



ENGINEERING
CONSULTANTS LTD

**FUNCTIONAL SERVICING AND STORMWATER
MANAGEMENT REPORT**

**345 and 355 Balmy Beach Road
Plan 447, Lots 51, 52 and 52A
Township of Georgian Bluffs
Dr Mehran Shahabi**

August, 2020

19-001

Prepared for:

Dr Mehran Shahabi
Township of Georgian Bluffs

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Functional Servicing and Stormwater Management Report
345 and 355 Balmy Beach Road, Plan 447 Lots 51, 52 & 52a
Dr. Mehran Shahabi
Georgian Bluffs

August, 2020

19-001

1.0 INTRODUCTION

The subject property is located along the shores of Georgian Bay, on Balmy Beach Road in the Township of Georgian Bluffs. The existing property consists of 3 lots. The northern end of the subject lands consists of a large lot and a small wedge-shaped triangle lot. The street number of the northern and triangle lot is 355 Balmy Beach Road and the legal description is Plan 447 Lot 52 Lot 52A. The southern lot is located at 345 Balmy Beach Road with a legal description of Plan 447 Part Lot 51.

The total property contains historic garages, cottages and various other buildings. These buildings are currently in various states of condition with some having recent renovations and others appear to have been abandoned for a considerable amount of time. The subject lands are adjacent to a municipally owned shore road allowance along Georgian Bay. The shore road allowance contains various structures including a boathouse, tennis court, shuffleboard pad and concrete retaining walls.

Drawing 19001-02 shows the overall, existing condition of the property and proposed removals.

This Functional Servicing Report (FSR) is provided for the proposed subdivision. The proposed subdivision will consist of 6 new lots. The lots are not of uniform size or frontage to allow accommodation for existing conditions, including the 15 m flood allowance from the 100-year flood level of 177.9 m asl. The proposed lots are shown on Drawing 19001-03.

The existing topography of the subject lands and surrounding area is relatively flat on the east side of Balmy Beach Road, sloping from the edge of the road easterly towards Georgian Bay. The northern portion of the subject lands contains a low area towards the eastern property boundary. The low area at the north end increases the non-developable area as per Grey Sauble Conservation Area (GSCA) 15 m allowance requirements for the 100 year flood level.

2.0 SANITARY SERVICING

There are no communal sanitary sewers present. Therefore, each lot is to be serviced by a private septic system. During the field study, soil and subgrade conditions were assessed using test pits. The assessment for sanitary servicing using private septic systems is presented in the following subsections.

As per the following sections, potable water service will be provided by extending the adjacent East Linton water distribution system. The end of the existing, 200 mm dia. watermain is at the immediate north end of the subdivision.

2.1 Groundwater

As per previous sections, the lands slope down to Georgian Bay. At the Georgian Bay shoreline is a 66' wide shore road allowance owned by the Township. The road allowance is undevelopable for dwellings due to GSCA flood allowance requirements from the 100 year flood level.

Therefore, no nitrate calculations for the proposed septic systems were performed due to the lack of downstream users. The bottom of the test pit located closest to Georgian Bay (TP#3) revealed some water seeping through the clay soil in the lower portion of the test pit. Water was visible at 1.5 meters below ground surface (mbgs). The remaining test pits contained dry soil and did not reveal any water.

2.2 Surface Water

Provincial policies do not include limits on surface water nitrate concentrations. As such, there are no required surface water quality requirements for nitrates at this location.

The area of Georgian Bay immediately offshore, as well as the lots themselves, are located within an intake protection zone (IPZ-1) for the Georgian Bluff East Linton water system intake. This intake protection zone has requirements to protect the drinking water.

As per the approved Source Water Protection Plan for the Grey Sauble and Saugeen River watershed, there are no identified significant threats related to the construction of new septic systems within an IPZ. Therefore, individual septic systems are not prohibited in this IPZ.

2.2 Septic Sizing

To determine the percolation "T" time of the existing soil, test pits were dug at select locations within the overall property. Four test pits were completed on July 19, 2019 and two samples were submitted to a recognized laboratory for grain size analysis. The samples submitted consisted of one sample representative of the sand and gravel layer and one sample representative of the clay layer. The test pit locations are shown on Drawing 19001-04.

Each test pit was completed to an approximate depth of 1.5 mbgs to 1.7 mbgs. Water was encountered in one test pit (TP#3). It was present in a lower clay layer so only a small amount of water was present in the pit before the pit was backfilled. Each test pit encountered a clay type layer at the bottom. In between the topsoil and the clay type layer is a mixture of gravel and sand. The gravel and sand layer varied in thickness from 0.8 m to 1.5 m.

The results of the sieve analysis revealed an estimated “T” time of 2 to 3 minutes/cm for the gravel and sand layer. The estimated “T” time for of the clay type layer was 40-50 minutes/cm. Based on the estimated “T” time of the clay layer, the clay layer would not be suitable for a septic system.

OBC Section 8.7.3.2. specifies that the bottom of absorption trenches must be 900 mm above a restrictive layer, such as a water table or soil with high percolation time. For this site, the restrictive layer is the clay type layer with a high percolation time of 40 to 50 minutes/cm. At final design, each septic system must be designed to maintain the 900 mm clearance above the restricted layer.

The presence of the clay type layer will require a partially raised septic system in those locations where the gravel and sand layer does not have sufficient depth. As per OBC 8.7.4.2.11, for any raised or partially raised systems, the minimum clearances from OBC Table 8.2.1.6.B. will be increased by twice the raised height.

Assuming a four (4) bedroom home, the given design flow as per Table 8.2.1.3.A of the OBC is 2,000 L/day. Based on the estimated percolation time and design flow, the distribution pipe length for the system is determined from OBC 8.7.3.1.2. for a conventional, non-tertiary, filter bed.

$$L = QT/200$$

$$L = (2,000 \text{ L/day} \times 3 \text{ min/cm}) / 200 \text{ using a T time of 3 for the gravel and sand layer.}$$

$$L = 30 \text{ m}$$

The required loading area for the filter medium is calculated to meet the requirement as specified in OBC 8.7.5.2.3.

$$A = Q/75$$

$$A = (2,000 \text{ L/day})/75$$

$$A = 26.7 \text{ m}^2 \text{ (minimum of } 30 \text{ m}^2 \text{ recommended).}$$

A calculation was performed for the required area for the dispersal bed filter medium to achieve the minimum area as specified in OBC 8.7.5.3.6. Since the area calculated below is less than the loading area above, the filter medium does not need to extend beyond the loading area.

$$A = QT/850$$

$$A = (2,000 \text{ L/day} \times 3 \text{ min/cm}) / 850 \text{ using a T time of 3 for the gravel and sand layer.}$$

$$A = 7 \text{ m}^2$$

As per OBC 8.7.2.1.1.B.ii., the gravel and sand layer has an allowable “T time” so the existing material can be used as the 15 m mantle, as required by OBC 8.7.4.2.1.B. This mantle is part of the septic system treatment system. To prevent possible damage to the treatment system, the 15 m mantle will be located outside of the GSCA regulated area.

2.3 Lot Sizing

The proximity to the lake, and the 100 year flood level of 177.9 m asl, requires that lot creation be in accordance with Grey Sauble Conservation Authority (GSCA) lot creation policies (Hazard Land Policies and Guidelines, July 1994). The policy states that all development must be outside of identified hazard areas. For the subject properties, the hazard area consists of the 100-year

flood level and the required 15 m flood allowance. To accommodate the existing topography, the proposed lots have been established to ensure buildings and septic systems are located upslope of the GSCA regulated area (including the 15 m flood allowance).

To determine lot areas, the land outside the GSCA hazard areas is combined with municipal set back requirements (front yard, rear yard and side yard setbacks) to determine developable areas. The developable area for each of the six lots is shown on Drawing 19001-03. The lot with the smallest developable area is Lot 1 with a total developable area of 755 m².

Assuming a four (4) bedroom house with a garage has an approximate footprint area of 270 m² (2,900 sq. ft.), the remaining developable area is 485 m² (755 m² – 270 m² = 485 m²).

The required 26.7 m² (30 m² recommended) septic loading area would result in an approximate rectangle with dimensions of ± 5m by ± 6 m (± 30 m²). This rectangular shape would require an additional mantle area of 15 m by ± 6 m, or ± 90 m².

The total septic area is ± 120 m². The remaining developable area of Lot 1 is 365 m² (485 m² – 120 m² = 365 m²). The relatively large, remaining area allows for flexibility for the septic system, house size and overall layout, as well as area for the stormwater system. A conceptual lot layout for Lot 1 is shown in Figure 1.

2.4 Lot Configuration with Tree Retention Areas

To accommodate EIS requirements, some of the building envelopes will be reduced from the developable area as described in Section 2.3. By limiting the building envelopes as shown in Drawing 19001-05, tree retention will be maximized as the building envelopes are mostly placed in existing open areas. As much as possible, septic systems and any other cause of tree removal shall be located within the building envelope.

The tree retention area is limited to the larger, southern lots (lots 3, 4, 5 and 6). The tree retention area does not affect lots 1 and 2 as these lots currently have minimal tree cover. Any area outside of the proposed building envelopes shall retain as much tree cover as possible.

3.0 WATER SUPPLY AND DISTRIBUTION

Water servicing for the proposed lots will be provided by extending the existing, 200 mm diameter Georgian Bluffs watermain that is currently capped at the north end of the subject lands. To achieve the requirements of the municipality, the watermain will be extended the full length of the subject lands and terminate at the south end of the development with a fire hydrant and a cap on the watermain. An additional fire hydrant will be located midway to accommodate the suggested maximum fire hydrant spacing of 120 m.

Individual services will be connected to the watermain for each of the six proposed lots. Individual services and watermain requirements will be designed as per by Georgian Bluffs' watermain standards. 25 mm diameter Municipex type service pipes (with tracing wire) are recommended for the new lots.

The watermain extension will be serviced by the East Linton Drinking Water System. Upon review of the 2017 Summary Report, prepared by the Ontario Clean Water Agency, the system has a maximum capacity of 2,600 m³/day. The maximum daily flow in 2017 was 863 m³/day and the maximum monthly daily average was 431 m³/day. These values indicate there is adequate reserve capacity to accommodate the proposed 6 residential lots. Staff from the Municipality of Georgian Bluffs have supported the required East Linton watermain extension.

4.0 STORMWATER MANAGEMENT

The proposed development consists of only 6 lots and the down gradient portions of each lot is undevelopable (due to the municipal shore road allowance, 100 year flood level and 15 m flood allowance from the 100 year flood level). As such, it is proposed to treat the stormwater at the lot level. Any overflow will be passed across the shore road allowance and outlet to Georgian Bay.

4.1 Existing Conditions

Based on site topography, stormwater originating onsite will flow easterly into Georgian Bay. However, ditching on the west side of Balmy Beach road intercepts stormwater originating from the upslope area west of Balmy Beach Road.

There is an existing culvert crossing the road from the west side to the east side, bringing some of the runoff from the west ditch onto the east side of the road to travel through the subject lands and reach Georgian Bay. This culvert is located near the north end of the property. The location of the culvert is shown on Drawing 02.

The culvert is partially buried and does not carry a large amount of flow. The existing culvert is a corrugated steel pipe (CSP) with a diameter of ± 350 mm. There is currently no easement provided for the flow from the culvert to travel through the subject lands.

There is also a small culvert at the east side of the road near the northern portion of the subject lands. This culvert is a polyvinyl chloride (PVC) pipe with a diameter of 150 mm. This pipe carries flow from a rear yard catch basin (RYCB) located in front of #361 Balmy Beach Road. The RYCB contains a ± 50 mm pipe outlet from the east, suggesting some stormwater drainage from #361 enters the RYCB. This 150 mm culvert is also shown on Drawing 02. Flow from this culvert discharges to the north end of the subject lands. The volume of flow from this culvert is typically minimal.

The stormwater flowing from the two culverts, described above, and the stormwater from the road centreline easterly, is the only stormwater flowing into the property. With limited flow from outside areas, the main source of stormwater is from the water falling directly on the lots.

4.2 Proposed Conditions

The existing surface water drainage travels mostly over grass and does not convey large amounts of contamination or sediment to Georgian Bay. The lands on the west side of Balmy Beach road are largely forested and are undeveloped. Runoff from new hard surfaces (roofs and driveways) is the main concern for generation of sediment from the subject property.

Due to the large undevelopable area of each of the proposed lots (flood level allowance and shore road allowance), a large area of each lot will remain as is with generally permeable surfaces. However, it is proposed that storm water generated by the construction of new impermeable surfaces (roofs and driveways) will be passed through individual stormwater systems to limit the amount of sediment being discharged into Georgian Bay and to infiltrate, at the lot level, a reasonable amount of the local runoff. A Low Impact Development (LID) type stormwater system is proposed for each lot upslope of the 15 m flood allowance. The surplus stormwater that does not infiltrate within the local LID will pass over grassed or natural area before reaching Georgian Bay.

GSCA has requested local lot stormwater be treated to an “enhanced” level. To achieve this level of stormwater quality, 80% of suspended solids are to be removed. For design of the lot level LID stormwater system, a conservative estimate of 35% impervious area, post development, has been assumed.

Using only infiltration, a stormwater generation rate of 25 m³/ha is required to achieve an “enhanced” level of treatment, based on the 35% impervious area (Table 3.2 of the Storm Water Management Planning and Design Manual, MOE 2003).

To determine the required infiltration volume, the total area of each lot was determined. The drainage area only considered lands up slope of the 15 m flood allowance. In addition, 10 m of the Balmy Beach road allowance width was included as part of the contributory area for each lot.

GSCA also requested that post development flows shall be controlled to predevelopment flows unless it can be proven there are no adverse effects on upstream or downstream areas. Since the only land crossing downstream is the road allowance before stormwater reaches Georgian Bay, there are no negative effects due to possible slight increases in stormwater quantity flowing to Georgian Bay.

4.3 Low Impact Development (LID) System

A LID system is proposed to detain and infiltrate the stormwater for each individual lot. Each system is designed based on lot size. The style of LID proposed is an infiltration trench will have adjacent, small, grassed berms to direct stormwater into the trench.

Proposed locations and cross section details for the infiltration trenches are shown on drawing 19001-06. The chart on Drawing 06 indicates the length of trench required for each lot. A typical cross section detail is also provided on Drawing 06. The intent is for roof water and surface water drainage from driveways etc. to first flow over grassed areas and then be directed by the minor berms to the downslope infiltration trench.

Water will be retained temporarily within the bermed area and then soak through a surface mat of river stone to the infiltration trench below. The infiltration trench below consists of 19 mm ($\frac{3}{4}$ ”) washed clear stone featuring a void ratio of approximately 30%. The top mat of washed river stone overlays a portion of the infiltration trench below. The intent is for the stormwater to soak quickly through the river stone mat, and then into the clear stone trench below and fill the voids. The stored water will then soak at a slower rate into the native soils below. Any surplus water that cannot be stored will overflow the local berming and ultimately drain downslope to Georgian Bay. The retention time behind the berming will provide solids removal for the overland flow component.

When individual lots are designed, conflicts may occur with the proposed location of the infiltration trench. If conflicts occur, it is possible to adjust the location of the infiltration trench somewhat to accommodate the lot layout. However, the infiltration trench needs to be located at the downslope end of the building lot area and water must still be directed towards the infiltration trench. It is also possible to separate the infiltration trench into two locations. If separated, a proportionate amount of water must be directed to each trench. For example, if the specified length of the infiltration trench is divided into two sections of each size, the berming needs to be adjusted to ensure about half of the total drainage drains to each infiltration trench.

4.4 Municipal Easements

The Township of Georgian Bluffs has requested the developer provide drainage easements through the property at two locations to convey stormwater from the west side of Balmy Beach Road through the subdivision and ultimately to Georgian Bay.

As such, Drawing 06 shows 6 m wide drainage easements between lots 1 and 2 and between lots 6 and adjacent lot at the South end. The easements will provide the municipality with locations to discharge stormwater from Balmy Beach Road.

At this time these easements are proposed to be grassed swales (6:1 side slopes) where slopes are less than 4% and to be grassed swales at 6:1 side slopes with a center, 1.8 m wide 50 mm dia. to 100 mm dia. river stone center swale where slopes exceed 4%.


Drawing 06 provides a cross section detail of the proposed swale.

5.0 SUMMARY

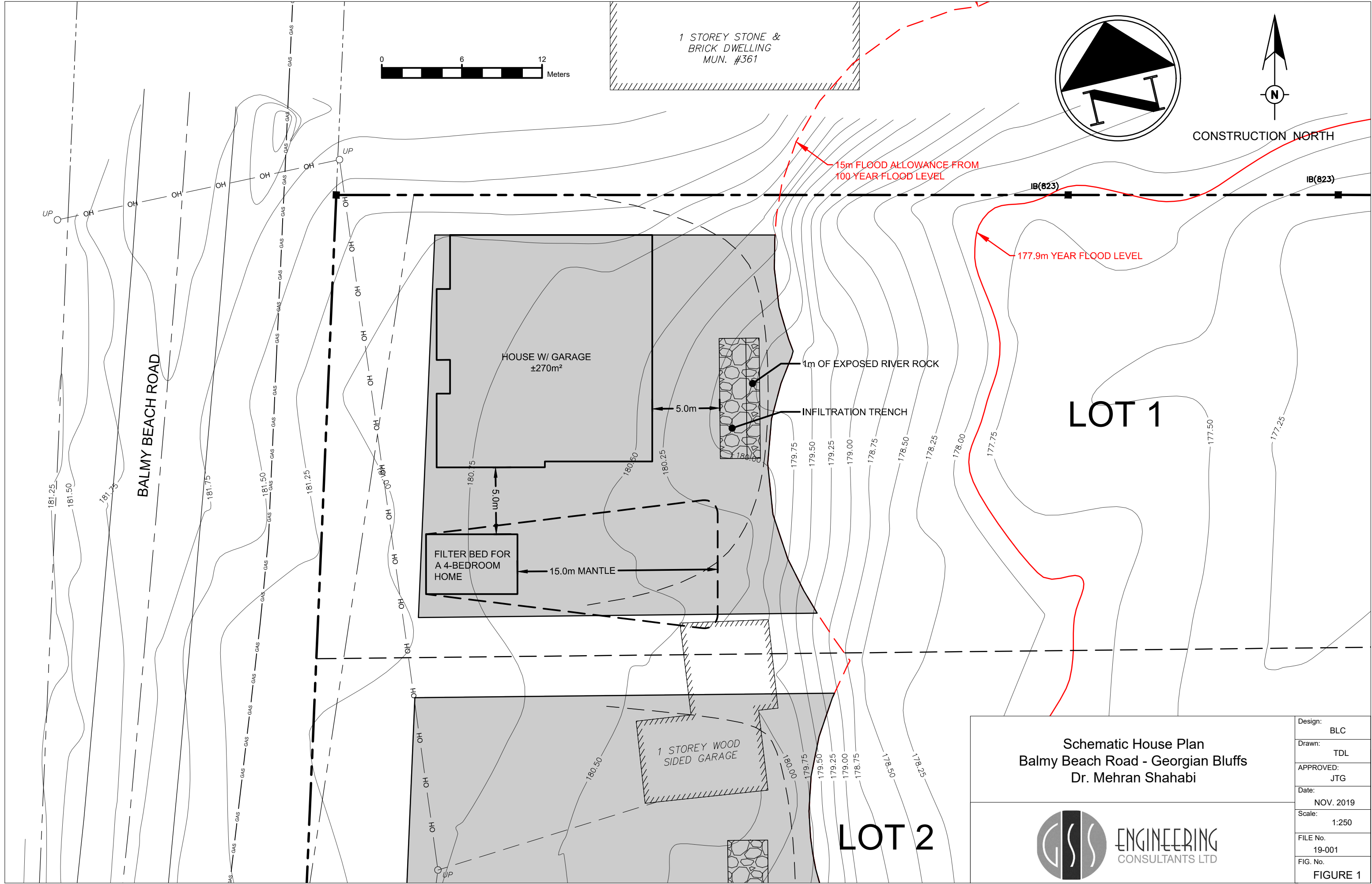
This report summarizes wastewater treatment, water supply and stormwater management features for the proposed subdivision. This report also provides a rationale for the proposed lot sizes and location of individual lot property lines. In summary, this report indicates that the proposed development can be serviced and developed with minimal environmental impact.

Prepared by;

GSS Engineering Consultants Ltd.



Jeff Graham, P. Eng., President
Designated Engineering Consultant
BC/JTG



APPENDIX A

Drawings

CONTRACT 19001

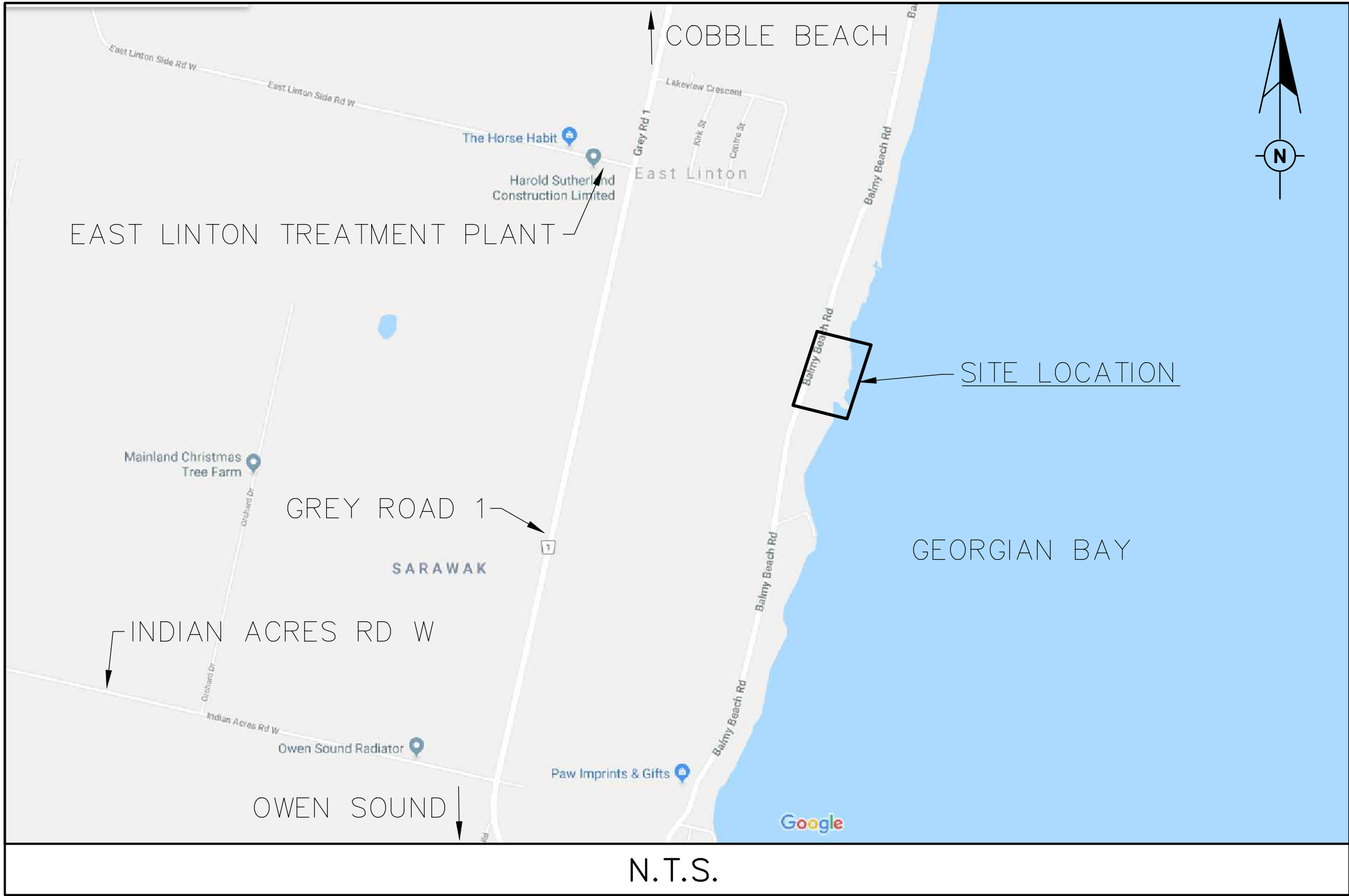
PLAN 447 LOTS 51, 52 & 52A SEVERANCE

345 & 355 BALMY BEACH ROAD (EAST LINTON)

DR. MEHRAN SHAHABI

TOWNSHIP OF GEORGIAN BLUFFS

AUG. 2020



N.T.S.

DRAWING INDEX	
DRAWING No.	DRAWING NAME
19001-01	TITLE SHEET AND INDEX
19001-02	EXISTING CONDITIONS AND REMOVALS
19001-03	PROPOSED SEVERANCES
19001-04	TEST PIT LOCATIONS
19001-05	TREE RETENTION AREA
19001-06	DRAINAGE & STORMWATER MANAGEMENT

10/08/20		REVISED LOT DIMENSIONS	
DD/MM/YY		DESCRIPTION	
		REVISION / ISSUE	
Seal not valid unless signed and dated			
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7 Telephone: (519) 372-4828			
Title: TITLE SHEET AND INDEX PLAN 447 LOTS 51, 52 & 52A BALMY BEACH RD GEORGIAN BLUFFS			
Client: DR. MEHRAN SHAHABI			
Design:	JTG	Scale:	NTS
Drawn:	TDL	Approved:	
Checked:	JTG		
Date:	AUG. 2020		
Drawing No.		19001-01	

PLOTTED: Monday, August 10, 2020 12:03:47 PM



KEY PLAN

LEGEND

- IB IRON BAR
- SIB STANDARD IRON BAR
- PROPERTY LINE
- FENCELINE
- ROAD CENTERLINE
- EX. BUILDING LAYOUT
- OVERHEAD WIRES
- UTILITY POLE (HYDRO)
- TP3 STAKED FIELD TP LOCATION FOR SEPTIC SYSTEM DESIGN (24/05/19)

GEORGIAN BAY WATER LEVEL = 177.05m. SURVEYED 24/05/19

ORIGINAL SURVEY PRODUCED BY EPLETT WROBEC RAIKES SURVEYING LTD, ONTARIO LAND SURVEYORS. COMPLETED NOVEMBER 29th 2018

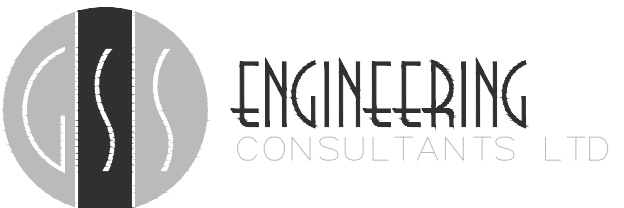
CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

10/08/20 REVISED LOT DIMENSIONS

DD/MM/YY DESCRIPTION

REVISION / ISSUE

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Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:

TEST PIT LOCATIONS

BALMY BEACH RD - GEORGIAN BLUFFS

Client: DR. MEHRAN SHAHABI

Design: JTG Scale: 1:400

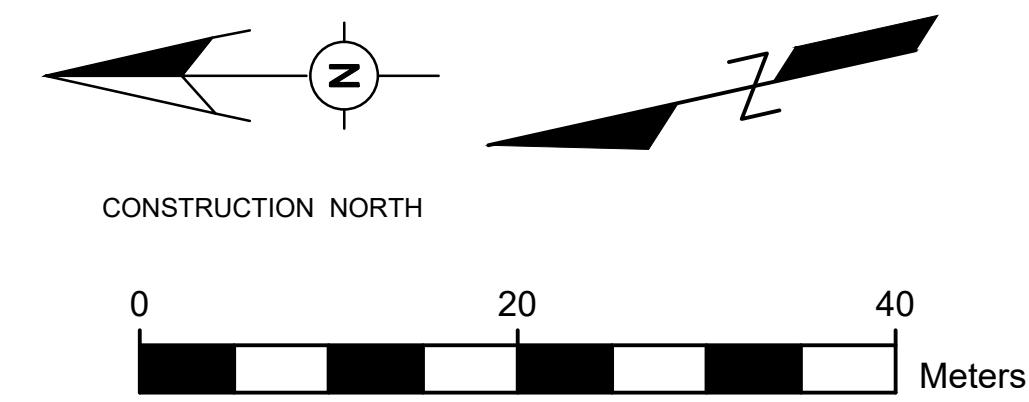
Drawn: TDL Approved: Design Engineer

Checked: JTG

Date: AUG. 2020

Drawing No. 19001-04

PLOTTED: Monday, August 10, 2020 12:04:01 PM



LEGEND	
■ IB	IRON BAR
■ SIB	STANDARD IRON BAR
---	PROPERTY LINE
- - - -	FENCELINE
---	ROAD CENTERLINE
---	EX. BUILDING LAYOUT
---	OVERHEAD WIRES
○ UP	UTILITY POLE (HYDRO)
■	PROPOSED BUILDING ENVELOPE

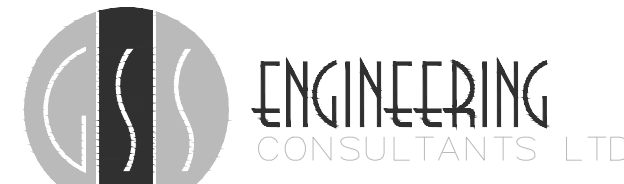
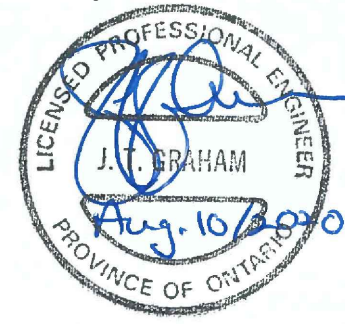
GEORGIAN BAY WATER LEVEL = 177.05m. SURVEYED 24/05/19

ORIGINAL SURVEY PRODUCED BY EPLETT WROBEC RAIKES SURVEYING LTD, ONTARIO LAND SURVEYORS. COMPLETED NOVEMBER 29th 2018

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DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

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Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:
BLDG ENVELOPES FOR TREE RETENTION AREA
PLAN 447 LOTS 51, 52 & 52A
BALMY BEACH RD - GEORGIAN BLUFFS

Client:	DR. MEHRAN SHAHABI	
Design:	JTG	Scale: 1:400
Drawn:	TDL	Approved: [Signature] Design Engineer
Checked:	JTG	
Date:	AUG. 2020	
Drawing No.	19001-05	

TABLE 1
Stormwater Retention Volume and Infiltration Trench Summary
Balmy Beach Subdivision
Dr. Shahabi

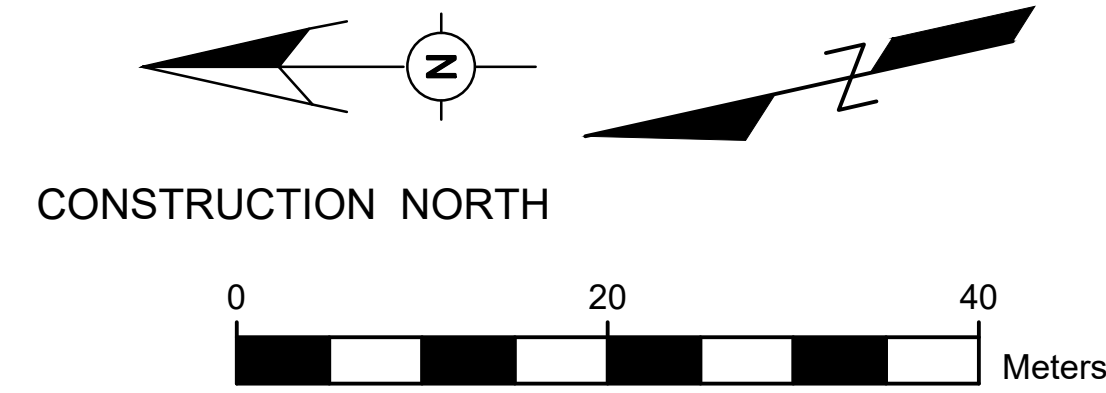
July 22, 2020

19-001

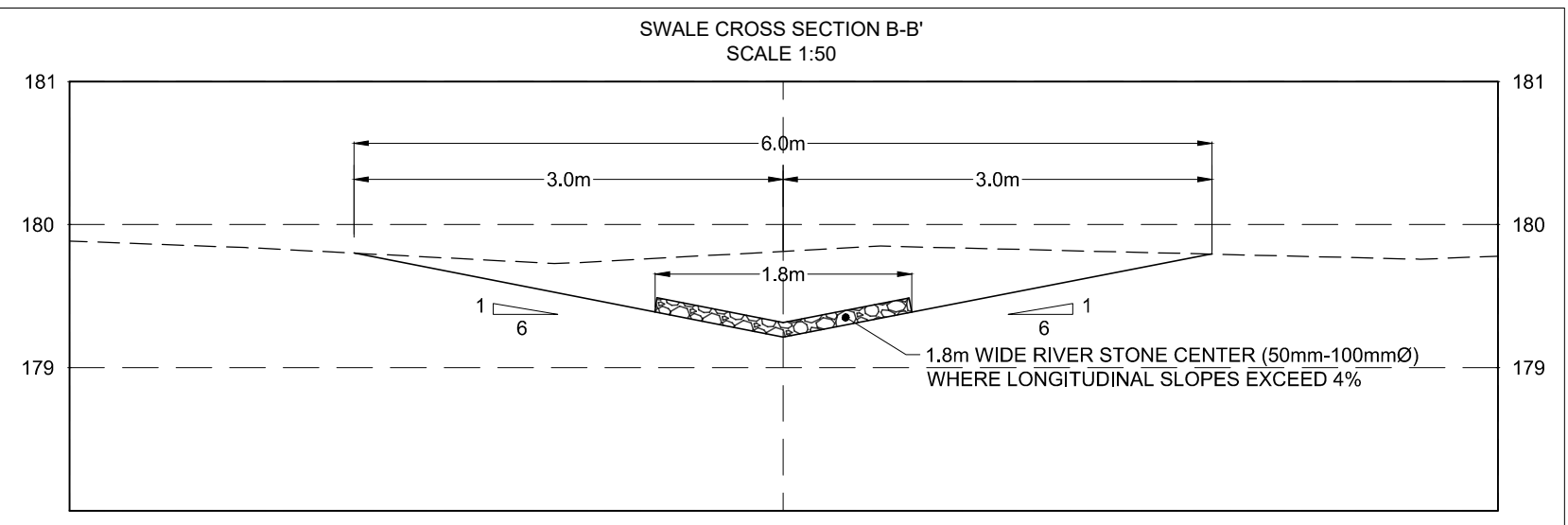
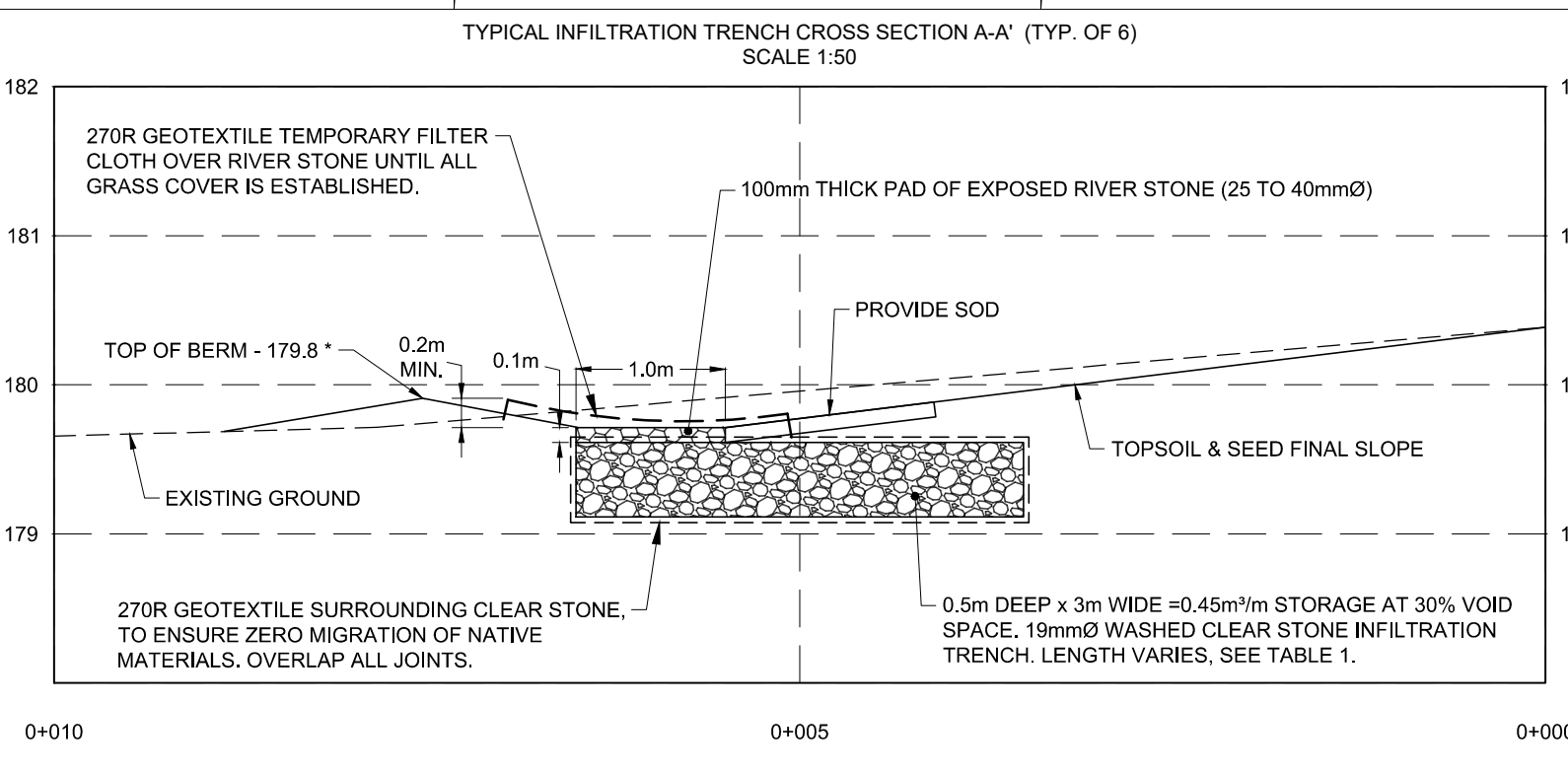
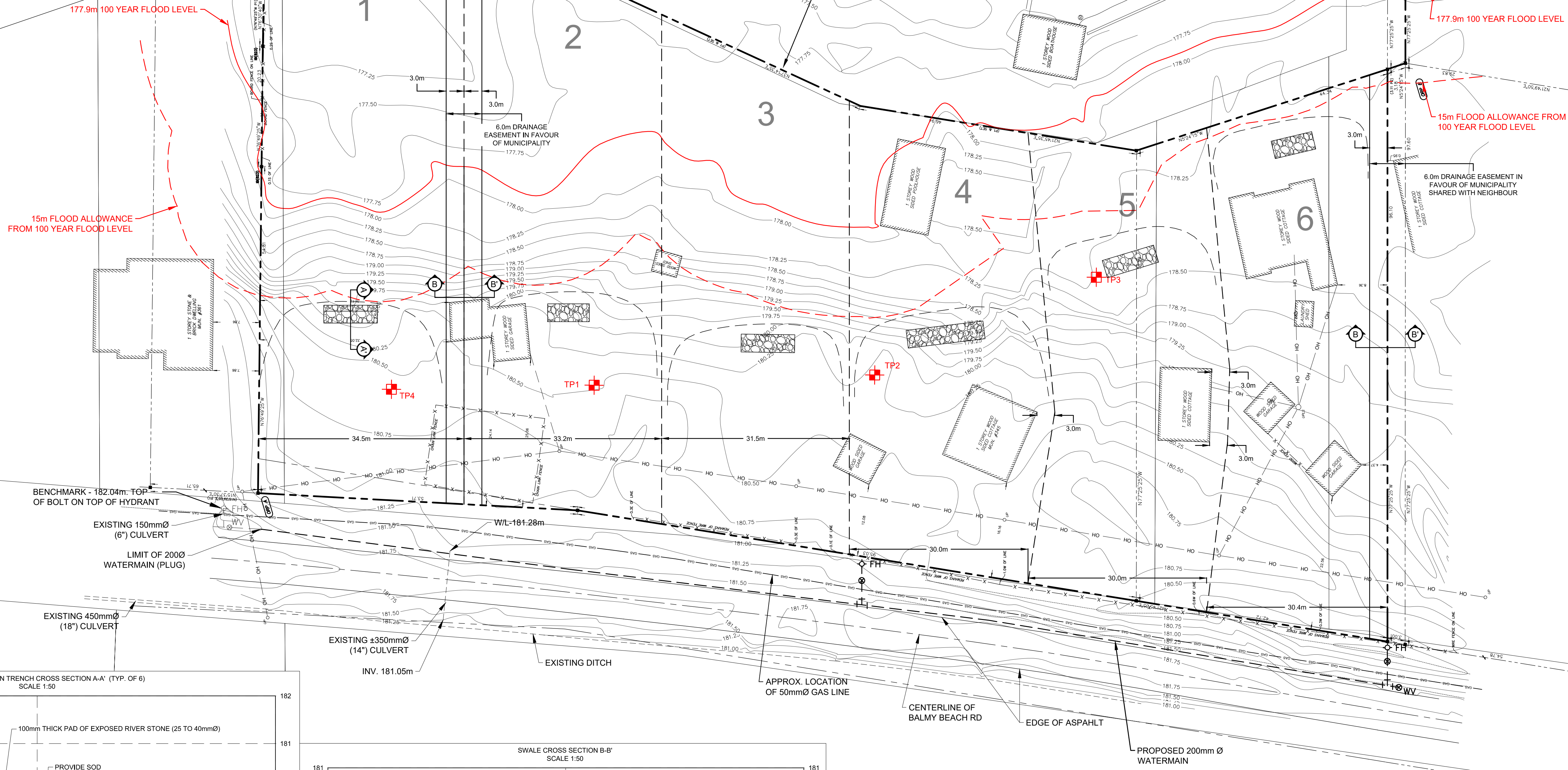
Lot Number	Width	Depth *	Area	Storage Volume Required **	Length of Infiltration Trench (based on 0.45 m³/m Storage Volume in Trench)
1	34.5 m	48 m	1,650 m²	4 m³	9 m
2	33.2 m	50 m	1,660 m²	3 m³	7 m
3	31.5 m	60 m	1,890 m²	4 m³	9 m
4	30 m	55 m	1,650 m²	6 m³	13 m
5	30 m	70 m	2,100 m²	4 m³	9 m
6	30.4 m	85 m	2,580 m²	3 m³	7 m
Total			11,530 m²	24 m³	

* Includes 10 m of road allowance. Measured to 15 m wave setback (15 m from 100-year flood line of 177.9 m).

** Based on 25 m³/ha for infiltration system providing Enhanced Protection (Table 3.2 of Storm Water Management Planning and Design Manual – MOE 2003)



LEGEND	
■ IB	IRON BAR
■ SIB	STANDARD IRON BAR
---	PROPERTY LINE
- - - - -	FENCELINE
---	ROAD CENTERLINE
---	EX. BUILDING LAYOUT
---	OVERHEAD WIRES
○ U/P	UTILITY POLE (HYDRO)
+	STAKED FIELD TP LOCATION FOR SEPTIC SYSTEM DESIGN (24/05/19)
▨	PROPOSED INFILTRATION TRENCH



* LOCATION OF INFILTRATION TRENCH MAY BE ADJUSTED TO ACCOMMODATE FINAL BUILDING LOCATIONS. DRAINAGE MUST BE DIRECTED TO THE INFILTRATION TRENCH. TWO SMALLER INFILTRATION TRENCHES MAY BE USED IN LIEU OF ONE, HOWEVER, THE TOTAL STORAGE VOLUME/LENGTH MUST BE EQUIVALENT TO THE VOLUMES SPECIFIED IN TABLE 1. BOTTOM OF INFILTRATION TRENCH NOT TO BE LOWER THAN 178.2m. NOTE: ADD CLEAN, PIT RUN GRAVEL FILL FOR LOTS 5 AND 6 TO RAISE INFILTRATION TRENCHES AS REQUIRED.

GEORGIAN BAY WATER LEVEL = 177.05m. SURVEYED 24/05/19
ORIGINAL SURVEY PRODUCED BY EPLETT WROBEC RAIKES SURVEYING LTD, ONTARIO LAND SURVEYORS. COMPLETED NOVEMBER 29th 2018
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L. SHAHABI
JULY 10 2020
PROVINCE OF ONTARIO

ENGINEERING CONSULTANTS LTD
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title: DRAINAGE & STORMWATER MANAGEMENT
PLAN 447 LOTS 51, 52 & 52A
BALMY BEACH RD – GEORGIAN BLUFFS
Client: DR. MEHRAN SHAHABI
Design: JTG Scale: 1:400
Drawn: TDL Approved: Design Engineer
Checked: JTG
Date: AUG. 2020
Drawing No. 19001-06

APPENDIX B

Sieve Analysis Report



August 13, 2019
Our File: 218194-6

Via Email: briannacollins@gssengineering.ca

GSS Engineering Consultants Ltd.
1010 9th Avenue West, Unit 104D
Owen Sound, ON N4K 5R7

Attention: Brianna Collins

Re: Soil Testing for Sewage System
345 & 355 Balmy Beach Road
Township of Grey Bruce

Dear Brianna,

As requested, we have performed a grading analysis on the two soil samples delivered to us on July 24, 2019. It is understood that the samples were collected from a depth of 0.6m and 1.1m from Testpit (TP-3, TP-4) respectively and excavated in the areas where leaching or filters are potentially to be constructed.

The first soil sample is a well graded gavel with traces of silt. From the attached Grain-Size Distribution Curve and based on The Hazen Formula, the co-efficient of permeability was calculated to be 9.6×10^{-2} cm/second. The second sample is a silty sand and gravel with a trace of clay. From the attached Grain-Size Distribution Curve and based on 11.0% clay content, we estimated the co-efficient of permeability to be in the order of 0×10^{-6} cm/second. Based on these results and the relationship of soil types to percolation times as per the Ontario Building Code (OBC), we have assessed a percolation time, "T" of 40 to 50 minutes/cm for the second sample and 2 to 3 minutes/cm for the first sample.

Because of the silt and clay in the soil, the "T" time is somewhat elevated, for the TP-4 sample and therefore, it is not feasible to construct an in-ground leaching or filter bed in such soil. A raised leaching or filter bed constructed of approved imported material must be considered.

Increased amounts of silt and clay will negatively affect the percolation time and the performance of the leaching or filter bed. The percolation time is also dependent upon the density, structure, and moisture content of the soil and the installation methods utilized. Therefore, it is the responsibility of the owner, system designer, and contractor to monitor the quality of the soils across the site and any imported material to assure themselves that the design criteria are met and if necessary, adjust the design of the system.

Should you have any questions, please do not hesitate to contact me.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per:

A handwritten signature in blue ink, appearing to read 'Wm. E. Dubeau'.

Wm. E. Dubeau, P.Eng.
WED/br

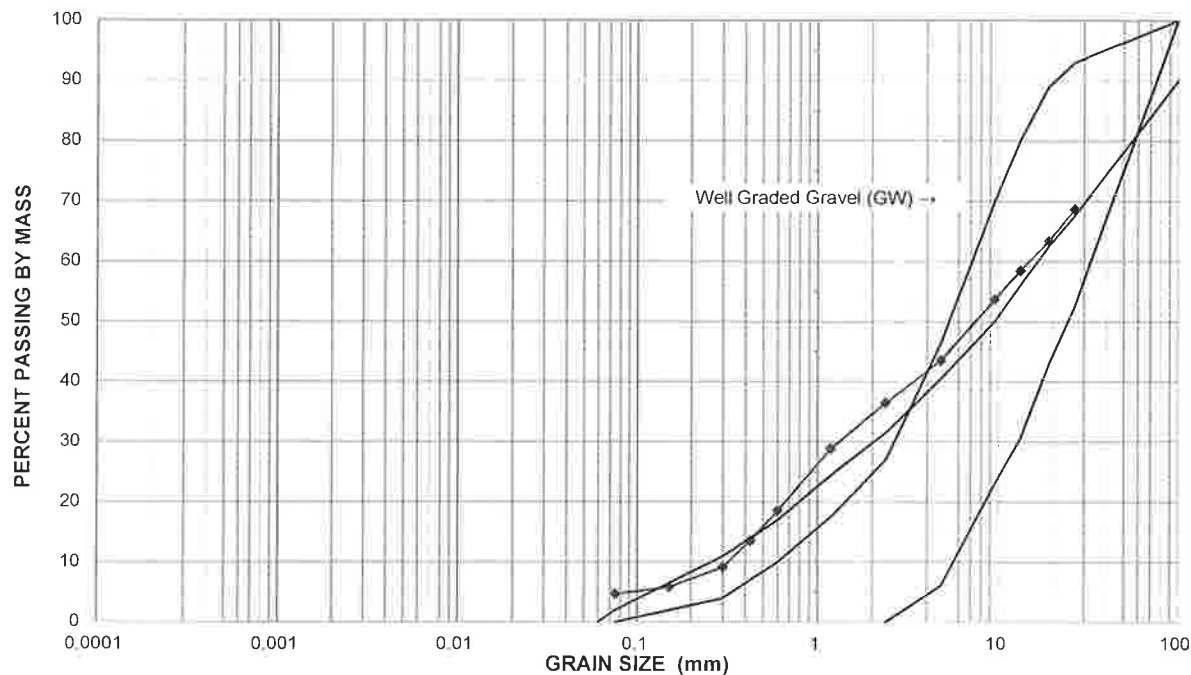
Encl.

cc: File No: 218194-6

PARTICLE SIZE ANALYSIS

PROJECT: M.T. - GSS Engineering (Project No. 19-001)	FILE NO.: 218194-6
LOCATION: 345 & 355 Balmy Beach Road, Georgian Bluffs	LAB SAMPLE NO.: S-3346
CLIENT: GSS Engineering	SAMPLE DATE: July 19, 2019
SOIL TYPE: Sandy Gravel with a trace of Fines	SAMPLED BY: Client
GRAPH #: 1 Well Graded Gravels, Gravel-Sand Mixtures Cu > 4	SOURCE: TP 3 at 2' depth

PARTICLE SIZE DISTRIBUTION



←		FINE		MEDIUM		COARSE		FINE		COARSE	
CLAY			SILT			SAND			GRAVEL		
SIEVE SIZE PARTICLE DIA. (mm)		PERCENT PASSING		HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING					
		SAMPLE				SAMPLE					
26.5		68.6		0.0600							
19		63.3		0.0400							
13.2		58.4		0.0300							
9.5		53.6		0.0250							
4.75		43.5		0.0200							
2.36		36.5		0.0120							
1.180		28.9		0.0090							
0.600		18.6		0.0060							
0.425		13.6		0.0045							
0.300		9.2		0.0032							
0.150		5.8		0.0023							
0.075		4.7		0.0013							

D₁₀ : 0.31 mm **D₆₀ :** 15 mm **Cu :** 47

Coefficient of Permeability: 9.6 x 10⁻² cm/sec **"T" Time :** 2 to 3 mins/cm

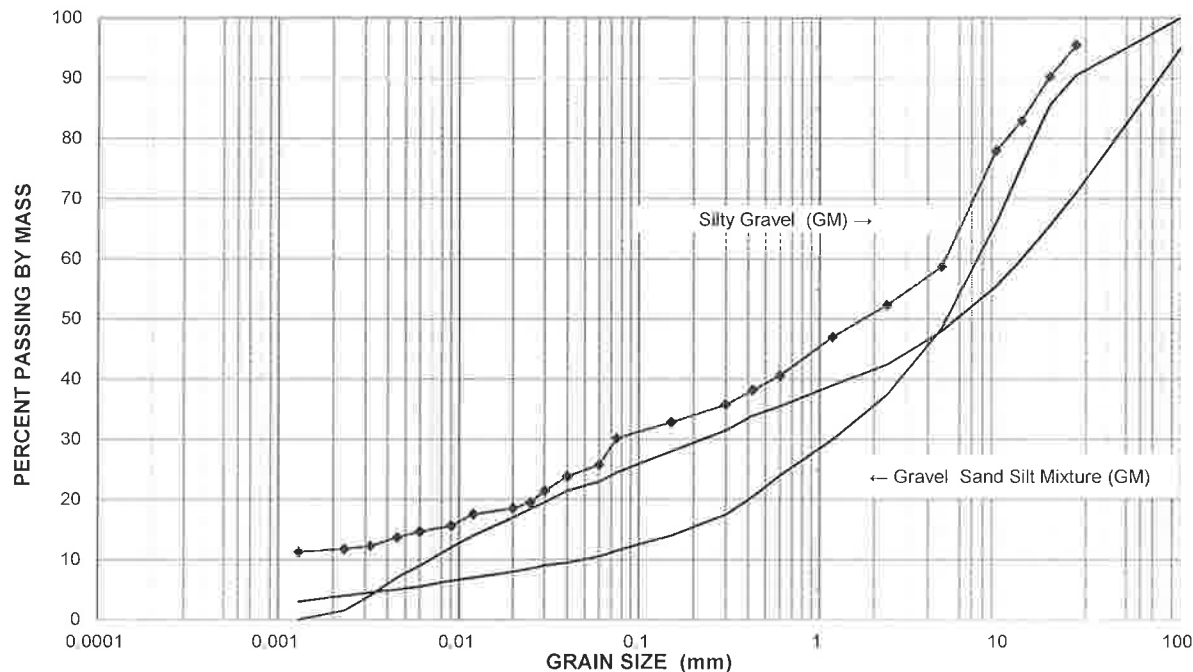
Comments:

PARTICLE SIZE ANALYSIS

PROJECT: M.T. - GSS Engineering (Project No. 19-001)
LOCATION: 345 & 355 Balmy Beach Road, Georgian Bluffs
CLIENT: GSS Engineering
SOIL TYPE: Gravel with some Sand and Silt with a little Clay
GRAPH #: 3 - Silty Gravels, Gravel Sand Silt Mixtures

FILE NO.: 218194-6
LAB SAMPLE NO.: S-3347
SAMPLE DATE: July 19, 2019
SAMPLED BY: Client
SOURCE: TP 4 at 3'7"

PARTICLE SIZE DISTRIBUTION



←		FINE		MEDIUM	COARSE	FINE		COARSE
CLAY		SILT		SAND		GRAVEL		
SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING SAMPLE				
26.5	95.5	0.0600		25.8				
19	90.2	0.0400		23.9				
13.2	82.9	0.0300		21.4				
9.5	78.0	0.0250		19.5				
4.75	58.7	0.0200		18.5				
2.36	52.4	0.0120		17.6				
1.180	47.1	0.0090		15.6				
0.600	40.7	0.0060		14.7				
0.425	38.2	0.0045		13.7				
0.300	35.8	0.0032		12.2				
0.150	32.9	0.0023		11.8				
0.075	30.2	0.0013		11.3				

D₁₀: 0.001 mm **D₆₀:** 5.1 mm **Cu:** 5100

Coefficient of Permeability: 1.0×10^{-6} cm/sec **"T" Time:** 40 to 50 mins/cm

Comments: