April 8, 2025
Project No. 2401249

VIA EMAIL: h.bye@hbyeconstruction.com

H. Bye Construction Ltd.
395 Church Street North
Mt. Forest, ON, N0G 2L2

Re: Hydrogeological Feasibility Study
Scoped D-5-4 and D-5-5 Studies
Viking Cives Development
Mt. Forest, ON

Dear Mr. Bye

GEI Consultants Canada Limited (GEI) has been retained to provide hydrogeologic services to support the application for a lot severance in the southern portion of the Municipality of West Grey, in close proximity with the boundary of the community of Mount Forest (Township of Wellington North). The lands under considerations (i.e., the "Site"), currently constitute 255 Watson Drive (Assessment Parcel 420501000702500), immediately north of the Township of Wellington North-West Grey boundary. The property is further defined as *Part Lot 32, Concession 1, Geographic Township of Normanby, Municipality of West Grey, Grey County*. The approximate location of the subject property is shown in Figure 1.

It is understood that to form the overall Viking Cives property parcel, approximately 7.67 ha (18.96 acres) of the Site will be severed from the entire existing parcel approximately 23.60 ha (58.31 acres), and subsequently be merged to the neighbouring northwesterly property (Assessment Parcel 420501000702430) to create one cohesive property approximately 9.71 ha (24 acres) in size. The retained lot is proposed to be reduced to a size of approximately 15.92 ha (39.35 acres). At this time, it is understood that the proposed severance, in tandem with the neighbouring parcel, will be developed to support a manufacturing facility, while the retained lot may remain undeveloped with possible future plans for further commercial or industrial development. An approximate Site Layout is presented in Figure 2 for reference.

The severed lot is proposed to be serviced with a private on-site sewage system and private water supply well. As part of this technical letter, a hydrogeological feasibility study is intended to establish whether it will be feasible to service the proposed lot with private on-site sewage system and private water supply with respect to impacts to existing to any existing private services and developments in the area. This study is completed with reference to the Ministry of Environment, Conservation and Parks (MECP) Guideline D-5-4 for *water quality impact risk assessment for the on-site sewage system*, and Guideline D-5-5 for *private well water supply assessment*, herein referred to as the "Guideline".

Geological Setting and Background

Physiographic mapping indicates that the Site lies within a Drumlinized Till Plain landform, which generally consists of large flat to gently sloping areas where till has been left from melted glaciers with drumlins present in localized areas. Additionally, the Site lies within the Horseshoe Moraines physiographic region which is generally characterized by irregular stoney knobs and ridges which are comprised mostly of till with some sand and gravel deposits as well as some pitted sand and gravel terraces and swampy valley floors (Chapman & Putnam, 1984).

According to map sets available from the Ontario Geological Survey, the surficial geologic materials underlying the Site can be briefly summarized as being comprised of both glaciofluvial deposits consisting of sandy deposits throughout a majority of the Site area, as well as a localized instance of till soils in the northeastern portion of the Site consisting of stone-poor sandy silt to silty sand-textured till (NDMNRF, 2010). These overburden materials are understood to be underlain by dolostone and shale bedrock materials of the Salina Formation (NDMNRF, 2011).

The overburden soils across the Site are identified as part of the Harriston Soil Series. This soil generally consists of calcareous medium-textured silt loam derived from dolomitic limestone till. Generally, the topography of these soils are smooth and gently to moderately sloping with a moderately stone content. As a result of the stratigraphy and general topography, the drainage capabilities of this soil are considered to be 'Good'. As a result, the characteristic hydraulic conductivity in the vicinity of the Site is expected to be moderate to high (Gillespie & Richards, 1954).

Based on topographic mapping of the immediate area, the elevation of the Site and the surrounding lands are gently sloped with elevation decreases moving toward the South Saugeen River, approximately 2.5 km from the Site. Within the Site itself there is an estimated elevation difference of approximately 14 metres with the greatest elevation difference occurring between the centralized area of the Site and a low-lying wooded wetland area in the southwestern portion. However, elevation is noted to decrease radially from the centralized high point.

For the purposes of this study, it is assumed that an individual sewage system equipped with a tile bed would likely be constructed in the southern portion of the Site, likely downgradient to other proposed development features. It can be reasonably assumed that surface run off, drainage and shallow groundwater flow travels southwesterly toward the low-lying wetland area, eventually leading to the South Saugeen River.

Nearby water well records within a 500 metre radius of the Site indicate that local water supply wells are typically completed in the underlying bedrock with an average depth of 34.4 mbgs (metres below ground surface). In the vicinity of the Site, the average depth to bedrock is approximately 30 mbgs and the overburden thickness is anticipated to be between 30 to 40 mbgs. A summary of the information found in the near by MECP well records can be found in Enclosure A as well as their locations shown in Figure 3.

Field Investigation

As part of a previous investigation completed by CMT Engineering Inc. in September 2021, a single subsurface soil sample was collected from the Site at an undisclosed location and depth with the intent of submitting the sample for a Grain Size Analysis and T-Time Determination.

The results of the analyses reported the soil sample is classified as silty sand with some gravel and trace clay with an associated percolation rate (T-time) estimate of 12 min/cm.

A copy of the Laboratory Test Results provided by CMT Engineering is provided in Enclosure B.

Servicing Considerations

D-5-4 Guideline Approach for On-Site Sewage Systems

The D-5-4 Guideline is a stepwise process that allows for differing methodologies to be applied to demonstrate sufficient attenuation of nitrate. Typically, this stepwise process is divided into three steps. Step 1 involves Lot Size Considerations in which the risk that exceedances imposed from the individual sewage system is considered acceptable for a private residential development on lots one hectare or larger. Step 2 involves System Isolation Considerations in which an assessment of the potential risk of sewage effluent impacting potential water supply aquifers is required and typically completed through a Site specific and comprehensive hydrogeological monitoring program. Step 3 involves Contaminant Attenuation Consideration through the use of either a monitoring, or predictive assessment.

Although the proposed development would not be residential, in this case, both the retained and proposed lots are much greater than one hectare in size, and therefore it is assumed that the attenuative process will be sufficient to reduce the nitrate concentration to an acceptable concentration in groundwater below adjacent property boundaries. However, to further support the proposed severance and development plan, a Predictive Assessment for Contaminant Attenuation Consideration (Step 3) has been provided herein for additional evidence of adequate attenuation.

On-Site Sewage Systems - Nitrogen Attenuation

The primary concern related to on-site sewage systems is the effect that these systems may have on the concentration of nitrate in local groundwater. The proposed development must ensure that the sewage disposal system does not negatively impact groundwater quality and preclude its use for other purposes for other off-site users. The most prevalent use for groundwater in the vicinity of the Site is domestic consumption and so typically this means that a given development must not result in nitrate concentrations of 10 mg/L or greater per the Ontario Drinking Water Standards (ODWS) in groundwater travelling off-site.

To estimate the potential for impacts to shallow groundwater, nitrogen attenuation calculations have been computed as per the method provided in the D-5-4 Guideline (1996) and are summarized in Table 1, below. For the purposes of this Study, the calculations have been provided for the proposed severed lot and lot addition. This Study will consider the severed portion of the Site, in combination with the merged lands as this area is representative of the space relied upon for dilution for the proposed development.

The retained portion of the subject lands will not be considered for attenuation calculations since it remains undeveloped and large enough to support attenuation criteria in its own right. In the event development and further severance of the retained lands is sought , it is recommended that a separate D-5-4 be completed on its own merits and based on the Site Plan(s) proposed.

The Predictive Assessment methodology provided in the D-5-4 Guideline may apply for commercial/industrial development. Based on quantities reported by the development team, it is understood that the sewage design flow is approximately 3,025 L/day based on the Ontario Building Code (OBC). The sewage generated is related to human sewage and the proposed design flows do not include industrial/commercial liquid waste.

Under application of the D-5-4 Guideline to commercial/industrial land use the amount of nitrate being discharged is calculated by using the peak design flow multiplied by a concentration of nitrate of 40 mg/L. The resultant nitrate loading estimate is compared to the ODWS criteria of 10 mg/L.

Table 1. Nitrogen Attenuation Calculation Proposed Use

Line	Item	Value	Source
1	**Average Annual Precipitation (mm/yr)**	1,034	Environment Canada (Mount Forest, 1991-2020)
2	**Average Annual Evapotranspiration (mm/yr)**	550	Ontario Ministry of Natural Resources (1984)
3	**Impervious Area Factor**	0.60	Ontario Ministry of Transportation Drainage Management Manual, Chart 1.07
4	**Lot Area Considered (m^2)**	97,125	From Site Layout (Figure 2)
5	**Hydrologic Input (L/yr)**	18,803,400	Line 4 * (Line 1 – Line 2) * (1 – Line 3), units converted
6	**Sewage Effluent Input Rate (L/day)**	3,025	Specified by Site Plan
7	**Annual Sewage Effluent Input (L/yr)**	1,104,125	Line 6 * 365, units converted
8	**Total Water Input (L/yr)**	19,907,525	Line 5 + Line 7, units converted
9	**Nitrate Loading (mg/L)**	40	Specified by the D-5-4 Guideline
10	**Annual Nitrogen Loading (mg/yr)**	44,165,000	Line 7 * Line 9, units converted
11	**Attenuated Nitrogen Concentration (mg/L)**	2.22	Line 10 / Line 8, units converted

Using the dilution approach, the attenuated nitrogen concentration for the portion of the Site and merged lands intended for development is estimated to be 2.22 mg/L and is less than the maximum allowable concentration of 10 mg/L. This calculation is considered to be a conservative estimate since it does not account for other attenuation mechanisms that are known to occur, such as dilution in groundwater and biological/geochemical attenuation processes. Consequently, the servicing of a proposed development would be feasible for both retained and severed properties with a standard Class IV or equivalent sewage system constructed under the requirements of the Ontario Building Code.

Based on the relatively large size of the lot versus the proposed use, we have also reviewed the ability of the site to accommodate daily sewage effluent production to the maximum allowable quantity of 10,000 litres per day under the OBC as specified under the Ontario Water Resources Act (over 10,000 L per day requires an Environmental Compliance Approval (ECA) for sewage generation from the MECP. This review is being completed to accommodate potential design change during development or future potential changes to site use.

Similar to Table 1 above, Table 2 displays the estimated attenuated nitrogen concentration for the proposed facility when applying a sewage generation rate of 10,000 L/day.

Table 2. Nitrogen Attenuation Calculation for Increased Use

Line	Item	Value	Source
1	**Average Annual Precipitation (mm/yr)**	1,034	Environment Canada (Mount Forest, 1991-2020)
2	**Average Annual Evapotranspiration (mm/yr)**	550	Ontario Ministry of Natural Resources (1984)
3	**Impervious Area Factor**	0.60	Ontario Ministry of Transportation Drainage Management Manual, Chart 1.07
4	**Lot Area Considered (m^2)**	97,125	From Site Layout (Figure 2)
5	**Hydrologic Input (L/yr)**	18,803,400	Line 4 * (Line 1 – Line 2) * (1 – Line 3), units converted
6	**Sewage Effluent Input Rate (L/day)**	10,000	Specified by Site Plan
7	**Annual Sewage Effluent Input (L/yr)**	3,650,000	Line 6 * 365, units converted
8	**Total Water Input (L/yr)**	22,453,400	Line 5 + Line 7, units converted
9	**Nitrate Loading (mg/L/lot)**	40	Specified by the D-5-4 Guideline
10	**Annual Nitrogen Loading (mg/yr)**	146,000,000	Line 7 * Line 9, units converted
11	**Attenuated Nitrogen Concentration (mg/L)**	6.50	Line 10 / Line 8, units converted

Similarly, using the dilution approach, the attenuated nitrogen concentration while applying a maximum sewage generation rate of 10,000 L/day before requiring an ECA for operation, is 6.50 mg/L. Less than the maximum allowable concentration of 10 mg/L as per the ODWS.

On-Site Sewage System – Sewage System Sizing

The feasibility of the sewage servicing system also depends on whether the lot is large enough to accommodate a Standard Class IV on-site sewage system. Based on the D-5-4 Guideline, lots of at least one hectare in size do not need further study, as it is clear that sufficient space exists to accommodate a sewage system including tile bedding. Based on our experience, sizing does not become a concern until lots are less than about 0.4 ha (1 acre) in size. The D-5-4 Guideline provides an exclusion from further assessment for sizing and attenuation for individual residential lots greater than 1 hectare in size.

Based on the sewage use similar large residential home, it is clear that a standard Class IV sewage system will be able to fit on the proposed lot of 9.7 ha.

Private Well and Water Supply

It is noted that the D-5-5 Guideline for Private Well Water Supply Assessment applies to industrial and commercial developments where water is used for human consumption. The quantities provided herein are strictly related to supply needed for human consumption to meet Guideline expectations and are not necessarily reflective of quantities required for facility operations. However, comment on potential supply yield is provided in a generic sense for reference.

While the Guideline typically calls for water supply requirements of 450L/day per person for a residential development, the water supply needs of this commercial development are assumed to be met based on design flow previously discussed. Following the sewage design flow of 3,025 L/day based on guidance from the OBC, as mentioned previously. The peak demand is specified as 3.75 L/min/person for 120 minutes

each day, with a minimum rate requirements of 13.7 L/min. Therefore, it is reasonable to expect that the development must meet a minimum supply demand that matches the design flow of 3,025 L/day with a peak demand rate of approximately 150 L/min over the duration of 120 minutes.

Based on nearby water well records and hydrogeological literature by Singer, Cheng and Scafe (2003), it appears that there are aquifers capable of supplying the required flow rate in the underlying bedrock. Anecdotally, the use and existence of the wells on adjacent lands suggest that bedrock wells are able to provide sufficient water quantity to support the proposed development. However, it is noted that the water quality from supply generated in the Salina Formation has been reported to have high concentrations of sulphate, iron and hardness due to the presence of anhydrite and gypsum throughout the bedrock unit.

A majority of the MECP well records in the vicinity of the Site indicate pumping test results that do not meet the peak demand rate. Of the 28 well records reviewed within 500 metres of the Site, 16 had information reporting pumping test results. No records specifically indicate the capability of supplying the peak demand quantity and duration. It is noted that the pumping rates range from approximately 20 L/min to 190 L/min suggesting the peak demand quantity is likely achievable. Additionally, the average drawdown reported amongst the well records is approximately 26% with two records showing no observed drawdown altogether after the completion of a pumping test. Based on this analysis, it is evident that the aquifer is considered to have “good” yields. Detailed information regarding the wells in the vicinity of the site have been tabulated in Enclosure A and shown with approximate locations in Figure 3.

In addition to showing existing water taking rates, a more detailed assessment of the potential water supply available using the local well records can be established to estimate the hydraulic properties of the underlying bedrock aquifer. To do this, the estimation method for “apparent transmissivity, as described in Maathuis and van der Kamp (2006), was applied to the study area wells.

The apparent transmissivity method is roughly based on the Cooper-Jacob (1946) method of pumping test analysis and involves the iterative solution of the following system of equations:

$$T_a = \frac{Q_t}{4\pi s}\left(-0.5772 - \ln(u) + u - \frac{u^2}{2 \cdot 2!} + \frac{u^3}{3 \cdot 3!}\right)$$

$$u = \frac{{r_c}^2 S}{4 T_a t}$$

Where:

- T_a is the apparent transmissivity (m^2/d)
- Q_t is the pumping rate during the test (m^3/d)
- s is the drawdown measured at the end of the pumping test (m)
- r_c is the radius of the well casing (m)
- S is the storativity (assumed 10^{-4})
- t is the duration of the pumping test (days)

The method was applied to 13 bedrock wells within 500 metres of the subject property in which there was sufficient data available to estimate transmissivity. The tabulated source data and calculation results are provided in Enclosure C. The average apparent transmissivity of the well records was approximately 24 m^2/day. For comparison, transmissivities in the order of 10 m^2/day or greater indicate high competency for supplying demand.

Based on the pumping rate and water column information provided in the local well records, the estimated apparent transmissivities of the available bedrock aquifer(s), as well as background geological mapping and reporting, it is anticipated that groundwater resources within the subject lands would be able to support a private water supply system capable of meeting water taking needs and peak flow specifications.

In the event that the on-site aquifer(s) cannot supply peak demand requirements, it may be beneficial to include water storage infrastructure design in the proposed development to administer water supply at peak demand periods while passively collecting water from the tapped aquifer(s) at a sustainable and approved rate of water taking. It is recommended that the design of such a supply network system be completed by a licensed well contractor and water management specialist to ensure adequate intake distances and depths are met while meeting pumping demands.

It is recommended that newly installed wells are located with respect to separation requirements set forth in the OBC from surface features. It is recommended that wells are drilled into the bedrock aquifer(s) and be constructed with a water-tight casing an annular seal extending from the surface to the approximate depth of the screen/open interval. Further, it is recommended that the design and installation of water supply wells be completed with a treatment system that can mitigate water quality issues previously identified (i.e., high sulphate, iron and hardness) in addition to any other susceptible impacts from activities at the surface (Singer, Cheng & Scafe, 2003). Such treatment elements may include reverse osmosis systems, UV or chlorination disinfection systems, and water softeners, as needed. To determine the appropriate systems, water quality testing should be completed on the intended supply well after installation and development.

Water Taking Impacts

The introduction of a new water supply well has the potential to affect existing wells that may be screened within the same aquifer system. Based on the proven performance of the aquifer system along the escarpment and within the area, it is reasonable to expect that the proposed water use (similar to a residential home) will not cause impacts beyond the proposed property limits.

Conclusion & Recommendations

A scoped Site Servicing Feasibility Study (D-5-4 and D-5-5 Studies) has been conducted for a proposed a commercial manufacturing facility located at 255 Watson Drive within the Municipality of West Grey and in close proximity to the community of Mount Forest, within the jurisdictional boundary of the Township of Wellington North. This study has been conducted to assess the feasibility of the Site to support the proposed severance and commercial development. The severed lot has a proposed size of 7.67 ha (18.96 acres) and will be merged with the neighbouring property 2.04 ha (5.04 acres) in size, for a total lot size of 9.71 ha (24 acres).

Based on the above analysis, the findings of this assessment indicate that:

- the proposed lot is suitable for servicing with a standard Class IV or equivalent on-site sewage system with a low potential for impacting local water resources. Using the D-5-4 Guideline predictive assessment method, the resultant nitrate concentration for the entire proposed layout was calculated to be 2.22 mg/L, which is below the ODWS of 10 mg/L;

- based on available well records in the surrounding area, sufficient groundwater is anticipated to be available from the bedrock aquifer system, based on the estimated aquifer transmissivity; and

- the hydrogeological conditions generally support the proposed development with a private sewage system and water supply well with no impacts or interference with present water resources.

We recommend that:

- the construction of the sewage system conform to the Ontario Building Code with respect to the T-time of the soils underlying the specific location intended for construction of the distribution bed, groundwater, or impermeable layers, and required setbacks from all applicable features confirmed as part of the design and construction phase of development;

- the on-site sewage system be designed and constructed by a licensed septic system installer per the Ontario Building Code and in respect to the required setbacks from applicable features;

- the water supply well is to be installed to meet the requirements of O. Reg. 903 and constructed with a minimum six metre casing; and

- the water quality from the supply well be tested to establish the owners preferred treatment levels for aesthetic parameters. Regardless of the natural water quality, the water system for the proposed development be furnished with a disinfection system.

Sincerely,

GEI CONSULTANTS CANADA LIMITED

Cuirin Cantwell, M.Eng., EIT
Technical Specialist

Matthew Nelson, P.Eng., P.Geo.
Senior Project Manager

CC/MN

Enclosures

Figure 1	Site Location	Enclosure A	Well Information Summary
Figure 2	Site Layout	Enclosure B	Grain Size Analysis Results
Figure 3	Study Area Wells	Enclosure C	Apparent Transmissivity Calculations

cc: Jeffery Holland, Viking-Cives Ltd.
Darren Hewgill, GEI Consultants Canada Ltd.

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Figures

Hydrogeological Feasibility Study

255 Watson Drive
Community of Mount Forest
Municipality of West Grey, ON

LEGEND

Property Boundary

SITE

Mount Forest

Figure 1

Site Location Map

Viking-Cives Expansion

GEI Consultants

April, 2025
Project No. 2401249
Projection EPSG:3857
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0 1 2 km

Hydrogeological Feasibility Study

255 Watson Drive
Community of Mount Forest
Municipality of West Grey, ON

LEGEND

- Retained Land (Viking-Cives)
- Severed Land (Viking-Cives)
- Merged Land

Figure 2

Site Layout

Viking-Cives Expansion

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Hydrogeological Feasibility Study

255 Watson Drive
Community of Mount Forest
Municipality of West Grey, ON

LEGEND

- Property Boundary
- Study Area (500 m)
- Study Area Wells

Figure 3

Study Area Wells

Viking-Cives Expansion

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0 125 250 m

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Enclosure A – Well Information Summary

Well Information Summary

WELL ID	LOT	CON	GEO. TOWNSHIP	EASTING	NORTHING	USAGE	WELL TYPE	STATIC WATER LEVEL	TOTAL DEPTH	DEPTH TO BEDROCK
								(mbgs)	(mbgs)	(mbgs)
2501699	73	A	NORMANBY	519714	4869963	WATER SUPPLY	BEDROCK	10.97	67.06	48.77
2504642	31	1 W	NORMANBY	519734	4871012	WATER SUPPLY	BEDROCK	1.83	28.04	27.13
2504969	31	1	EGREMONT	519934	4870989	WATER SUPPLY	BEDROCK	9.75	42.67	27.74
2505188	31	1 W	NORMANBY	519934	4870604	WATER SUPPLY	BEDROCK	4.57	45.72	33.53
2505500	32	1 W	NORMANBY	520264	4870694	WATER SUPPLY	BEDROCK	3.05	35.05	33.83
2513332	31	1 W	NORMANBY	519453	4870763	WATER SUPPLY	BEDROCK	3.05	28.04	26.21
2513858	31	1 W	NORMANBY	519912	4870830	WATER SUPPLY	BEDROCK	3.05	42.06	29.57
2516376	31	1 W	NORMANBY	519753	4870940	WATER SUPPLY	BEDROCK	3.66	28.96	27.74
2516381	31	1 W	NORMANBY	519755	4870876	WATER SUPPLY	BEDROCK	3.66	30.48	28.96
2516833	32	1 W	NORMANBY	519910	4870952	WATER SUPPLY	BEDROCK	3.05	35.36	28.96
7046938	32	1 W	NORMANBY	520063	4870845	WATER SUPPLY	BEDROCK	4.88	41.76	32.92
7101817	31	1 W	NORMANBY	519826	4870785	WATER SUPPLY	BEDROCK	7.62	31.39	27.13
7160019	32	1 W	NORMANBY	520073	4870419	WATER SUPPLY	OVERBURDEN	2.74	34.14	-
7160026	32	1 W	NORMANBY	519915	4870556	WATER SUPPLY	OVERBURDEN	2.74	31.70	-
7160039	32	1 W	NORMANBY	519591	4870335	WATER SUPPLY	BEDROCK	13.72	66.75	40.23
7183212	32	1 W	NORMANBY	519634	4870415	WATER SUPPLY	BEDROCK	9.14	59.74	34.14
7305035	32	1 W	NORMANBY	519899	4869966	OBSERVATION	OVERBURDEN	-	1.37	-
7305036	32	1 W	NORMANBY	519861	4869952	OBSERVATION	OVERBURDEN	-	6.00	-
7308784	31	1 W	NORMANBY	519913	4870959	WATER SUPPLY	BEDROCK	3.66	35.66	29.26
7310505	32	1 W	NORMANBY	519909	4870945	ABANDONED	-	-	-	-
7323362	32	1 W	NORMANBY	519861	4869952	OBSERVATION	OVERBURDEN	-	1.83	-
7323363	32	1 W	NORMANBY	519899	4869966	ABANDONED	-	-	-	-
7323366	32	1 W	NORMANBY	519873	4869923	ABANDONED	-	-	-	-
7325616	32	1 W	NORMANBY	520006	4870825	WATER SUPPLY	BEDROCK	2.74	29.57	26.52
7409035	31	1 W	NORMANBY	519513	4870668	UNKNOWN	-	-	-	-
7439322	32	1	EGREMONT	520284	4870809	UNKNOWN	-	-	-	-
7441107	32	1 W	NORMANBY	520204	4870399	UNKNOWN	-	-	-	-
7443971	31	1 W	NORMANBY	519664	4870885	UNKNOWN	-	-	-	-
							AVERAGE	5.22	34.45	31.41

*** Highlighted rows indicate well records found within the subject property.**

Enclosure B – Grain Size Analysis Results

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Tel: 519-699-5775
Fax: 519-699-4664
www.cmtinc.net

September 21, 2021 01-133.R29

H. Bye Construction Ltd.
395 Church Street West
P.O. Box 189
Mount Forest, Ontario
N0G 2L0

Attention: Mr. Tom Bye

Dear Sir:

Re: Laboratory Test Results
Grain Size Analysis and T-Time Determination
Randhar Lots

As requested, CMT Engineering Inc. (CMT Inc.) has performed a gradation analysis on a sample obtained from the above-referenced site and submitted to the CMT Inc. laboratory in St. Clements, Ontario on September 17, 2021.

The sample can be classified as SM using the Unified Soil Classification System. The corresponding soil percolation rate, as referenced to Section 6 of the Supplementary Guidelines to the Ontario Building Code 2012 (amended in 2019), would be T = 12 min/cm. The grain size analysis is attached (Figure 1).

It should be noted that these test results are based on a single sample delivered to our laboratory and do not constitute as a guarantee for the entire site. Additional test samples should be obtained and tested if there is a variation observed at any time.

We trust this information meets with your present requirements. Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

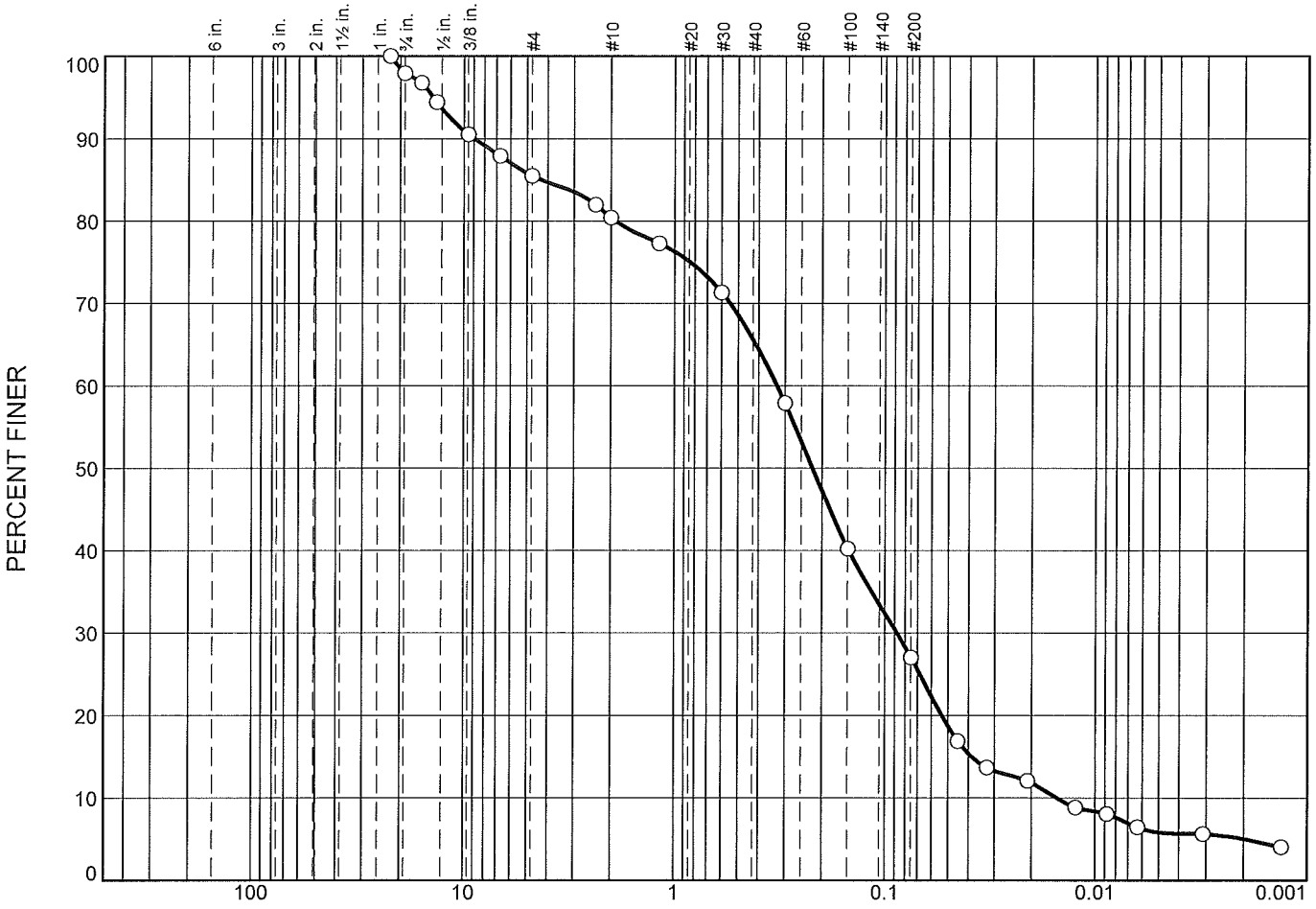
Marci Smith, C. Tech
Laboratory Manager

LICENSED PROFESSIONAL ENGINEER
09/21/21
N. J. CHORTOS
100210851
PROVINCE OF ONTARIO

Nathan Chortos, P. Eng.

Encl. Grain Size Analysis

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	2.1	12.4	5.1	14.8	38.6	22.0	5.0

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	Client	1		silty sand, some gravel, trace clay	SM
				Estimated Percolation Rate; T = 12 min/cm	
				Submitted to Lab September 17, 2021	
				Tested by MS of CMT Engineering Inc., September 18, 2021	

CMT Engineering Inc.

St. Clements, ON

Client: H. Bye Construction

Project: Randhar Lots

Project No.: 01-133

Figure 1

Enclosure C – Apparent Transmissivity Calculations

Apparent Transmissivity Calculations

WELL ID	DURATION		DRAWDOWN		RATE		DIAMETER		u	Ta*
(--)	(hours)	(days)	(ft)	m	(GPM)	(cu.m/d)	(in.)	(m)	(--)	(m^2/d)
2504642	1.5	0.0625	24	7.32	30	196.56	4	0.102	8.33E-11	48.4
2504969	3	0.1250	28	8.53	8	52.416	4	0.102	8.06E-10	10.0
2505188	2	0.0833	15	4.57	35	229.32	4	0.102	5.86E-11	91.7
2505500	1	0.0417	50	15.24	20	131.04	4	0.102	1.79E-10	15.0
2513332	1	0.0417	17	5.18	25	163.8	5	0.127	7.34E-11	57.2
2516376	2	0.0833	17	5.18	10	65.52	6	0.152	5.82E-10	20.8
2516381	2	0.0833	24	7.32	12	78.624	6	0.152	6.91E-10	17.5
2516833	1	0.0417	0.2	0.06	12	78.624	6	0.152	2.25E-12	2693.7
7101817	2	0.0833	40	12.19	12	78.624	6	0.152	1.17E-09	10.3
7160039	1.5	0.0625	35	10.67	7	45.864	6	0.152	1.33E-09	6.8
7183212	1	0.0417	70	21.34	10	65.52	6	0.152	1.23E-09	4.9
7308784	1	0.0417	29	8.84	10	65.52	6	0.152	4.92E-10	12.3
7325616	2	0.0833	51	15.54	10	65.52	10	0.254	5.42E-09	6.2
									Geometric Mean	24.2

*Ta - Apparent Transmissivity. Calculated using an assumed Storage of 10^{-4} (geometric mean Singer et al 2003).
Duration of Pumping, Drawdown, Pumping Rate, and Well Diameter all taken from the respective well records.