010/01796
Other Patents Pending

Table of Contents

Congratulations!

Your selection of a Stormceptor® means that you have chosen the most recognized and efficient stormwater oil/sediment separator available for protecting the environment. Stormceptor is a pollution control device often referred to as a "Hydrodynamic Separator (HDS)" or an "Oil Grit Separator (OGS)", engineered to remove and retain pollutants from stormwater runoff to protect our lakes, rivers and streams from the harmful effects of non-point source pollution.

1 – Stormceptor Overview

Stormceptor is a patented stormwater quality structure most often utilized as a treatment component of the underground storm drain network for stormwater pollution prevention. Stormceptor is designed to remove sediment, total suspended solids (TSS), other pollutants attached to sediment, hydrocarbons and free oil from stormwater runoff. Collectively the Stormceptor provides spill protection and prevents non-point source pollution from entering downstream waterways.

Key benefits of Stormceptor include:

- Removes sediment, suspended solids, debris, nutrients, heavy metals, and hydrocarbons (oil and grease) from runoff and snowmelt.
- Will not scour or re-suspend trapped pollutants.
- Provides sediment and oil storage.
- Provides spill control for accidents, commercial and industrial developments.
- Easy to inspect and maintain (vacuum truck).
- "STORMCEPTOR" is *clearly* marked on the access cover (excluding inlet designs).
- Relatively small footprint.
- 3rd Party tested and independently verified.
- Dedicated team of experts available to provide support.

Model Types:

- STC (Standard)
- STF (Fiberglass)
- EOS (Extended Oil Storage)
- OSR (Oil and Sand Removal)
- MAX (Custom designed unit, specific to site)

Configuration Types:

- Inlet unit (accommodates inlet flow entry, and multi-pipe entry)
- In-Line (accommodates multi-pipe entry)
- Submerged Unit (accommodates the site's tailwater conditions)
- Series Unit (combines treatment in two systems)

Please Maintain Your Stormceptor

To ensure long-term environmental protection through continued performance as originally designed for your site, **Stormceptor must be maintained**, as any stormwater treatment practice does. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided within this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck.

If you require information about Stormceptor, or assistance in finding resources to facilitate inspections or maintenance of your Stormceptor please call your local Stormceptor Licensee or Imbrium® Systems.

2 – Stormceptor Operation & Components

Stormceptor is a flexibly designed underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention using patented flow separation technology.

Stormceptor creates a non-turbulent treatment environment below the insert platform within the system. The insert diverts water into the lower chamber, allowing free oils and debris to rise, and sediment to settle under relatively low velocity conditions. These pollutants are trapped and stored below the insert and protected from large runoff events for later removal during the maintenance procedure.

With thousands of units operating worldwide, Stormceptor delivers reliable protection every day, in every storm. The patented Stormceptor design prohibits the scour and release of captured pollutants, ensuring superior water quality treatment and protection during even the most extreme storm events. Stormceptor's proven performance is backed by the longest record of lab and field verification in the industry.

Stormceptor Schematic and Component Functions

Below are schematics of two common Stormceptor configurations with key components identified and their functions briefly described.

Figure 1.

Inline Stormceptor

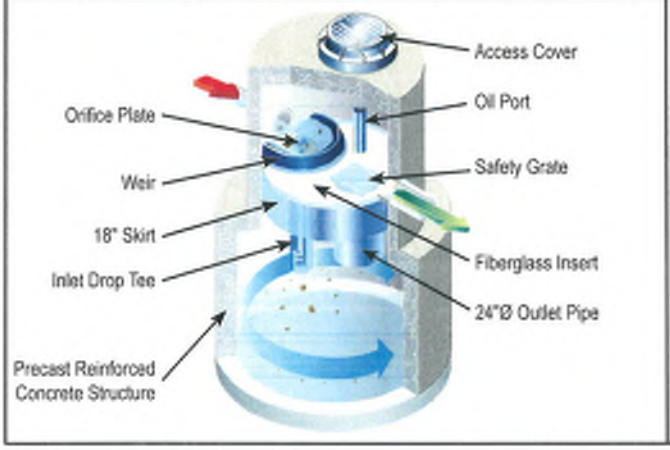
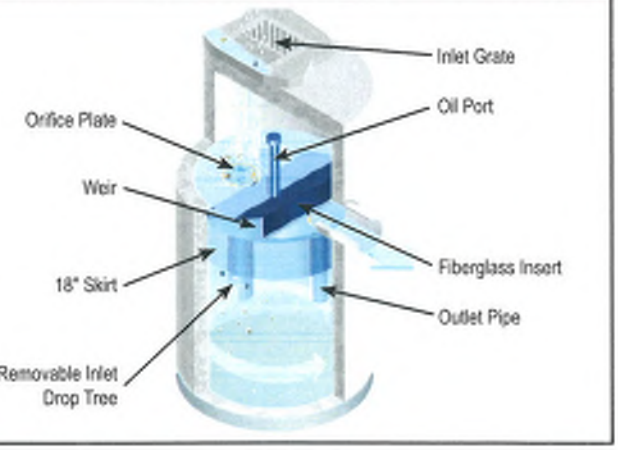


Figure 2.

Inlet Stormceptor



- **Manhole access cover** – provides access to the subsurface components
- **Precast reinforced concrete structure** – provides the vessel's watertight structural support
- **Fiberglass insert** – separates vessel into upper and lower chambers
- **Weir** – directs incoming stormwater and oil spills into the lower chamber
- **Orifice plate** – prevents scour of accumulated pollutants
- **Inlet drop tee** – conveys stormwater into the lower chamber
- **Fiberglass skirt** – provides double-wall containment of hydrocarbons
- **Outlet riser pipe** – conveys treated water to the upper chamber; primary vacuum line access port for sediment removal
- **Oil inspection port** – primary access for measuring oil depth and oil removal
- **Safety grate** – safety measure to cover riser pipe in the event of manned entry into vessel

3 – Stormceptor Identification

Stormceptor is available in both precast concrete and fiberglass vessels, with precast concrete often being the dominant material of construction.

In the Stormceptor, a patented, engineered fiberglass insert separates the structure into an upper chamber and lower chamber. The lower chamber will remain full of water, as this is where the pollutants are sequestered for later removal. Multiple Stormceptor model (STC, OSR, EOS, MAX and STF) configurations exist, each to be inspected and maintained in a similar fashion.

Each unit is easily identifiable as a Stormceptor by the trade name "Stormceptor" embossed on each access cover at the surface. To determine the location of "inlet" Stormceptor units with horizontal catch basin inlet, look down into the grate as the Stormceptor insert will be visible. The name "Stormceptor" is not embossed on inlet models due to the variability of inlet grates used/ approved across North America.

Once the location of the Stormceptor is determined, the model number may be identified by comparing the measured depth from the fiberglass insert level at the outlet pipe's invert (water level) to the bottom of the tank using **Table 1**.

In addition, starting in 1996 a metal serial number tag containing the model number has been affixed to the inside of the unit, on the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the unit using depth measurements, please contact your local Stormceptor Representative for assistance.

Sizes/Models

Typical general dimensions and capacities of the standard precast STC, EOS & OSR Stormceptor models in both USA and Canada/International (excluding South East Asia and Australia) are provided in **Tables 1 and 2**. Typical rim to invert measurements are provided later in this document. The total depth for cleaning will be the sum of the depth from outlet pipe invert (generally the water level) to rim (grade) and the depth from outlet pipe invert to the precast bottom of the unit. Note that depths and capacities may vary slightly between regions.

Table 1A. (US) Stormceptor Dimensions – Insert to Base of Structure

STC Model	Insert to Base (in.)
450	60
900	55
1200	71
1800	105
2400	94
3600	134
4800	128
6000	150
7200	134
11000*	128
13000*	150
16000*	134

EOS Model	Insert to Base (in.)
4-175	60
9-365	55
12-590	71
18-1000	105
24-1400	94
36-1700	134
48-2000	128
60-2500	150
72-3400	134
110-5000*	128
130-6000*	150
160-7800*	134

OSR Model	Insert to Base (in.)
65	60
140	55
250	94
390	128
560	134
780*	128
1125*	134

Typical STFm (in.)
1.5 (60)
1.5 (61)
1.8 (73)
2.9 (115)
2.3 (89)
3.2 (127)
2.9 (113)
3.5 (138)
3.3 (128)

Notes:

1. *Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 1B. (CA & Int'l) Stormceptor Dimensions – Insert to Base of Structure

STC Model	Insert to Base (m)
300	1.5
750	1.5
1000	1.8
1500	2.8
2000	2.8
3000	3.7
4000	3.4
5000	4.0
6000	3.7
9000*	3.4
11000*	4.0
14000*	3.7

EOS Model	Insert to Base (m)
300	1.5
750	1.5
1000	1.8
2000	2.8
3000	3.7
4000	3.4
5000	4.0
6000	3.7
9000*	3.4
10000*	4.0
14000*	3.7

OSR Model	Insert to Base (m)
300	1.7
750	1.6
2000	2.6
4000	3.6
6000	3.7
9000*	3.6
14000*	3.7

Typical STF m (in.)
1.5 (60)
1.5 (61)
1.8 (73)
2.9 (115)
2.3 (89)
3.2 (127)
2.9 (113)
3.5 (138)
3.3 (128)

Notes:

1. *Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 2A. (US) Storage Capacities

STC Model	Hydrocarbon Storage Capacity gal	Sediment Capacity ft³	**EOS Model**	Hydrocarbon Storage Capacity gal	**OSR Model**	Hydrocarbon Storage Capacity gal	Sediment Capacity ft³
450	86	46	**4-175**	175	**065**	115	46
900	251	89	**9-365**	365	**140**	233	58
1200	251	127	**12-590**	591			
1800	251	207	**18-1000**	1198			
2400	840	205	**24-1400**	1457	**250**	792	156
3600	840	373	**36-1700**	1773			
4800	909	543	**48-2000**	2005	**390**	1233	465
6000	909	687	**60-2500**	2514			
7200	1059	839	**72-3400**	3418	**560**	1384	690
11000*	2797	1089	**110-5000***	5023	**780***	2430	930
13000*	2797	1374	**130-6000***	6041			
16000*	3055	1677	**160-7800***	7850	**1125***	2689	1378

Notes:

1. *Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 2B. (CA & Int'l) Storage Capacities

STC Model	Hydrocarbon Storage Capacity L	Sediment Capacity L	EOS Model	Hydrocarbon Storage Capacity L	OSR Model	Hydrocarbon Storage Capacity L	Sediment Capacity L
300	300	1450	**300**	662	**300**	300	1500
750	915	3000	**750**	1380	**750**	900	3000
1000	915	3800	**1000**	2235			
1500	915	6205					
2000	2890	7700	**2000**	5515	**2000**	2790	7700
3000	2890	11965	**3000**	6710			
4000	3360	16490	**4000**	7585	**4000**	4700	22200
5000	3360	20940	**5000**	9515			
6000	3930	26945	**6000**	12940	**6000**	5200	26900
9000*	10555	32980	**9000***	19010	**9000***	9300	33000
11000*	10555	37415	**10000***	22865			
14000*	11700	53890	**14000***	29715	**14000***	10500	53900

Notes:

1. *Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.*

**Consist of two chamber structures in series.*

4 – Stormceptor Inspection & Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and is required to insure proper functioning of the Stormceptor. Both inspection and maintenance of the Stormceptor is easily performed from the surface. Stormceptor's patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

When is maintenance cleaning needed?

- For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit's total storage capacity (see **Table 2**). The frequency should be adjusted based on historical inspection results due to variable site pollutant loading.

- Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

What conditions can compromise Stormceptor performance?

- If construction sediment and debris is not removed prior to activating the Stormceptor unit, maintenance frequency may be reduced.
- If the system is not maintained regularly and fills with sediment and debris beyond the capacity as indicated in **Table 2**, pollutant removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur for the Stormceptor and removal efficiency of sediment and hydrocarbons may be reduced.

What training is required?

The Stormceptor is to be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. For typical inspection and maintenance activities, no specific supplemental training is required for the Stormceptor. Information provided within this Manual (provided to the site owner) contains sufficient guidance to maintain the system properly.

In unusual circumstances, such as if a damaged component needs replacement or some other condition requires manned entry into the vessel, confined space entry procedures must be followed. Only professional maintenance service providers trained in these procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

What equipment is typically required for inspection?

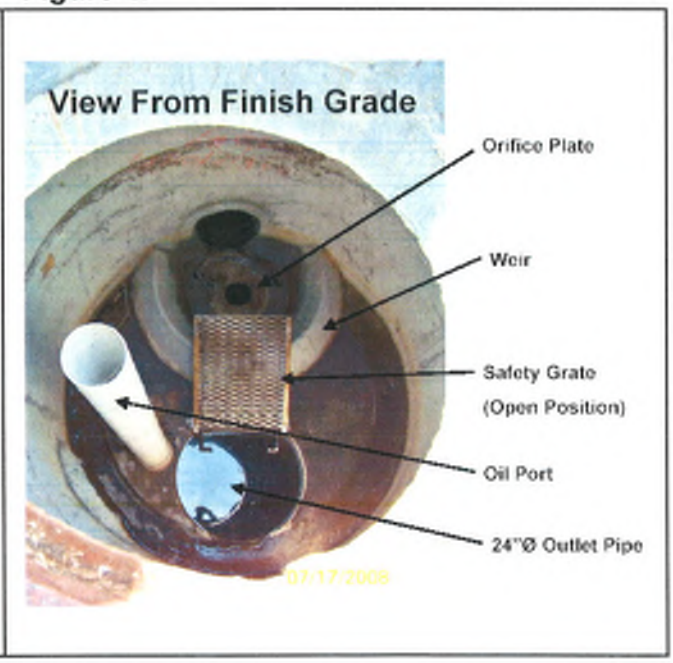
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

Recommended Stormceptor Inspection Procedure:

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Oil depth is measured through the oil inspection port, either a 4-inch (100 mm) or 6-inch (150 mm) diameter port.
- Sediment depth can be measured through the oil inspection port or the 24-inch (610 mm) diameter outlet riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

Figure 3.

Figure 4.



What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required

Recommended Stormceptor Maintenance Procedure

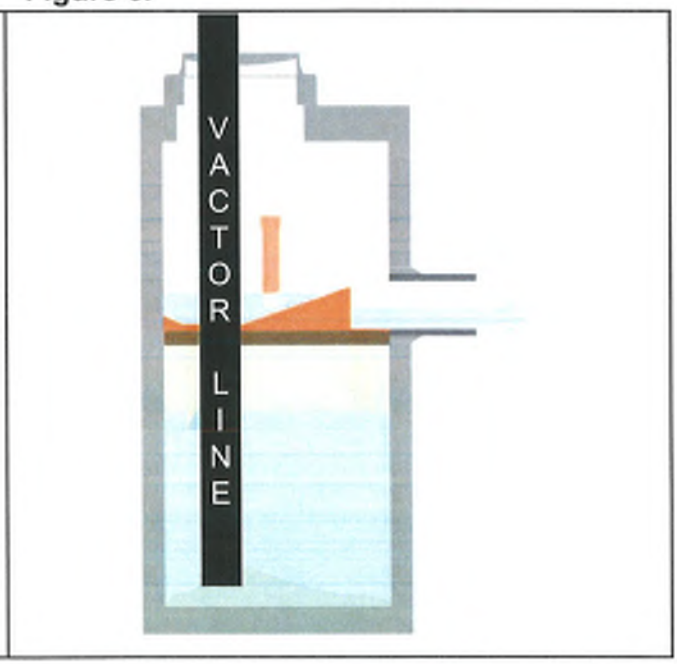
Maintenance of Stormceptor is performed using a vacuum truck.

No entry into the unit is required for maintenance. ***DO NOT ENTER THE STORMCEPTOR CHAMBER*** unless you have the proper personal safety equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (e.g. 29 CFR 1910.146 or Canada Occupational Safety and Health Regulations – SOR/86-304). Without the proper equipment, training and permit, entry into confined spaces can result in serious bodily harm and potentially death. Consult local, provincial, and/or state regulations to determine the requirements for confined space entry. Be aware, and take precaution that the Stormceptor fiberglass insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower chamber.

- Ideally maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is to be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
    - For 6-ft (1800 mm) diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch (610 mm) outlet riser pipe.
    - For 4-ft (1200 mm) diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch (305 mm) drop tee hole.

Figure 5.

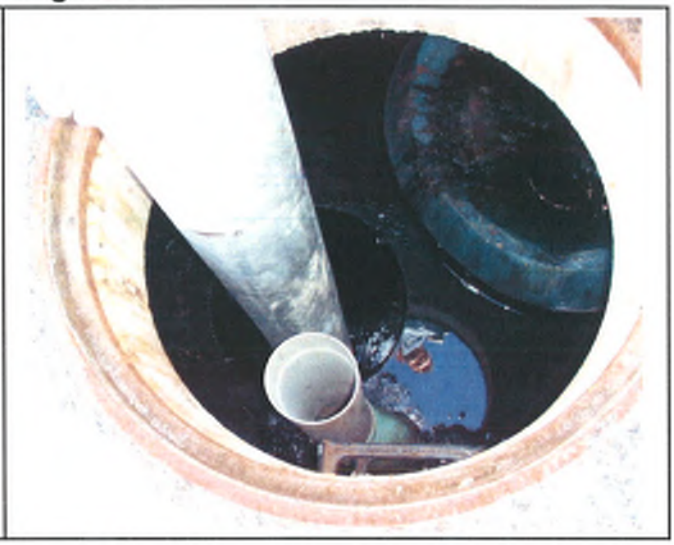
Figure 6.



- Using the vacuum hose, decant the water from the lower chamber into a separate containment tank or to the sanitary sewer, if permitted by the local regulating authority.
- Remove the sediment sludge from the bottom of the unit using the vacuum hose. For large Stormceptor units, a flexible hose is often connected to the primary vacuum line for ease of movement in the lower chamber.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using safe and proper confined space entry procedures.

Figure 7.

Figure 8.



A maintenance worker stationed at the above ground surface uses a vacuum hose to evacuate water, sediment, and debris from the system.

What is required for proper disposal?

The requirements for the disposal of material removed from Stormceptor units are similar to that of any other stormwater treatment Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. This could be site and pollutant dependent. In some cases, approval from the disposal facility operator/agency may be required.

What about oil spills?

Stormceptor is often implemented in areas where there is high potential for oil, fuel or other hydrocarbon or chemical spills. Stormceptor units should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a hydrocarbon rainbow or sheen can be seen at

very small oil concentrations (< 10 ppm). Stormceptor is effective at removing 95% of free oil, and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

What factors affect the costs involved with inspection/maintenance?

The Vacuum Service Industry for stormwater drainage and sewer systems is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean Stormceptor units will vary. Inspection and maintenance costs are most often based on unit size, the number of units on a site, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

What factors predict maintenance frequency?

Maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, site activity and use, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high from an unstable site or sediment loads transported from upstream catchments, maintenance may be required semi-annually. Conversely once a site has stabilized, maintenance may be required less frequently (for example: two to seven year, site and situation dependent). Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in **Table 3** based on the unit size.

Table 3A. (US) Recommended Sediment Depths Indicating Maintenance

STC Model	Maintenance Sediment depth (in)	EOS Model	Maintenance Sediment depth (in)	Oil Storage Depth (in)	OSR Model	Maintenance Sediment depth (in)
450	8	**4-175**	9	24	**065**	8
900	8	**9-365**	9	24	**140**	8
1200	10	**12-590**	11	39		
1800	15					
2400	12	**24-1400**	14	68	**250**	12
3600	17	**36-1700**	19	79		
4800	15	**48-2000**	16	68	**390**	17
6000	18	**60-2500**	20	79		
7200	15	**72-3400**	17	79	**560**	17
11000*	17	**110-5000***	16	68	**780***	17
13000*	20	**130-6000***	20	79		
16000*	17	**160-7800***	17	79	**1125***	17

Note:

1. *The values above are for typical standard units.*

**Per structure.*

Table 3B. (CA & Int'l) Recommended Sediment Depths Indicating Maintenance

STC Model	Maintenance Sediment depth (mm)	EOS Model	Maintenance Sediment depth (mm)	Oil Storage Depth (mm)	OSR Model	Maintenance Sediment depth (mm)
300	225	**300**	225	610	**300**	200
750	230	**750**	230	610	**750**	200
1000	275	**1000**	275	990		
1500	400					
2000	350	**2000**	350	1727	**2000**	300
3000	475	**3000**	475	2006		
4000	400	**4000**	400	1727	**4000**	375
5000	500	**5000**	500	2006		
6000	425	**6000**	425	2006	**6000**	375
9000*	400	**9000***	400	1727	**9000***	425
11000*	500	**10000***	500	2006		
14000*	425	**14000***	425	2006	**14000***	425

Note:

1. *The values above are for typical standard units.*

**Per structure.*

Replacement parts

Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. Therefore, inspection and maintenance activities are generally focused on pollutant removal. However, if replacements parts are necessary, they may be purchased by contacting your local Stormceptor Representative, or Imbrium Systems.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor's long and effective service life.

Stormceptor Inspection and Maintenance Log

Stormceptor Model No: _____

Allowable Sediment Depth: _____

Serial Number: _____

Installation Date: _____

Location Description of Unit: _____

Other Comments: _____

Contact Information

Questions regarding the Stormceptor can be addressed by contacting your area Stormceptor Licensee, Imbrium Systems, or visit our website at www.stormceptor.com.

Stormceptor Licensees:

CANADA

Lafarge Canada Inc.	
www.lafargepipe.com	
403-292-9502 / 1-888-422-4022	Calgary, AB
780-468-5910	Edmonton, AB
204-958-6348	Winnipeg, MB, NW. ON, SK
Langley Concrete Group	
www.langleyconcretegroup.com	
604-502-5236	BC
Hanson Pipe & Precast Inc.	
www.hansonpipeandprecast.com	
519-622-7574 / 1-888-888-3222	ON
Lécuyer et Fils Ltée.	
www.lecuyerbeton.com	
450-454-3928 / 1-800-561-0970	QC
Strescon Limited	
www.strescon.com	
902-494-7400	NS, NF
506-633-8877	NB, PE

UNITED STATES

Rinker Materials
www.rinkerstormceptor.com
1-800-909-7763

AUSTRALIA & SOUTHEAST ASIA, including New Zealand & Japan

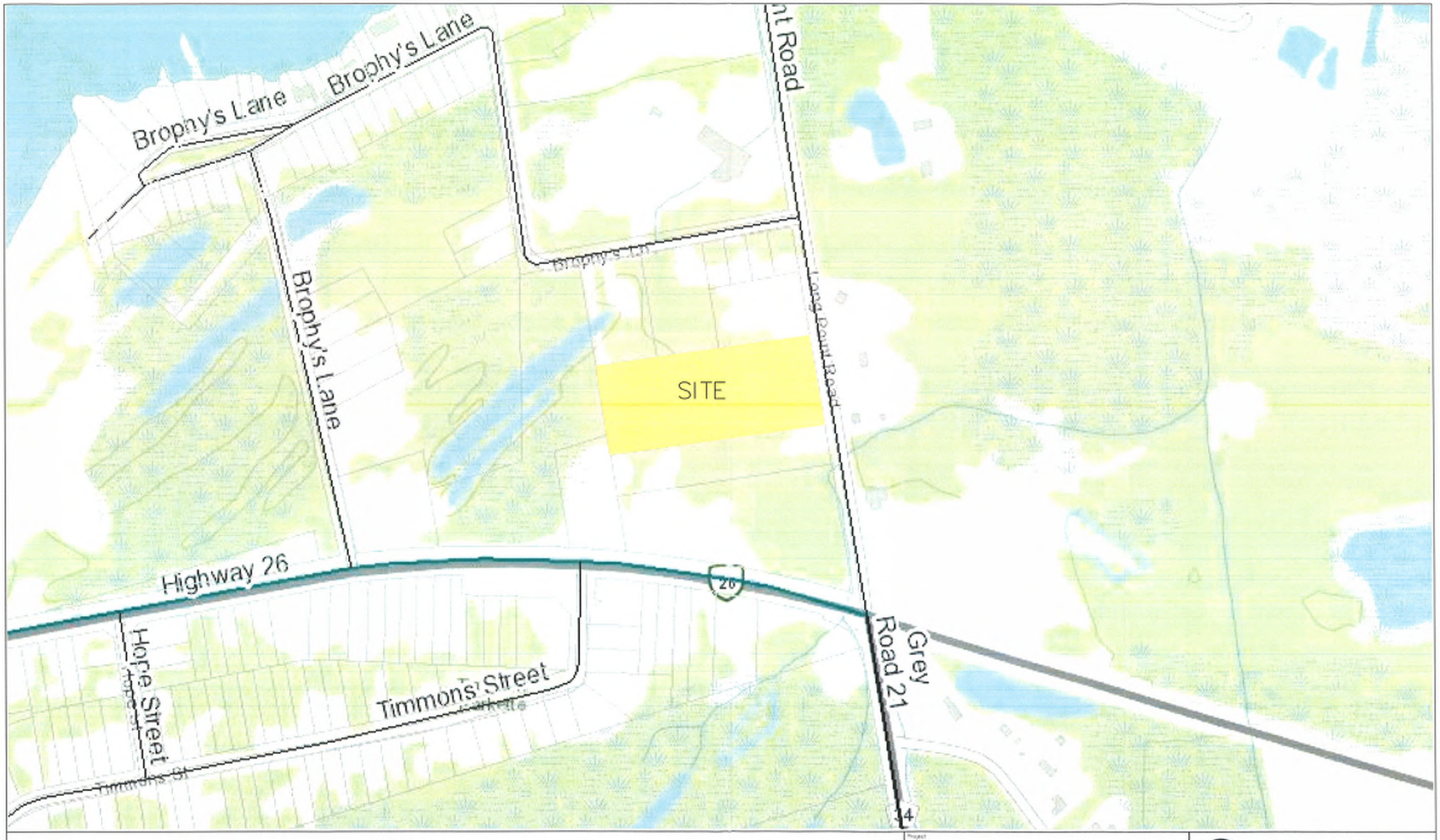
Humes Water Solutions
www.humes.com.au
+61 7 3364 2894

Imbrium Systems Inc. & Imbrium Systems LLC

Canada	1-416-960-9900 / 1-800-565-4801
United States	1-301-279-8827 / 1-888-279-8826
International	+1-416-960-9900 / +1-301-279-8827
Email	info@imbriumsystems.com

www.imbriumsystems.com
www.stormceptor.com

FIGURES



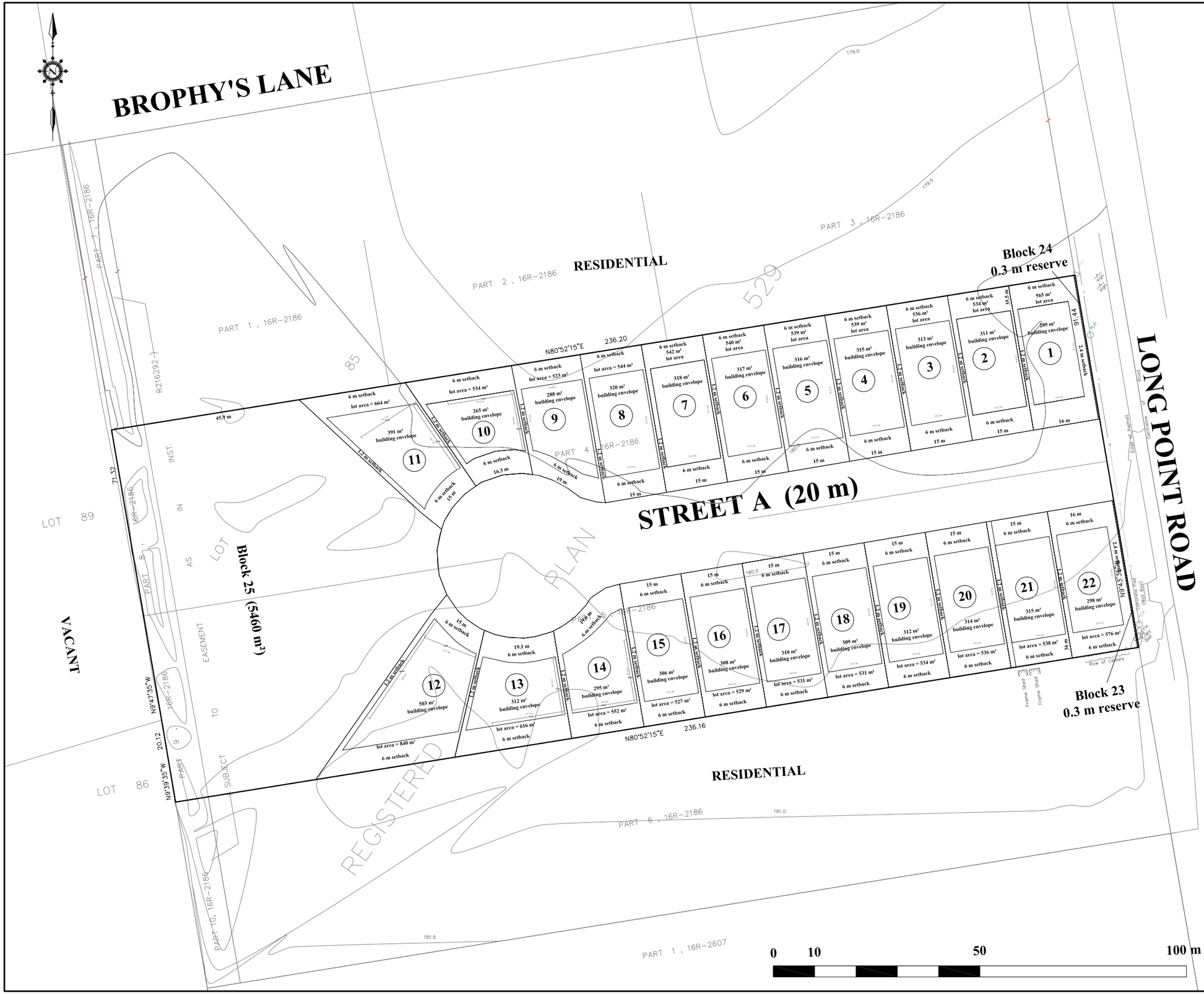
LONG POINT ROAD

SITE LOCATION

CROZIER & ASSOCIATES Consulting Engineers

1988-5783

FIGURE 1



Draft Plan of Subdivision
Long Point Road

PART OF LOT 85
REGISTERED PLAN 529

TOWN OF THE BLUE MOUNTAINS
(Formerly Township of Collingwood)
COUNTY OF GREY

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

OCTOBER 29, 2018 _____
PAUL R. THOMSEN O.L.S.
ZUBEK, EMO, PATTEN & THOMSEN LTD

OWNER'S CERTIFICATE

PASCUZZO PLANNING INC. WAS AUTHORIZED BY TONY LESIAK AND ISABELA LEHMANN TO SUBMIT THE PROPOSED PLAN OF SUBDIVISION TO THE COUNTY OF GREY FOR APPROVAL.

OCTOBER 29, 2018 _____
ANDREW PASCUZZO MCIP RPP
PASCUZZO PLANNING INC.

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

(a) AS SHOWN ON DRAFT PLAN,
(b) AS SHOWN ON DRAFT PLAN,
(c) AS SHOWN ON DRAFT AND KEY PLAN,
(d) THE LAND IS TO BE USED ACCORDING TO THE SCHEDULE OF LAND USE,
(e) AS SHOWN ON DRAFT PLAN,
(f) AS SHOWN ON DRAFT PLAN,
(g) AS SHOWN ON DRAFT PLAN,
(h) MUNICIPAL WATER SUPPLY,
(i) SAND,
(j) AS SHOWN ON DRAFT PLAN,
(k) MUNICIPAL SANITARY SEWER,
(l) EASEMENT -MUNICIPAL DRAIN

SCHEDULE OF LAND USE

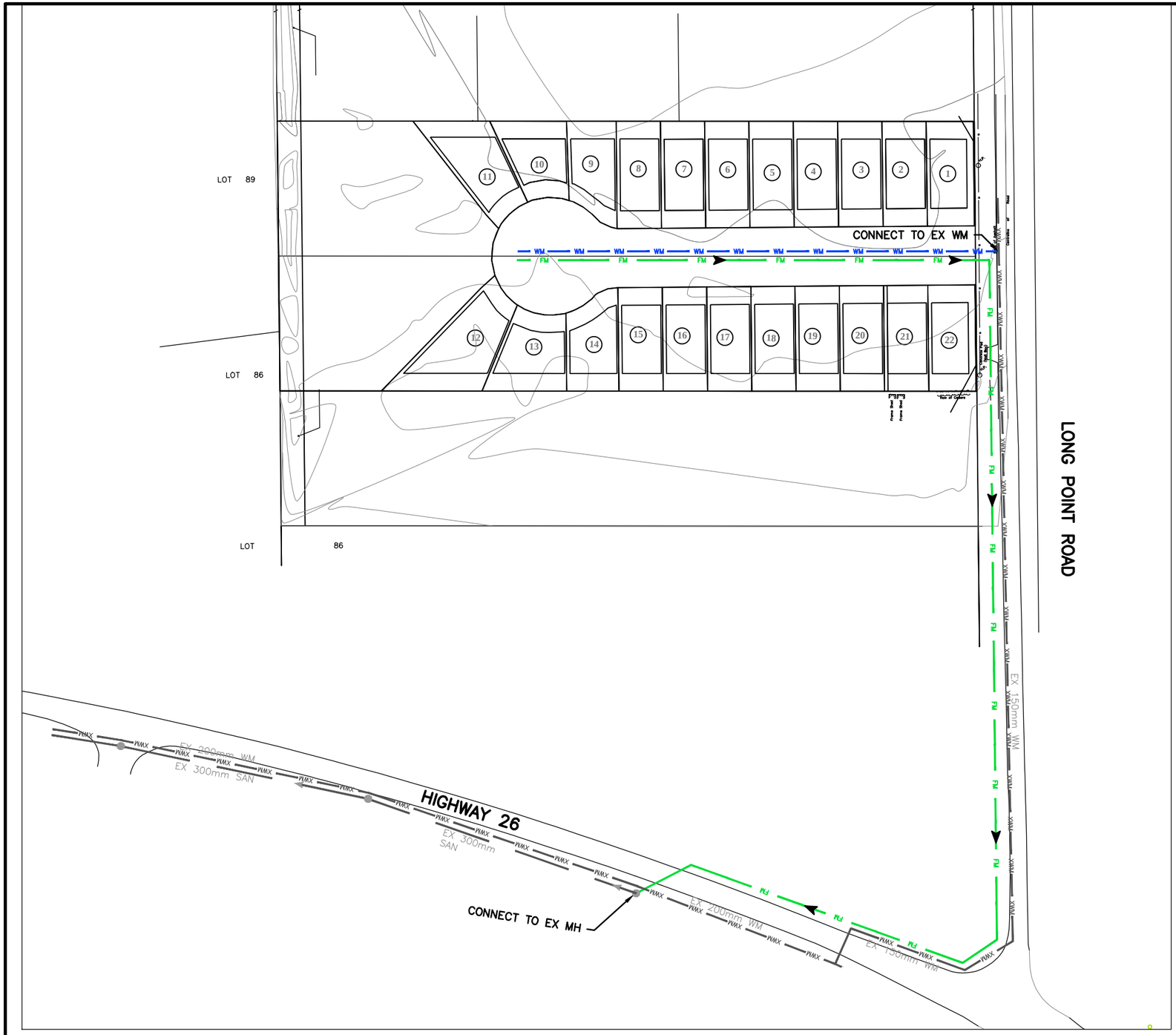
	UNITS	AREA
SINGLE-FAMILY RESIDENTIAL (LOTS 1-22)	22	1.23 ha.
1 FOOT RESERVES (BLOCK 23 and 24)		0.002 ha.
OPEN SPACE (BLOCK 25)		0.55 ha.
ROAD (STREET A)		0.38 ha.
TOTAL	22	2.16 ha.

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

PROJECT: 892-17	DRAWN: AP	JAN 2021

DWG: 892-17-DP8+

PASCUZZO PLANNING INC.



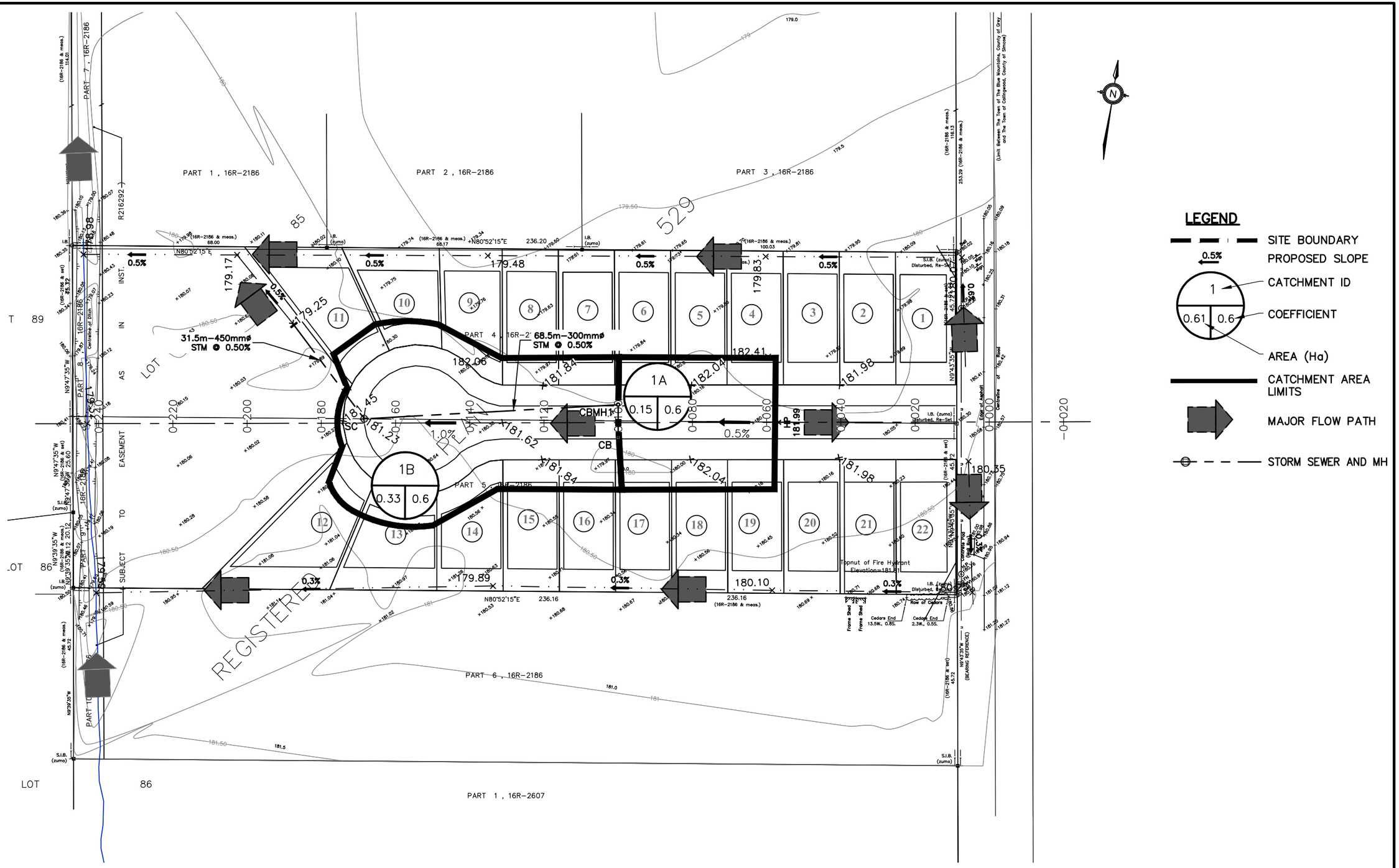
Project: LONG POINT ROAD SUBDIVISION

Drawing: WATERMAIN AND FORCEMAIN

CROZIER CONSULTING ENGINEERS
8 Market Street
Suite 600
Toronto, ON M5E 1M6
416-477-3392 T
www.cfcrozier.ca

Drawn By	Design By	Project
N.L.	M.V.R.	1988-5783
Scale	Date	Check By	Drawing
1:1250	02/19/2021	J.L.	FIG 3

J:\1900\1988-Terrabrook Homes\5783-Longpoint Road\CAD\Civil_Sheets\5783-Fig 3.dwg, Fig 3, 2021-02-19 4:13:52 PM, mrichardson



LEGEND

- SITE BOUNDARY
- 0.5% PROPOSED SLOPE
- 1 / 0.61 | 0.6 — CATCHMENT ID / COEFFICIENT / AREA (Ha)
- CATCHMENT AREA LIMITS
- MAJOR FLOW PATH
- STORM SEWER AND MH

Project	LONG POINT ROAD SUBDIVISION
Drawing	GRADING AND STORM SEWER

CROZIER CONSULTING ENGINEERS
8 Market Street
Suite 600
Toronto, ON M5E 1M6
416-477-3392 T
www.cfcrozier.ca

Drawn By	M.V.R.	Design By	M.V.R.	Project	1988-5783
Scale	1:1000	Date	02/19/2021	Check By	K.V./B.H	Drawing	FIG 4

J:\1900\1988-Terrabrook Homes\5783-Longpoint Road\CAD\Civil_Sheets\5783-Fig 4.dwg, Fig 4, 2021-02-19 5:16:27 PM, mrichardson