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ON-SITE SEWAGE SYSTEM DESIGN AND WATER RESOURCE IMPACT STUDY

Caledon Service Centre, 14027 Hurontario Street, Inglewood

Project #: 22-0162
Prepared for: BVD Holdings Caledon Inc.
Date: August 26, 2022

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August 26, 2022

BVD Holdings Caledon Inc.
130 Delta Park Boulevard
Brampton, Ontario L6T 5E7
Attention: Bikram Dhillon

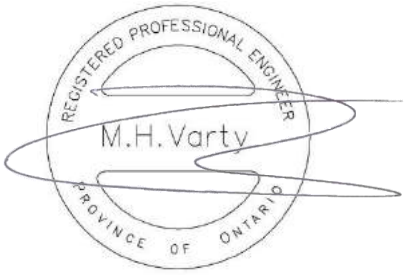
SUBJECT: ON-SITE SEWAGE SYSTEM DESIGN AND WATER RESOURCE IMPACT STUDY, CALEDON SERVICE CENTRE

EnVision Consultants Ltd. is pleased to present the enclosed On-Site Sewage System Design and Water Resource Impact Study for the development proposed at 14027 Hurontario Street, Inglewood, ON.

The enclosed technical report describes the existing conditions at the site, provides a design brief illustrating the proposed sewage treatment and disposal system and includes a water resource impact study in accordance with the *MOE Design Guidelines for Sewage Works (2008)*. Engineering design drawings are included in the Appendix of this report.

If there are any questions regarding the proposal, please do not hesitate to contact us.

Yours sincerely,



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1. INTRODUCTION

1.1. BACKGROUND

At the request of BVD Holdings Caledon Inc. (the 'Client'), EnVision Consultants Ltd. (EnVision) is pleased to submit the following report documenting the detailed sewage system design and water resource impact assessment at the Caledon Service Centre (the 'site'). A location map is provided as Figure 1, attached.

The site is located in the Region of Peel, at the northeast quadrant of the Hurontario and King Street intersection. The site is currently vacant with the exception of an abandoned residential building. The area immediately surrounding the site generally consists of mixed commercial and agricultural areas with minor rural residential properties present. The site is generally rectangular in shape and occupies an area of approximately 3.2 hectares.

The development plans include the construction of:

- a gas bar and cardlock;
- a convenience store;
- two, eight (8) seat, restaurants;
- two (2) commercial office spaces; and,
- a stand-alone, forty (40) seat, fast-food style restaurant.

Municipal wastewater services are not available at the site; therefore, the site will be serviced via private on-site sewage system. Water supply will be provided by way of municipal connection. As the daily sewage flow for the site (as proposed) is greater than 10,000 L/day, the Ministry of Environment, Conservation, and Parks (MECP) will be the regulating authority for the proposed sewage works, under Section 53 of the Ontario Water Resources Act.

In preparation of this report, EnVision reviewed background material provided by the Client including:

1. *Geotechnical Investigation for a Commercial Property Located at 14027 Hurontario Street, Inglewood, Ontario, A&A Environmental Consultants,* October 25, 2019.
2. *Small-Scale Hydrogeological Assessment Residential Property Located at 14027 Hurontario Street, Inglewood, ON, A&A Environmental Consultants,* November 29, 2019.

EnVision has reviewed these reports as background information and input to the design process and water resource impact study.

1.2. OBJECTIVES AND SCOPE

The objectives of this study are as follows:

- To review background information to aid in the understanding of the geotechnical and hydrogeological characteristics of the site;
- To calculate the theoretical daily design sewage flow of the proposed development;
- To infer the sewage quality characteristics for the proposed development;
- To complete an on-site sewage treatment and disposal system design for the wastewater generated by the proposed development;
- To complete a water resource impact study related to the proposed new sewage disposal system servicing the proposed development; and,
- To recommend a monitoring program for the proposed sewage system.

This report has been prepared in accordance with the above-noted objectives as detailed in the following Sections.

1.3. MECP PRE-CONSULTATION

A pre-consultation letter report was prepared by EnVision and was submitted to the MECP Halton-Peel District Office on May 20, 2022. The letter outlined the general site characteristics, daily design sewage flow, sewage strength, and water resource impact study.

The MECP technical support group reviewed the pre-consultation letter and commented on EnVision's initial classification of the site as a low permeability environment. Subsequent communications with the MECP technical support group, including the supervisor for the Central Region Water Resources Unit, determined that a total nitrogen limit of 5 mg/L would be appropriate for the protection of groundwater resources in the site area.

This pre-consultation letter and correspondence from the Water Resources Unit is provided in Appendix A.

2. PROJECT SETTING

2.1. SITE LOCATION

The site is located on the northeast corner of Hurontario Street and King Street, approximately 5 km from the northern extent of the 410 Highway, in a mixed commercial and agricultural area with minor rural residential properties present in the Region of Peel. The site is generally rectangular in shape and occupies an area of approximately 3.2 hectares. The site is currently vacant, with an abandoned structure on the site.

It is understood that this geographic portion of the Town of Caledon is now serviced by means of a 300 mm diameter PVC Watermain with 25 mm water services lines teeing off of the main; including the properties located immediately downgradient of the site.

2.2. REGIONAL PHYSIOGRAPHY

The site lies within the South Slope Physiographic Region (Figure 2), as described by the Ontario Geological Survey (Chapman and Putnam, 1984). The South Slope is characterized by the presence of clayey silt till and silty clay tills immediately below ground surface.

Available mapping indicates that the local surficial geology at or near the surface is described as clayey to silt textured till. The surficial geological mapping is provided in Figure 3.

Observations made from site investigations completed by *A&A Environmental Consultants* (2019) are consistent with the literature review as detailed in Section 2.6 of this report.

2.3. LOCAL TOPOGRAPHY

Surficial topographic mapping, see Figure 4, notes a topographical elevation of approximately 290 m above sea level (ASL) at the west extent of the site sloping slightly to the east.

It is assumed that the direction of shallow groundwater flow is a subtle reflection of topography, as such, local shallow groundwater is inferred to flow east towards a tributary of Etobicoke Creek. Etobicoke Creek is approximately 300 m from the eastern edge of the site.

2.4. REGIONAL BEDROCK GEOLOGY AND OVERBURDEN THICKNESS

The site is underlain by bedrock belonging to the Queenston Formation (Figure 5), which is primarily characterized by shale; and also contains red siltstone. Regional bedrock topography indicates that bedrock is at an elevation of approximately 245 m to 250 m ASL at the site; falling to the east. This indicates that the drift thickness at the Site is approximately 40 m to 45 m in depth.

2.5. HYDROSTRATIGRAPHY

The hydrogeologic setting was interpreted based on the local water well record database maintained by the MECP. The location of water supply wells near the study area are shown on Figure 6. The location of these wells has been based on the information contained within the individual well records (i.e., key maps) and not necessarily based on the UTM coordinates provided in the MECP Database. This was completed to increase the accuracy of the information, as the UTM coordinates, especially for older wells, can be inaccurate. Figure 7 is a hydrostratigraphic interpretation of the subsurface sediments and bedrock conditions based on the results of this review.

The water wells reviewed indicate that the soil is generally clay with discontinuous mixtures of silt, sand, and gavel, as well as isolated areas of sandier material of limited horizontal and vertical extent. Water producing zones for historic domestic consumption were noted between 10.7 m and 39.6 m below ground surface in the water records reviewed.

The regional hydrogeologic setting of the area is described below with the visual aid of hydrostratigraphic section A-A' (Figure 7). The hydrostratigraphy consists of the following types of units:

Upper Aquitard

Overburden Aquifer

The Upper Aquitard is generally a silt or clay till from approximately ground surface to generally greater than 10 m in depth, with the exception of groundwater monitoring well 7104751 which reported a silty sand till seam between 8.1 and 9.5 m below ground surface and drinking water well 7045631 which also noted the silty sand till seam from 6.7 to 18.3 m, although it did not encounter a water producing zone until deeper in the hole. This aquitard is comprised of mostly fine-grained sediments that behave as a protective layer above the water-bearing units. The aquitard is generally described as clay, with varying amounts of sand, silt and gravel and will have reduced permeability. The aquitard acts as a barrier to retard the vertical movement of groundwater, including sewage inputs, from the ground surface to the underlying aquifer(s).

The Overburden Aquifer(s) is comprised of somewhat more granular sediments than the aquitard, varying from sand, to silt and gravel, to clay and gravel, of generally limited vertical extent. Water producing zones for historic domestic consumption were noted between 10.7 m and 39.6 m below ground surface in the water records reviewed.

2.6. HISTORIC SITE INVESTIGATIONS

A preliminary geotechnical investigation was completed by *A&A Environmental Consultants Inc.* in July and October 2019. It is understood that the investigations consisted of eight (8) boreholes designated as BH-1 through BH-8 drilled across the proposed development.

The boreholes were completed to depths ranging from 3.0 meter below ground level (mbgl) to 9.1 mbgl. Monitoring wells were installed at BH-1, BH-2, and BH-3 to monitor groundwater elevations.

The shallow soils on site generally consist of a thin layer (approximately 1.5 to 2.25 m) of variable soil types (generally silt to silty sand) underlain by clayey silt or silty clay till continuing to the depth of the boreholes (maximum borehole depth was recorded as 9.1 mbgl). It is noted that BH-7 and BH-8 were dissimilar to the other boreholes in the sense that these logs indicated a predominately sand composition to the upper portion of the subsurface. These boreholes were completed near to Hurontario Street and King Street, respectively, based on the borehole map provided and thus the soil composition may be indicative of fill activity from road construction rather than the native soil type.

The soils tested from the geotechnical investigations at the site have an estimated percolation rate (T-time) of approximately 45 to 50 min/cm based on the principles of the Unified Soil Classification System (USCS). As per Appendix 6.3.1. and 6.3.2. of the Manual of Policy, Procedures and Guidelines for Private Sewage Disposal Systems (MECP, 1982) the soils would likely be classified as SC soils with high clay content. The corresponding coefficient of permeability according to the MECP document would be considered 10^{-6} cm/s for this soil type.

Groundwater was noted in BH-1, BH-2, and BH-3 at relatively shallow depths of approximately 5.8 mbgl, 7.3 mbgl and 3.3 mbgl respectively as measured on July 12, 2019 by *A&A Environmental Consultants Inc.* The borehole logs and borehole location plan are provided in Appendix B.

EnVision completed five (5) shallow hand auger holes at the site on May 17, 2022, targeted in the area of the proposed sewage disposal system. The hand auger locations are provided on the design drawing (Appendix C), while the hand auger logs and soil test results are provided in Appendix B. In general, the shallow hand augers noted a silt and clay soil type, while the particle size distribution analysis demonstrates a percolation rate of approximately 45 min/cm in accordance with the principles of the USCS.

3. PROPOSED SEWAGE TREATMENT AND DISPOSAL SYSTEM

A technical description of the design and construction specifications is described in the sections below. The detailed sewage system design drawing is included in Appendix C.

3.1. DESIGN FLOW

The Property itself is planned to consist of the following features:

- a gas bar and cardlock;
- a convenience store;
- two, eight (8) seat, restaurants;
- two (2) commercial office spaces; and,
- a stand-alone, forty (40) seat, fast-food style restaurant.

The theoretical total daily design sewage flow for the Site has been based on the combined theoretical sewage flows for the individual occupancy uses as per Table 8.2.1.3.B of the Ontario Building Code (OBC, 2012). These flows have been summarized in Table 1 below:

Table 1 Theoretical Peak Daily Sewage Flow Calculations

Description of Unit	Number of Units	Flow Per Unit (L/day)	Total Flow (L/day)
Gas Bar			
Gas Bar Fuel Outlets[a]	6	560	3,360
Cardlock Fuel Outlets[a]	4	560	2,240
Gas Bar Convenience Store			
Washrooms[a]	3	950	2,850
Restaurant #1			
Seats[b]	8	125	1,000
Restaurant #2			
Seats[b]	8	125	1,000
Restaurant #3			
Seats[b]	40	125	5,000
Office Building #1			
Floor Area[c]	335	75 per 9.3 m^2	2,700
Office Building #2			
Floor Area[c]	335	75 per 9.3 m^2	2,700
		Total Flow	**20,850**

a) Based on Table 8.2.1.3.B of the Ontario Building Code for "Service Stations"
b) Based on Table 8.2.1.3.B of the Ontario Building Code for "Food Service Operation (not 24-hour)".
c) Based on Table 8.2.1.3.B of the Ontario Building Code for "Office Building".

Based on the above calculated sewage flow values, the total combined peak daily design sewage flow for the Site is estimated at 20,850 L/day. It should be noted that the theoretical flows calculated are typically conservative and overestimate the actual daily sewage flow.

3.2. WASTEWATER STRENGTH

It is inferred that the primary sources of wastewater for the site are from the following:

- Convenience Store and Restaurant Bathroom Facilities (water closets and sinks);
- Restaurant Kitchen Facilities; and,
- Office Complex Bathroom Facilities (water closets, and sinks).

Given the sources of the wastewater noted above, and the nature of the facilities, it is inferred that the sewage strength will be domestic in origin; however, will be high strength for parameters such as BOD_5, TSS, Fats/Oil/Grease (FOG), and ammonia. Provided in Table 2 are the anticipated concentrations of key sewage parameters in the wastewater stream; these concentrations are inferred to be representative of the mixed sewage strength at the proposed site.

Table 2 Theoretical Sewage Strength

Parameter	Typical Concentration Range (mg/L)		Anticipated Concentration (mg/L)
	Low	High	
BOD_5	500	2,000	1,250
Total Suspended Solids	150	1,000	750
Total Nitrogen	40	200	100
Total Phosphorous	4	50	20

The concentrations of the parameters noted above are based on EnVision's experience with similar development sites throughout Ontario.

Process calculations for the sewage treatment system, provided in Appendix D, have been based on the anticipated concentrations listed above. The design of the system is contingent on these input concentrations and as such any significant deviations in influent quality that are noted during the monitoring program (see Section 6) should be identified to EnVision so that design and operation alterations can be contemplated.

3.3. TREATMENT AND DISPOSAL METHOD

Given the shallow soil type noted in Section 2 of this report, and the peak daily design sewage flow of 20,850 L/day, an advanced sewage treatment system discharging to a partially raised *Type A* dispersal bed has been selected as the preferred servicing option.

Using a *Type A* sewage disposal system, in conjunction with an advanced treatment unit, there is capacity to hydraulically load the contact soils at a greater rate than conventional systems due to the reduced strength of the sewage being discharged. This allows for a reduction in the total area required for the installation. Detailed design drawings for the proposed sewage works are provided in Appendix C.

3.4. SEWAGE SYSTEM DESIGN PARAMETERS

As the peak theoretical daily design sewage flow for the site is greater than 10,000 L/day, the *Ontario Building Code* requirements are no longer the regulatory guideline for the proposed sewage disposal system; however, they have been used as the general basis for this design. Sewage disposal systems that have a design capacity more than 10,000 L/day are regulated by the MECP, under Section #53 of the Ontario Water Resources Act (R.S.O. 1990). Guidelines for the design of large private sewage disposal systems have been published by the MECP, specifically the *Design Guidelines for Sewage Works 2008*. This document has also been used as the overarching basis for the proposed treatment and disposal system design, and associated water resource impact study.

The proposed sewage treatment system has been designed to achieve Level IV treatment concentrations as defined in Table 8.6.2.2.A of the OBC, in addition to nitrogen reduction as required by the impact assessment (see Section 5). The effluent objectives are noted in Table 3 below:

Table 3 Effluent Objectives

Sewage Effluent Parameter	Proposed Effluent Objective (mg/L)
$CBOD_5$	10
TOTAL SUSPENDED SOLIDS	10
TOTAL NITROGEN	5

Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) is a measure of the oxygen demand exerted by carbon in the sample; with the nitrogenous oxygen demand suppressed using an inhibitor. Since most factors that are conducive to improved effluent quality from secondary (or better) wastewater treatment systems are also conducive to nitrification, the effluent Biochemical Oxygen Demand (BOD_5) values can erroneously indicate poorer quality due to the nitrogenous oxygen demand. $CBOD_5$ results are thus a more accurate reflection of sewage quality for secondary or better wastewater effluent.

Total suspended solids (TSS) are a measure of fixed and volatile solids within the effluent sample. Both $CBOD_5$ and TSS reduction are important to ensure the long-term functionality of the sewage disposal system.

Total Nitrogen (TN) is the sum of all nitrogen forms (Ammonia Nitrogen, Organic Nitrogen (Nitrogen within amino acids and proteins), Nitrite, and Nitrate). Nitrification is a microbial process by which reduced nitrogen compounds (primarily ammonia) are sequentially oxidized to nitrite and nitrate. The nitrate is then removed from the wastewater through a process called denitrification. Denitrification is the process by which nitrates are reduced to gaseous nitrogen by facultative anaerobes. If oxygen is available, the denitrifying bacteria use it for metabolism before they use the nitrate and thus dissolved oxygen concentrations must be minimized for the denitrification process to function. Nitrogen containing compounds such as ammonia will naturally be converted to nitrate within the effluent plume if not fully treated prior to disposal and will ultimately join the shallow groundwater regime via the subsurface disposal system and exit the property boundary down gradient of the system.

Although Total Nitrogen reduction is not required to ensure the long-term viability of the sewage disposal system, nitrate is a health-related parameter in drinking water and as such treatment, in this circumstance to 5 mg/L, is required as discussed in Section 5.

3.5. SEWAGE SYSTEM CLEARANCE DISTANCES

Given that the design of the sewage disposal systems will be a partially raised *Type A* bed, constructed on soils with a native percolation rate of 45 min/cm, the standard minimum clearance distances from the distribution pipe must be increased by twice the raised height of the *Type A* bed to the designated objects noted below. As noted in the design drawings (Appendix C), the area bed will be raised by a maximum of approximately 1.5 metre.

Table 4 Minimum Distance Separation from Leaching Bed Pipes

Designated Object	Standard Clearance (m)	Adjusted Clearance (m)
Structure	5	8
Drilled Well	15	18
Any Other Well	30	33
Property Line	3	6
Water Body, Course, or Spring	15	18

Table 5 Minimum Distance Separation from Sewage Treatment Tanks

Designated Object	Standard Clearance (m)
Structure	1.5
Well	15
Property Line	3
Water Body, Course, or Spring	15

The MECP document, *Design Guidelines for Sewage Works 2008*, states that vertical separation between the infiltration surface and the water table needs to be maintained to achieve acceptable pollutant removal, sustain aerobic conditions in the subsoil, and provide an adequate hydraulic gradient across the infiltration zone. Based on the OBC requirements for *Type A* sewage disposal systems, the minimum

clearance distance to the high groundwater table or impermeable soil from the base of the stone layer shall be 600 mm; however, for large sewage system groundwater mounding must also be considered (see Section 4 of this report).

3.6. SEWAGE COLLECTION

The sewage collection system from the individual site uses will be designed by the Civil Engineer for the project under separate cover. Due to the distance from the sewage treatment tanks to the individual commercial buildings it is likely that the collection network will require a small pumping station at its terminus. EnVision has designed the pre-treatment system under the assumption that the sewage entering the flow equalization tank is under pressure and that the elevation of the inlet to that tank is not dependant on the elevation of the collection network.

It will be the responsibility of the civil engineer to design an appropriate pumping station, including the pumps, controls, benching, etc., to discharge the sewage to the treatment system described in the Sections that follow.

It is understood that commercial restaurant uses are part of the site plan. Sewage from the kitchen facilities (i.e., preparation sinks, kitchen sinks, slop sinks, and floor drains) in the restaurants will flow by gravity to two (2) external 7,000 L grease tanks connected in series. Wastewater from washroom facilities in the restaurants must bypass the external grease tanks and enter directly into the main sewage collection network.

The grease tanks will provide sufficient retention time to cool and separate the fats, oils, and greases from the wastewater stream. It is critical that the grease tanks are appropriately maintained and pumped on a frequent basis to protect the downstream treatment facilities and the subsurface sewage disposal system. It has been EnVision's experience that commercial kitchen facilities require the grease tanks to be pumped on a bi-monthly basis, depending on the store usage. Failing to adequately care for, and maintain, these tanks will likely result in pre-mature failure of the sewage pumps, treatment equipment, and disposal system.

3.7. FLOW EQUALIZATION AND SLUDGE STORAGE

The flow equalization tank will provide useable storage to buffer the treatment system from peak instantaneous flows, as well as providing a consistent flow rate to the system. This allows for a sewage capacity greater than the instantaneous flow during peak usage periods, thus minimizing the size of subsequent equipment to accommodate for average daily flows. The intention of the flow equalization in this case is not to accommodate daily flows greater than 20,850 L/day, but rather to accommodate the peak usage periods (hourly) of the facility.

Sewage from the collection system will enter to the proposed 22,000 L single compartment flow equalization tank which has been sized to accommodate the daily sewage flow. The flow equalization tank should be equipped with a vent pipe, or vented lid, complete with a carbon filter for odour removal, to mitigate the possibility of the tank pressurizing and depressurizing when the pumps are used.

Effluent from the flow equalization tank will be pumped into one single compartment 42,000 L (working capacity) sludge storage tank by two (2) alternating BJM SV400, 0.5 hp, (or equivalent) submersible sewage pumps via a 50 mm diameter flexible HDPE forcemain. The sewage will be discharged at a rate of 20,850 L/day, or 869 L/hour, into the sludge storage tank. The pumps should be set to discharge approximately 217 L/dose, once every 15 minutes (each pump to run 2 times per hour, offset by 15 minutes from each other).

Effluent from the flow equalization tank shall pass through one (1) ultrasonic flow meter (Keyence Model FD-Q or equivalent), installed on the 50 mm forcemain to the sludge storage tank. The flow meter will allow for the raw sewage discharge rates to be accurately measured.

The 42,000 L (working capacity) sludge storage tank will promote coarse particles to settle from the sewage and provide storage for the scum and sludge return from the clarifiers. Effluent will flow from the sludge storage tank, by gravity, to a single compartment 13,300 L primary clarification tank via a 150 mm diameter PVC pipe.

The 13,300 L (working capacity) primary clarification tank will provide additional volume to separate settable (and buoyant) particles from the waste stream prior to advanced biological treatment. Sewage will flow by gravity from the primary clarification tank, via a 150 mm PVC pipe, to the advanced sewage treatment process described in Section 3.8.

The flow equalization, sludge storage, and primary clarification tanks provide a total capacity of over 3.5 times the average daily sewage flow. Multiple tanks have been favoured over a single tank to reduce the potential for short circuiting. Select pump, tank, and other specifications can be found in Appendix E.

3.8. SEWAGE TREATMENT PROCESS

An iQ.MBBR sewage treatment system has been selected to treat the sewage to a minimum Level IV standard as described in Columns 2 and 3 of Table 8.6.2.2. of the Ontario Building Code. The system has also been designed to treat nitrogen, the requirement of which is discussed in Section 5. Process calculations provided by the supplier can be found in Appendix D.

The iQ.MBBR system uses a plastic carrier media that is circulated throughout the bioreactors to achieve the treatment benefits of both suspended growth and fixed-film biomass. The treatment system allows bacteria to grow and produce a biofilm on a carrier material which is circulated within the wastewater.

Wastewater from the primary clarifier tank will flow via gravity through a 22,700 L (working capacity) aeration tank (Bioreactor #1). The sewage will flow from Bioreactor #1 via gravity, through a 150 mm PVC pipe, to an intermediate clarifier tank (10,700 L working capacity). The intermediate clarifier will be completed with one (1) sloped wall double hopper, equipped with two (2) sludge return pumps, and one floating skimmer pump. The settled solids within the clarifier will fall to the bottom of the hoppers and be sent to the sludge storage tank via the submersible sludge return pumps (Goulds Model LSP0311F) while the buoyant solids will return to the sludge storage tank via the single surface skimmer pump (Goulds Model LSP0311F).

From the intermediate clarifier the sewage will flow via gravity, through a 150 mm PVC pipe, to Bioreactor #2 (22,700 L working capacity). Wastewater will flow through the sludge storage, primary clarifier and bioreactors at a rate of 4.34 m^3/hour (hourly daily design flow), accounting for 400% recirculation from Bioreactor #2 to the sludge storage tank. Bioreactors #1 and #2 will contain a combined volume of 18 m^3 of media, with a media carrier surface area of 9,000 m^2. Each bioreactor will be fitted with 20 fine bubble diffusers (40 diffusers total). Two (2) side channel air compressors (FPZ model SCL R40-MD-4-3) will be located in a local control building and will deliver 200 Nm^3/hr of air to the diffusers. The compressors are monitored and automatically adjusted to supply the required air dosing through two (2) dissolved oxygen sensors (optical 4-20 mA, ASI model DOGB-0003), one in each Bioreactor #1 and #2.

A recirculation pump (Goulds Model LSP0311F) will be installed in Bioreactor #2 and will recirculate mixed liquor, via a 50mm HDPE forcemain, at up to four times the design flow back into the sludge storage tank (SS1) to provide enhanced denitrification.

The sewage will flow from Bioreactor #2 via gravity, through a 150 mm PVC pipe, to a secondary clarifier tank (3,300 L working capacity). The secondary clarifier will be completed with one (1) sloped wall double hopper, equipped with two (2) sludge return pumps, and one floating skimmer pump. The settled solids within the clarifier will fall to the bottom of the hoppers and be sent to the sludge storage tank via the submersible sludge return pumps (Goulds Model LSP0311F) while the buoyant solids will return to the sludge storage tank via the single surface skimmer pump (Goulds Model LSP0311F).

Sewage from the secondary clarifier will flow via gravity, through a 150 mm PVC pipe, to an Anoxic Bioreactor for tertiary denitrification. The anoxic bioreactor will have a working volume of 4,500 L. The anoxic bioreactor also uses the plastic carrier media in the bioreactor to support the growth of denitrifying bacteria. The anoxic reactor will contain 1.8 m^3 of media with a media carrier surface area of 900 m^2. Supplemental carbon dosing using MicroC-2000 is required in the anoxic bioreactor to support the denitrification process. MicroC will be dosed using a ProMinent CNPb-1601 or equivalent chemical dosing pump located in the control building. The carbon supplement is intermittently mixed with the influent to the reactor via a mixing pump. Carbon addition from the chemical dosing pump will be via a 25 mm PVC pipe; this pipe should be insulated, and heat traced, to ensure that the chemical within the feed line dose not freeze.

It is not anticipated that alkalinity addition will be required to support the nitrification process; however, space should be available within the control building and into the control panel to support an alkalinity addition system should it be required in the future. Alkalinity requirements are sensitive to the raw wastewater quality and as such should be reviewed as part of the ongoing monitoring program detailed in Section 6.

The anoxic bioreactor is fully mixed periodically using four (4) coarse bubble diffusers (Tideflex model TFA-0.75) and two (2) dedicated blowers (Hiblow model HP-150) to remove excess biomass from the media.

Due to the addition of an external carbon source, the effluent from the anoxic bioreactor may contain residual $CBOD_5$ and TSS. To reduce these parameters to the target concentrations the effluent will flow, via gravity, from the anoxic reactor to a tertiary effluent polishing tank (Bioreactor #3).

The tertiary effluent polishing tank will have a working capacity of 4,500 L. Wastewater will flow through the tertiary effluent polishing tank a rate of 869 m^3/hour (hourly daily design flow). The polishing tank will contain 1.5 m^3 of media with a media carrier surface area of 750 m^2. The bioreactor will be fitted with four (4) fine bubble diffusers. Two (2) side channel air compressors (Hiblow model HP-200) will be located in a local control building and will deliver 11.2 Nm^3/hr each (22.4 Nm^3/hr total) of air to the diffusers.

The sewage will flow from the tertiary effluent polishing tank (Bioreactor #3) via gravity, through a 150 mm PVC pipe, to a final clarifier tank (2,900 L working capacity). The final clarifier will be equipped with one (1) sloped wall double hopper, with two (2) sludge return pumps, and one floating skimmer pump for the tank. The settled solids within the clarifier will fall to the bottom of the hoppers and be sent to the sludge storage tank via the submersible sludge return pumps (Goulds Model LSP0311F) while the surface solids will return to the sludge storage tank via the surface skimmer pump (Goulds Model LSP0311F).

Effluent from the final clarifier tank will flow via gravity, through a 150 mm PVC pipe, into a 7,000 L final pumping tank. The final pumping tank will be equipped with duplex effluent pumps that will dose the leaching bed via a single 50 mm diameter HDPE forcemain. Pump specifications and dosing regimen are further described in Section 3.10 below.

3.9. SEWAGE DISPOSAL SYSTEM

A *Type A* leaching bed has been specified to further treat and disperse effluent within the soil at the site. *Type A* leaching beds are comprised of a stone layer, housing the distribution piping network, situated on top of a sand layer. The design of the *Type A* disposal system is described in the subsections below.

3.9.1. Leaching Bed Design

As per the Ontario Building Code, where a *Type A* bed is installed on soil having a percolation rate of greater than 15 min/cm, imported sand fill shall be used in its construction. The imported sand fill should have a corresponding percolation rate between 6 and 10 min/cm and contain less than 5% fines (silt and clay). The imported sand fill shall be a minimum of 300 mm deep at all locations within the leaching bed area and extend a minimum of 15 metres beyond the distribution pipe in the direction of horizontal shallow groundwater flow. The minimum area of the *Type A* bed is calculated using the formula:

$$A = \frac{QT}{400}$$

where:

A = the area of contact (sand area) (m^2)
Q = the total daily design sanitary sewage flow (L)
T = the percolation rate of the native soil to a maximum of 50 (min/cm)

Based on the above formula, a daily design flow rate of 20,850 L/day, and a native soil percolation rate of 45 min/cm, the minimum size of the leaching bed is calculated to be 2,346 m^2. Since the native soil has a percolation rate greater than 15 min/cm, the leaching bed shall be constructed in imported sand fill with a percolation rate between 6 to 10 min/cm. The proposed sewage disposal system, as designed, will have a total area of 2,400 m^2 (40 m x 60 m), which includes a 40 m mantle extending towards the south/southeast (inferred direction of groundwater flow).

The leaching bed layout and construction details are provided in Appendix C.

3.9.2. Stone and Pipe Design

A stone layer, comprised of septic stone meeting the gradation criteria set forth in Table 8.7.3.3., Division B, of the *Ontario Building Code*, shall be installed to accommodate the distribution piping to obtain even distribution of the treated sewage effluent. The stone layer shall have a minimum thickness of 200 mm, be rectangular in shape with the long dimension parallel to site contours and be protected by a permeable geo-textile (or equivalent). The minimum stone area is calculated based on:

$$A = \frac{Q}{50}$$

where:

A = the area of contact between the base of the stone layer and the underlying soils (m^2)
Q = the total daily design sewage flow (L)

Based on the above formula and a flow rate of 20,850 L/day, the minimum stone area is calculated to be 417 m^2. EnVision has specified the stone area to be a minimum of 300 mm in depth to properly accommodate and protect the distribution piping.

The proposed system, as designed, will have a stone and pipe area of 420 m^2 consisting of a common stone and pipe area with a width of 30 m and a length of 14 m. The leaching bed will consist of two (2) piping arrangements each containing fourteen (14) runs of 13.5 m long, 75 mm diameter, perforated distribution pipe (189 linear meters per arrangement, 378 linear meters in total). The distribution pipes shall be set a minimum of 500 mm in from the edge of the stone and all distribution pipes shall be installed 1.0 metre apart, centre to centre, as illustrated in Appendix C. The ends of all distribution lines shall be tied together with solid pipe.

A distribution box splitting the flow between the piping arrangements followed by a split header will be used to distribute the effluent evenly between the runs of pipe. The 300 mm thick stone layer will be covered with a permeable geotextile fabric prior to backfilling with sand to prevent soil from entering the stone area.

Imported sand soils will be placed over the bed to within 100 to 150 mm of finished grade. The leaching bed will then be brought up to finished grade with a maximum of 100 to 150 mm of screened topsoil and sod/seed. If seed is used, the area should be monitored for erosion during the grow-in period.

3.10. LEACHING BED DOSING

The treated sewage within the final pump tank will be pumped via two (2) timer-controlled BJM J400 (or equivalent) 0.5 hp, duplex effluent pumps, with a total dynamic head (TDH) of approximately 5 m, to the leaching bed. The pumps will alternate between cycles by using a time-dosing system and as such the leaching bed will be protected from hydraulic overloading. See Appendix C for the pump specifications. The pumps will be controlled by Click + Clean control panels with GPRS remote monitoring.

The minimum volume of effluent that should be pumped during any run cycle is equivalent to 75% of the receiving pipe volume; this minimum volume ensures that the effluent is evenly distributed through the distribution pipe network. This volume should be delivered within 15 minutes from when the pump turns on.

The internal volume of the distribution pipe is equivalent to approximately 1.67 m^3 based on 378 m of 75 mm diameter distribution piping. Thus, the minimum pump discharge volume, based on 75% pipe capacity, is approximately 1,250 L. The pumps should be set to deliver approximately 1,300 L per cycle (near to the recommended minimum volume); this results in 16 cycles per day, one dose every 90 minutes, alternating between pumps. Based on the pump specification and the Total Dynamic Head (TDH), the required volume will be delivered in approximately 7 minutes. A TDH of approximately 5 m has been inferred based on the friction loss within the forcemain and the change in elevation from the pump setting to the discharge point.

3.11. CONTROLS AND ELECTRICAL REQUIREMENTS

The waterproof treatment plant control panels, blowers, pump controls and timers shall be installed in a standalone precast concrete service building located near to the sewage treatment tankage. In general, the control building should be tamper proof, fireproof, and weatherproof. To ensure sufficient area within the building for the above ground works a 3 metre by 3 metre concrete shed structure is recommended.

Tanks equipped with pumps shall also be equipped with a high-level alarm float to warn of pump failure. It is recommended that standby pumps and a standby blower be kept readily accessible at the site in case of failure.

The required electrical power supply to the control building is 120/240 VAC 1-Phase/60 Hz with a connected/peak load of approximately 70.5/54.5 A at 120 VAC and 38.5 A at 240 VAC (overall peak load at 240 VAC = 65.7 A). The system as proposed is estimated to require the following power supply circuits:

2 x 240 VAC/1-phase @ 30 A

1 x 120 VAC/1-phase @ 20 A

4 x 120 VAC/1-phase @ 15 A

The electrical connections related to the sewage treatment equipment and pumps should be checked by a qualified electrician prior to, and during, the construction of the system to ensure that the power requirements can be satisfied.

3.12. CONSTRUCTION AND OPERATION REQUIREMENTS

It is noted that the drawings contained in Appendix C are for permit purposes only. A *"For Construction"* set of drawings must be issued by EnVision for tender and construction purposes.

The sewage treatment tanks, except for the final dosing tank, shall be insulated on the sides (to 1.5 mbgl) and top utilizing 2-inch-thick R-10 (or greater) rigid board insulation to mitigate the effects of frost and extreme cold. By insulating the tanks, the sewage contained in the tanks will remain warmer supporting the nitrification/de-nitrification processes required in this application (Section 5).

All multi-piece tanks must be sealed with primer and mastic band as well as additional external waterproofing measures. The additional waterproofing measures include sealing with a waterproof membrane (Blueskin or equivalent) around the exterior of the tank to cover the tank seams.

Good construction practices should be used when installing the tanks and pumps. If groundwater is encountered during the installation of the tanks, EnVision must be notified to determine the anchoring and installation requirements.

Inlet pipes should maintain an appropriate distance from tank baffles to minimize the potential for plugging. Pumps should be set on pump blocks to reduce the amount of solids taken up during cycles.

Forcemains should be insulated and protected when traveling under driveways/roadways and when near ground surface (closer than 1.5 m to grade) such as near the inlets and outlets of tanks.

Design elevations for the proposed leaching beds can be adjusted and agreed upon with the Contractor and by a Qualified Engineer should field conditions differ from the information used in the preparation of this report.

Soil and groundwater conditions, which can affect the sewage system operation, may be variable across the property, and the conditions used in the design may not apply in untested areas. The site conditions, as determined from the field investigations, should be confirmed prior to construction of the sewage disposal system. In this regard, periodic engineering supervision must be provided during construction of the system to confirm the presence of satisfactory soil and groundwater conditions, and to ensure that the contractor adheres to the design.

4. POTENTIAL FOR GROUNDWATER MOUNDING

A minimum separation of 600 mm should be maintained between the base of stone and the water table to reduce the risk of hydraulic failure, and to maximize the treatment of the sewage effluent. Due to the silty nature of the native soils and local topography, effluent should either evapotranspirate or migrate vertically through the soils, and then horizontally as it joins with the groundwater table.

A groundwater mounding calculation has been carried out using the simplified Hantush calculation presented by Finnemore et al. (1983). The calculation uses the following formula:

$$Z_m = IC(L/4)^n(1/(Kh_a))^{0.5n}(t/S_y)^{1-0.5n}$$

In which:

Z_m = the maximum height of the mound above the existing groundwater (m)
I = the loading rate to the bed (m/day)
C and n = constants based on length to width ratio
L = the length of the wastewater application area (m)
K = the hydraulic conductivity of the soil (m/day)
h_a = the average depth of groundwater under the bed (m)
t = time (d)
S_y = the specific yield of the soil

The formula requires an iterative approach, with an initial estimate of Z_m. This estimate is used to calculate h_a by way of the formula below:

$$h_a = h_o + Z_m/2$$

In which:

h_o = initial depth (thickness of the groundwater)

The result of this calculation is used by the original formula to get a new estimate of Z_m. This process is repeated until the estimate of Z_m is nearly equal to the calculated Z_m.

Assumptions that must be made in using this approach are:

- The groundwater system is horizontal and extends infinitely in all directions;
- There are no other inputs to the groundwater system;
- The recharge from the leaching bed is constant over time;
- The properties of the receiving soil are constant in all directions; and,
- The loading rate is equivalent to the daily design flow divided by the contact area.

Based on the formula presented by Finnemore, and an annual average flow rate of 20,850 L/day (see Section 3.1), the maximum height of the groundwater mound beneath the bed is estimated to be 0.61 m above the highest evidenced shallow groundwater elevation over a 200-day period. If this assessment

was to be extended to a period of 20 years, the resulting increase in the groundwater table could be approximately 0.84 m. Detailed calculations are provided in Appendix E.

The calculated mounds for both the 200 day and 20-year period will not be problematic and should not interfere with the operation of the proposed leaching bed as it has been designed as a raised bed in order to maintain over 600 mm of unsaturated soil beneath the stone layer based on the calculated mounds for both the 200 day and 20-year periods.

5. WATER RESOURCE IMPACT STUDY

As noted in the MECP's *Design Guidelines for Sewage Works 2008*, a water resources impact assessment is required to assess the risk of sewage effluent from the point where it enters the subsurface, on surrounding water bodies, water resources, and other users, including all groundwater and surface water that may be significantly affected. The focus of such an assessment is on the effect of the sewage relative to any potential or actual function or use of those waters. This assessment should consider the design of a sewage works, and in turn, the design of the works would need to minimize the risk of undesirable environmental effects.

The following section is premised on the current MECP 2008 Design Guidelines for Sewage Works.

5.1. CRITICAL CONTAMINANT

The closest surface water body, being an intermittent tributary of Etobicoke Creek, is located approximately 300 m downgradient of the site boundary, and approximately 350 m downgradient from the anticipated sewage system in the direction of groundwater flow, and therefore it is inferred that local groundwater will be the ultimate receiver of the sewage effluent. As such, the critical contaminant being disposed of in the sewage effluent is nitrate. In general, it is assumed that the reasonable use of any groundwater is drinking water. The Ontario Drinking Water Quality Standard (ODWQS) for nitrate is 10 mg/L.

5.2. LOCAL WATER SUPPLIES

EnVision understands that the properties located immediately downgradient of the proposed development (3074 and 3094 King Street), as well as the properties to the south (3029, 3061, 3071, 3083 and 3103 King Street) are serviced by means of a 300 mm diameter PVC Watermain with 25 mm water service lines teeing off of the main and as such do not rely on private water wells for consumption. This understanding is based on servicing drawings provided by the Region; however, it has not been field verified by EnVision.

5.3. ASSESSMENT APPROACH

The MECP Design Guidelines for the Sewage Works allows for an isolation approach where a low permeability environment exists when assessing the impact of subsurface disposal systems on local water resources (Section 22.5.14). The Guideline states that:

"Where it can be shown that the uppermost subsurface unit(s) at an infiltration facility have a vertical hydraulic conductivity of 10^{-5} cm/sec or less, is at least 10 metres thick and extends at least 100 m down gradient of the infiltration area, attenuation calculations may not be required."

As discussed previously, and illustrated in Figure 7, the overburden thickness of the low permeability till (10^{-6} cm/sec) soils is generally greater than 10 metres thick and is inferred to exist 100 m down gradient (east/southeast) of the future leaching bed. This aquitard protects the lower water bearing units near the Site.

Given the availability of municipal water servicing surrounding the site and the presence of the shallow confining layer, it has inferred that there is limited risk to human or environmental health due to the proposed sewage discharge.

Through communication with the MECP it was determined that although this layer will provide protection to the lower groundwater resources, it did not meet the MECP's definition of a low permeability environment as there were discontinuous layers of more granular materials noted in the available well records, and a lack of detailed information provided for immediately downgradient of the sewage disposal system.

In accordance with the MECP 2008 Design Guidelines for Sewage Works, maximum allowable nitrate concentrations would apply at the downgradient property boundary to ensure protection of the groundwater resources. The standard methodology for calculating the boundary nitrate concentrations does not contain a mechanism for reflecting sites with limited risk to human or environmental health but are also not considered hydrogeologically isolated. As such EnVision consulted with the MECP to determine an appropriate boundary criterion for nitrogen related parameters in the groundwater (Appendix A). Based on this consultation it was determined that 5 mg/L of Total Nitrogen would be appropriate in this circumstance, as measured at the compliance boundary (the downgradient property line).

6. PROPOSED MONITORING REQUIREMENTS

The purpose of a monitoring program is to ensure the long-term functionality of the sewage disposal system, and protection of human health and the natural environment. Parameter concentrations are recommended for both effluent objectives and site compliance criteria. Objectives are recommended to help preserve the functionality of the system and to warn of process failures, while the criteria are site compliance issues related to environmental legislation and human health concerns.

To protect the long-term functionality of the *Type A* leaching bed, and warn of process treatment upset, EnVision recommends the effluent parameters listed in Table 6 be measured and monitored in the final pumping tank as a free-flowing grab sample on a quarterly basis.

Table 6 Proposed Effluent Objectives (from Final Pumping Tank)

Sewage Effluent Parameter	Proposed Effluent Objective (quarterly grab samples)
BOD_5	10 mg/L
Total Suspended Solids	10 mg/L
Total Inorganic Nitrogen (TIN)	5 mg/L

To support the assessment of compliance within the groundwater at the property boundary, groundwater monitoring wells will be required. The proposed monitoring locations (3 locations) for the groundwater monitoring wells are depicted on the design drawings (Appendix B). They should be drilled into the shallow groundwater table, at a depth that would remain saturated year-round, in accordance with Ontario Regulation 903, by a licensed water well driller.

As determined through the MECP consultation process (Section 5), groundwater should be obtained from the future monitoring wells and analyzed for the parameters listed in Table 7 below.

Table 7 Proposed Groundwater Criteria

Sewage Effluent Parameter	Proposed Groundwater Criteria (quarterly grab samples)
Total Nitrogen (TN)	5 mg/L

It is recommended that grab samples of raw sewage, treated effluent, and groundwater be analyzed during the quarterly sampling events for the parameters listed in Table 8 below.

Table 8 Proposed Sampling Parameter List

Raw Sewage	Treated Effluent	Groundwater
BOD_5	$CBOD_5$	Total Nitrogen
Total Suspended Solids	Total Inorganic Nitrogen	Nitrate
Total Kjeldahl Nitrogen	Total Nitrogen	Nitrite
Ammonia Nitrogen	Nitrate	Ammonia Nitrogen
pH	Nitrite	
Alkalinity	Ammonia Nitrogen	
Fats, Oils, Grease (FOG)	pH	
	Alkalinity	
	Total Suspended Solids	

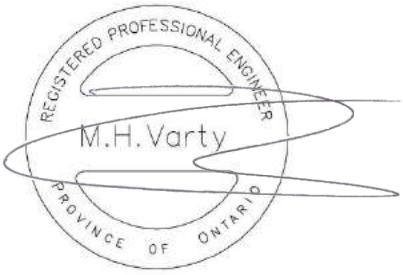
7. CLOSING

Based on the information obtained through this study, Envision presents the following conclusions and recommendations:

- Construction of an on-site sewage treatment and disposal system for domestic waste streams from the proposed development is feasible, as per this report and the design specifications provided in Appendix C.
- Given the hydrogeologic conditions at the site, groundwater is anticipated to be the ultimate receiver of the sewage effluent, and as such nitrate is the inferred parameter of concern for the water resource impact study.
- Advanced sewage treatment (Level IV), including de-nitrification, of the sewage effluent is required to protect the long-term functionality of the sewage leaching bed, and to protect downgradient groundwater users.
- The sewage treatment and disposal system design are sensitive to both quantity and quality changes in the sewage effluent stream. Should either the sewage quality or quantity differ from the assumptions in this report, EnVision should be notified immediately to determine the impact to the design.
- The design is sensitive to the soil and groundwater conditions present in the design leaching bed area. If the soil and/or groundwater conditions at the time of construction are found to differ from the anticipated soil conditions, EnVision should be notified immediately to determine the impact to the design.
- The monitoring program, as specified in the future Environmental Compliance Approval, should be conducted by a qualified individual or firm to assess the adequacy of the work on an ongoing basis.

Prepared by,

EnVision Consultants Ltd.



Michael Varty, P.Eng. PMP
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Paisley McDowell, P.Eng
Project Engineer – Rural Servicing
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8. LIMITATIONS

EnVison prepared this report solely for the use of the intended recipient in accordance with the professional services agreement. In the event a contract has not been executed, the parties agree that the EnVision General Terms and Conditions, which were provided prior to the preparation of this report, shall govern their business relationship.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment. The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the report are based on the observations and/or information available to EnVision at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by EnVision and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

EnVision disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, EnVision reserves the right to amend or supplement this report based on additional information, documentation or evidence.

EnVision makes no other representations whatsoever concerning the legal significance of its findings. The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. EnVision does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

In preparing this report, EnVision has relied in good faith on information provided by others, as noted in the report. EnVision has reasonably assumed that the information provided is correct and EnVision is not responsible for the accuracy or completeness of such information.

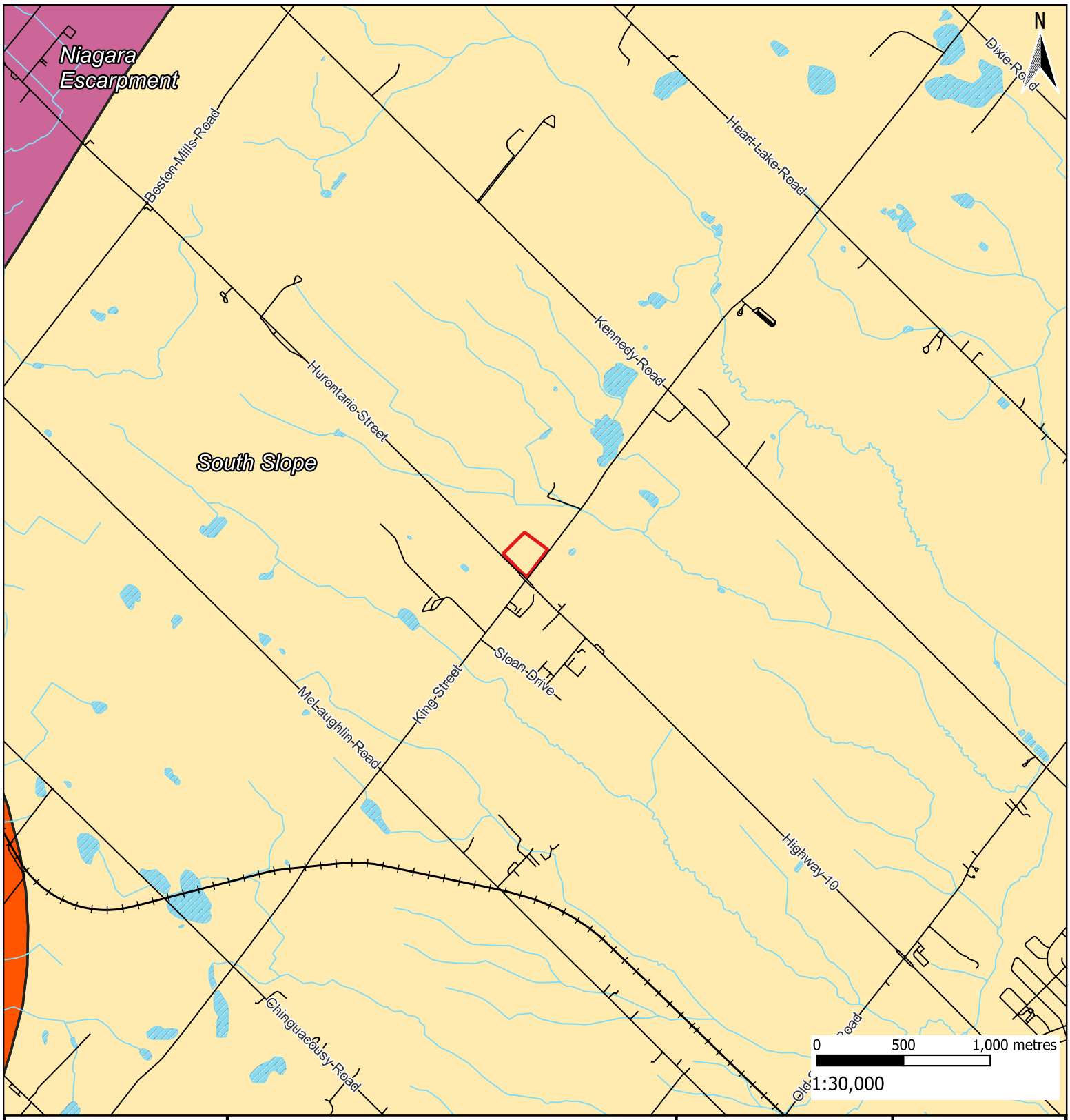
This limitations statement is considered an integral part of this report.

ATTACHMENTS

LEGEND

- Project Area
- Topographic Contours

Title: SITE LOCATION MAP	
Project: Caledon Service Centre 14027 Hurontario Street Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 1



LEGEND

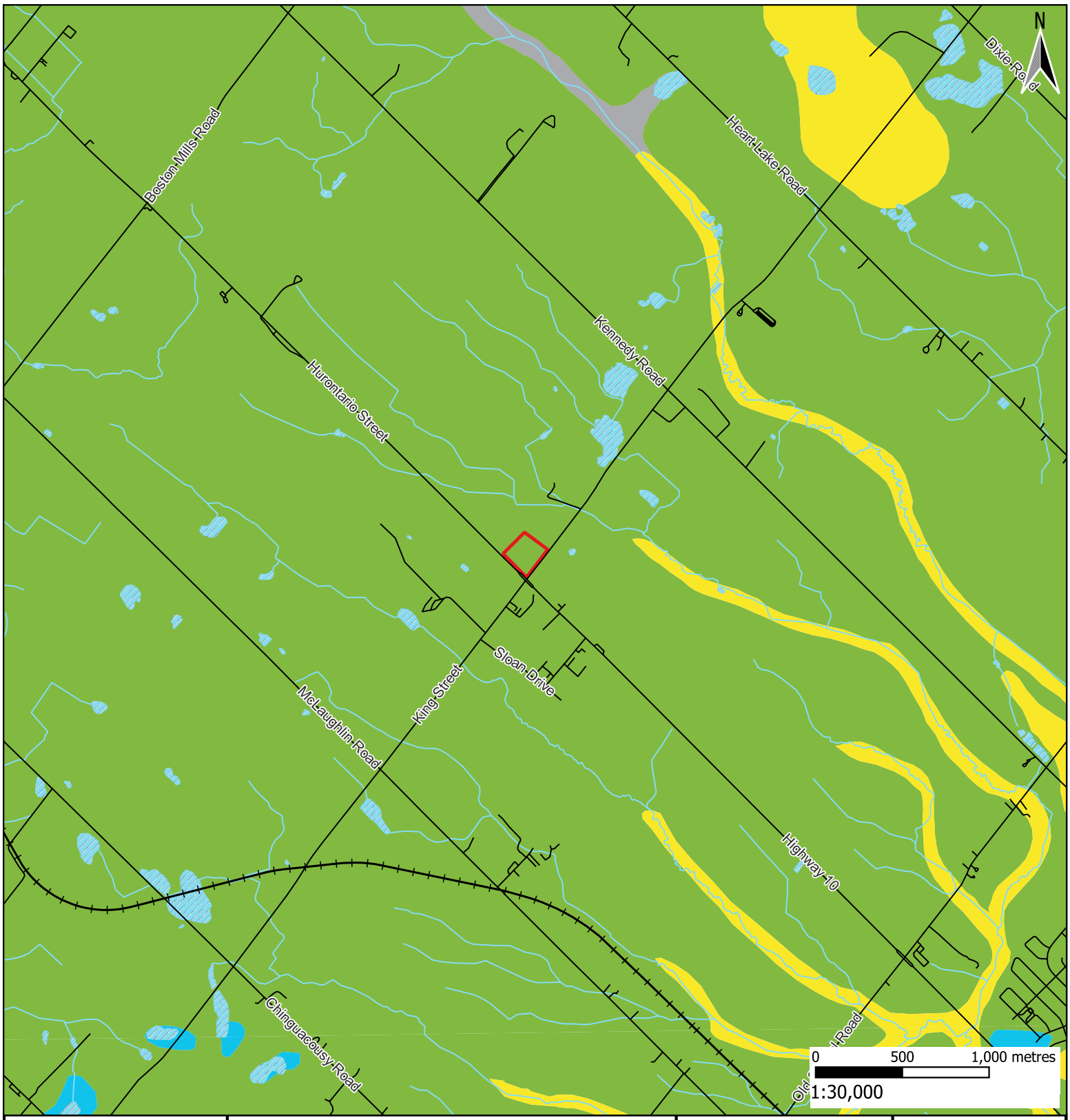
- Project Area
- Regional Boundary
- Railways
- Waterbodies

Physiography

- Spillways
- Till Moraines
- Till Plains (Drumlinized)

Data Source: Ministry of Natural Resources, Ontario Base Mapping, January 2017. Physiography of Southern Ontario, MRD 228, Ministry of Northern Development and Mines.

Title: PHYSIOGRAPHY	Designed by: SS
	Reviewed by: MV
Project: Caledon Service Centre, 14027 Hurontario Street, Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 2



LEGEND

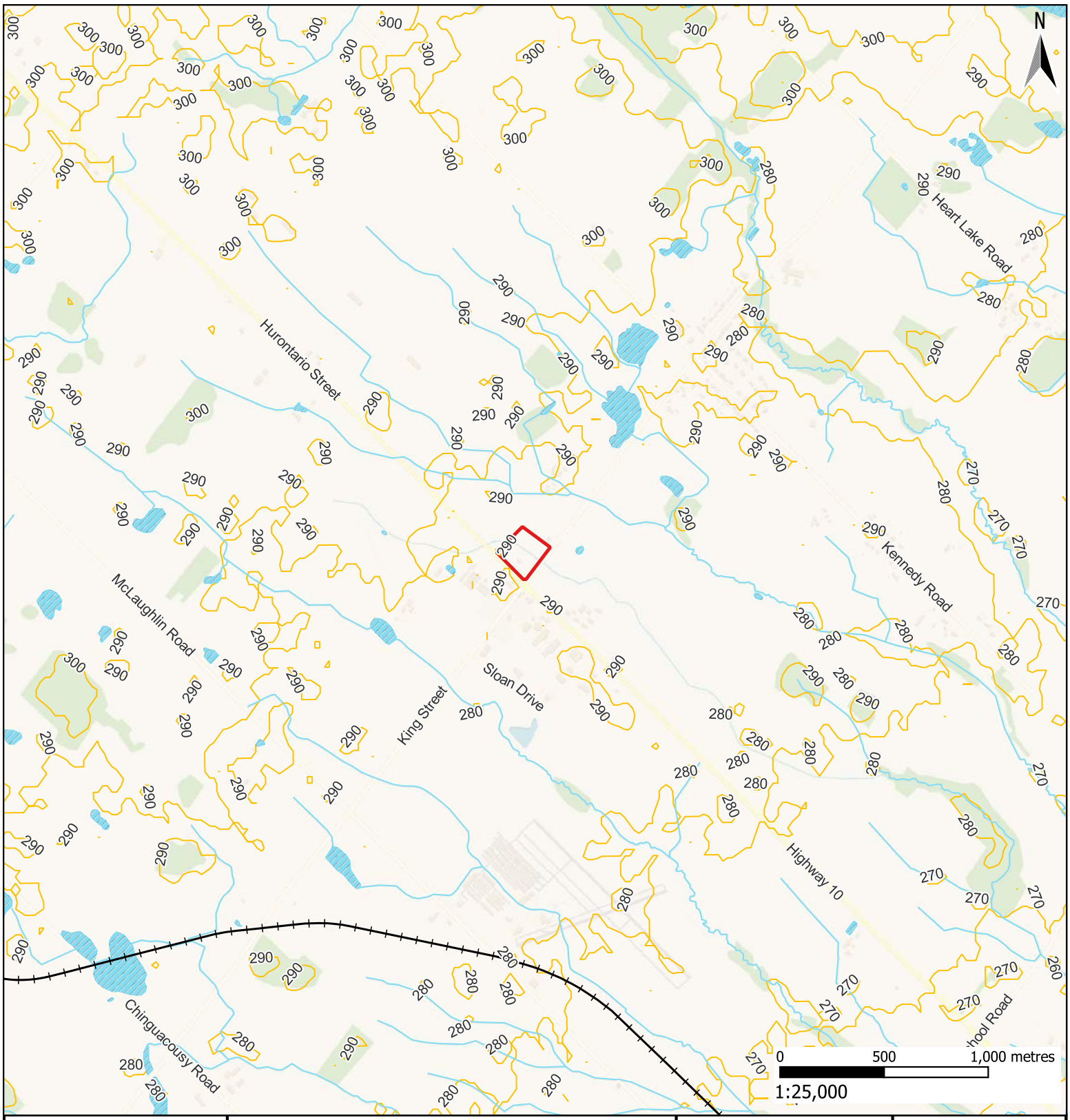
- Project Area
- Railways
- Waterbodies

Surficial Geology

- Diamicton
- Organic Deposits
- Sand
- Silt

Data Source: Ministry of Natural Resources, Ontario Base Mapping, May 2019. Surficial Gology of Southern Ontario, MRD 128, Ministry of Northern Development and Mines.

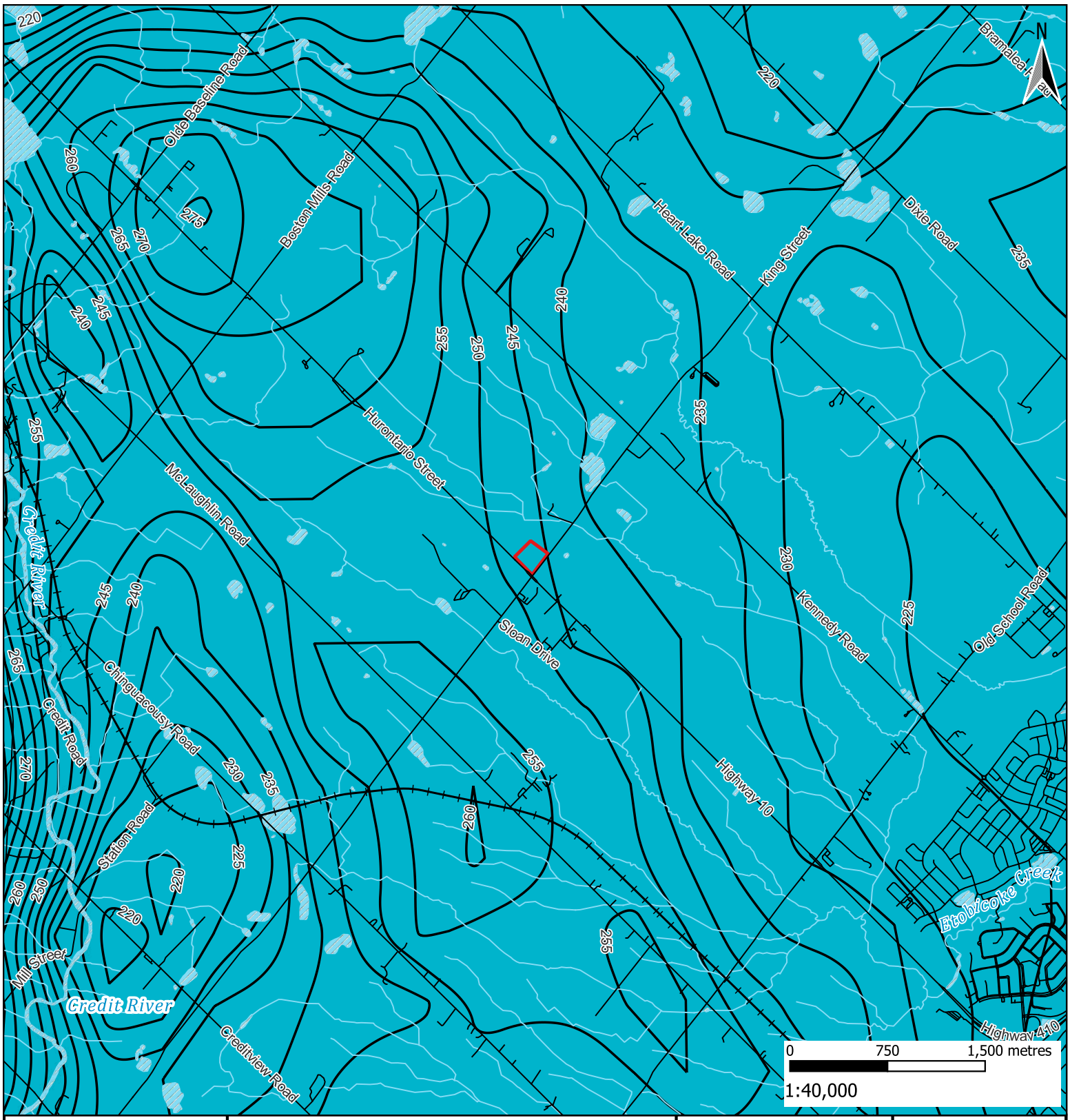
Title: SURFICIAL GEOLOGY	Designed by: SS
	Reviewed by: MV
Project: Caledon Service Centre 14027 Hurontario Street Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 3



LEGEND

- Project Area
- Topographic Contours
- Railways
- Waterbodies

Title: TOPOGRAPHY	Designed by: SS
	Reviewed by: MV
Project: Caledon Service Centre 14027 Hurontario Street Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 4



LEGEND

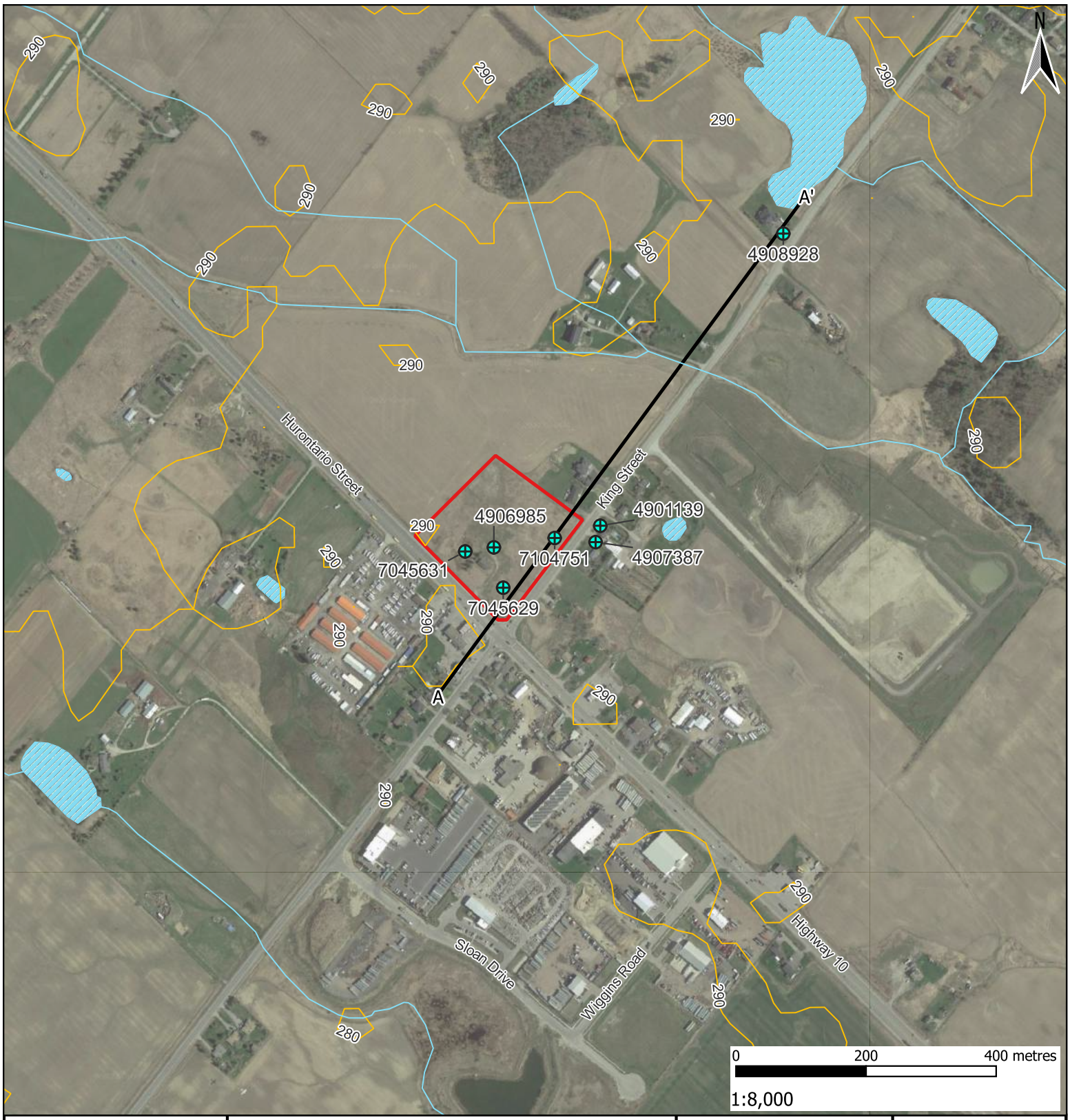
- Project Area
- Bedrock Elevation (mASL, 5m Interval)
- Railways
- Waterbodies

Bedrock Geology

- Queenstone Formation

Data Source: Ministry of Natural Resources, Ontario Base Mapping, March 2021. Bedrock Topography and Overburden Thickness of Southern Ontario, MRD 207, Ministry of Northern Development and Mines.

Title: BEDROCK TOPOGRAPHY & GEOLOGY	Designed by: SS
	Reviewed by: MV
Project: Caledon Service Centre 14027 Hurontario Street Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 5

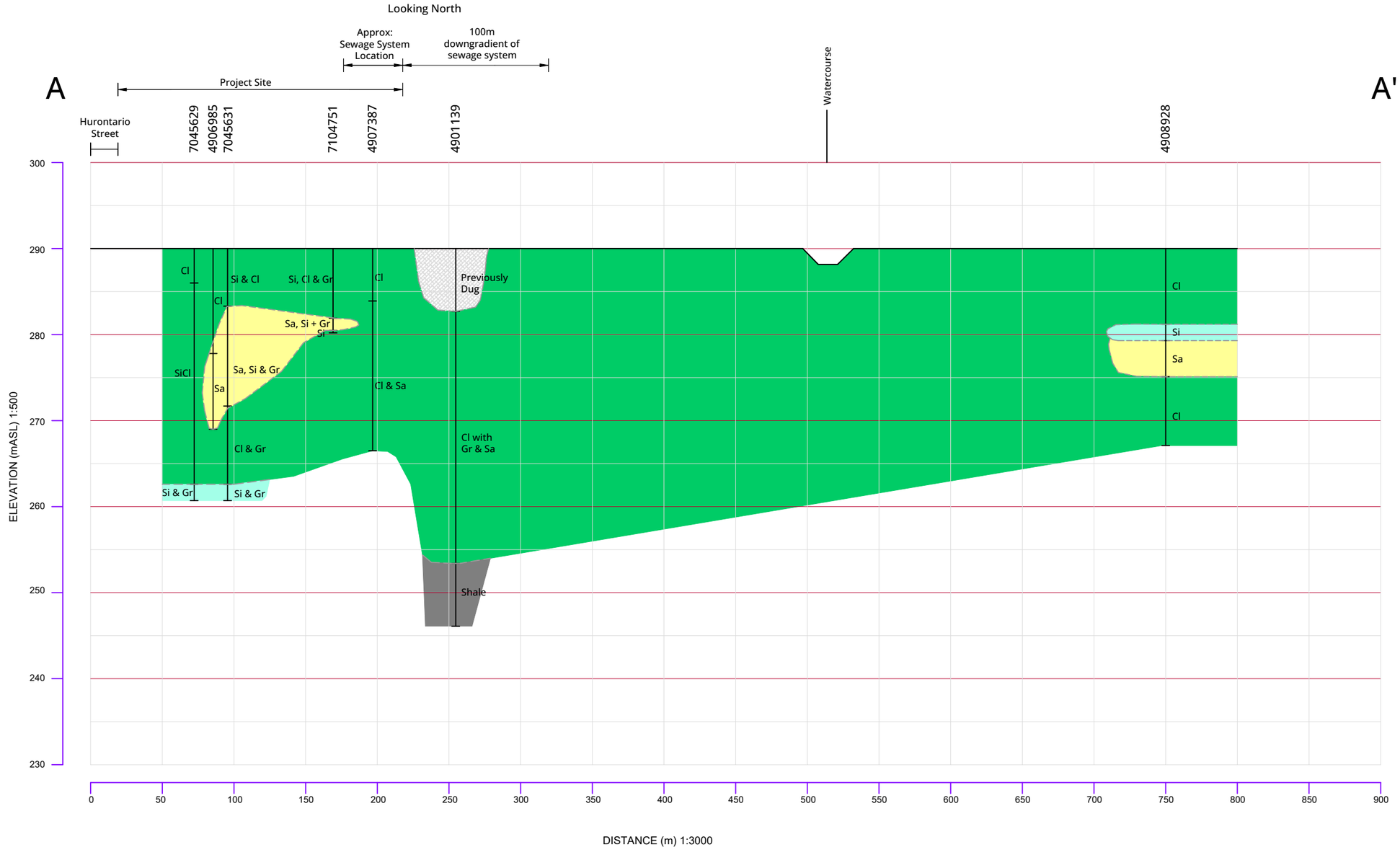


LEGEND

- Project Area
- Water Well Records
- Topographic Contours
- A—A' Cross Section
- Waterbodies

Title: LOCAL WATER WELL LOCATION MAP	Designed by: SS
	Reviewed by: MV
Project: Caledon Service Centre 14027 Hurontario Street Caledon, Ontario	Project No: 22-0162
	Date: Aug 2022
Client: BVD Holdings Caledon	Figure: 6

Looking North



NOTE:
THE ACTUAL SOIL STRATIFICATION HAS BEEN VERIFIED FROM DATA OBTAINED AT THE WATER WELL LOCATIONS ONLY. THE INFERRED CONTACTS SHOWN ARE BASED ON GEOLOGICAL EVIDENCE AND THESE MAY VARY FROM THOSE SHOWN BETWEEN BORINGS.

LEGEND:

- Previously Dug
- Clay(Cl)/ Silty Clay (SiCl)/ Silt & Clay (Si & Cl)/ Silt Clay & Gravel (Si, Cl & Gr)/ Clay & Gravel (Cl & Gr)/ Clay & Sand (Cl & Sa)/ Clay with Gravel & Sand (Cl with Gr&Sa)
- Sand (Sa)/ Sand, Silt & Gravel (Sa, Si & Gr), Sand, Silt + Gravel (Sa, Si + Gr)
- Silt (Si)/ Silt & Gravel (Si & Gr)
- Shale

TITLE: Local Hydrogeologic Cross Section

PROJECT: Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

PROJECT NO: 22-0162

DATE: Aug 2022

CLIENT: BVD Holdings Caledon Inc.

FIGURE NO: 7

APPENDIX A:

MECP Correspondence

Michael Varty

From: Michael Varty
Sent: August 11, 2022 3:23 PM
To: Michael Varty
Subject: ECA Pre-submission for 14027 Hurontario Street, Inglewood, Ontario

---

From: Belayneh, Ted (MECP) <Ted.Belayneh@ontario.ca>
Sent: July 27, 2022 1:38 PM
To: Michael Varty <mvarty@envisionconsultants.ca>; Pannu, Fariha (MECP) <Fariha.Pannu@ontario.ca>
Cc: Paisley McDowell <pmcdowell@envisionconsultants.ca>
Subject: RE: ECA Pre-submission for 14027 Hurontario Street, Inglewood, Ontario

Hi again, Michael. Sorry, it took me longer than I expected to get back to you.

We have discussed the file with our colleagues at approvals as well. As you alluded, we the hydrogeologic interpretation and application of the guideline is appropriate. At the same time, the ministry is also aware of the challenges of achieving very low TN targets. In discussion with our engineering colleagues at approvals, achieving a total nitrogen (TN) target of 5 mg/L can be done on a reliable basis. I have also discussed with the review hydrogeologist and, for this proposal, we will not object if a **TN limit of 5 mg/L** to be met on a monthly basis is applied. I hope this addresses your concerns satisfactorily and concludes the applied science review of your proposal by our section.

If you have additional hydrogeological information, please continue to discuss these with the reviewer. If you would like to have a conversation about the topic in general, do not hesitate to give me a call.

Ted Belayneh, M.Sc., P.Geo
Supervisor, Water Resources Unit, Central Region
Ministry of the Environment, Conservation and Parks
5775 Yonge Street, 8th Floor, Toronto, ON, M2M 4J1
Tel (*new*): (437) 778 3309 E-mail: Ted.belayneh@ontario.ca

ENVISION
CONSULTANTS LTD

6415 NORTHWEST DRIVE
UNITS 37-40
MISSISSAUGA, ON L4V 1X1

May 20, 2022

Project #: 22-0162

BVD Holdings Caledon Inc.
130 Delta Park Boulevard
Brampton, Ontario L6T 5E7

Attention: Bikram Dhillon

SUBJECT: MECP PRE-CONSULTATION LETTER – CALEDON SERVICE CENTRE

EnVision Consultants Ltd. (EnVision) was retained by BVD Holdings Caledon Inc. (the 'Client') to conduct an on-site wastewater study in accordance with the Ontario Water Resources Act to support a private on-site sewage system design and Environmental Compliance Approval Application (ECA) for the proposed development of the Caledon Service Centre located at 14027 Hurontario Street, Inglewood, Ontario (the 'Site'), see *Figure 1*.

Municipal wastewater services are not available at the Site; therefore, the site is proposed to be serviced via a private on-site sewage system.

As the theoretical daily sewage flow for the Site is greater than 10,000 L/day, the Ministry of Environment, Conservation, and Parks (MECP) is the regulating authority for the sewage works, under Section 53 of the Ontario Water Resources Act. It is understood that the Environmental Permissions Branch in Toronto will ultimately be responsible for issuing the ECA; however, comments will be solicited from the Halton-Peel District Office, and such it is appropriate to address potential concerns at this time.

Please accept this letter report, containing background information, as a formal request for an MECP pre-consultation meeting.

DESCRIPTION OF THE SITE

The Site is located on the northeast corner of Hurontario Street and King Street, approximately 5 km from the northern extent of the 410 Highway, in a mixed commercial and agricultural area with minor rural residential properties present in the Region of Peel. The Site is generally rectangular in shape and occupies an area of approximately 3.2 hectares. The site is currently vacant, with an abandoned structure on the site.

The development plans include the construction of:

- a 6-nozzle gas bar;
- a 4 nozzle cardlock;
- a convenience store (C-Store) with approximately 3 water closets;
- two, 8 seat, restaurants;

- 2 commercial office spaces; and
- 1 stand-alone fast-food style restaurant.

PHYSIOGRAPHY

The site lies within the South Slope Physiographic Region (***Figure 2***), as described by the Ontario Geological Survey (Chapman and Putnam, 1984). The South Slope is characterized by the presence of clayey silt till and silty clay tills immediately below ground surface.

Available mapping indicates that the local surficial geology at or near the surface is described as clayey to silt textured till. The surficial geological mapping is provided in ***Figure 3***.

Observations made from site investigations completed by the A&A Environmental Consultants (2019) are consistent with the literature review as detailed later in this letter report.

TOPOGRAPHY AND DRAINAGE

Surficial topographic mapping, see ***Figure 4,*** notes a topographical elevation of approximately 290 m above sea level (ASL) at the west extent of the site sloping slightly to the east.

It is assumed that the direction of shallow groundwater flow is a subtle reflection of topography, as such, local shallow groundwater is inferred to flow east towards a tributary of Etobicoke Creek. Etobicoke Creek is approximately 300 m from the eastern edge of the site.

BEDROCK GEOLOGY AND DRIFT THICKNESS

The site is underlain by bedrock belonging to the Queenston Formation (***Figure 5***), which is primarily characterized by shale; and also contains red siltstone. Regional bedrock topography indicates that bedrock is at an elevation of approximately 245 m to 250 m ASL at the Site; falling to the east. This indicates that the drift thickness at the Site is approximately 40 m to 45 m in depth.

HYDROSTRATIGRAPHY

The hydrogeologic setting was interpreted based on the local water well record database maintained by the MECP. The location of water supply wells near the study area are shown on ***Figure 6.*** The location of these wells has been based on the information contained within the individual well records (i.e. key maps) and not necessarily based on the UTM coordinates provided. This was completed to increase the accuracy of the information, as the UTM coordinates, especially for older wells, can be inaccurate. ***Figure 7*** is a hydrostratigraphic interpretation of the subsurface sediments and bedrock conditions based on the results of this review.

The water well records reviewed for the off-site wells, obtained from the MECP database, are provided in ***Attachment A***. The water wells reviewed indicate that the soil is generally clay with discontinuous mixtures of silt, sand, and gavel, as well as isolated areas of sandier material of limited horizontal and vertical extent. Water producing zones for historic domestic consumption were noted between 10.7 m and 39.6 m below ground surface in the water records reviewed.

It is understood that this geographic portion of the Town of Caledon is now serviced by means of a 300 mm diameter PVC Watermain with 25 mm water services lines teeing off of the main; including the properties located immediately downgradient of the site (See *Attachment B*).

The regional hydrogeologic setting of the area is described below with the visual aid of hydrostratigraphic section A-A' (*Figure 7*). The hydrostratigraphy consists of the following types of units:

- Upper Aquitard
- Overburden Aquifer

The Upper Aquitard is generally a silt or clay till from approximately ground surface to generally greater than 10 m in depth, with the exception of groundwater monitoring well 7104751 which reported a silty sand till seam between 8.1 and 9.5 m below ground surface and drinking water well 7045631 which also noted the silty sand till seam from 6.7 to 18.3 m, although it did not encounter a water producing zone until deeper in the hole. This aquitard is comprised of mostly fine-grained sediments that behave as a protective layer above the water-bearing units. The aquitard is generally described as clay, with varying amounts of sand, silt and gravel and will have reduced permeability. The aquitard acts as a barrier to retard the vertical movement of groundwater, including sewage inputs, from the ground surface to the underlying aquifer(s).

The Overburden Aquifer(s) is comprised of somewhat more granular sediments than the aquitard, varying from sand, to silt and gravel, to clay and gravel, of generally limited vertical extent. Water producing zones for historic domestic consumption were noted between 10.7 m and 39.6 m below ground surface in the water records reviewed.

SITE INVESTIGATIONS

A preliminary geotechnical investigation was completed by A&A Environmental Consultants Inc. in July and October 2019. It is understood that the investigations consisted of eight (8) boreholes designated as BH-1 through BH-8 drilled across the proposed development.

The boreholes were completed to depths ranging from 3.0 mbgl to 9.1 meter below ground level (m bgl). Monitoring wells were installed at BH-1, BH-2, and BH-3 to monitor groundwater elevations.

The shallow soils on site generally consist of a thin layer (approximately 1.5 to 2.25 m) of variable soil types (generally silt to silty sand) underlain by clayey silt or silty clay till between continuing to the depth of the boreholes (maximum borehole depth was recorded as 9.1 m bgl). It is noted that BH-7 and BH-8 was dissimilar to the other boreholes in the sense that these logs indicated a predominately sand composition to the upper portion of the subsurface. These boreholes were completed near to Hurontario Street and King Street, respectively, based on the borehole map provided and thus the soil composition may be indicative of fill activity rather than the native soil type.

The soils tested from the geotechnical investigations at the site have an estimated percolation rate (T-time) of approximately 45 to 50 min/cm based on the principles of the Unified Soil Classification System (USCS). As per Appendix 6.3.1. and 6.3.2. of Manual of Policy, Procedures and Guidelines for Private Sewage Disposal Systems (MECP, 1982) the soils would be likely be classified as SC soils with high clay content. The corresponding coefficient of permeability according to the MECP document would be considered 10^{-6} for this soil type.

Groundwater was noted in BH-1, BH-2, and BH-3 at relatively shallow depths of approximately 5.8 mbgl, 7.3 mbgl and 3.3 m bgl respectively as measured on July 12, 2019 by A&A Environmental Consultants Inc. The borehole logs and borehole location plan are provided as *Attachment C*.

SEWAGE QUANTITY

The Property itself is planned to consist of the follow features:

- a gas bar and cardlock;
- a convenience store;
- two restaurants;
- 2 commercial office spaces; and,
- 1 stand-alone fast-food style restaurant.

The theoretical total daily design sewage flow for the Site has been based on the combined theoretical sewage flows for the individual occupancy uses as per Table 8.2.1.3.B of the Ontario Building Code (OBC, 2012). These flows have been summarized in *Table 1* below:

Table 1 Theoretical Peak Daily Sewage Flow Calculations

Description of Unit	Number of Units	Flow Per Unit (L/day)	Total Flow (L/day)
Gas Bar			
Gas Bar Fuel Outlets[a]	6	560	3,360
Cardlock Fuel Outlets[a]	4	560	2,240
Gas Bar Convenience Store			
Washrooms[a]	3	950	2,850
Restaurant #1			
Seats[b]	8	125	1,000
Restaurant #2			
Seats[b]	8	125	1,000
Restaurant #3			
Seats[b]	40	125	5,000
Office Building #1			
Floor Area[c]	335	75 per 9.3 m^2	2,700
Office Building #2			
Floor Area[c]	335	75 per 9.3 m^2	2,700
		Total Flow	**20,850**

a) Based on Table 8.2.1.3.B of the Ontario Building Code for "Service Stations"

b) Based on Table 8.2.1.3.B of the Ontario Building Code for "Food Service Operation (not 24-hour)".

c) Based on Table 8.2.1.3.B of the Ontario Building Code for "Office Building".

Based on the above calculated sewage flow values, the total combined peak daily design sewage flow for the Site is estimated at 20,850 L/day. It should be noted that the theoretical flows calculated are typically conservative and overestimate the actual daily sewage flow.

SEWAGE QUALITY

It is inferred that the primary sources of wastewater for the site are from the following:

- Convenience Bathroom Facilities (water closets, and sinks);
- Restaurant Kitchen Facilities; and
- Office Complex Bathroom Facilities (water closets, and sinks).

Given the sources of the wastewater noted above, and the nature of the facilities, it is inferred that the sewage strength will be domestic in origin; however, will be high strength for parameters such as BOD_5, TSS, Fats/Oil/Grease (FOG), and ammonia. Provided in *Table 2* are the anticipated concentrations of key sewage parameters in the wastewater stream; these concentrations are inferred to be representative of the mixed sewage strength at the proposed site.

Table 2 Theoretical Sewage Strength

Parameter	Typical Concentration Range (mg/L)		Anticipated Concentration (mg/L)
	Low	High	
BOD_5	500	2,000	1,250
Total Suspended Solids	150	1,000	750
Total Nitrogen	40	200	100
Total Phosphorous	4	50	20

The concentrations of the parameters noted above are based on EnVision's experience with similar development sites throughout Ontario.

CONCEPTUAL SERVICING CONCEPT

Due to the fine-grained shallow soils present at the site, a *Type A* leaching bed would be the likely distribution and disposal method for the treated sewage effluent. *Type A* leaching beds are comprised of a stone layer, housing the distribution piping network, situated on top of a sand layer.

As per the Ontario Building Code, where a *Type A* bed is installed on soil having a percolation rate of greater than 15 min/cm, imported sand fill shall be used in its construction. The imported sand fill should have a corresponding percolation rate between 6 and 8 min/cm and contain less than 5% fines (silt and clay). The imported sand fill shall be a minimum of 300 mm deep at all locations within the leaching bed area and extend a minimum of 15 metres beyond the distribution piping in the direction of horizontal shallow groundwater flow. The minimum area of the *Type A* bed is calculated using the formula:

$$A = \frac{QT}{400}$$

where:

A = the area of contact (sand area) (m^2)
Q = the total daily design sanitary sewage flow (L)
T = the percolation rate of the native soil to a maximum of 50 (min/cm)

Based on the above formula, a daily design flow rate of 20,850 L/day, and a native soil percolation rate of 45 min/cm, the minimum size of the leaching bed is calculated to be 2,346 m^2. Since the native soil has a percolation rate greater than 15 min/cm, the leaching bed shall be constructed in imported sand fill with a percolation rate between 6 to 8 min/cm. The conceptual sewage disposal system is shown to have a total area of 3,675 m^2 (irregular shape, ***Figure 8***), which includes a minimum 15 m mantle extending towards the east (inferred direction of groundwater flow). Although this entire area will not be used in the final design, the conceptual area provides flexibility to optimize the design during the detailed engineering.

WATER RESOURCE IMPACT ASSESSMENT

As noted in the MECP's Design Guidelines for Sewage Works 2008, a water resources impact assessment may be required to assess the risk of undesirable effects of the sewage on surrounding water resources. The impact assessment should consider the potential or actual impacts on the various uses of the receiver(s). For the subsurface disposal of the sewage effluent, groundwater is typically considered to be the receiver of the effluent but in some cases surface water may be the receiver.

Surface Water

The closest surface water bodies, being an intermittent tributary of Etobicoke Creek, is located approximately 300 m downgradient of the site boundary, and approximately 350 m downgradient from the anticipated sewage system in the direction of groundwater flow. As per Section 22.5.11 of the MECP's Design Guidelines for the Sewage Works (2008), a 300 m separation distance between the area of the sewage infiltration and a surface water feature should be sufficient to ensure there are no appreciable effects to surface water quality. Given the separation distance to the surface water feature satisfies the MECP Guideline, EnVision infers that no additional studies are required related to surface water protection.

Groundwater

The MECP Design Guidelines for the Sewage Works allows for an isolation approach where a low permeability environment exists when assessing the impact of subsurface disposal systems on local water resources (Section 22.5.14). The Guideline states that:

"Where it can be shown that the uppermost subsurface unit(s) at an infiltration facility have a vertical hydraulic conductivity of 10^{-5} cm/sec or less, is at least 10 metres thick and extends at least 100 m down gradient of the infiltration area, attenuation calculations may not be required."

As discussed previously in this letter report, and illustrated in ***Figure 7***, the overburden thickness of the low permeability till (10^{-6} cm/sec) soils is generally greater than 10 metres thick and is inferred to exist 100 m down gradient (east/southeast) of the future leaching bed. This aquitard protects the lower water bearing units near the Site. As such, it can be inferred that the hydrogeologic characteristics of the Site can be classified as a "low permeability environment" as defined by the MECP Design Guideline.

Provided as additional evidence to the limited risk posed by the sewage system to human health, it is understood by EnVision that the properties located immediately downgradient of the proposed development (3074 and 3094 King Street), as well as the properties to the south (3029, 3061, 3071, 3083 and 3103 King Street) are serviced by means of a 300 mm diameter PVC Watermain with 25 mm water services lines teeing off of the main and as such do not rely on private water wells for consumption (***Attachment B***).

EnVision infers that the Site characteristics satisfy the MECP requirements of being hydraulically isolated from local down gradient water resources and thus attenuation calculations should not be required. There is limited risk to human or environmental health due to the presence of the shallow confining layer and the availability of municipal water servicing surrounding the site.

PROPOSED MONITORING REQUIREMENTS

The purpose of a monitoring program is to ensure the long-term functionality of the sewage disposal system, and protection of the natural environment. Parameter concentrations are recommended for both effluent objectives and site compliance criteria. The objectives listed in ***Table 3*** are recommended to help preserve the functionality of the system and to warn of process failures.

Table 3 Proposed Effluent Objectives

Sewage Effluent Parameter	Proposed Effluent Objective (monthly grab samples)
BOD_5	10
Total Suspended Solids	10

It is recommended that grab samples of raw sewage and treated effluent be analyzed during the regulatory sampling events for the following parameters.

Table 4 Proposed Sampling Parameter List

Raw Sewage	Treated Effluent
BOD_5	$CBOD_5$
Total Suspended Solids	Total Suspended Solids
Total Kjeldahl Nitrogen	Total Kjeldahl Nitrogen
Ammonia Nitrogen	Nitrate
pH	Nitrite
Alkalinity	Alkalinity
Fats, Oils, Grease (FOG)	pH
	Ammonia Nitrogen
	Fats, Oils, Grease (FOG)

CLOSING

EnVision requests that the MECP review this document prior to the formal pre-consultation meeting to become familiar with the development and proposed environmental assessment approach. Key findings of this assessment include:

- Peak sewage flows at the site necessitate and ECA application from the MECP.
- Sewage generated at the site will be domestic in origin, however, will be high strength and will require sewage treatment prior to discharge.
- Section 22.5.11 of the MECP 2008 Design Guidelines for Sewage Works allows for the elimination of a formal surface water resource impact assessment if the downgradient surface water receiver is greater than 300 m away, as is the case in this development proposal.
- Section 22.5.14 of the MECP 2008 Design Guidelines for Sewage Works allows for the elimination of a formal groundwater water resource impact assessment if the site meets the criteria of a low permeability environment, as is the case in this development proposal.

We trust that this information will be sufficient for the purposes of a pre-consultation submission. Please contact the undersigned at (905) 868-4032 or mvarty@envisionconsultants.ca to arrange a meeting to discuss the requirements of this sewage works application.

Yours sincerely,

EnVision Consultants Ltd

Michael Varty, P.Eng. PMP
Director – Rural Servicing
mvarty@envisionconsultants.ca

Paisley McDowell, P.Eng.
Project Engineer – Rural Servicing
pmcdowell@envisionconsultants.ca

INCLUSIONS:

Figures

Figure 1	Site Location Map
Figure 2	Physiography
Figure 3	Surficial Geology
Figure 4	Topography
Figure 5	Bedrock Geology
Figure 6	Local Water Well Location Map
Figure 7	Local Hydrogeologic Cross Section

Attachments

Attachment A	MECP Water Well Records
Attachment B	Municipal Water Servicing
Attachment C	Borehole Records

APPENDIX B:

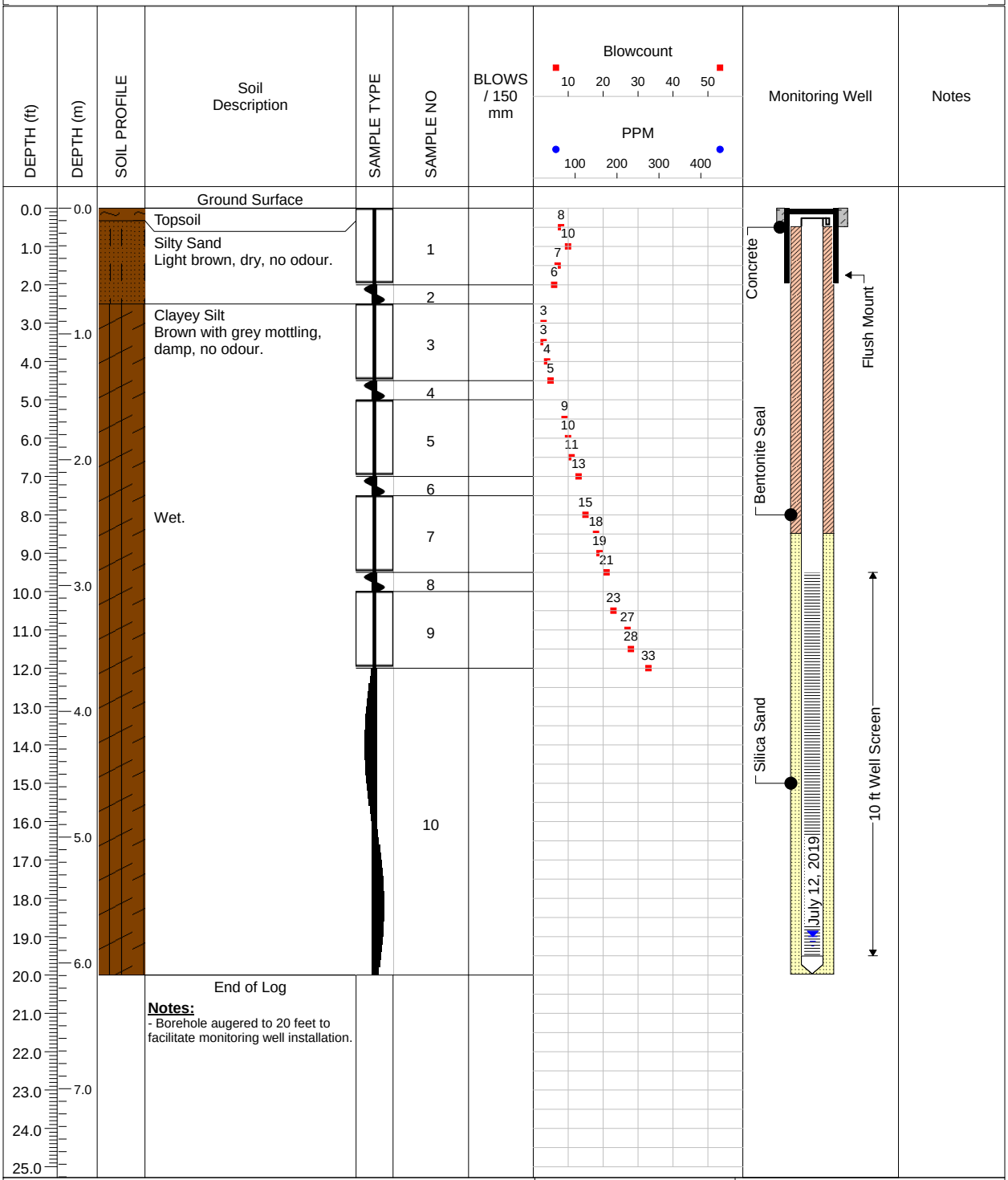
Soil Investigation Results

Figure 4 – Geotechnical Boreholes Location, Satellite Image

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Northeast portion of subject site	**BOREHOLE NO: BH/MW1**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

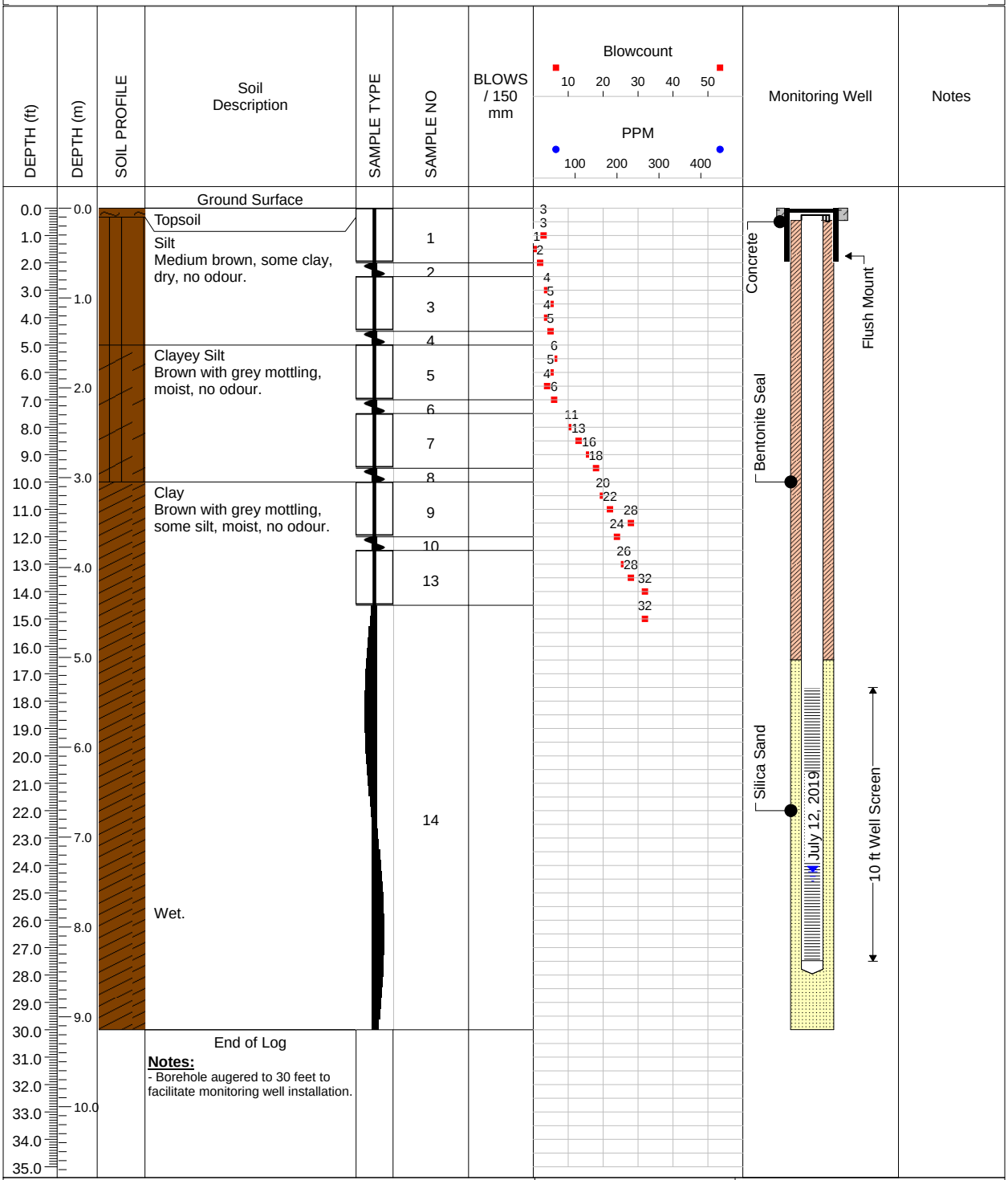


A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** T. Thornton **REVIEWED BY:** A. Rasoul **DRILL DATE:** July 12, 2019
	COMPLETION DEPTH: 20 feet **DRILL METHOD:** Split spoon & rotary **Page:** 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Central south portion of subject site	**BOREHOLE NO: BH/MW2**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS



A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** T. Thornton **REVIEWED BY:** A. Rasoul **DRILL DATE:** July 12, 2019
	COMPLETION DEPTH: 30 feet **DRILL METHOD:** Split spoon & rotary **Page:** 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** South portion of subject site	**BOREHOLE NO: BH/MW3**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	Soil Description	SAMPLE NO	BLOWS / 150 mm
0.0	0.0	Ground Surface		
0.0		Topsoil		
1.0		Gravelly Silty Sand Medium brown, dry, no odour.	1	5
2.0			2	10
3.0	1.0	Silt Medium brown, damp, no odour.	3	12
4.0			4	5
5.0				3
6.0	2.0	Brown with grey mottling, some clay, dry.	5	3
7.0			6	4
8.0		Clayey Silt Brown with grey mottling, trace gravel, dry, no odour.	7	9
9.0			8	12
10.0	3.0		9	12
11.0				16
12.0			10	19
13.0	4.0	Damp.	11	22
14.0				21
15.0		Clay Brown with grey mottling, some silt, moist, no odour.		23
16.0	5.0			26
17.0				25
18.0				25
19.0	6.0		12	25
20.0				29
21.0				24
22.0				30
23.0	7.0			33
24.0				34
25.0		End of Log		
26.0	8.0	**Notes:** - Borehole augered to 25 feet to facilitate monitoring well installation.		
27.0				
28.0				
29.0				
30.0	9.0			

Blowcount: 10 20 30 40 50

PPM: 100 200 300 400

Monitoring Well: Concrete; Flush Mount; Bentonite Seal; July 12, 2019; Silica Sand; 10 ft Well Screen

Notes

A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** T. Thornton **REVIEWED BY:** A. Rasoul **DRILL DATE:** July 12, 2019
COMPLETION DEPTH: 25 feet **DRILL METHOD:** Split spoon & rotary **Page:** 1 of 1	

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Central portion of subject site	**BOREHOLE NO: BH4**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	SOIL PROFILE	Soil Description	SAMPLE TYPE	SAMPLE NO	BLOWS / 150 mm	Blowcount 10 20 30 40 50 / PPM 100 200 300 400	Monitoring Well	Notes
0.0	0.0		Ground Surface						
			Topsoil						
			Silty Sand Silt, some sand, medium brown, dry, no odour.		1	4 5 5 6			
2.0					2				
	1.0		Silt No sand, damp, no odour.		3	4 4 4 3			
4.0					4				
5.0			Clayey Silt Brown & grey, damp, no odour.		5	10 11 15 20			
6.0	2.0								
7.0			Moist at 7.5 ft		6				
					7	18 21 24 28			
9.0									
	3.0				8				
10.0			End of Log **Notes:** - No monitoring well installed.						
11.0									
12.0									
13.0	4.0								
14.0									
15.0									

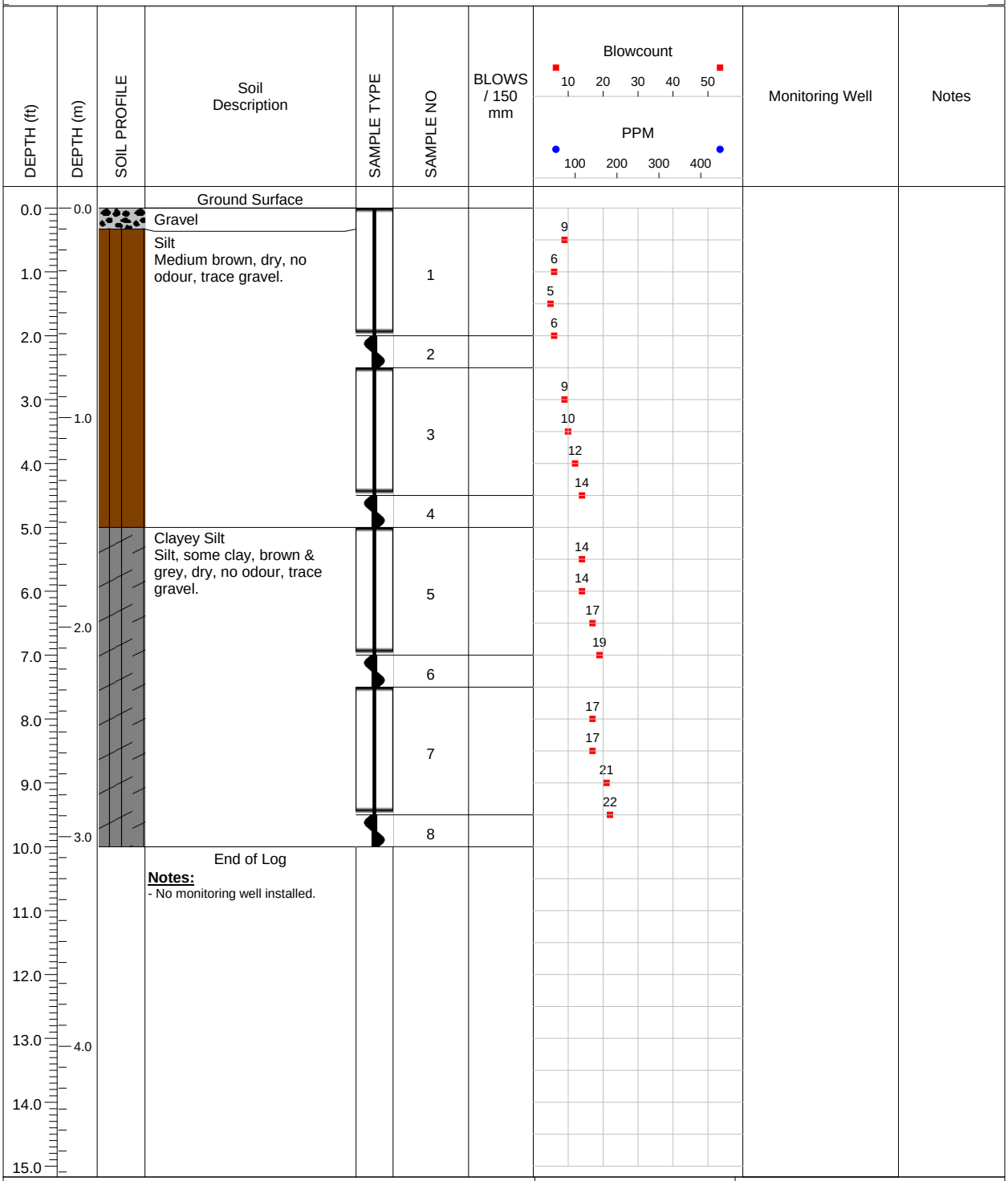
A & A Environmental Consultant Inc.
16 Young Street Woodstock, ON

LOGGED BY: T. Thornton	**COMPLETION DEPTH:** 10 feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** Split spoon
DRILL DATE: July 12, 2019	**Page:** 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Central W boundary	**BOREHOLE NO: BH5**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS



A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** T. Thornton	**COMPLETION DEPTH:** 10 feet
	REVIEWED BY: A. Rasoul	**DRILL METHOD:** Split spoon
	DRILL DATE: July 12, 2019	**Page:** 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** NW portion of site	**BOREHOLE NO: BH6**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	SOIL PROFILE	Soil Description	SAMPLE TYPE	SAMPLE NO	BLOWS / 150 mm	Blowcount / PPM	Monitoring Well	Notes
0.0	0.0		Ground Surface						
			Topsoil						
			Clayey Silt Silt, some clay, brown & grey, dry, no odour.		1	3 4 4 4			
					2				
					3	4 5 5 7			
			Moist at 4.5 ft		4				
					5	11 12 14 17			
					6				
					7	12 14 20 21			
					8				
10.0	3.0		End of Log						

Notes:
- No monitoring well installed.

Blowcount: 10 20 30 40 50

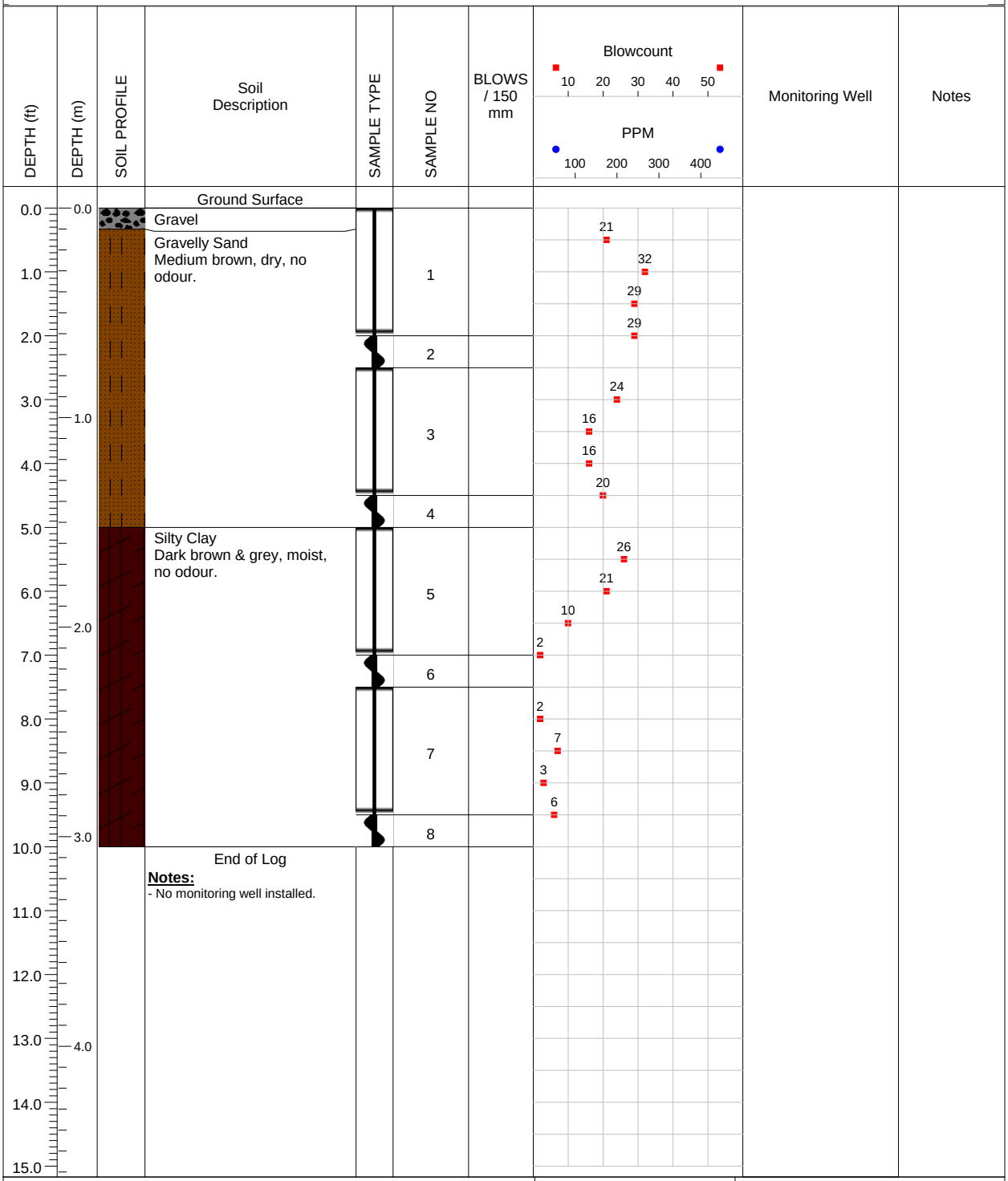
PPM: 100 200 300 400

A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** T. Thornton
	REVIEWED BY: A. Rasoul
	DRILL DATE: July 12, 2019
	COMPLETION DEPTH: 10 feet
	DRILL METHOD: Split spoon
	Page: 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Along Hurontario St Rd	**BOREHOLE NO: BH7**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

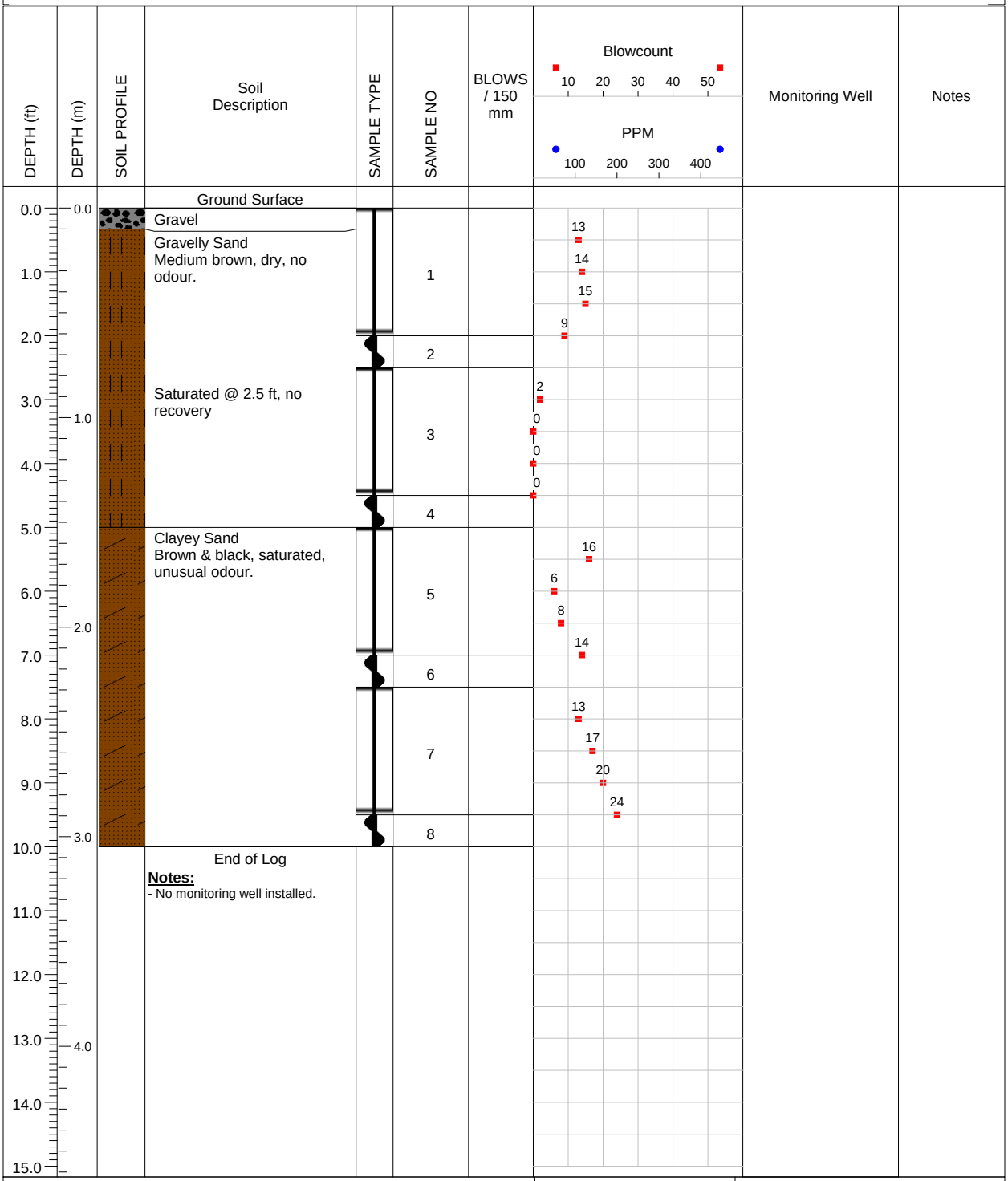


A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** M. Richardson **COMPLETION DEPTH:** 10 feet
	REVIEWED BY: A. Rasoul **DRILL METHOD:** Split spoon
	DRILL DATE: Oct 1, 2019 **Page:** 1 of 1

PROJECT: Geotechnical & Hydrogeological	**BH LOCATION:** Along King St Rd	**BOREHOLE NO: BH8**
PROJECT NO: 4545- BVD Caledon	**LOCATION:** NE corner of Hurontario Street & King Street Intersection, Caledon, ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE SHELBY TUBE CORE SAMPLE SPT SAMPLE GRAB SAMPLE NO RECOVERY

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS



A & A Environmental Consultant Inc. 16 Young Street Woodstock, ON	**LOGGED BY:** M. Richardson **COMPLETION DEPTH:** 10 feet
	REVIEWED BY: A. Rasoul **DRILL METHOD:** Split spoon
	DRILL DATE: Oct 1, 2019 **Page:** 1 of 1

APPENDIX C – Grain Size Distribution and Test Results

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

Aug 2nd, 2019

File No. 7-18-0032-57
Stoney Creek Office

A&A Environmental Consultants
16 Young Street
Woodstock, Ontario
N4S 3L4

Attention: Mr. Thomas Demers

RE: LABORATORY TEST RESULTS
PROJECT – 4545 BVD Caledon

Dear Sir:

This report presents the results of laboratory testing carried out on a soil sample received at our Stoney Creek laboratory on July 18th, 2019.

The laboratory testing included the following:

- Particle size analyses per ASTM D422 & D2217;
- Atterburg Limits per ASTM 4318;

The results of the testing are summarized in the attached Table 1 and shown on the accompanying Figures.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, please do not hesitate to contact the undersigned.

Yours truly,
Terraprobe Inc.

Aaron Skipper
Lab Supervisor

Rev: P. Cannon, P. Eng.

Table 1

Summary of Laboratory Testing

A & A Project No. 4545 BVD Caledon

Sample No.	Depth (ft.)	Soil Description	Atterburg Limits (%)			Particle Size Distribution (Figure No.)
			w_L	w_P	I_P	
BH 1	10 – 12’	Silty Clay some Sand and Gravel	28.75	15.11	13.64	1
BH 2	12.5 – 14.5’	Clayey Silt with Sand trace Gravel	30.50	15.84	14.66	2
BH 3	5 – 7	Clayey Silt with Sand trace Gravel	30.39	16.91	13.48	3
BH 4	7.5 – 9.5’	Clayey Silt with Sand trace Gravel	29.75	15.38	14.37	4
BH 5	2.5 – 4.5’	Silt and Clay some Sand trace Gravel	33.01	15.99	17.02	5
BH 6	7.5 – 9.5’	Silt and Clay some Sand trace Gravel	29.74	16.19	13.55	6

Notes: To be read with accompanying letter.

Terraprobe

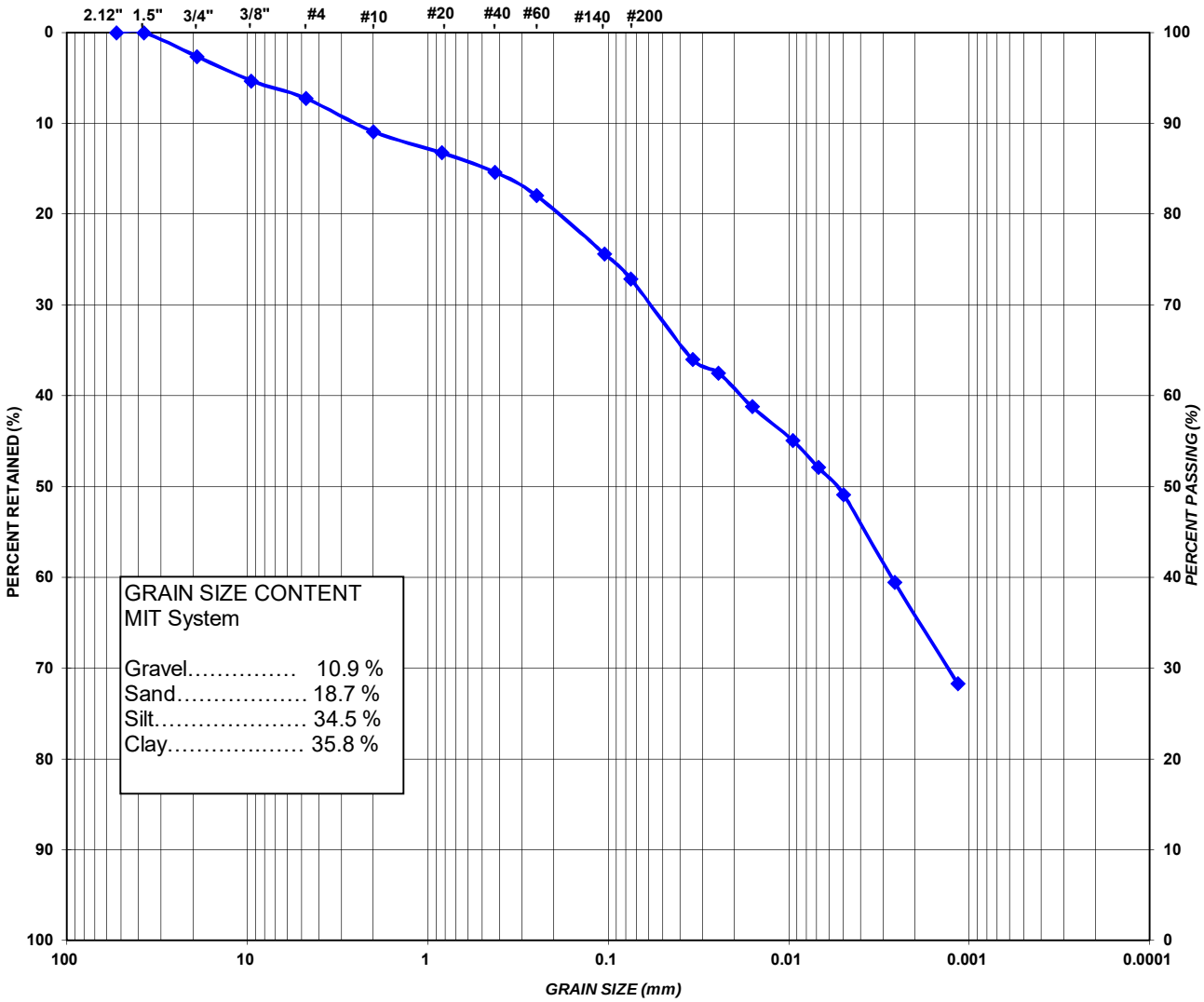
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **1**
SAMPLE NUMBER:
SAMPLE DEPTH: **10 - 12'**
SAMPLE DESCRIPTION: **Silty Clay some Sand and Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3411**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		SAND			SILT	CLAY
			COARSE	MEDIUM	FINE		

UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Figure 1

Terraprobe

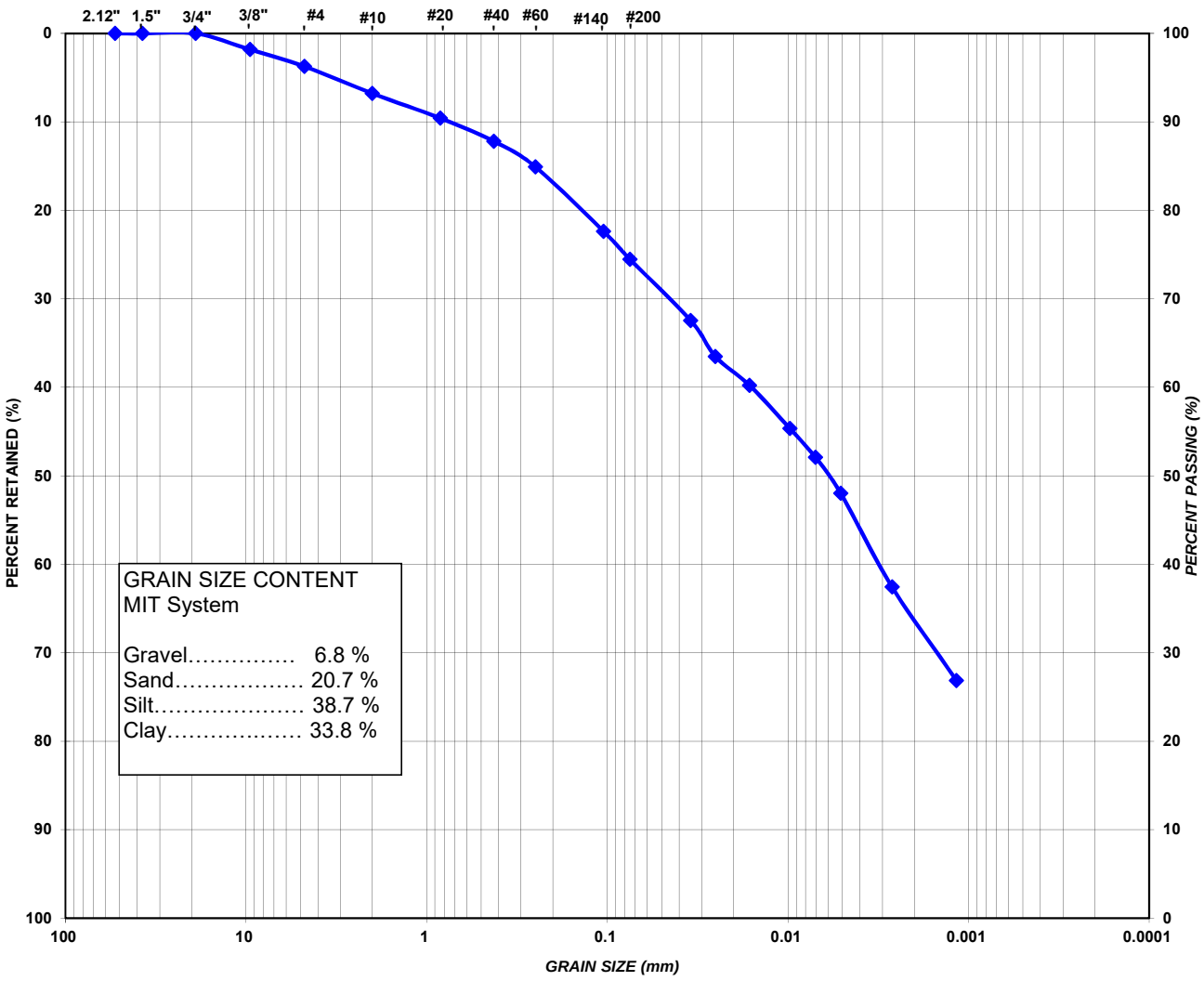
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **2**
SAMPLE NUMBER:
SAMPLE DEPTH: **12.5 - 14.5'**
SAMPLE DESCRIPTION: **Clayey Silt with Sand trace Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3412**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL	COARSE	MEDIUM	FINE	SILT	CLAY
		SAND				

UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Figure 2

Terraprobe

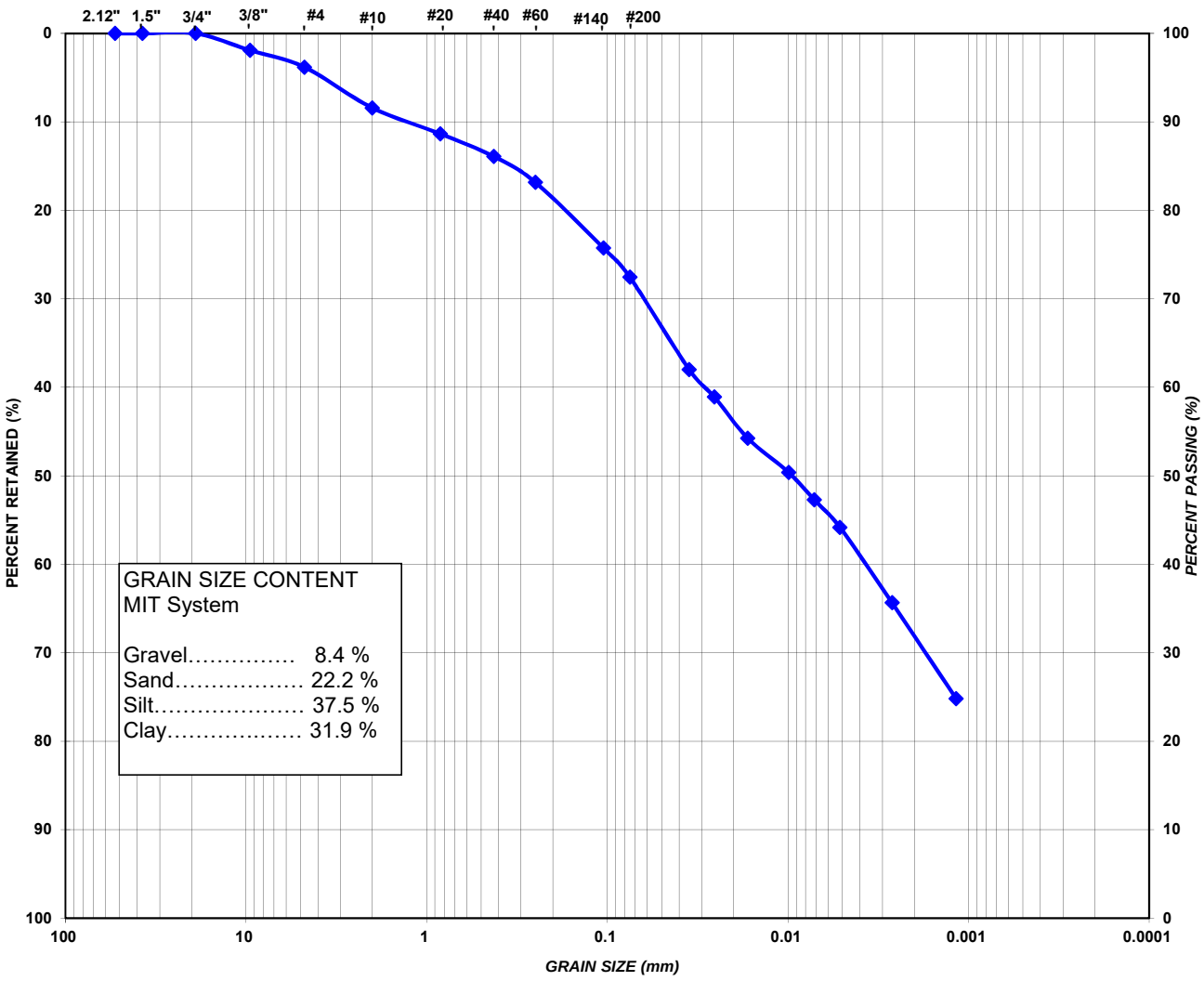
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **3**
SAMPLE NUMBER:
SAMPLE DEPTH: **5 - 7'**
SAMPLE DESCRIPTION: **Clayey Silt with Sand trace Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3413**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE / MEDIUM / FINE SAND		SILT	CLAY
UNIFIED SYSTEM	COARSE / FINE GRAVEL		COARSE / MEDIUM / FINE SAND		SILT AND CLAY	

Figure 3

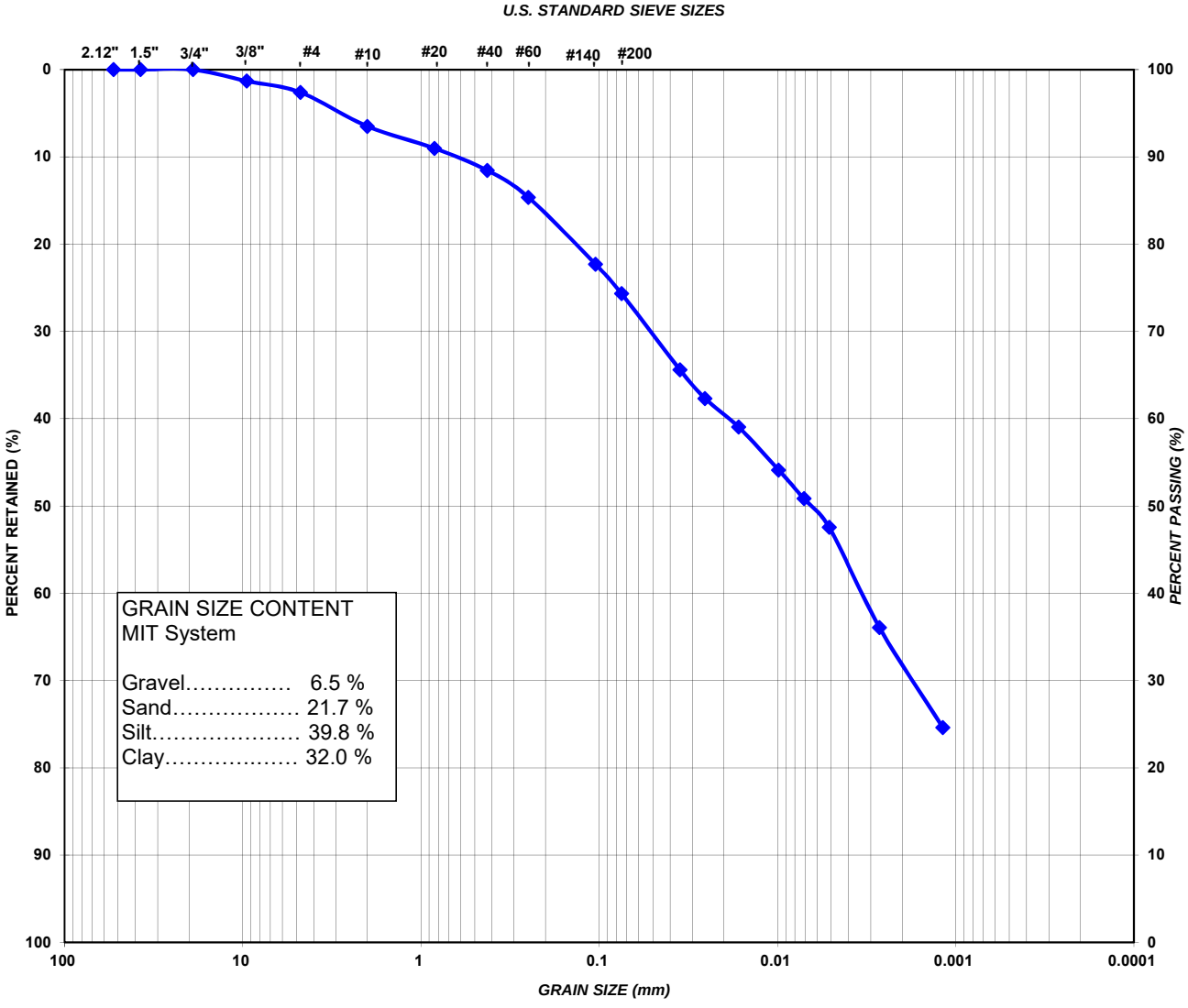
Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **4**
SAMPLE NUMBER:
SAMPLE DEPTH: **7.5 - 9.5'**
SAMPLE DESCRIPTION: **Clayey Silt with Sand trace Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3414**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Figure 4

Terraprobe

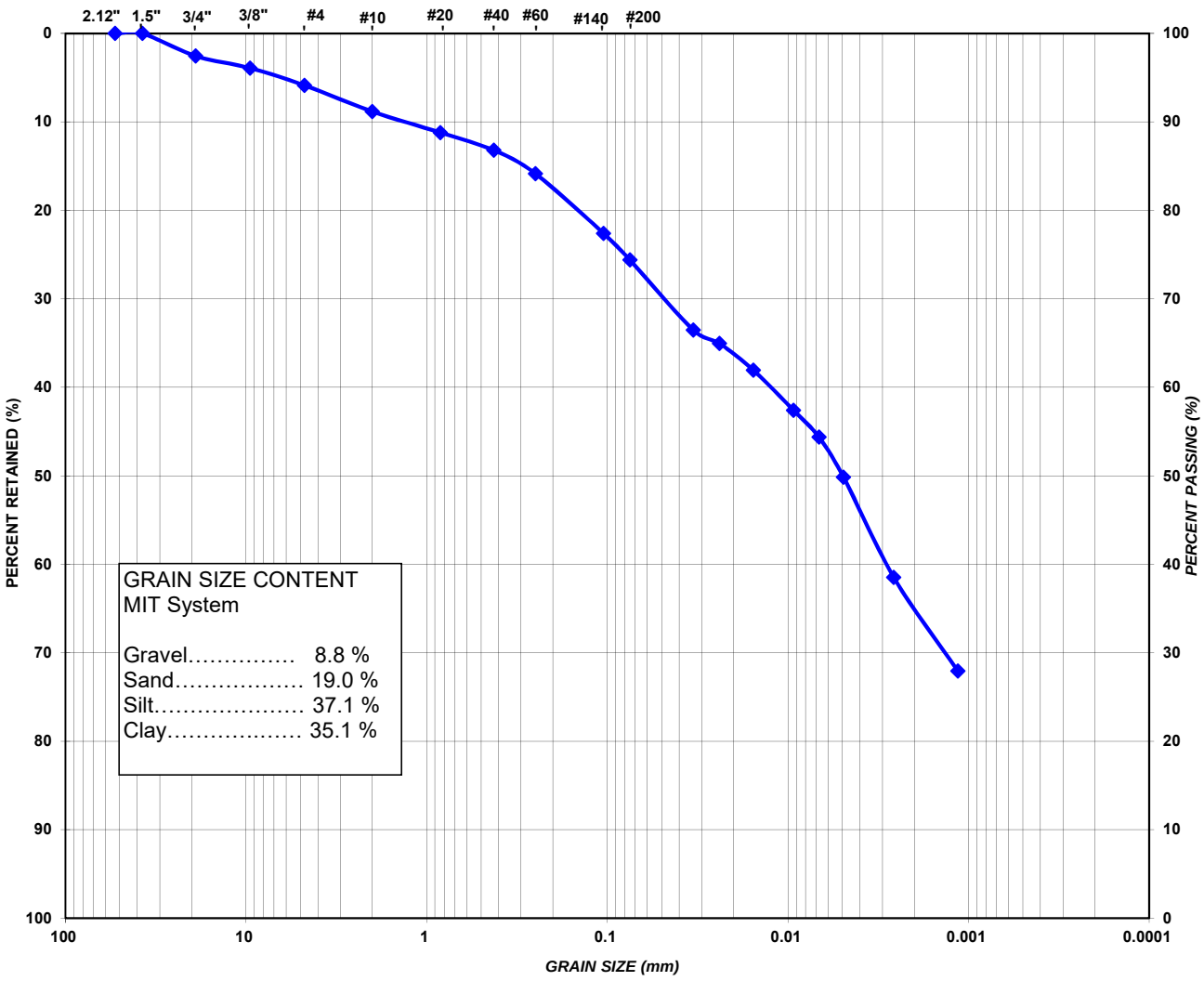
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **5**
SAMPLE NUMBER:
SAMPLE DEPTH: **2.5 - 4.5'**
SAMPLE DESCRIPTION: **Silt and Clay some Sand trace Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3415**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE / MEDIUM / FINE SAND		SILT	CLAY
UNIFIED SYSTEM	COARSE / FINE GRAVEL		COARSE / MEDIUM / FINE SAND		SILT AND CLAY	

Figure 5

Terraprobe

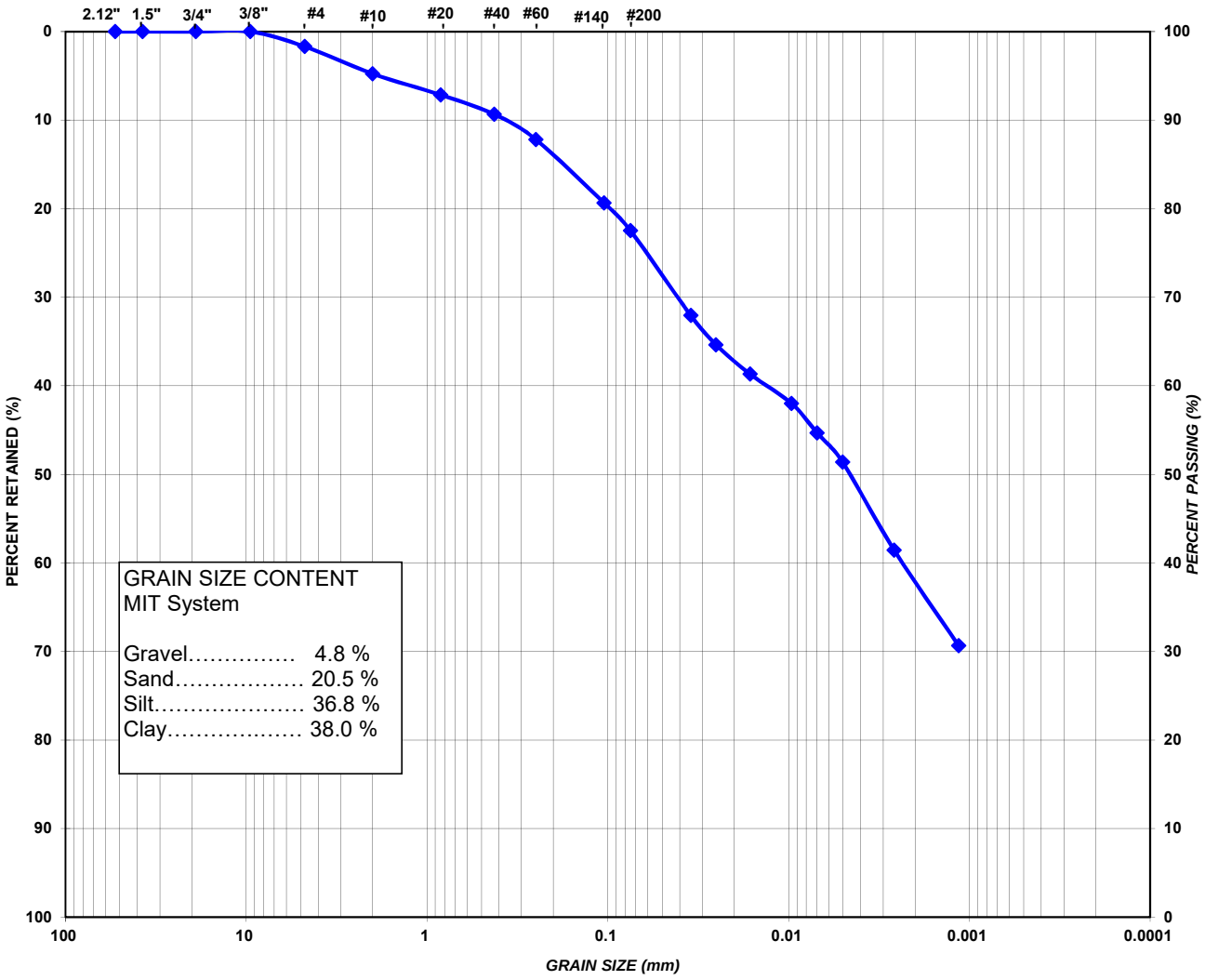
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **6**
SAMPLE NUMBER:
SAMPLE DEPTH: **7.5 - 9.5'**
SAMPLE DESCRIPTION: **Silt and Clay some Sand trace Gravel**

FILE NO.: **7-18-0032-57**
LAB NO.: **S3416**
SAMPLE DATE: **July 18, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE / MEDIUM / FINE SAND		SILT	CLAY
UNIFIED SYSTEM	COARSE / FINE GRAVEL		COARSE / MEDIUM / FINE SAND		SILT AND CLAY	

Figure 6

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

Oct 15th, 2019

File No. 7-18-0032-65
Stoney Creek Office

A&A Environmental Consultants
16 Young Street
Woodstock, Ontario
N4S 3L4

Attention: Mr. Thomas Demers

RE: LABORATORY TEST RESULTS
PROJECT – 4545 BVD Caledon

Dear Sir:

This report presents the results of laboratory testing carried out on soil samples received at our Stoney Creek laboratory on Oct 4th, 2019.

The laboratory testing included the following:

- Water content per ASTM D2216;
- Particle size analyses per ASTM D422 & D2217;
- Atterburg Limits per ASTM 4318;

The results of the testing are summarized in the attached Table 1 and shown on the accompanying Figures.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, please do not hesitate to contact the undersigned.

Yours truly,
Terraprobe Inc.

Aaron Skipper
Lab Supervisor

Rev: P. Cannon, P. Eng.

Table 1

Summary of Laboratory Testing

A & A Project No. 4545 BVD Caledon

Sample No.	Depth (ft.)	Water Content (%)	Soil Description	Atterburg Limits (%)			Particle Size Distribution (Figure No.)
				w_L	w_P	I_P	
BH 8	7.5 – 9.5’	17.3	Sandy Clay with Silt some Gravel	28.44	14.71	13.74	1
BH 7	2.5 – 4.5’	7.4	Sand and Gravel trace Silt and Clay		Non Plastic		2

Notes: To be read with accompanying letter.

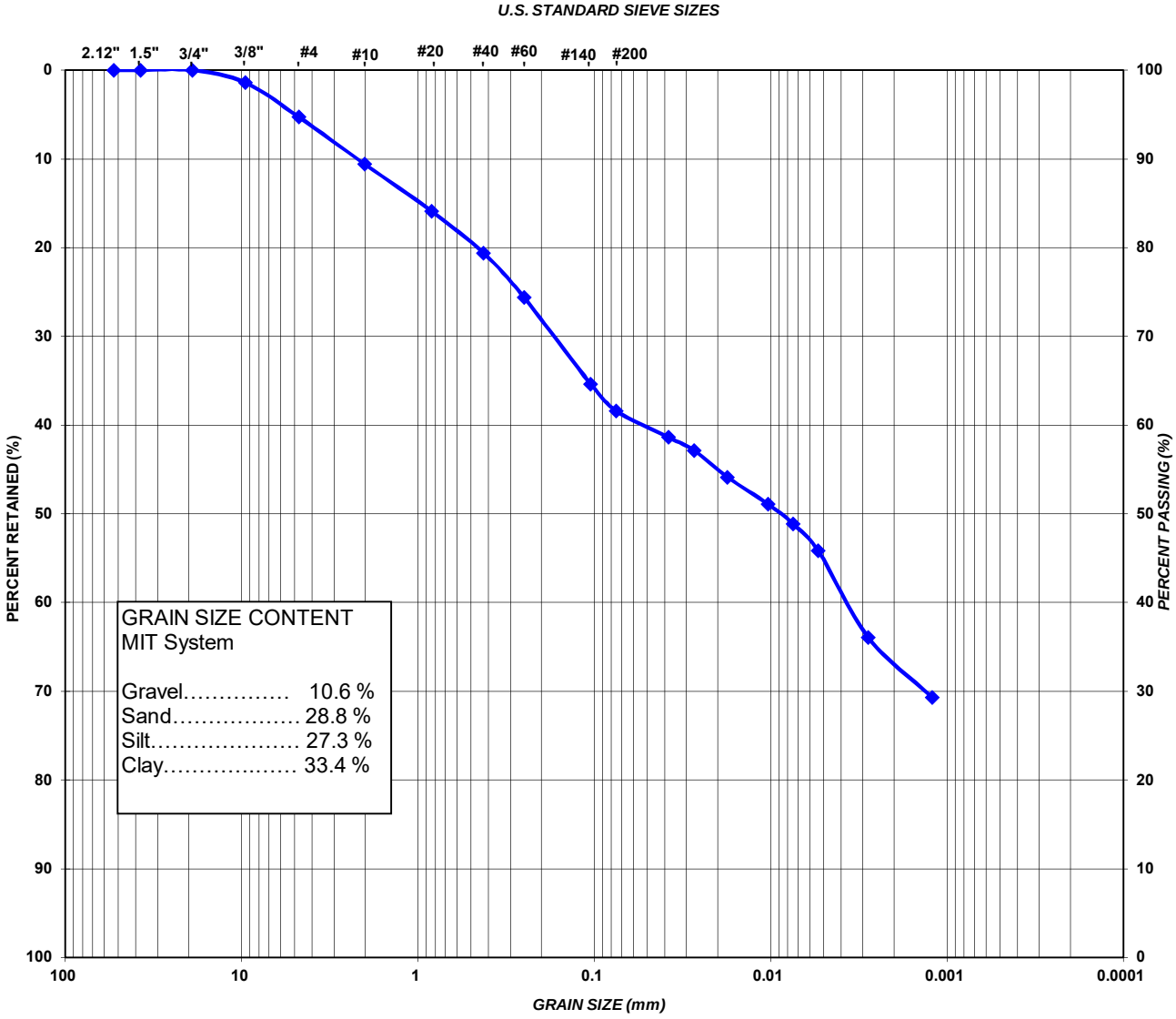
Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **8**
SAMPLE NUMBER:
SAMPLE DEPTH: **7.5 - 9.5'**
SAMPLE DESCRIPTION: **Sandy Clay with Silt some Gravel**

FILE NO.: **7-18-0032-65**
LAB NO.: **S3567**
SAMPLE DATE: **Oct 4, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		SAND			SILT	CLAY
			COARSE	MEDIUM	FINE		

UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Figure 1

Terraprobe

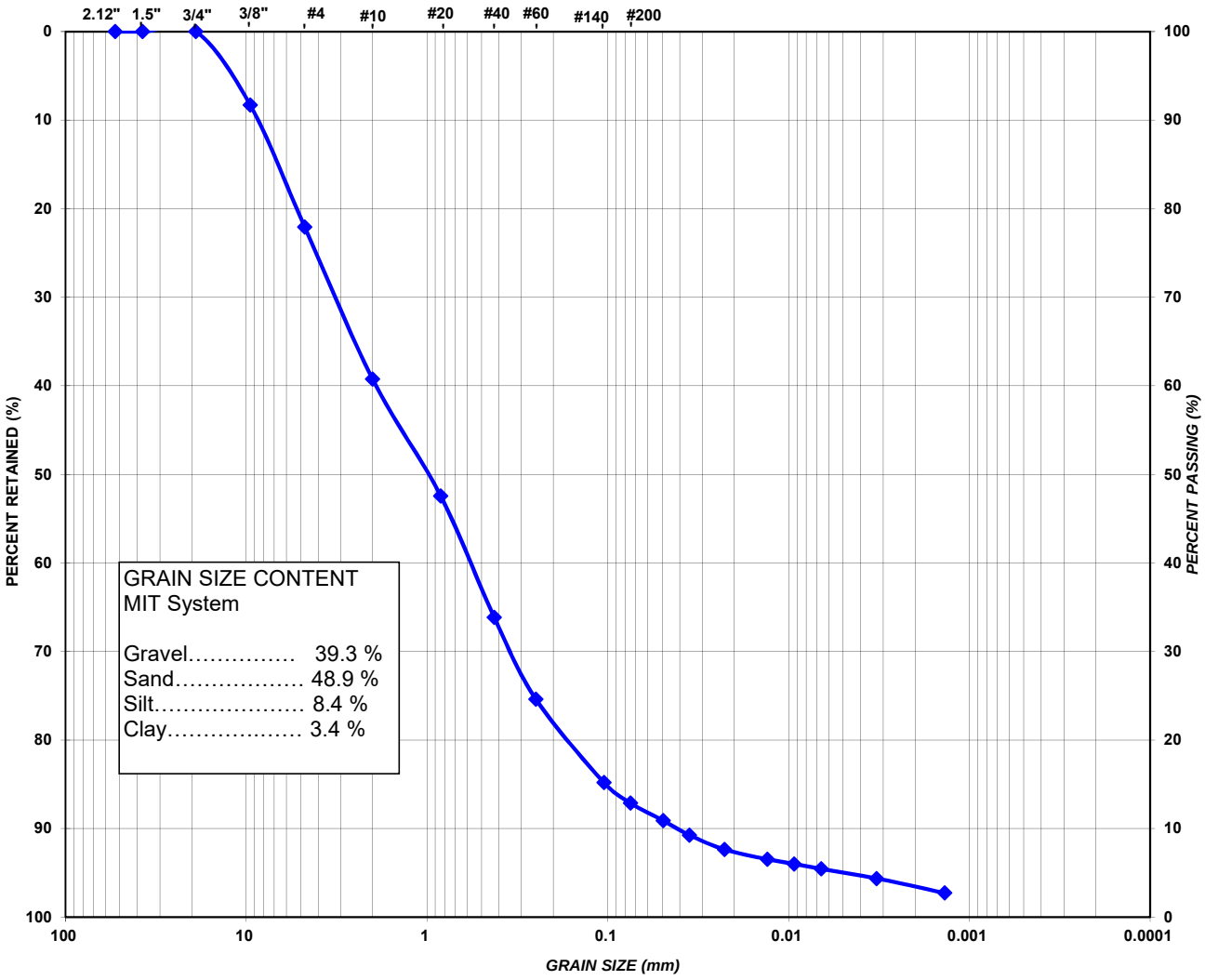
SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **4545 BVD Caledon**
LOCATION: **Woodstock, Ontario**
CLIENT: **A&A Enviromental**
BOREHOLE: **7**
SAMPLE NUMBER:
SAMPLE DEPTH: **2.5 - 4.5'**
SAMPLE DESCRIPTION: **Sand and Gravel trace Silt and Clay**

FILE NO.: **7-18-0032-65**
LAB NO.: **S3568**
SAMPLE DATE: **Oct 4, 2019**
SAMPLED BY: **Client**

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Figure 2

ENVISION
CONSULTANTS LTD

6415 NORTHWEST DRIVE
UNITS 37-40
MISSISSAUGA, ON L4V 1X1

May 17, 2022

Project #: 22-0162

BVD Holdings Caledon Inc.
130 Delta Park Boulevard
Brampton, Ontario L6T 5E7

SUBJECT: CALEDON SERVICE CENTRE HAND AUGER LOGS

TP22-1

0.0 – 0.09 m Brown topsoil moist, compact

0.09 – 0.58 m Brown clayey silt (some grey spots), some sand, trace medium gravel, DTPL, very stiff, orange mottling

0.58 – 1.17 m Brown clayey silt, some sand, trace medium gravel, DTPL, soft, orange mottling at 1.15m

- SS1 taken at 0.3-0.5 m
- SS2 taken at 0.6-1.0 m
- Dry at 1.17 m

TP22-2

0.0 – 0.06 m Brown topsoil, damp, loose, some worms and roots

0.06 – 0.8 m Brown clayey silt, some sand, trace medium gravel, APL, soft, orange mottling at 0.46m

0.8 – 1.52m Brown/Grey clayey silt, some sand, trace fine gravel and brown sand, APL to WTPL, very soft to firm

- SS1 taken at 0.46-0.80 m
- SS2 taken 0.8-1.50 m
- Dry at 1.52 m

TP22-3

0.0 – 0.6 m Brown clayey silt, some sand, trace medium gravel, stiff, DTPL

0.6 – 1.14 m Brown silt with some clay, some sand, trace medium gravel, firm, DTPL

- SS1 taken at 0.1-0.6 m
- SS2 taken at 0.6-1.10 m

- Dry at 1.14 m

TP22-4

0.0 – 0.05 m Brown topsoil, damp, soft

0.05 – 0.5 m Brown clayey silt, trace sand and medium gravel, firm, APL

- SS1 taken at 0.06-0.4 m
- Dry at 0.5 m

TP22-5

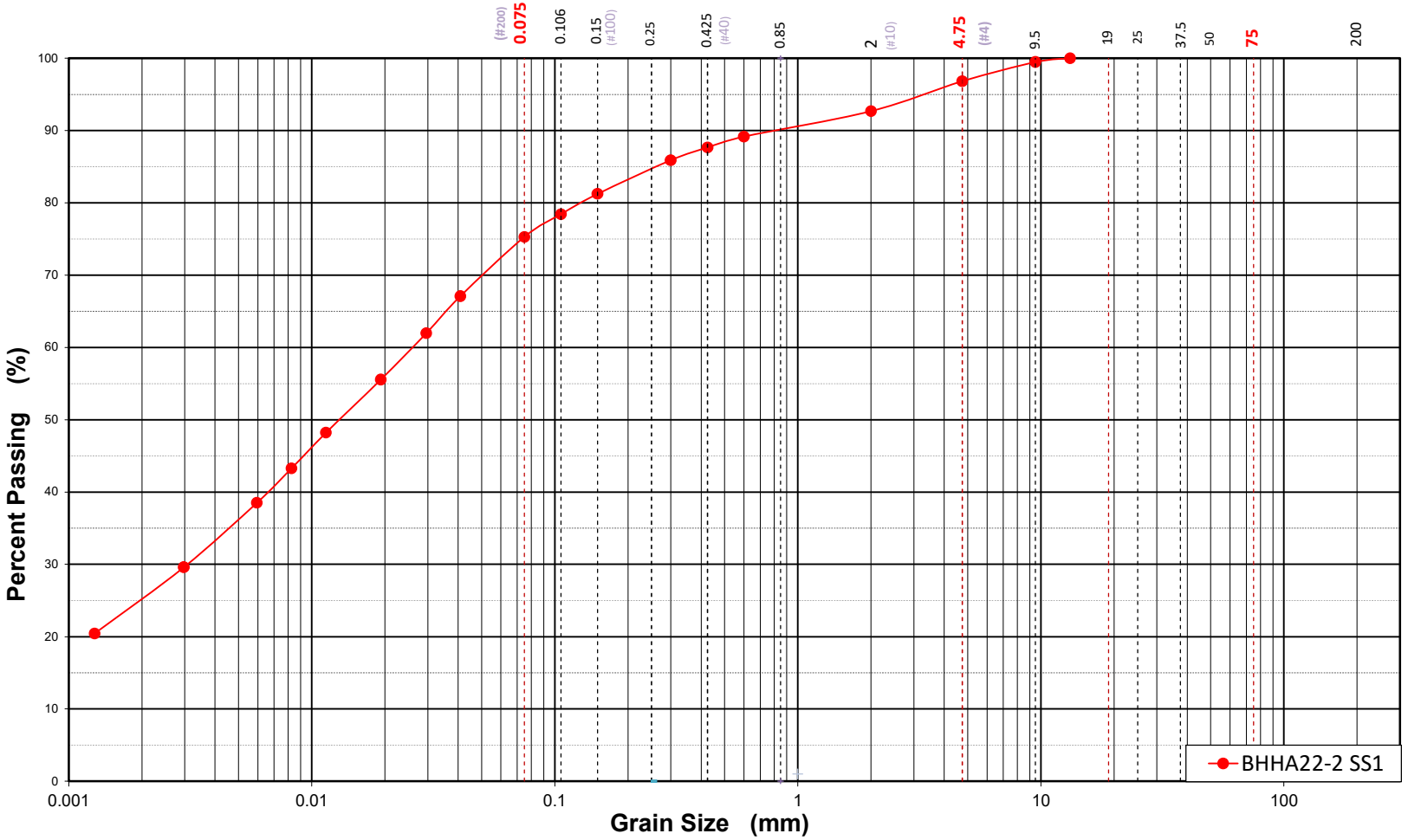
0.0– 0.06 m Brown topsoil, damp, soft

0.06 – 0.4 m Brown clayey silt, some sand, trace medium gravel, firm, APL, orange mottling at 0.37m

0.4 – 0.93 m Brown silt with some clay, trace medium gravel and brown sand, very stiff, DTPL

- SS1 taken at 0.06-0.4 m
- SS2 taken at 0.4-0.93 m
- Dry at 0.93 m

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

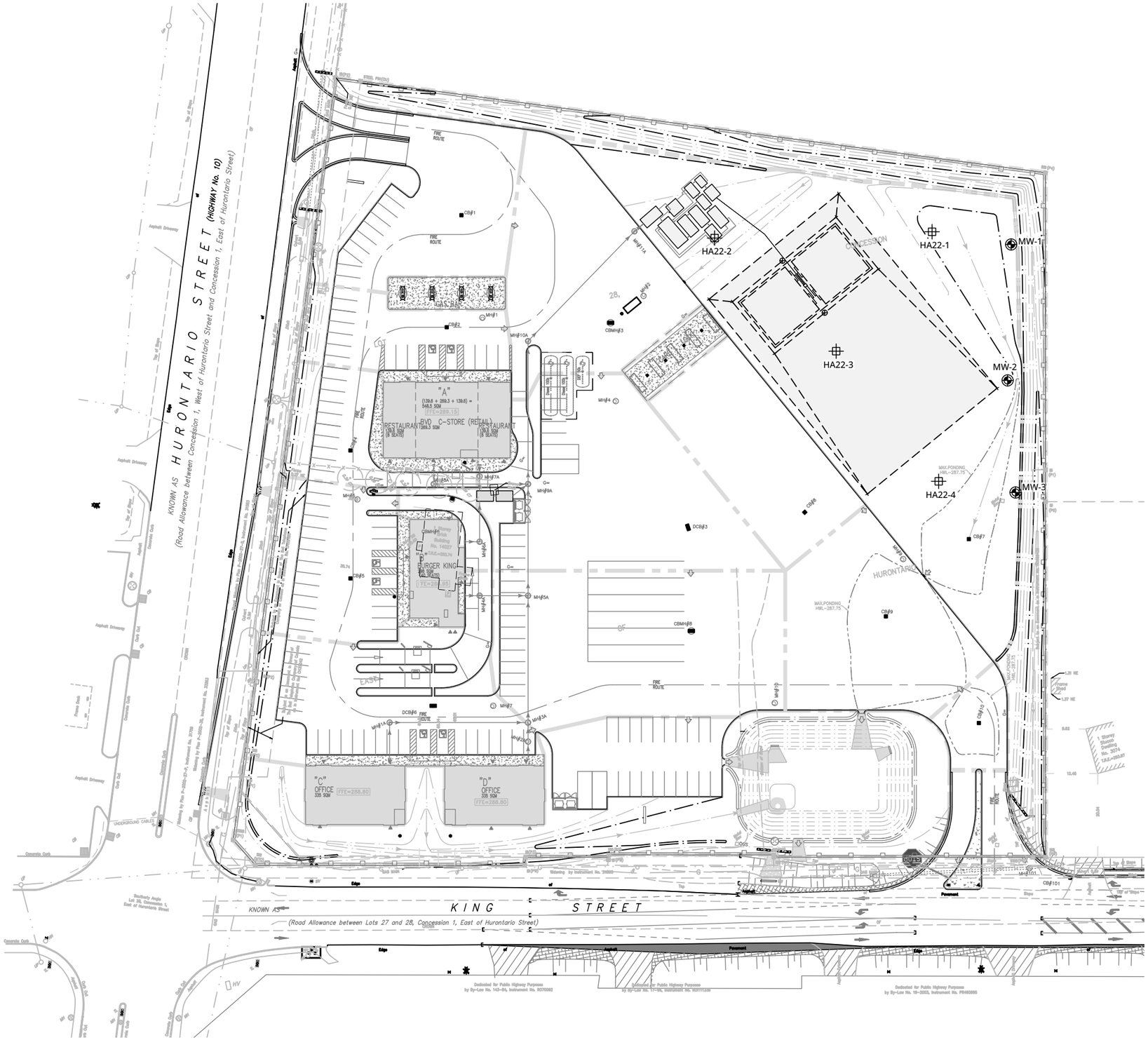
ENVISION CONSULTANTS LTD	GRAIN SIZE DISTRIBUTION	Figure No	1
		Project No	22-0162
		Date	May 30/2022

APPENDIX C:

Sewage System Design Drawings

Drafted by: Moo

IT IS THE RESPONSIBILITY OF THE CLIENT AND THEIR CONTRACTORS TO CONFIRM THE ACCURACY OF THE SETBACKS, LOCATION AND GRADES. ANY VARIATION BETWEEN EXISTING CONDITIONS AND THIS PLAN SHOULD BE REFERRED TO ENVISION TO DETERMINE THE IMPACT ON THE SUITABILITY OF THE DESIGN.



LEGEND

- PROPOSED GROUNDWATER MONITOR
- HAND AUGER LOCATION AND DESIGNATION (MAY 17, 2022)

10.0 0 10.0 20.0 30.0 metres
scale 1:1000

TITLE:

SITE PLAN

PROJECT:

Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

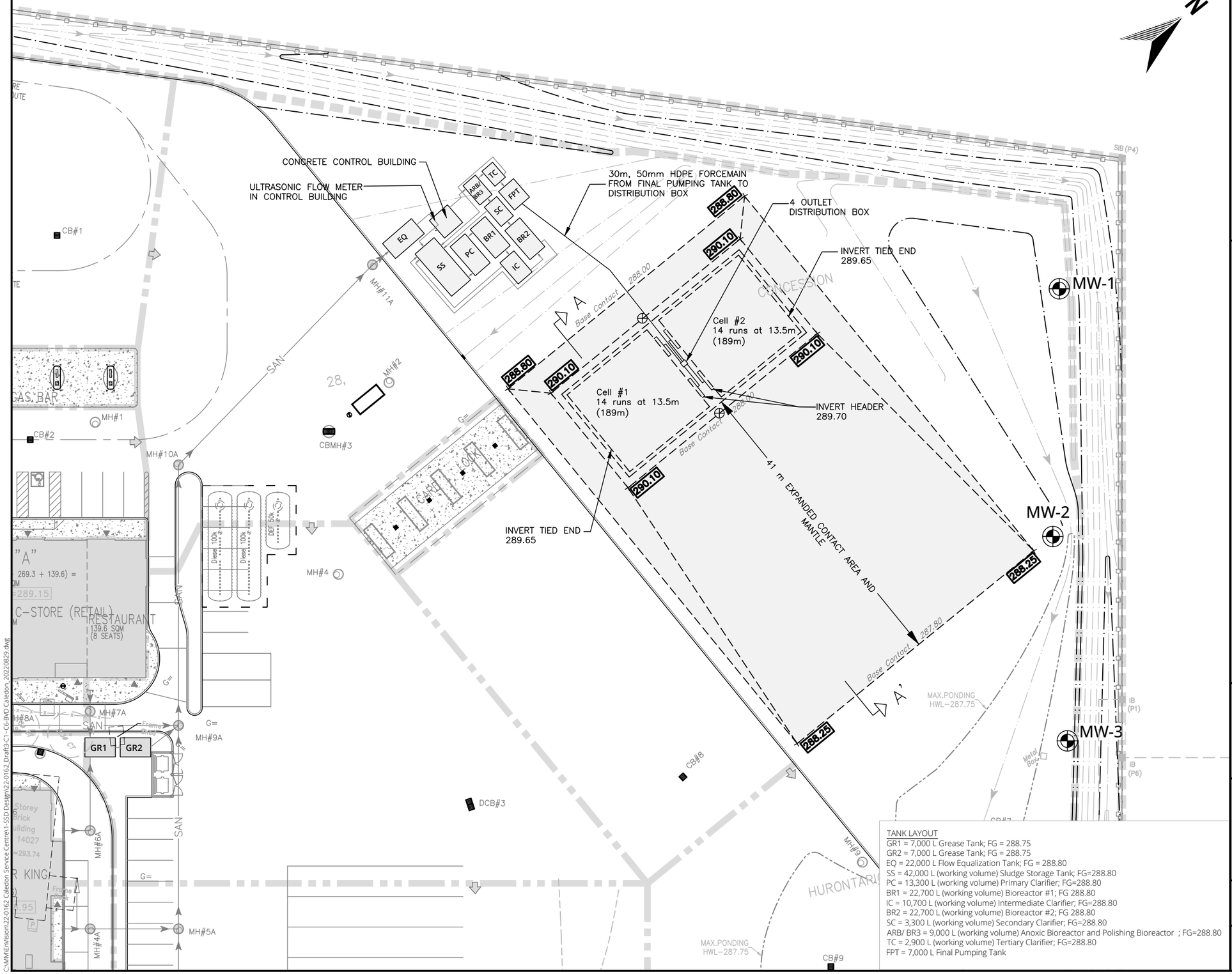
REGISTERED PROFESSIONAL ENGINEER
M.H. Varty
PROVINCE OF ONTARIO

CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO:	REVIEWED BY:	FIGURE NO
22-0162	PLM	C1

C:\MMEnVision\22-0162_Caledon Service Centre\1-SSD Design\22-0162_Draft3-C1 - C6-BVD Caledon_20220829.dwg

Drafted by: Moo

IT IS THE RESPONSIBILITY OF THE CLIENT AND THEIR CONTRACTORS TO CONFIRM THE ACCURACY OF THE SETBACKS, LOCATION AND GRADES. ANY VARIATION BETWEEN EXISTING CONDITIONS AND THIS PLAN SHOULD BE REFERRED TO ENVISION TO DETERMINE THE IMPACT ON THE SUITABILITY OF THE DESIGN.



TANK LAYOUT
GR1 = 7,000 L Grease Tank; FG = 288.75
GR2 = 7,000 L Grease Tank; FG = 288.75
EQ = 22,000 L Flow Equalization Tank; FG = 288.80
SS = 42,000 L (working volume) Sludge Storage Tank; FG=288.80
PC = 13,300 L (working volume) Primary Clarifier; FG=288.80
BR1 = 22,700 L (working volume) Bioreactor #1; FG 288.80
IC = 10,700 L (working volume) Intermediate Clarifier; FG=288.80
BR2 = 22,700 L (working volume) Bioreactor #2; FG 288.80
SC = 3,300 L (working volume) Secondary Clarifier; FG=288.80
ARB/ BR3 = 9,000 L (working volume) Anoxic Bioreactor and Polishing Bioreactor ; FG=288.80
TC = 2,900 L (working volume) Tertiary Clarifier; FG=288.80
FPT = 7,000 L Final Pumping Tank

KEY PLAN
N.T.S

LEGEND

- PROPOSED GROUNDWATER MONITOR
- 288.25 PROPOSED GRADE ASSOCIATED WITH SEWAGE SYSTEM DESIGN
- A CROSS SECTION LINE
- LEACHING BED STANDPIPE

Wastewater System Engineering Calculations

Gasbar and Cardlock Fuel Outlets = 10
Flow per Fuel Outlet = 560 L/day
Convenience Store Washrooms = 3
Flow per Washroom = 950 L/day
Restaurant Seats (site total) = 56
Flow per Seat = 125 L/day
Office Building Floor area (site total) = 670 sq. m
Flow per 9.3 sq. m = 75 L/day

Theoretical daily peak sewage flow = 10x560 + 3x950 + 56x125 + (670/9.3)x75 = 20,850 L/day

Percolation rate of native soil = 45 min/cm (See Figure C-6)

Type of Sewage Treatment System = MBBR (Level IV) with Anoxic Nitrate Treatment discharging to a Type A Leaching Bed
Flow Equalization Tank Discharge Rate = 217 L per dose, one dose every 15 minutes alternating between pumps

Minimum Leaching Bed Area = QT/400 = 2,345 sq. m
Proposed Leaching Bed Area = 2,400 sq. m (40 x 60 m)
Minimum Stone and Pipe Area = Q/50 = 417 sq. m
Proposed Stone and Pipe Area = 420 sq. m (14 x 30 m)
Proposed Distribution Pipe Layout = 2 cells,
each with 14 runs of 75 mm PVC distribution pipe at 13.5 m in length;
total pipe length of 378 linear m
Final Pump Tank Discharge Rate = 1,300 L per dose,
one dose every 90 minutes alternating between pumps

5.0 0 5.0 10.0 15.0 metres
scale 1:500

TITLE:

Sewage System Design - Plan View

PROJECT:

Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO:	REVIEWED BY:	FIGURE NO
22-0162	PLM	C2

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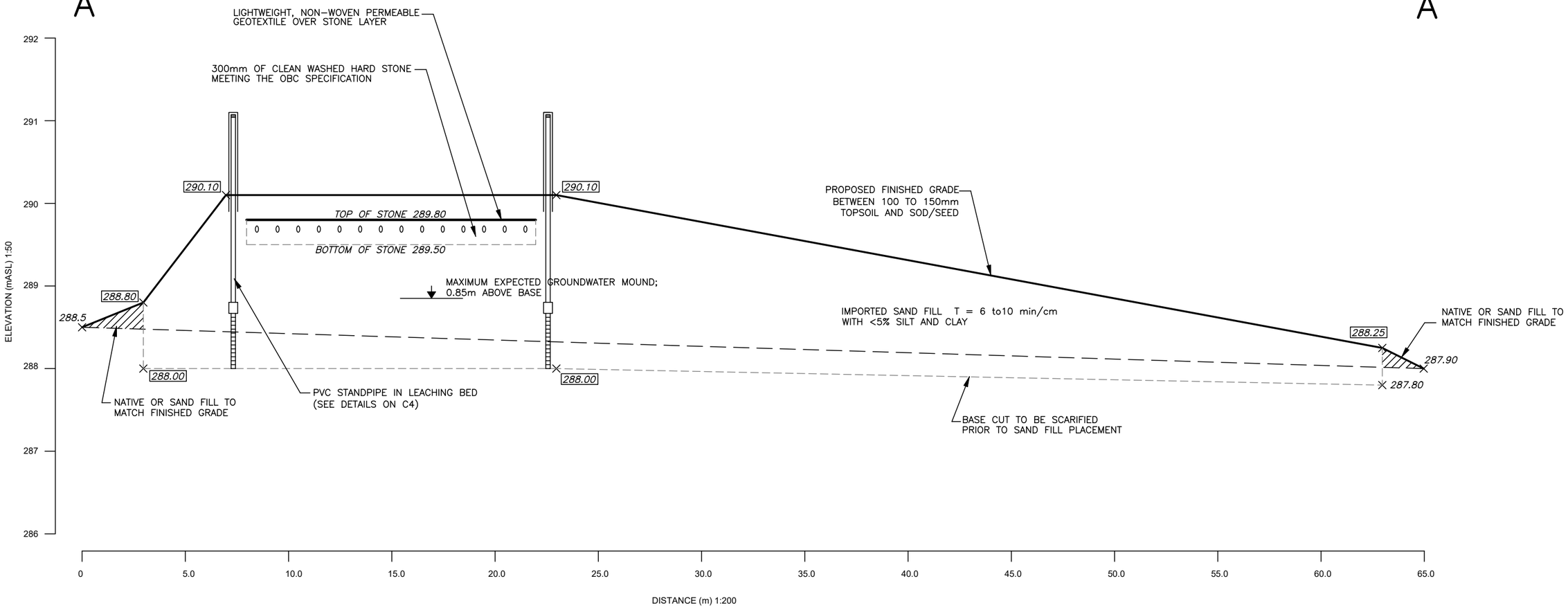
CROSS SECTION A-A'



LEGEND

× 288.60	PROPOSED FINISHED GRADE AT SPECIFIC LOCATION
× 288.5	EXISTING GRADE

REGISTERED PROFESSIONAL ENGINEER
M.H.Varty
PROVINCE OF ONTARIO

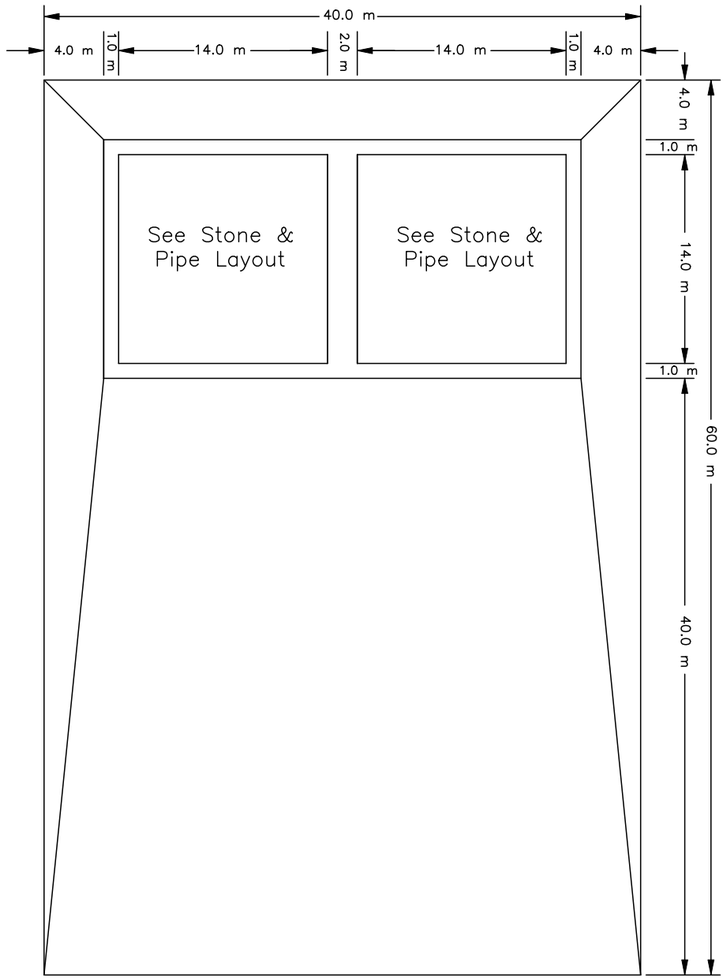
TITLE: Cross Section Details

PROJECT:
Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

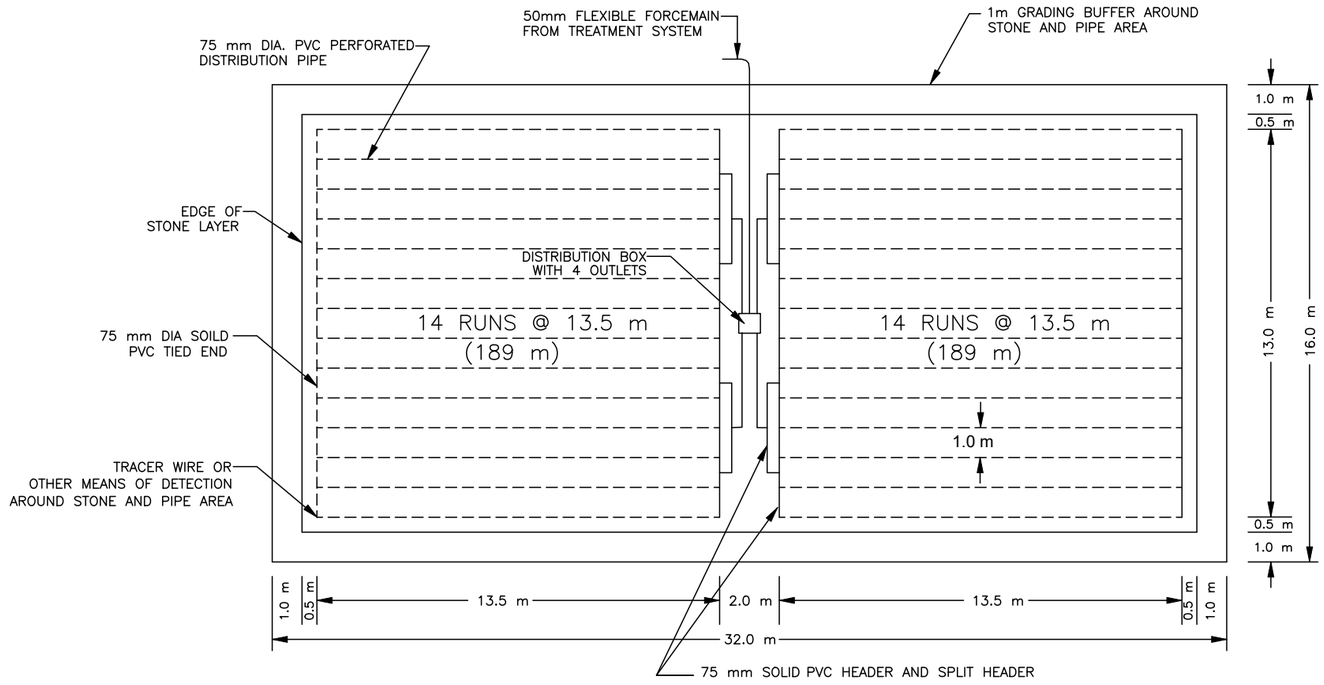
CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO: 22-0162	REVIEWED BY: PLM	FIGURE NO C3

Drafted by: Moo

BED LAYOUT (SCALE 1:400)

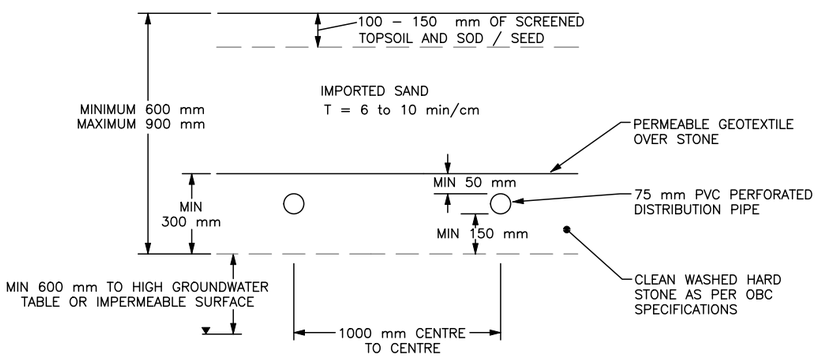


STONE AND PIPE LAYOUT (SCALE 1:200)



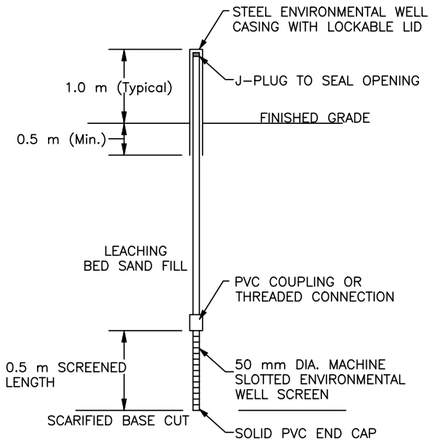
STONE LAYER DETAIL

(NOT TO SCALE)



LEACHING BED STANDPIPE DETAILS

(NOT TO SCALE)



REGISTERED PROFESSIONAL ENGINEER
M.H.Varty
PROVINCE OF ONTARIO

TITLE: Section Details

PROJECT:
Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO:	REVIEWED BY:	FIGURE NO
22-0162	PLM	C4

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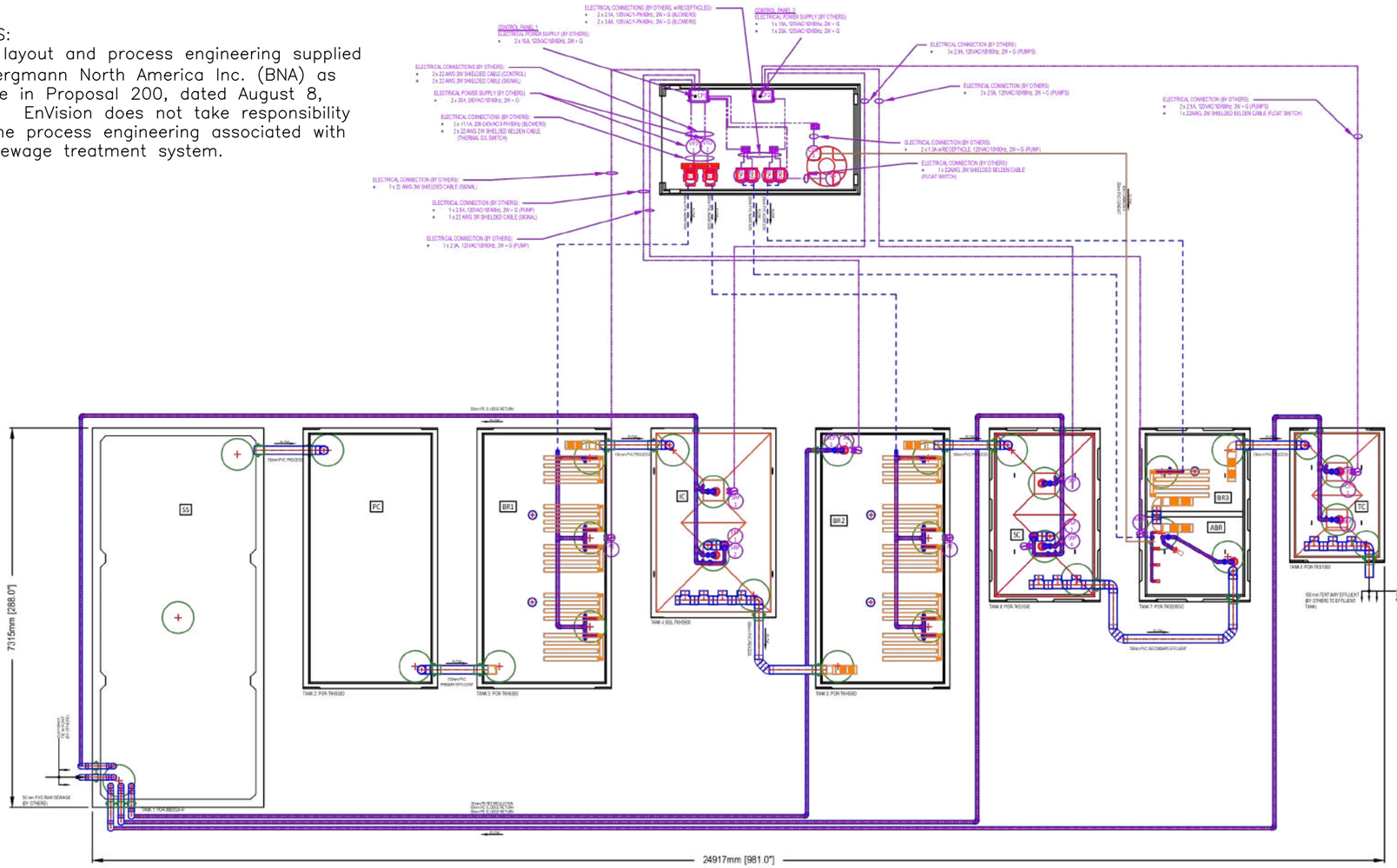
NOTES:
Tank layout and process engineering supplied by Bergmann North America Inc. (BNA) as outline in Proposal 200, dated August 8, 2022. EnVision does not take responsibility for the process engineering associated with the sewage treatment system.

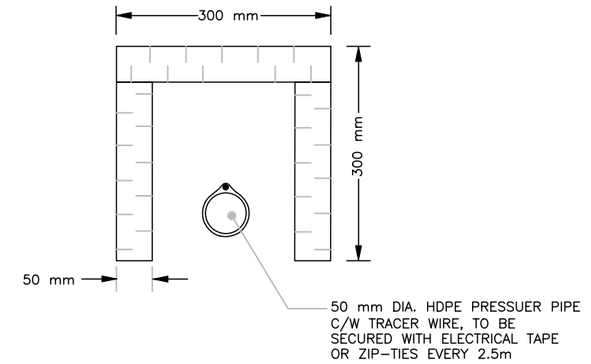


TANK LIST			
PROCESS NAME		TANK #	~ WORKING VOLUME (m³)
SS	SLUDGE STORAGE	1	42.0
PC	PRIMARY CLARIFIER	2	13.3
BR1	BIOREACTOR 1	3	22.7
IC	INTERMEDIATE CLARIFIER	4	10.7
BR2	BIOREACTOR 2	5	22.7
SC	SECONDARY CLARIFIER	6	3.3
ABR	ANOXIC BIOREACTOR	7	4.5
BR3	BIOREACTOR 3	7	4.5
TC	TERTIARY CLARIFIER	8	2.9

PROCESS FLOW
SLUDGE RETURN/RECIRC
AERATION
CHEMICAL DOSING
ELECTRICAL

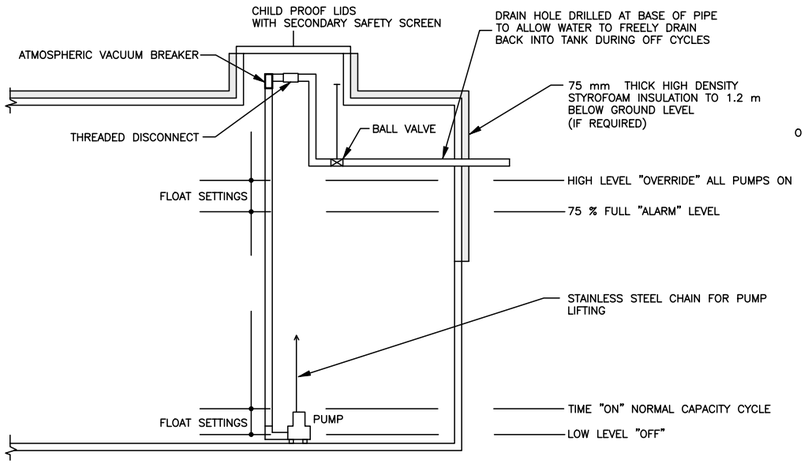
BL BLOWER
VFD VARIABLE FREQUENCY DRIVE
CDP CHEMICAL DOSING PUMP
SRP SLUDGE RETURN PUMP
FSP FLOATING SLUDGE (SKIMMER) PUMP
EQP FLOW EQUALIZATION PUMP
RCP RECIRCULATION PUMP
EP EFFLUENT PUMP
LS LEVEL SWITCH (FLOAT)
MXP MIXING PUMP

RIGIDBOARD INSULATION DETAILS
(NOT TO SCALE)

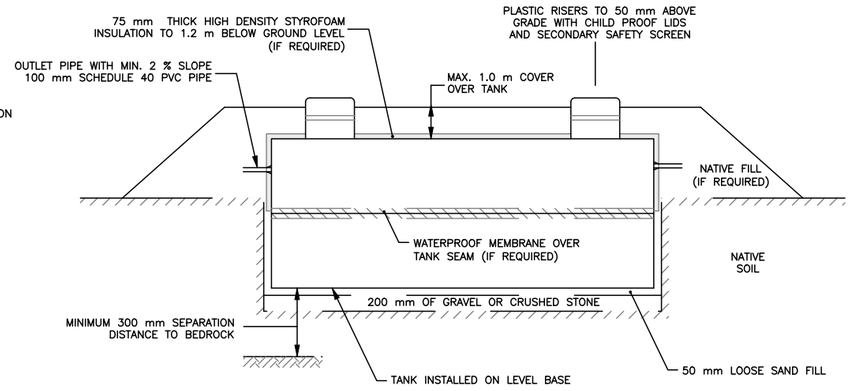


NOTES:
1. TO BE USED OVER FORCEMAINS WHERE LESS THAN 1.5m COVER. TO BE USED OVER GRAVITY SEWERS WHERE LESS THAN 1.0m COVER.
2. RIGIDBOARD TO BE MINIMUM 50mm THICK R-10 (OR GREATER)
3. TRENCH EXCAVATION, BEDDING AND BACKFILL AS PER OPSS.

TYPICAL PUMP INSTALLATION
(NOT TO SCALE)



TYPICAL TANK SECTION
(NOT TO SCALE)

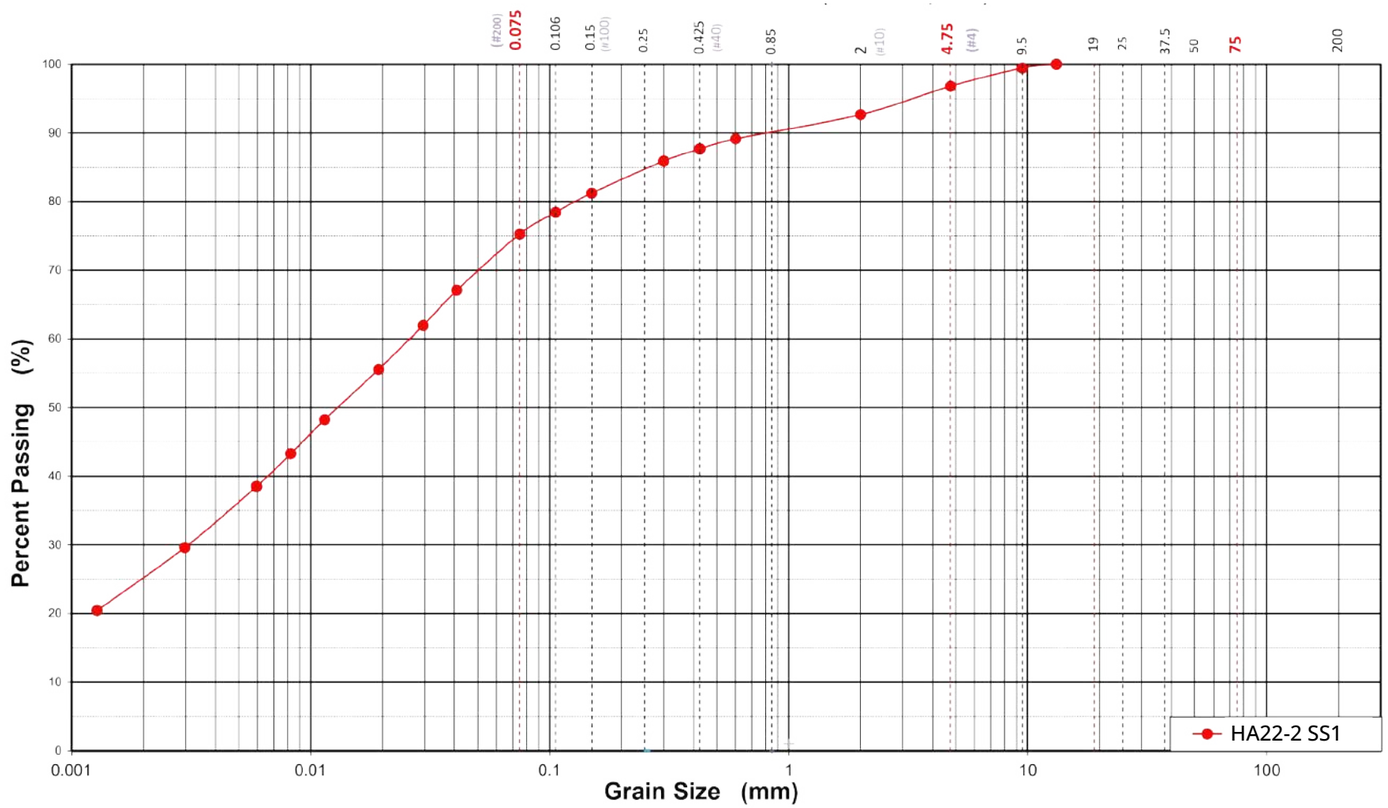


REGISTERED PROFESSIONAL ENGINEER
M.H. Varty
PROVINCE OF ONTARIO

TITLE:
Tank Layout

PROJECT:
Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO:	REVIEWED BY:	FIGURE NO
22-0162	PLM	C5



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

SEWAGE SYSTEM CONSTRUCTION NOTES

1. SEWAGE DISPOSAL SYSTEM HAS BEEN DESIGNED TO ACCEPT BOD <15 mg/L, CBOD <10 mg/L, TSS <10 mg/L.
2. SEWAGE SYSTEM DESIGNED FOR A DAILY FLOW OF 20, 850 L/DAY.
3. PRESSURE PIPES SHALL BE HIGH DENSITY POLYETHYLENE.
4. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
5. PRIOR TO COMMENCEMENT OF EXCAVATIONS, UNDERGROUND SERVICES SHALL BE LOCATED (CONTRACTORS RESPONSIBILITY)
6. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO THE PROJECT ENGINEER TO DETERMINE THE IMPACT.
7. ANY CHANGES MUST BE APPROVED BY THE PROJECT ENGINEER.
8. ALL RISERS SHALL EXTEND TO SURFACE, COMPLETE WITH CHILD PROOF, TAMPER PROOF, LIDS AND HAVE SECONDARY SAFETY SCREENS.
9. ALL GRAVITY CONNECTIONS SHALL HAVE A MINIMUM 2 % GRADE, UNLESS OTHERWISE SPECIFIED.
10. ALL SANITARY PIPES / FORCEMAINS SHALL BE INSULATED UNDER AND WITHIN 1.5m OF ROADWAYS AND WALKWAYS AND PARKING AREAS.
11. GRAVITY SANITARY PIPES TO HAVE MINIMUM 0.6 m COVER AND SHALL BE INSULATED WHERE LESS THEN 1.0 m COVER. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 m COVER.
12. ENVISION MUST BE PRESENT DURING CONSTRUCTION ACTIVITIES TO VERIFY DESIGN ASSUMPTIONS AND TO DOCUMENT THE CONSTRUCTION OF THE SYSTEM. THIS DESIGN CANNOT BE RELIED UPON WITHOUT THIS SUPERVISION.
13. CONSTRUCTION OF THE SYSTEM SHALL BE COMPLETED BY A LICENSED CONTRACTOR (BY THE MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING).
14. BASE EXCAVATION IS TO BE SCARIFIED PRIOR TO PLACING FILL MATERIAL. NO EQUIPMENT (RUBBER TIRE OR TRACK) IS TO COME INTO CONTACT WITH THE SOIL AFTER SCARIFICATION. SCARIFIED SOILS CANNOT BE LEFT EXPOSED TO RAIN. IMPORTED MATERIAL IS TO BE BLADED ONTO THE SCARIFIED AREA IN 0.20 TO 0.25 m LIFTS AND TRACK COMPACTED.
15. SAND FILL MUST MEET THE SPECIFICATIONS OF T = 10 min/cm OR LESS WITH ≤ 5% PASSING THE 200 SEIVE.
16. LEACHING BEDS SHALL BE IMMEDIATELY SODDED OR SEEDED UPON COMPLETION, SLOPED AREAS (4:1 OF STEEPER) MUST BE SODDED.
17. NO LANDSCAPING OR BUILDINGS ARE PERMITTED ON THE LEACHING BED AREA UNLESS SPECIFICALLY APPROVED BY ENVISION.
18. NO IRRIGATION SYSTEMS ARE PERMITTED ON THE LEACHING BED AREA.
19. PUMP CHAMBERS AND PUMPS SHALL HAVE ALL ELECTRICAL COMPONENTS AND CONNECTIONS INSTALLED IN ACCORDANCE WITH THE CURRENT SPECIFICATIONS OF HYDRO.
20. TANKS SHALL BE INSTALLED ON 50mm OF LOOSE SAND SPREAD EVENLY OVER MINIMUM 200mm OF COMPACTED GRAVEL OR CRUSHED STONE.
21. ALARMS SHALL BE A 120 VOLT AUDIBLE ALARM LOCATED IN A CONVENIENT, ACCESSIBLE AREA, AND CLEARLY AND PERMANENTLY LABELED AS "SEWAGE PUMP TANK-HIGH LEVEL ALARM".
22. THE BUILDING SUMP, WATER SOFTENER, WATER TREATMENT, FURNACE CONDENSATE DISCHARGE AND EAVES TROUGH DOWN SPOUTS SHALL NOT BE CONNECTED TO THE SEWAGE SYSTEM. DIRECT ALL SUCH FLOWS TO APPROVED OUTLETS LOCATED AWAY FROM LEACHING BED AND TANK AREAS.
23. TANKS SHALL BE INSTALLED AT AN APPROPRIATE DEPTH TO ACCOMMODATE GRAVITY FLOW BETWEEN TANKS (WHERE APPLICABLE) BASED ON FINISHED GRADE.
24. TANK SEAMS MUST BE WATERPROOFED WITH AN EXTERIOR MEMBRANE SHOULD GROUNDWATER BE ENCOUNTERED OR REASONABLY EXPECTED AT THE SEAM ELEVATION.
25. ALL JOINT SEALS TO BE DONE WITH PRIMER AND MASTIC BAND, OR AS PER THE MANUFACTURER'S REQUIREMENTS.
26. ALL HOLES AROUND PIPES GOING THROUGH CONCRETE STRUCTURE SHALL BE SEALED WITH NON-SHRINKING GROUT FROM INSIDE AND OUTSIDE.
27. IF HIGH GROUNDWATER CONDITIONS ARE ENCOUNTERED, TANKS WITH DYNAMIC WATER LEVELS MUST BE ANCHORED.
28. ALL CONCRETE TANKS ARE TO HAVE A MAXIMUM BURIAL DEPTH OF 1.0 m IN NON TRAFFIC AREAS. EXTRA REINFORCEMENT IS REQUIRED FOR TRFFIC AREAS AND/ OR DEEP BURIAL.

HAND AUGER - HA22-1

0.00 - 0.09 m BROWN TOPSOIL, MOIST, COMPACT
0.09 - 0.58 m BROWN CLAYEY SILT (SOME GREY SPOTS), SOME SAND, TRACE MEDIUM GRAVEL, DTPL, VERY STIFF, ONE ORANGE MOTTLING SPOT
0.58 - 1.17 m BROWN CLAYEY SILT, SOME SAND, TRACE MEDIUM GRAVEL, DTPL, SOFT, ORANGE MOTTLING AT 1.15m

- SS1 TAKEN AT 0.3 - 0.5 m.
- SS2 TAKEN AT 0.6 - 1.0 m.
- DRY AT 1.17 m.

HAND AUGER - HA22-2

0.00 - 0.06 m BROWN TOPSOIL, DAMP, LOOSE, SOME WORMS AND ROOTS
0.06 - 0.80 m BROWN CLAYEY SILT, SOME SAND, TRACE MEDIUM GRAVEL, APL, SOFT, ORANGE MOTTLING AT 0.46m
0.80 - 1.52 m BROWN/GREY CLAYEY SILT, TRACE FINE GRAVEL AND BROWN SAND, APL TO WTPL, VERY SOFT TO FIRM

- SS1 TAKEN AT 0.46 - 0.80 m.
- SS2 TAKEN AT 0.80 - 1.50 m.
- DRY AT 1.52 m.

HAND AUGER - HA22-3

0.00 - 0.60 m BROWN CLAYEY SILT, SOME SAND, TRACE MEDIUM GRAVEL, STIFF, DTPL
0.60 - 1.14 m BROWN SILT WITH SOME CLAY, SOME SAND, TRACE MEDIUM GRAVEL, FIRM, DTPL

- SS1 TAKEN AT 0.10 - 0.60 m.
- SS2 TAKEN AT 0.60 - 1.10 m.
- DRY AT 1.14 m.

HAND AUGER - HA22-4

0.00 - 0.05 m BROWN TOPSOIL, DAMP, SOFT
0.05 - 0.50 m BROWN CLAYEY SILT, TRACE SAND AND MEDIUM GRAVEL, FIRM, APL

- SS1 TAKEN AT 0.06 - 0.4 m.
- DRY AT 0.50 m.

HAND AUGER - HA22-5

0.00 - 0.06 m BROWN TOPSOIL, DAMP, SOFT
0.06 - 0.40 m BROWN CLAYEY SILT, SOME SAND, TRACE MEDIUM GRAVEL, FIRM, APL, ORANGE MOTTLING AT 0.37m
0.40 - 0.93 m BROWN SILT WITH SOME CLAY, TRACE MEDIUM GRAVEL AND BROWN SAND, VERY STIFF, DTPL

- SS1 TAKEN AT 0.06 - 0.40 m.
- SS2 TAKEN AT 0.40 - 0.93 m.
- DRY AT 0.93 m.

REGISTERED PROFESSIONAL ENGINEER
M.H.Varty
PROVINCE OF ONTARIO

TITLE:
Particle Size Distribution Curve and Notes

PROJECT:
Caledon Service Centre
14027 Hurontario Street,
Inglewood, Ontario

CLIENT:	DESIGNED BY:	DATE:
BVD Holdings Caledon Inc.	MHV	Aug 2022
PROJECT NO:	REVIEWED BY:	FIGURE NO
22-0162	PLM	C6

APPENDIX D:

Process Calculations

Wastewater Treatment System Calculation Summary

Project: 0200
Caledon Travel Plaza WWTS

Design Parameters:

Influent BOD_5	=	1,250	mg/L		Effluent BOD_5 =		mg/L
Influent TSS	=	750	mg/L		Effluent $CBOD_5$ =	10	mg/L
Influent TKN	=	100	mg/L		Effluent TSS =	10	mg/L
Influent TP	=	20	mg/L		Effluent TAN =		mg/L
					Effluent TIN =		mg/L
Average Flow, Q_A	=	14.6	m^3/d		Effluent TN =	5	mg/L
Design Flow, Q_D	=	**20.85**	m^3/d		Effluent TP =		mg/L
Peak Flow, Q_P	=	2.09	m^3/h	10 h	Effluent EC/FC =		CFU/100 mL
Equalized Flow, Q_E	=	0.87	m^3/h				
Influent BOD5 Load	=	26.06	kg/d		Influent $CBOD_5$ Population Equivalent =	434	PE (@0.6 $gCBOD_5$/person-d)
Influent TN Load	=	2.09	kg/d		Influent TN Population Equivalent =	174	PE (@0.12 gTN/person-d)

Treatment Process Selection:

C+N3 — Standard Carbon Oxidation + Total Nitrogen Reduction (>90%)

400	= % Internal Recirculation	3.48 m^3/h	57.92 L/min
	= % Effluent Recirculation	- m^3/h	- L/min

Influent Flow Equalization (EQT):

Design Criteria			Min. Volume	EQT Tank Selection (model)	Quantity		Specified Volume
Hydraulic Retention Time (HRT)	≥ 18 h		15.6 m^3	POR-TKH5500	1		22.7 m^3
				Internal Length =	4.775	m	
				Internal Width =	2.337	m	
Parameters as Specified				Nominal Depth =	2.032	m	
Hydraulic Retention Time (HRT)	= 26.1 h			Depth Override =		m	

Sludge Storage, Inline (SS):

Design Criteria			Min. Volume	SS Tank Selection (model)	Quantity		Specified Volume
Min. Sludge Haulage Frequency	= 3.33 months		40.4 m^3	POR-8800GA-S	1		42.0 m^3
Hydraulic Retention Time (HRT)	≥ 2 h			Internal Length =	7.01	m	
Primary+Secondary Sludge Volume	= 31.7 m^3			Internal Width =	2.997	m	
Tertiary Sludge Volume (see below)	= 0.0 m^3			Nominal Depth =	2.0	m	
				Depth Override =		m	
Parameters as Specified							
Total Hydraulic Retention Time	= 9.7 h						
Estimated Sludge Storage Time	= 6.3 months						

Primary Clarifier (PC):

Design Criteria			Min. Volume	PC Tank Selection (model)	Quantity		Specified Volume
Hydraulic Retention Time (HRT)	≥ 2.0 h		8.7 m^3	POR-TKH3500	1		13.3 m^3
				Internal Length =	4.775	m	**Specified Surface Area**
Parameters as Specified				Internal Width =	2.337	m	11.2 m^2
$CBOD_5$ Reduction in Primary	= 33.0 %			Nominal Depth =	1.194	m	
				Depth Override =		m	
Unit Flow w/Recirculation	= 4.34 m^3/h						
Hydraulic Retention Time (HRT)	= 3.1 h						
Surface Overflow Rate (SOR)	= 0.39 $m^3/m^2/h$						
SOR MOE Guideline	≤ 1.25 $m^3/m^2/h$						

Wastewater Treatment System Calculation Summary

Project: 0200

Caledon Travel Plaza WWTS

Aerobic Bioreactors (BR):

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	3	h	45.0 m³
Media $CBOD_5$ Surface Loading	≤	2	$gCBOD_5/m^2$-d	
Media TAN Surface Loading	≤	1	$gTAN/m^2$-d	
Minimum Media Volume	=	17.5	m^3	

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	10.4	h
Media Volume	=	18.0	m^3
Media Surface Area	=	9,000	m^2
Media Filling Degree	=	40	%
Media $CBOD_5$ Surface Loading	=	1.94	$gCBOD_5/m^2$-d
Media TAN Surface Loading	=	0.23	$gTAN/m^2$-d

Aeration Design					
Design Oxygen Demand	=	34.56	kgO_2/d		
Specified Aeration Rate	=	200.	Nm^3/h	Denit. Credit	
Specified Aeration Running %	=	45%		80%	
Specified Aeration Running Time	=	10.7	hr/d		
Specified Oxygen Transfer Efficiency	=	5.8%			
Specified Oxygen Supply @25◦C	=	34.56	kgO_2/d		
Specified Mixing per Unit Volume	=	1.23	$L/s\text{-}m^3$		
Specified Mixing per Surface Area	=	2.49	$L/s\text{-}m^2$		

BR1

Tank Selection (model)	Quantity		Specified Volume
POR-TKH5500	1		22.7 m^3
Internal Length =	4.775	m	Specified Surface Area
Internal Width =	2.337	m	11.2 m^2
Nominal Depth =	2.032	m	
Depth Override =		m	

BR2

Tank Selection (model)	Quantity		Specified Volume
POR-TKH5500	1		22.7 m^3
Internal Length =	4.775	m	Specified Surface Area
Internal Width =	2.337	m	11.2 m^2
Nominal Depth =	2.032	m	
Depth Override =		m	

Specified Total Volume: **45.3** m^3

Specified Total Surface Area: 22.3 m^2

Blower Model	Quantity			
SCL R40-MD-4-3	2			
Diffuser Length =	40	m		
Design Blower Pressure =	245	mbar	3.56 PSI	98.5 WG (in)
Design Blower Rate / Blower =	100	Nm^3/h	58.9 scfm	
Specified Power / Blower =	2.99	kW	4.0 HP	
Amperage =	11.1	Amp	VFD spec.	BA0018FAA

Intermediate Clarifier (IC):

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	2.5	h	10.9 m^3
Max. Surface Overflow Loading	≤	1.00	$m^3/m^2.h$	

Parameters as Specified			
Observed Flow including all recirculations	=	4.34	m3/h
Hydraulic Retention Time (HRT)	=	2.5	h
Surface Overflow Rate (SOR)	=	0.57	$m^3/m^2.h$
SOR MOE Guideline	≤	1.38	$m^3/m^2/h$

IC

Tank Selection (model)	Quantity		Specified Volume (with hoppers)
BAB-TKH3900	1		10.7 m3
Internal Length =	3.454	m	Specified Surface Area
Internal Width =	2.21	m	7.6 m^2
Nominal Depth =	2.108	m	
Depth Override =		m	
Number of Hoppers =	Double		

Secondary Clarifier (SC):

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	3.0	h	2.6 m^3
Max. Surface Overflow Loading	≤	0.80	$m^3/m^2/h$	

Parameters as Specified			
Unit Flow w/Recirculation	=	0.87	m^3/h
Hydraulic Retention Time (HRT)	=	3.8	h
Surface Overflow Rate (SOR)	=	0.15	$m^3/m^2/h$
Max. SOR by MOE Guideline	≤	1.38	$m^3/m^2/h$

SC

Tank Selection (model)	Quantity		Specified Volume (with hoppers)
POR-TKS1500	1		3.3 m^3
Internal Length =	3.102	m	Specified Surface Area
Internal Width =	1.883	m	5.8 m^2
Nominal Depth =	1.143	m	
Depth Override =		m	
Number of Hoppers =	Double		

Tertiary Denitrification System (ABR):

Design Criteria				Min. Volume	
Design Flow	=	20.85	m^3/d	2.8 m^3	
Remaining Nitrate to Remove	=	17.0	mg/L		
Nitrate Mass Loading	=	0.35	$kgNO_3/d$	80%	Denit Credit.
Maximum Media NO_3 Surface Loading	≤	0.5	gNO_3/m^2-d		
Minimum Media Volume	=	1.4	m^3		

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	5.1	h
Media Volume	=	1.8	m^3
Media Surface Area	=	900	m^2
Media Filling Degree	=	40	%
Media NO_3 Surface Loading	=	0.39	gNO_3/m^2-d

ABR

Tank Selection (model)	Quantity		Specified Volume
POR-TKD2000 1/2a	1		4.5 m^3
Internal Length =	1.473	m	
Internal Width =	1.854	m	
Nominal Depth =	1.632	m	
Depth Override =		m	

Wastewater Treatment System Calculation Summary

Project: 0200
Caledon Travel Plaza WWTS

Tertiary Bioreactor (BR3):

BR3

Design Criteria				Min. Volume	Tank Selection (model)	Quantity		Specified Volume
Hydraulic Retention Time (HRT)	≥	2.5	h	2.2 m^3	POR-TKD2000 1/2b	1		4.5 m^3
Media $CBOD_5$ Surface Loading	≤	2	$gCBOD_5/m^2$-d		Internal Length =	1.499	m	**Specified Surface Area**
Minimum Media Volume	=	0.6	m^3		Internal Width =	1.854	m	2.8 m^2
					Nominal Depth =	1.607	m	
					Depth Override =		m	

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	5.1	h
Media Volume	=	1.5	m^3
Media Surface Area	=	750	m^2
Media Filling Degree	=	33.6	%
Media $CBOD_5$ Surface Loading	=	0.83	$gCBOD_5/m^2$-d

Aeration Design			
Design Oxygen Demand	=	1.72	kgO_2/d
Specified Aeration Rate	=	22.4	Nm^3/h
Specified Aeration Running %	=	33%	
Specified Aeration Running Time	=	7.9	hr/d
Specified Oxygen Transfer Efficiency	=	4.3%	
Specified Oxygen Supply @25◦C	=	2.13	kgO_2/d
Specified Mixing per Unit Volume	=	1.39	$L/s\text{-}m^3$
Specified Mixing per Surface Area	=	2.24	$L/s\text{-}m^2$

Blower Selection (model)	Quantity			PSI	WG (in)
200HP2502P	2				
Diffuser Length =	4	m			
Design Blower Pressure =	197	mbar		2.86	79.1
Design Blower Rate / Blower =	11.2	Nm^3/h		6.59	scfm
Specified Power / Blower =	0.19	kW		0.25	HP
Amperage =	3.62	Amp	VFD spec.	<not required>	

Tertiary Clarifier (TC):

TC

Design Criteria				Min. Volume	Tank Selection (model)	Quantity		Specified Volume (with hoppers)
Hydraulic Retention Time (HRT)	≥	2.5	h	2.2 m^3	POR-TKS1000	1		2.9 m^3
Maximum Surface Area Loading	≤	0.8	m^3/m^2-d		Internal Length =	2.413	m	**Specified Surface Area**
					Internal Width =	1.651	m	4.0 m^2
					Nominal Depth =	1.168	m	
					Depth Override =		m	
					Number of Hoppers =	Double		

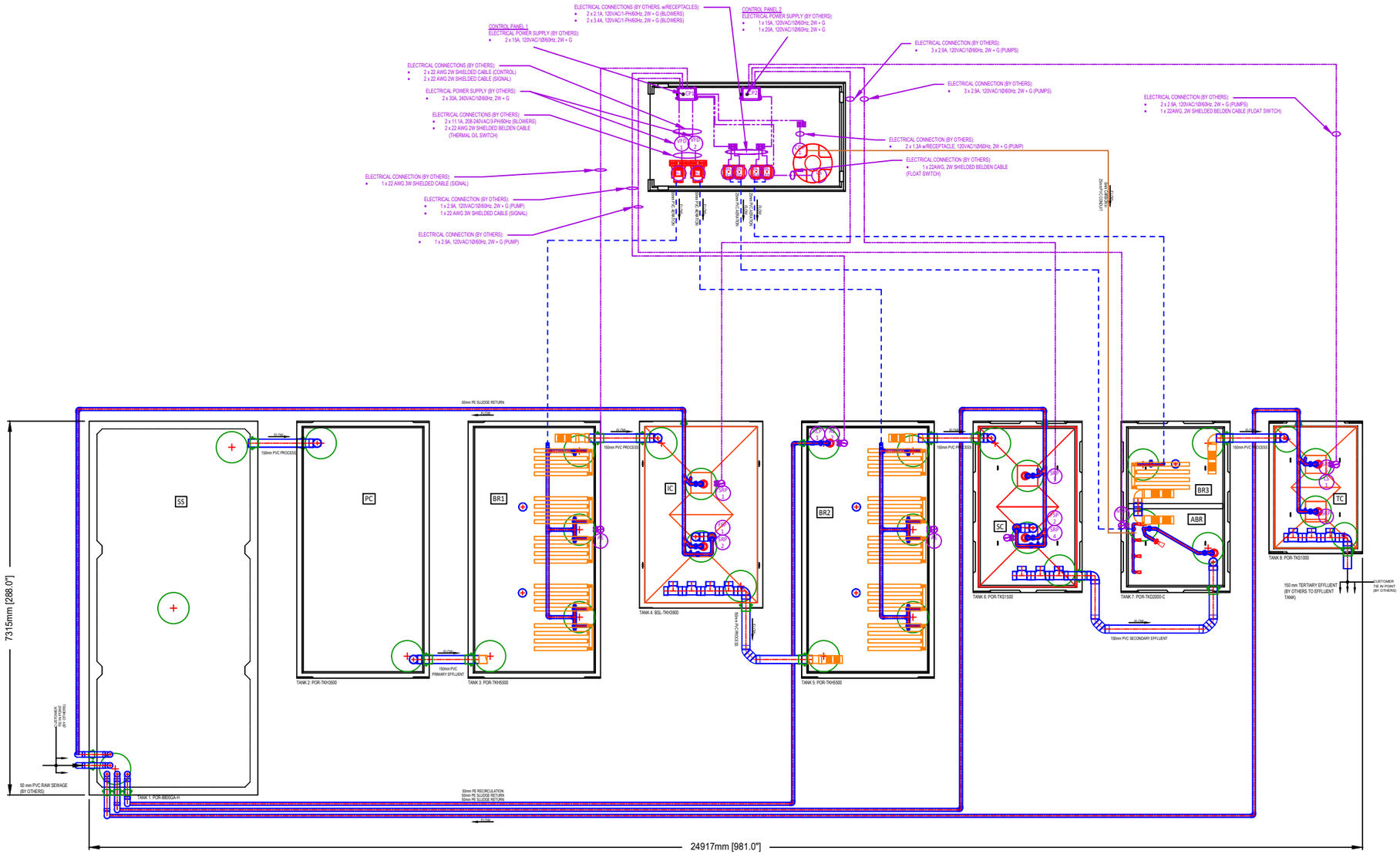
Parameters as Specified			
Unit Flow w/Recirculation	=	0.87	m^3/d
Hydraulic Retention Time (HRT)	=	3.3	h
Surface Area Loading (SOR)	=	0.22	m^3/m^2-d

Effluent Pump Tank (EPT):

EPT

Design Criteria				Min. Volume	Tank Selection (model)	Quantity		Specified Volume
Hydraulic Retention Time (HRT)	≥	6.0	h	5.2 m^3	POR-TKH2000	1		7.6 m^3
					Internal Length =	3.105	m	
					Internal Width =	1.886	m	
					Nominal Depth =	1.295	m	
					Depth Override =		m	

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	8.73	h



TANK LIST

PROCESS NAME		TANK #	~ WORKING VOLUME (m³)
SS	SLUDGE STORAGE	1	42.0
PC	PRIMARY CLARIFIER	2	13.3
BR1	BIOREACTOR 1	3	22.7
IC	INTERMEDIATE CLARIFIER	4	10.7
BR2	BIOREACTOR 2	5	22.7
SC	SECONDARY CLARIFIER	6	3.3
ABR	ANOXIC BIOREACTOR	7	4.5
BR3	BIOREACTOR 3	7	4.5
TC	TERTIARY CLARIFIER	8	2.9

PROCESS FLOW
SLUDGE RETURN/RECIRC
AERATION
CHEMICAL DOSING
ELECTRICAL

BL	BLOWER
VFD	VARIABLE FREQUENCY DRIVE
CDP	CHEMICAL DOSING PUMP
SRP	SLUDGE RETURN PUMP
FSP	FLOATING SLUDGE (SKIMMER) PUMP
EQP	FLOW EQUALIZATION PUMP
RCP	RECIRCULATION PUMP
EP	EFFLUENT PUMP
LS	LEVEL SWITCH (FLOAT)
MXP	MIXING PUMP

NOTES:

A. ALL WORK, INSTALLATION AND CONNECTIONS IN RELATION TO THE TREATMENT SYSTEM SHALL BE DONE IN ACCORDANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED BY BERGMANN NORTH AMERICA INC. AND IN ACCORDANCE WITH ALL APPLICABLE LOCAL CODES AND REGULATIONS.

B. ALL ACCESS OPENINGS MUST BE INSTALLED TO GRADE AND SECURED TO PREVENT ACCIDENTAL OR UNAUTHORIZED ACCESS.

C. A MAXIMUM OF 1 METRE BURIAL DEPTH IS ALLOWABLE ON TOP OF ANY TANKS IN A NON-TRAFFIC AREA. EXTRA REINFORCEMENT IS REQUIRED FOR USE IN AREAS WITH VEHICULAR TRAFFIC AND BURIAL DEPTHS OVER 1 METRE.

BNA BERGMANN NORTH AMERICA INC.

iQ. MBBR

CALEDON TRAVEL PLAZA WWTS (20.85 m3/d)

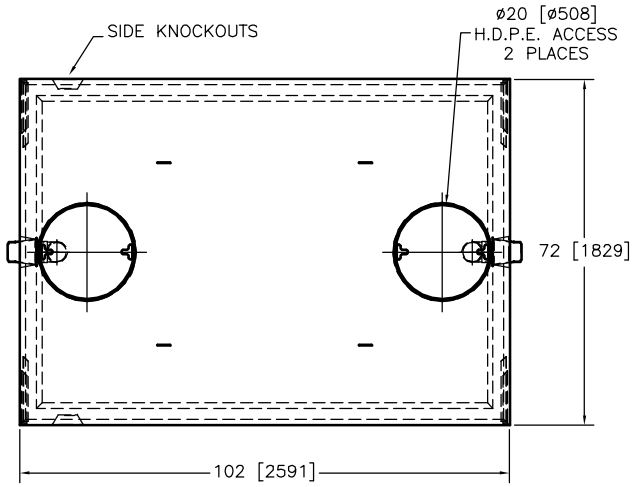
DRAWING: PLAN LAYOUT
FOR PROPOSAL
Rev.0

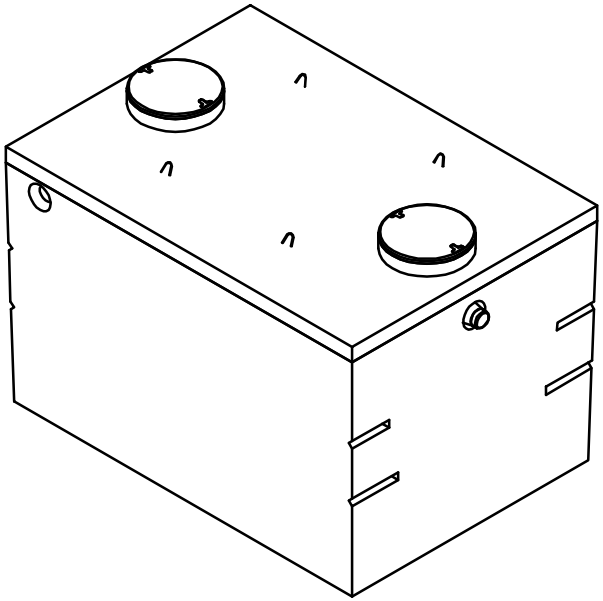
DRAWN BY: IR | APPROVED BY: MM | SHEET 1 of 1

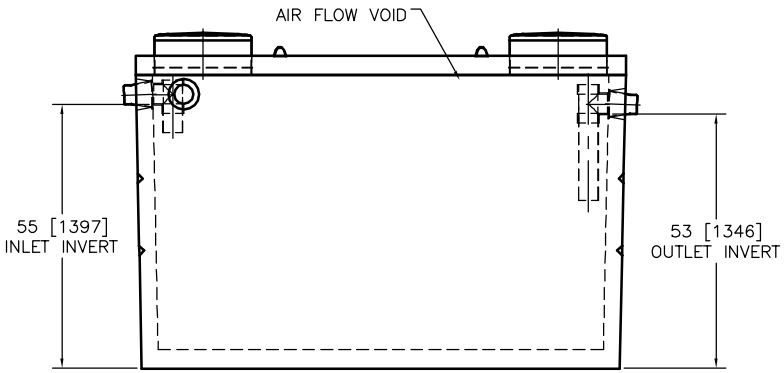
DATE: 2022/08/08 | SCALE: 1:90

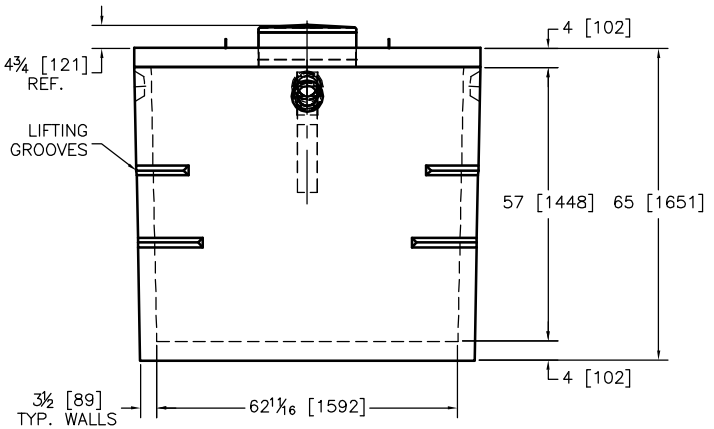
APPENDIX E:

Specifications









NOTES: INLET EDPM RUBBER PIPE SEAL WILL ACCEPT 4 [102] PVC PIPE. OUTLET EDPM RUBBER PIPE SEAL WILL ACCEPT 3 [76] AND 4 [102] PVC PIPE. BOTH ARE SUPPLIED WITH STAINLESS STEEL CLAMPS. INLET AND OUTLET BAFFLES ARE SUPPLIED LOOSE AND WILL ACCEPT 4 [102] PVC PIPE. EFFLUENT FILTERS ARE AVAILABLE. HDPE RISERS ARE MODULAR AND ARE AVAILABLE IN 6 [152] AND 12 [305] HEIGHTS. THIS TANK IS FACTORY ASSEMBLED AND SEALED WITH MASTIC SEALANT.

JOB #	Q.C. PRE
CUSTOMER	Q.C. POST

A Division of J.A. Porter Holdings (Lucknow) Ltd.

Porter's

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Tel: 519 528 3537
Fax: 519 528 2025

Owen Sound, Ontario
Tel: 519 372 1636
Fax: 519 372 1882

www.porters.ca

THIS DRAWING IS NOT TO SCALE
DIMENSIONS: INCHES [MILLIMETERS] UNLESS OTHERWISE NOTED

CONCRETE
40 MPA @ 28 DAYS - 4-7% AIR ENTRAINMENT

DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 11565 LBS [5245 KG]
TANK: 9185 LBS [4166 KG]
LID: 2380 LBS [1079 KG]

MODEL
1000GBS

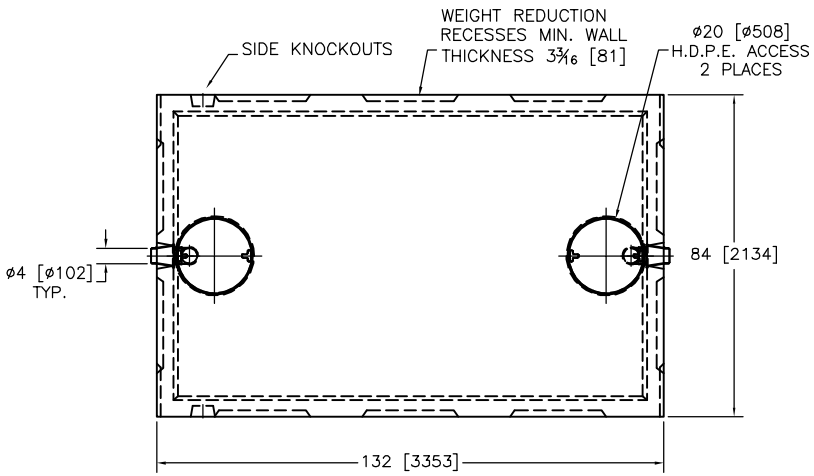
TYPE
SINGLE COMPARTMENT HOLDING

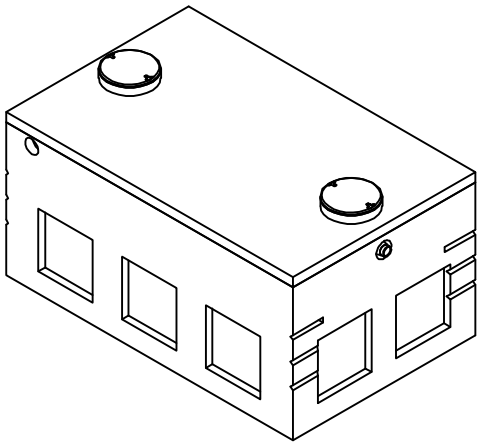
SIZE / VOLUME
1020 G [4637 L]

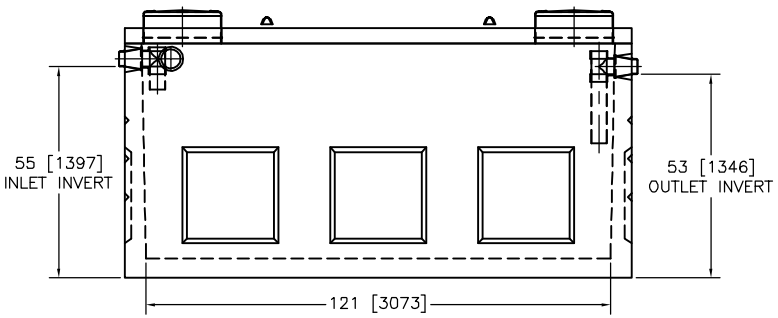
TITLE
1000 G / 4500 L
SINGLE COMPARTMENT
HOLDING TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

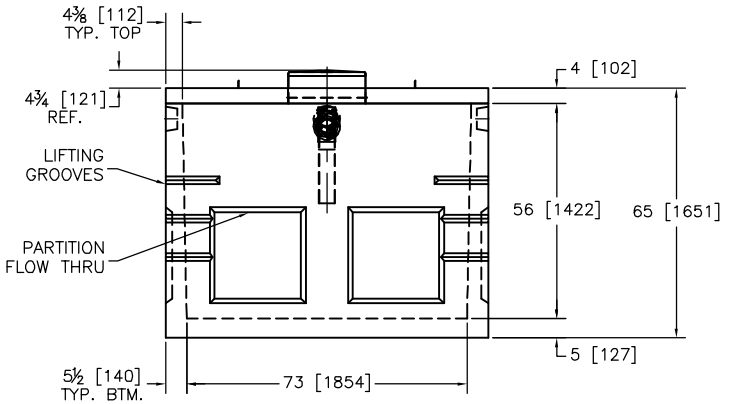
SHT #	DATE
1 OF 6	01NOV08

DWG #	REV
1000GB000-P-S	0









NOTES:
INLET EDPM RUBBER PIPE SEAL WILL ACCEPT 4 [102] PVC PIPE. OUTLET EDPM RUBBER PIPE SEAL WILL ACCEPT 3 [76] AND 4 [102] PVC PIPE. BOTH ARE SUPPLIED WITH STAINLESS STEEL CLAMPS. INLET AND OUTLET BAFFLES ARE SUPPLIED LOOSE AND WILL ACCEPT 4 [102] PVC PIPE. EFFLUENT FILTERS ARE AVAILABLE. HDPE RISERS ARE MODULAR AND ARE AVAILABLE IN 6 [152] AND 12 [305] HEIGHTS. THIS TANK IS FACTORY ASSEMBLED AND SEALED WITH MASTIC SEALANT.

JOB #	Q.C. PRE
CUSTOMER	Q.C. POST

A Division of J.A. Porter Holdings (Lucknow) Ltd.

Porter's

Lucknow, Ontario
Tel: 519 528 3537
Fax: 519 528 2025

Owen Sound, Ontario
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Fax: 519 372 1882

www.porters.ca

THIS DRAWING IS NOT TO SCALE
DIMENSIONS: INCHES [MILLIMETERS] UNLESS OTHERWISE NOTED

CONCRETE
40 MPA @ 28 DAYS - 4-7% AIR ENTRAINMENT

DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 18440 LBS [8362 KG]
TANK: 13800 LBS [6259 KG]
LID: 4640 LBS [2104 KG]

MODEL
1500GA

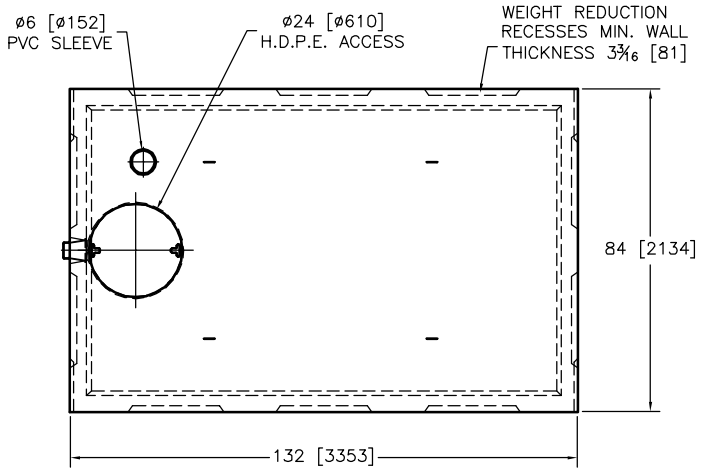
TYPE
SINGLE COMPARTMENT

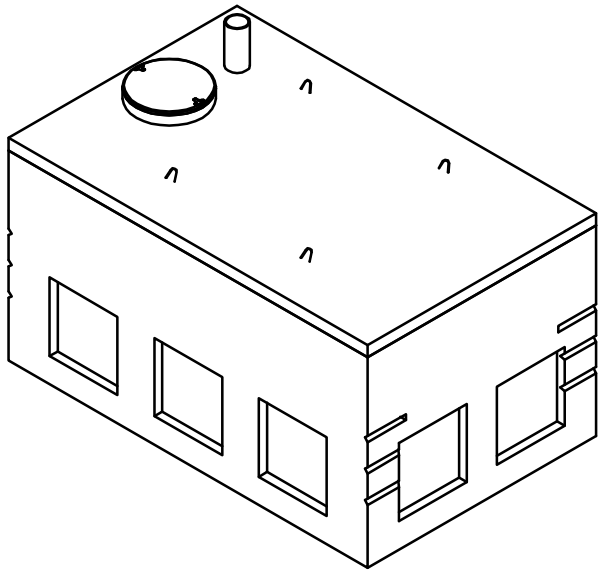
SIZE / VOLUME
1560 G [7091L]

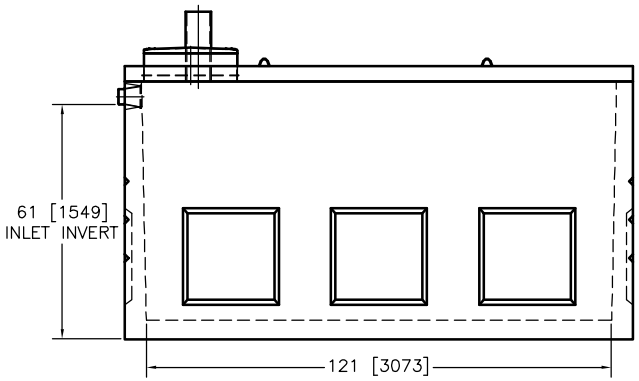
TITLE
1500 G / 6800 L
SINGLE COMPARTMENT
BALANCING TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

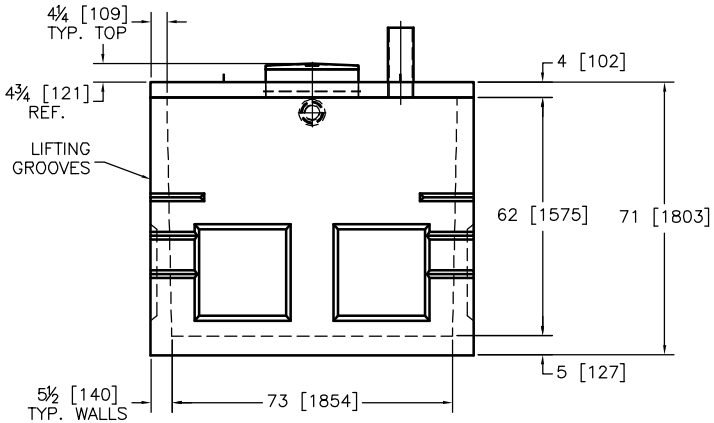
SHT #	DATE
1 OF 1	01NOV08

DWG #	REV
1500GA000-P-S	0









NOTES: INLET EDPM RUBBER PIPE SEAL WILL ACCEPT 4 [102] PVC PIPE AND IS SUPPLIED WITH STAINLESS A STEEL CLAMP. HDPE RISERS ARE MODULAR AND ARE AVAILABLE IN 6 [152] AND 12 [305] HEIGHTS. THIS TANK IS FACTORY ASSEMBLED AND SEALED WITH MASTIC SEALANT. HDPE ACCESS WILL ACCOMODATE VENTING FOR PUMPING AND HIGH LEVEL ALARM ACCESS. PVC PUMP OUT SLEEVES ARE AVAILABLE WITH ACCESS PLUG.

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CONCRETE
40 MPA @ 28 DAYS - 4-7% AIR ENTRAINMENT

DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 19850 LBS [9002 KG]
TANK: 15130 LBS [7488 KG]
LID: 4720 LBS [2141 KG]

MODEL
2000GA

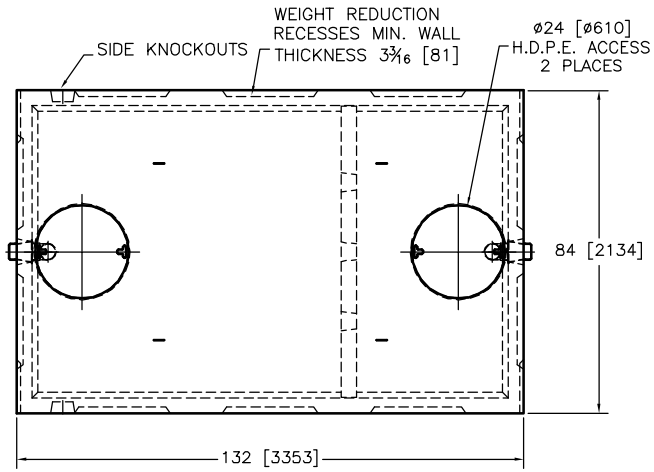
TYPE
SINGLE COMPARTMENT HOLDING

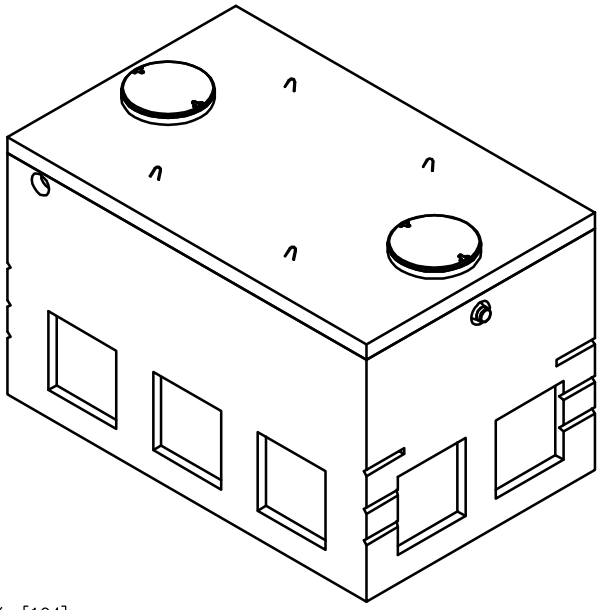
SIZE / VOLUME
1827 G [8306 L] SIDE INLET - 2028 G [9218 L] INTERIOR

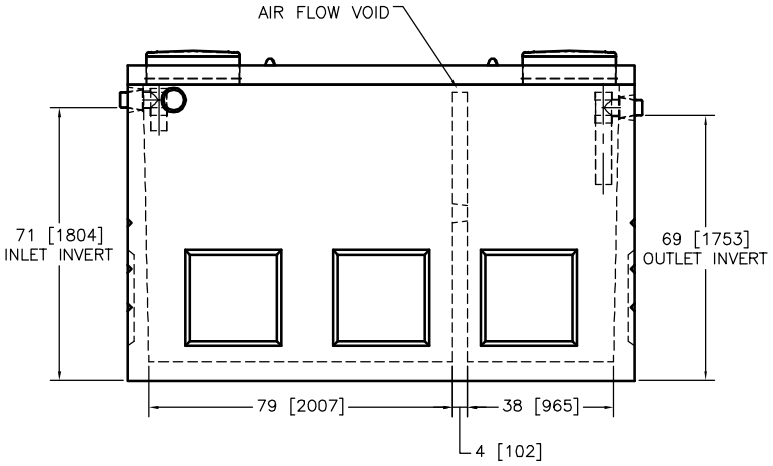
TITLE
2000 G / 9100 L
SINGLE COMPARTMENT
HOLDING TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

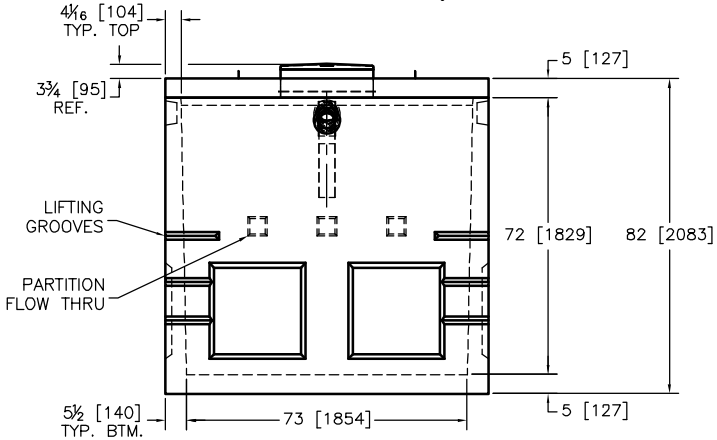
SHT #	DATE
1 OF 1	01NOV08

DWG #	REV
2000GA000-P	0









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DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 23115 LBS [10483 KG]
TANK: 18475 LBS [8379 KG]
LID: 4640 LBS [2104 KG]

MODEL
2000GB

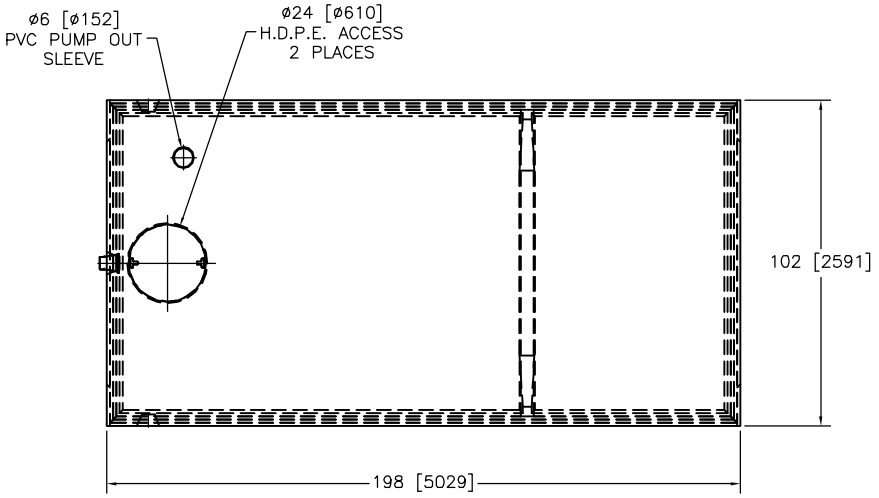
TYPE
DOUBLE COMPARTMENT SEPTIC

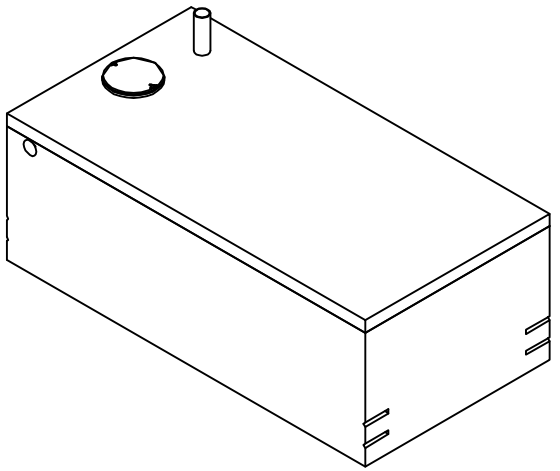
SIZE / VOLUME
2026 G [9210 L]

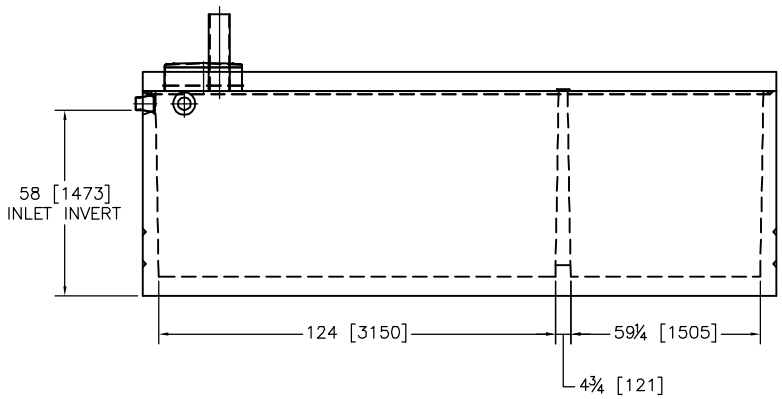
TITLE
2000 G / 9100 L
DOUBLE COMPARTMENT
SEPTIC TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

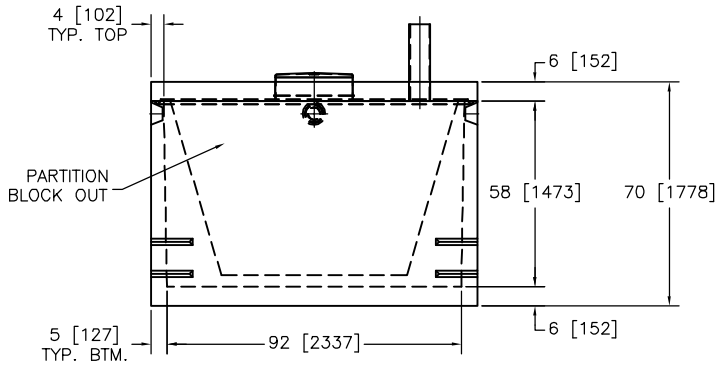
SHT #	DATE
1 OF 6	01NOV08

DWG #	REV
2000GB000-P	0









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CONCRETE
40 MPA @ 28 DAYS - 5-8% AIR ENTRAINMENT

DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 34200 LBS [15510 KG]
LOWER PORTION: 24100 LBS [10930 KG]
UPPER PORTION: 10100 LBS [4581KG]

MODEL
3500GA

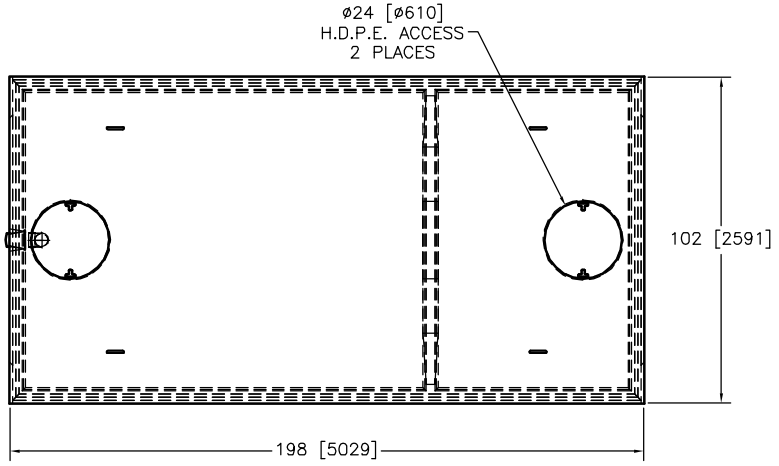
TYPE
SINGLE COMPARTMENT HOLDING

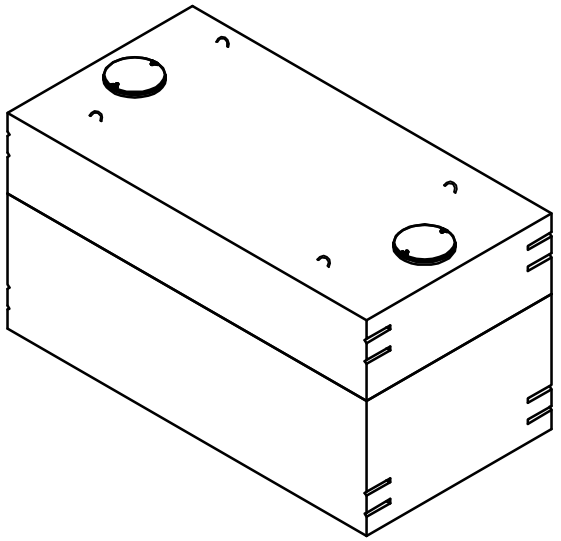
SIZE / VOLUME
3270 G [14865 L] SIDE INLET - 3687 G [16761 L] INTERIOR

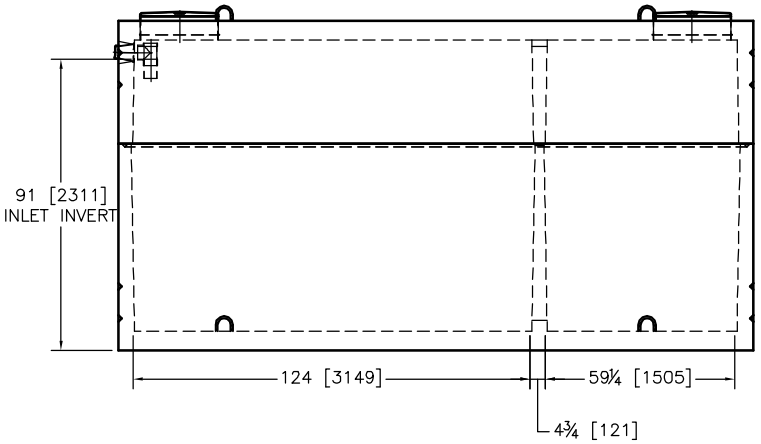
TITLE
3500 G / 15900 L
SINGLE COMPARTMENT
HOLDING TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

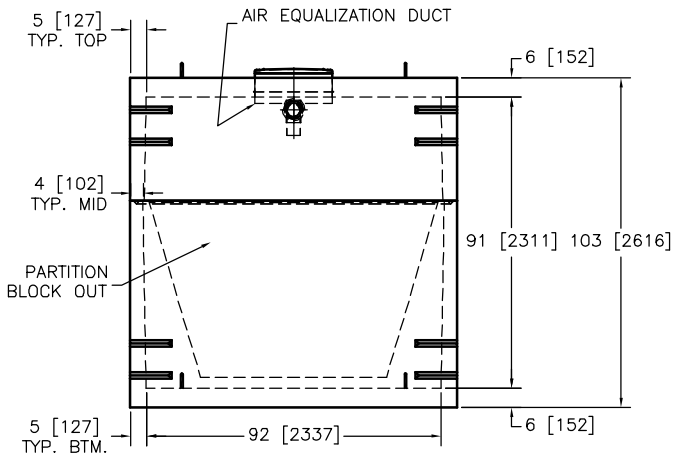
SHT #	DATE
1 OF 1	15APR09

DWG #	REV
3500GA000-P	0









NOTES: INLET EDPM RUBBER PIPE SEAL WILL ACCEPT 4 [102] PVC PIPE AND IS SUPPLIED WITH STAINLESS A STEEL CLAMP. HDPE RISERS ARE MODULAR AND ARE AVAILABLE IN 6 [152] AND 12 [305] HEIGHTS. THIS TANK IS SITE ASSEMBLED AND SEALED WITH MASTIC SEALANT. HDPE ACCESS WILL ACCOMODATE VENTING FOR PUMPING AND HIGH LEVEL ALARM ACCESS. PVC PUMP OUT SLEEVES ARE AVAILABLE WITH ACCESS PLUG.

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CONCRETE
40 MPA @ 28 DAYS - 5-8% AIR ENTRAINMENT

DESIGN
CSA B66-05 - 60 [1524] BURIAL DEPTH

REINFORCING
REINFORCING BAR TO CSA G30.18
ALL REINFORCING BAR HAS 1 [25] MINIMUM COVER
STRUCTURAL MACRO FIBER

WEIGHT
ASSEMBLY: 43000 LBS [19501 KG]
LOWER PORTION: 24100 LBS [10930 KG]
UPPER PORTION: 18900 LBS [8571 KG]

MODEL
5500GA

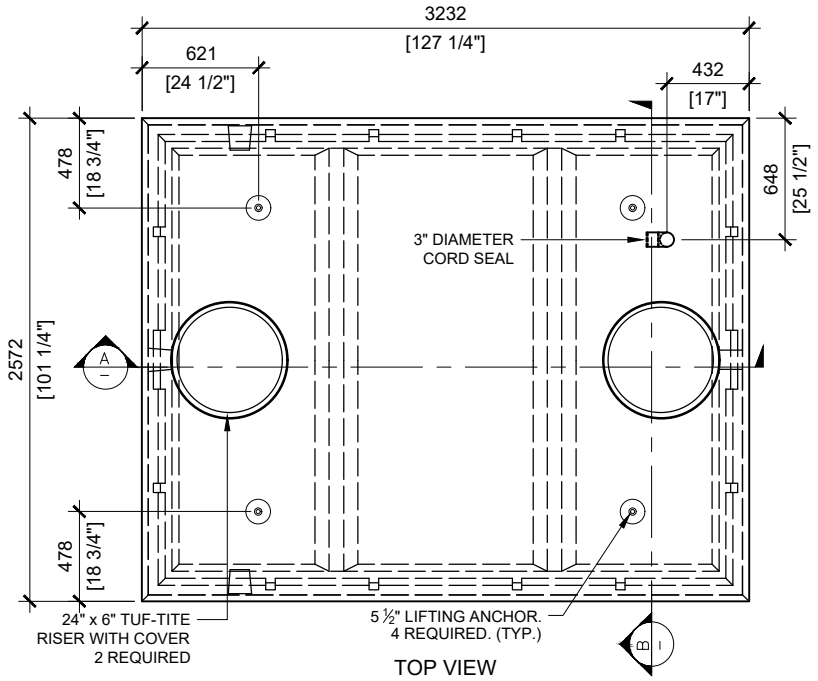
TYPE
SINGLE COMPARTMENT HOLDING

SIZE / VOLUME
5197 G [23625 L] SIDE INLET - 5685 G [25844 L] INTERIOR

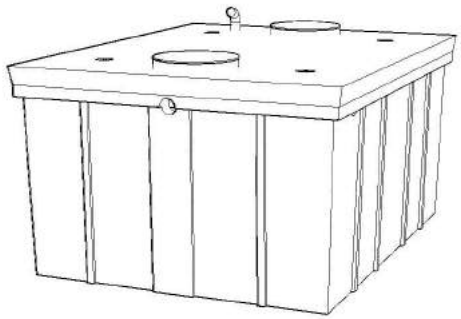
TITLE
5500 G / 25000 L
SINGLE COMPARTMENT
HOLDING TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

SHT #	DATE
1 OF 1	15APR09

DWG #	REV
5500GA000-P	0

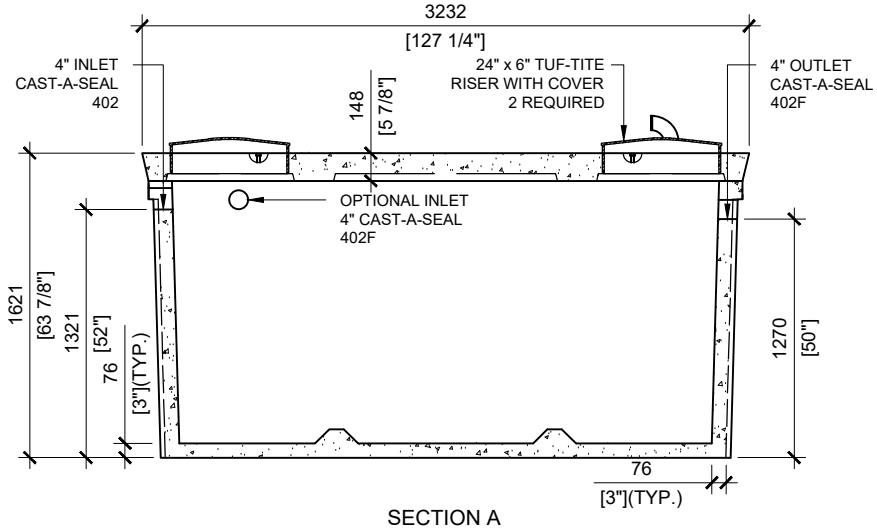


TOP VIEW
SCALE:1/40

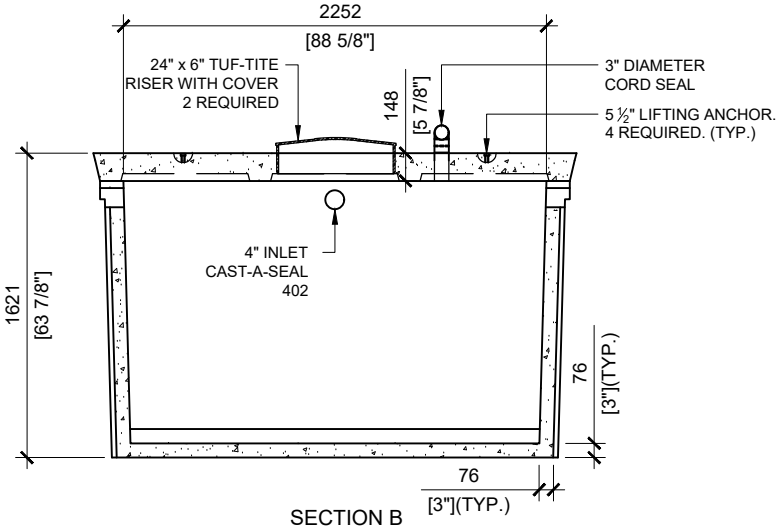


GENERAL NOTES:

1. UNITS ARE SEALED WITH BUTYL TAPE AT THE JOINTS
2. DELIVERY IS MADE BY CRANE-EQUIPPED TRUCKS
3. EXCAVATION MUST BE READY, SAFE AND ACCESSIBLE FOR UNLOADING FROM THE REAR OF THE TRUCK.
4. MIN OVERHEAD CLEARANCE OF 18FT (5.5 METRES) IS REQUIRED
5. ALL UNITS MUST BE HANDLED WITH PROPER LIFTING EQUIPMENT
6. MAXIMUM BURIAL DEPTH = 1 METRE IN FIRM SOIL AWAY FROM ANY VEHICULAR TRAFFIC



SECTION A
SCALE:1/40



SECTION B
SCALE:1/40

BROOKLIN CONCRETE PRODUCTS

MANUFACTURED:
BROOKLIN, ON
1-800-655-3430

CONCRETE: 35MPa at 28 days/5000PSI
AIR ENTRAINMENT: 5-8%
REINFORCEMENT: STEEL TO CSA CAN A23.1 /A23.3 G30.18 Fy=400MPa

UNIT WEIGHT: 13,690lbs / 6,210kg
CPA CERTIFIED
MEETS CAN/CSA-B66
"AGINP"

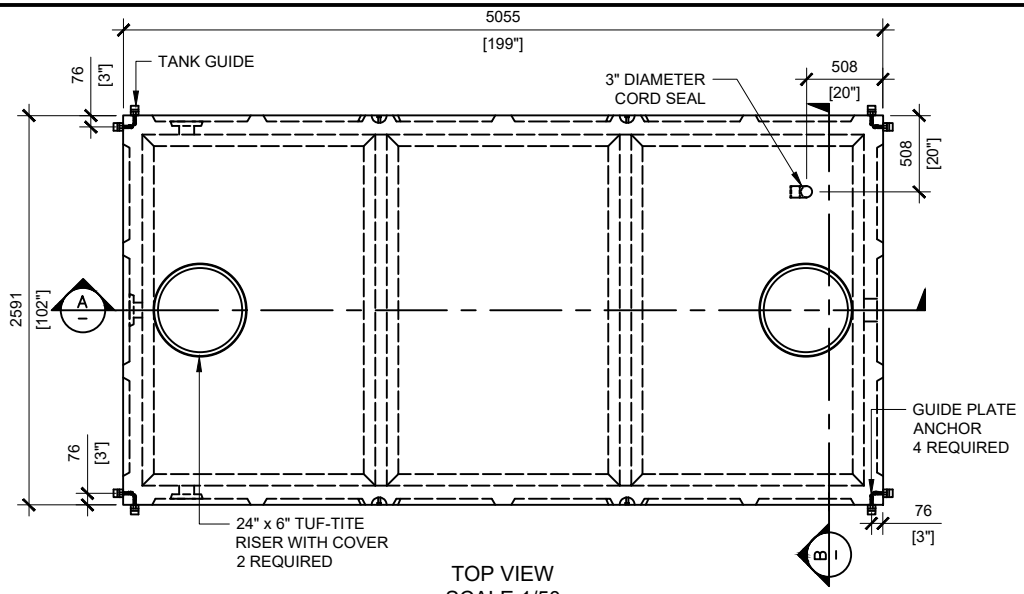
DRAWN BY: N.CHAN

DATE: MAR/2021

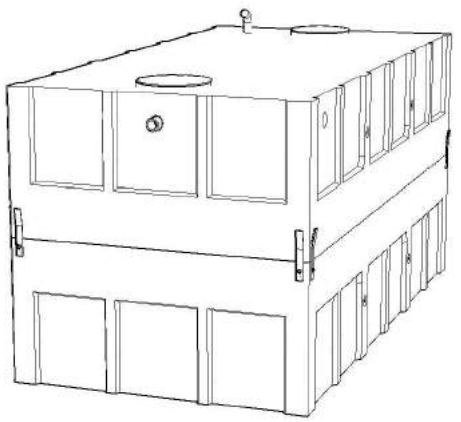
7000 LITRES PUMP TANK

WORKING CAPACITY: 7,899L TO INVERT OF INLET

TOTAL CAPACITY: 8,892L TO UNDERSIDE OF CHAMBER LID



TOP VIEW
SCALE:1/50



GENERAL NOTES:

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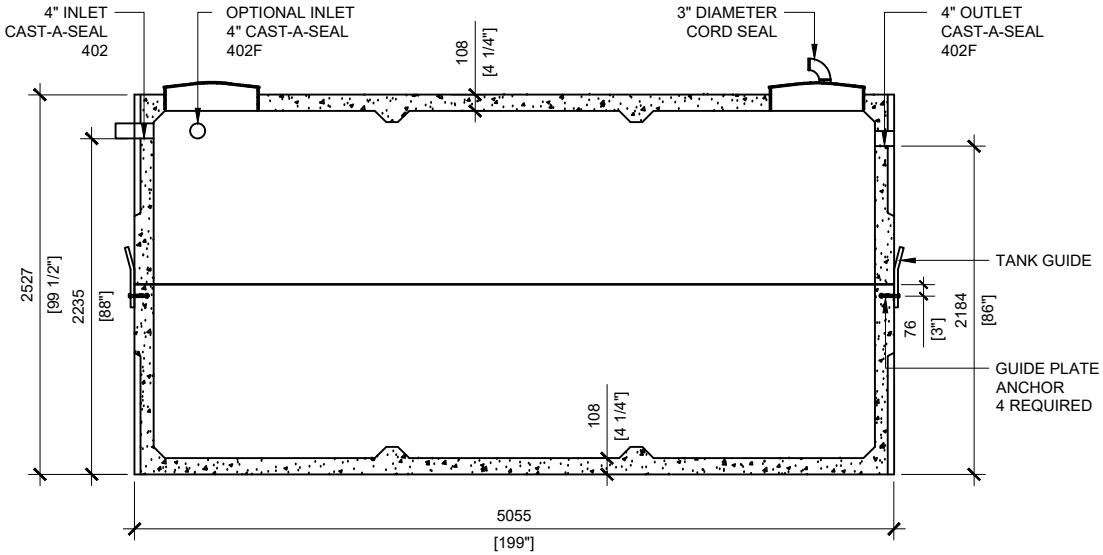
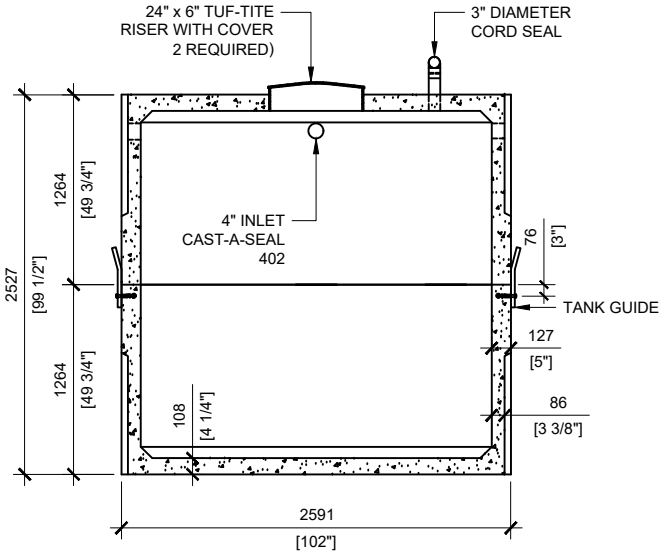
2. DELIVERY IS MADE BY CRANE-EQUIPPED TRUCKS
3. EXCAVATION MUST BE READY, SAFE AND ACCESSIBLE FOR UNLOADING FROM THE REAR OF THE TRUCK.
4. MIN OVERHEAD CLEARANCE OF 18FT (5.5 METRES) IS REQUIRED
5. ALL UNITS MUST BE HANDLED WITH PROPER LIFTING EQUIPMENT
6. MAXIMUM BURIAL DEPTH = 1 METRE IN FIRM SOIL AWAY FROM ANY VEHICULAR TRAFFIC



SECTION A
SCALE:1/50



SECTION B
SCALE:1/50

BROOKLIN CONCRETE PRODUCTS

MANUFACTURED:
BROOKLIN, ON
1-800-655-3430

CONCRETE: 35MPa at 28 days/5000PSI
AIR ENTRAINMENT: 5-8%
REINFORCEMENT: STEEL TO CSA CAN A23.1 /A23.3 G30.18 Fy=400MPa

WEIGHT: 34,870lbs / 15,820kg
BOTTOM: 17,690lbs / 8,041kg
TOP: 17,180lbs / 7,809kg
CPA CERTIFIED
MEETS CAN/CSA-B66
"AGINP"

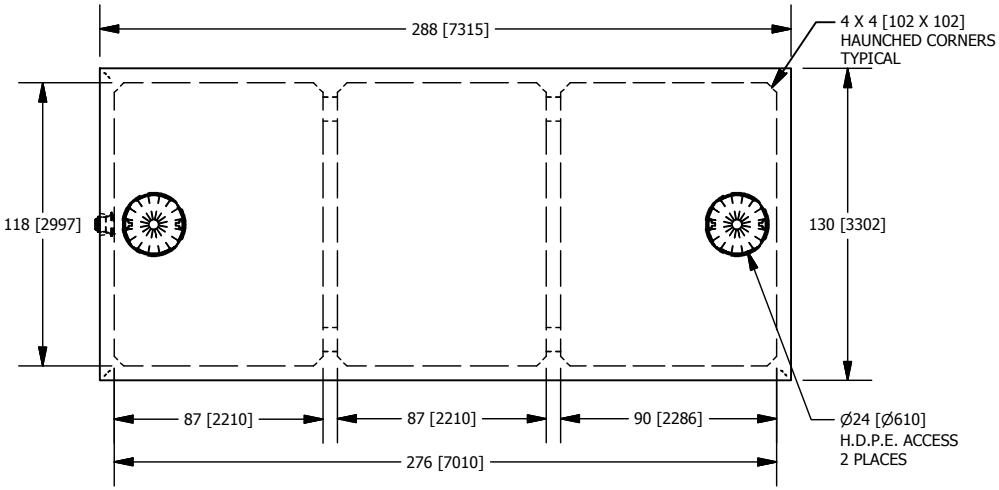
DRAWN BY: N.CHAN

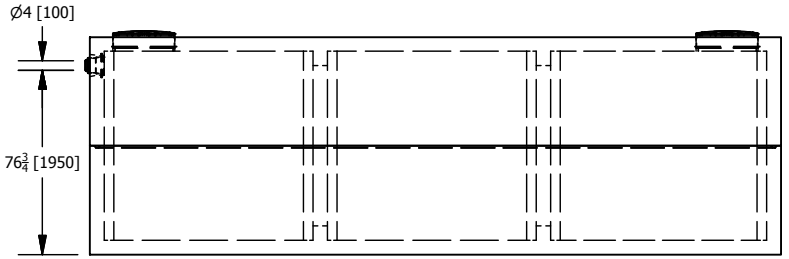
DATE: MAR/2021

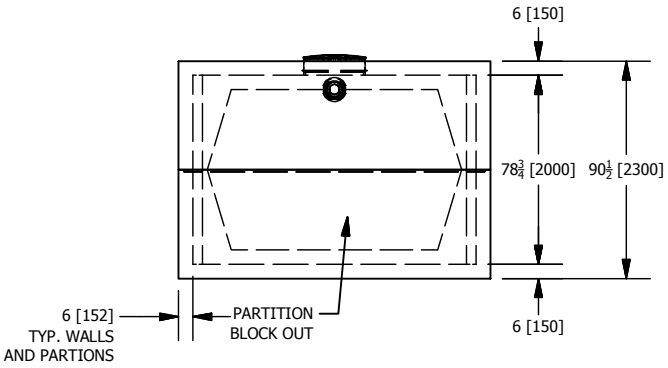
22000 LITRES SINGLE CHAMBER

WORKING CAPACITY: 23,820L TO INVERT OF INLET

TOTAL CAPACITY: 25,852L TO UNDERSIDE OF CHAMBER LID







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DIMENSIONS: INCHES [MILLIMETERS] UNLESS OTHERWISE NOTED

CONCRETE
45 MPa 5-8% air entrainment

DESIGN
CSA B66 1.2m burial depth non vehicular traffic

REINFORCING
To CSA A23.3 & G30.18 details available up request
All reinforcing has 2 [50] minimum cover
Macro fibre

NOTES
17000 kg Unit Wt. Per Half
Mastic sealant and sanitary tee baffles supplied loose
8 tonne swift lift anchors used for product handling

MODEL
8800GAH

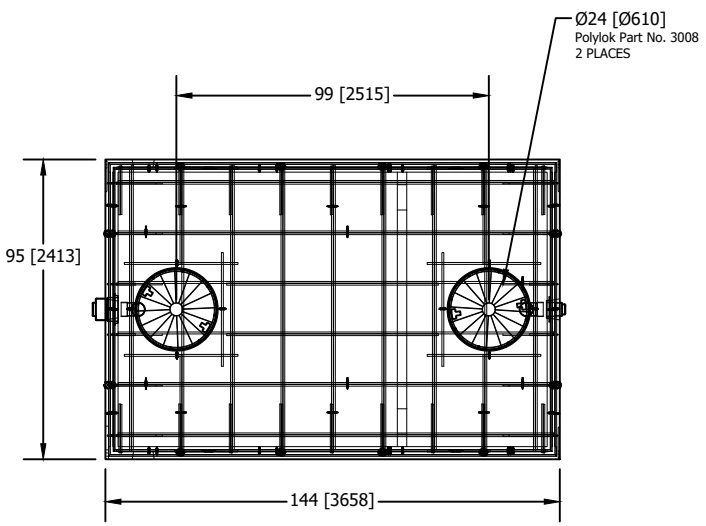
TYPE
Single Compartment Holding

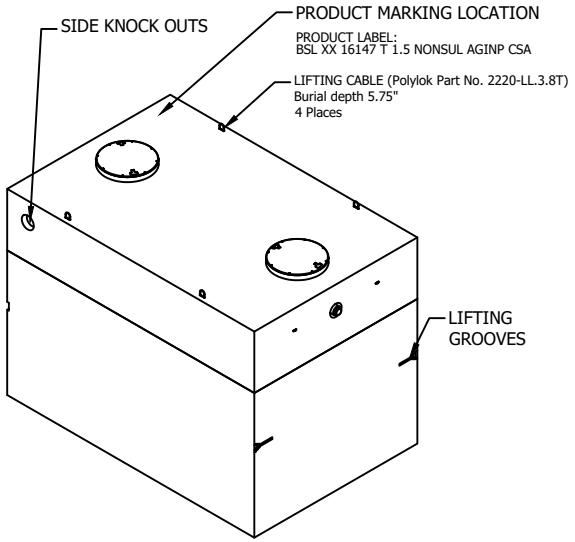
SIZE / VOLUME
9091 G [41327 L] Interior

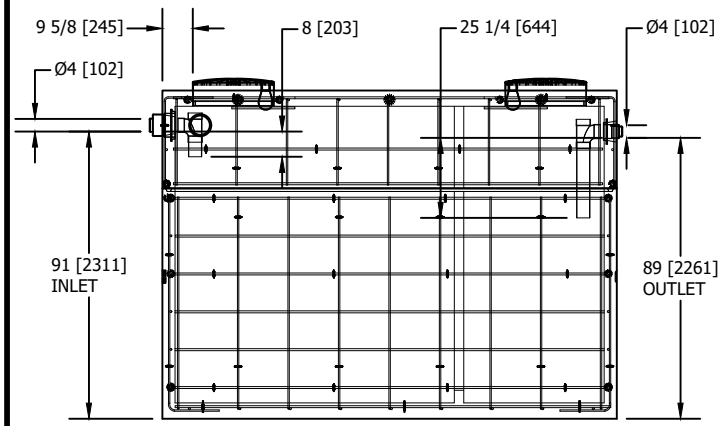
TITLE
8800 G / 40000 L
Single Compartment Holding Tank
Standard Construction

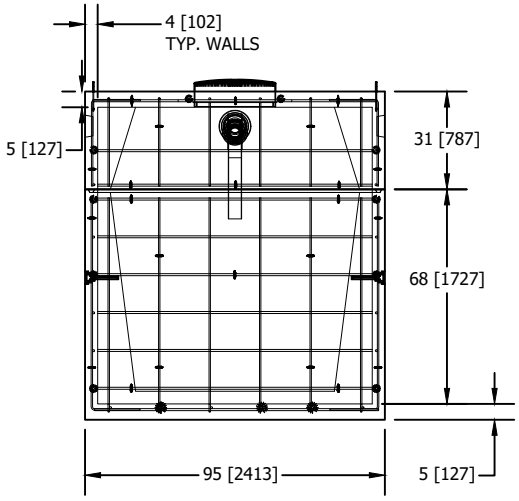
SHT #	DATE	REV	SIZE
1	09/08/2016		A

DWG #
40000 L Holding.dwg









Note: Outlet baffle for reference only, effluent filters available. Inlet and outlet seal is Polylok Part No. 3003-OE

Note: This drawing is not to scale and uses third angle projections. All dimensions are in inches [millimetres] unless otherwise noted.

www.babcocksupply.ca
10357 Base Line Dresden, ON
Tel: (519) 683-2696
Fax: (519) 683-2548

CONCRETE:
35 MPa 5-8% Air Entrainment

DESIGN:
CSA B-66

STEEL REINFORCEMENT:
15M Deformed Bar
10M Deformed Bar
CSA G30.18 (400W)

FIBRE REINFORCEMENT:
Synthetic Macro Fibre, ASTM C 1116

PRODUCT DETAIL:

MODEL	15900L SC (T)
PARTITION	N/A
TYPE	Trickle Type
WORKING CAPACITY	16147 L
TOTAL CAPACITY	18052 L
LID WEIGHT	4615 kg
TANK WEIGHT	7798 kg
TOTAL WEIGHT	12413 kg

NOTES:
REINFORCING CONCRETE COVER
1" (25.4 mm) minimum

PRODUCT LABEL
BSL XX 16147 T 1.5 NONSUL AGINP CSA

BURIAL DEPTH
1.5 m
(non vehicular traffic rated)

SEALANT
Butyl Rubber Sealant

TITLE:
3500G / 15900L
SINGLE COMPARTMENT
SEPTIC TANK
FULL ASSEMBLY
STANDARD CONSTRUCTION

REV:	SHEET SIZE:
1.0	A
SHT #	DATE:
1	May 14, 2018

HP series

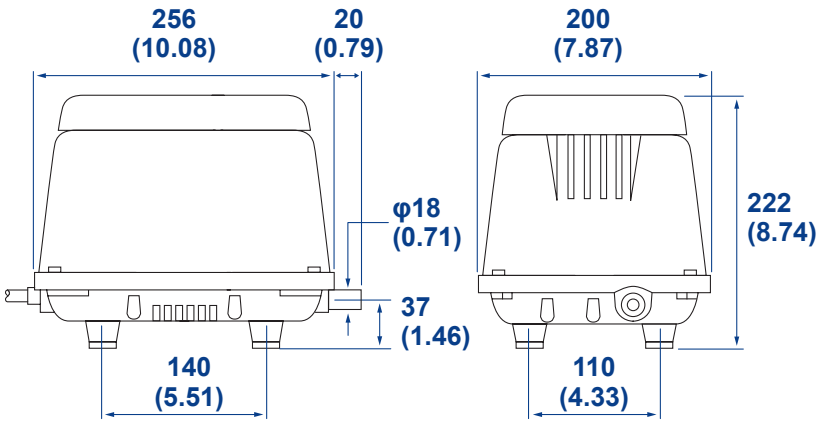
HIBLOW AIR PUMP

HP-150, 200

PRESSURE TYPE

Dimensions

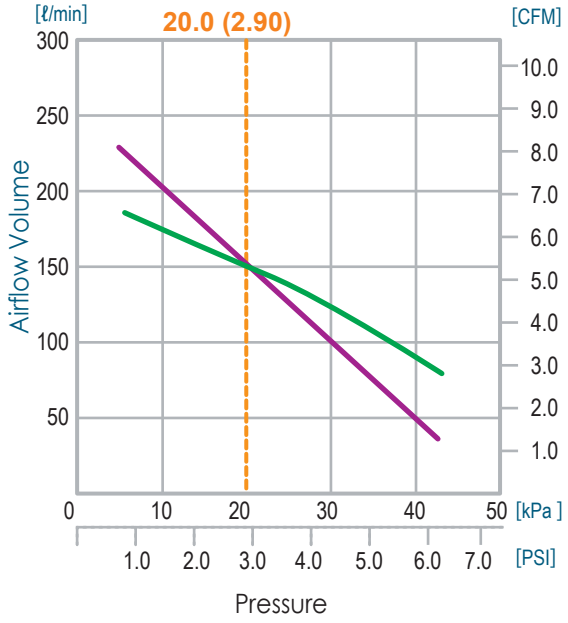
[Unit: mm(inch)]



Performance Curves

Rated Loading Pressure [kPa(PSI)]
50Hz 60Hz

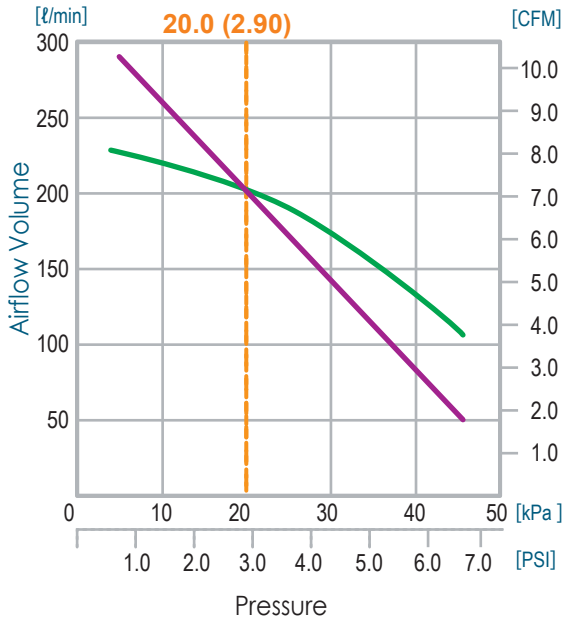
HP-150



Specifications

		HP-150		HP-200	
Rated Voltage	V	AC100 / 110-120 / 220-240			
Power Supply Frequency	Hz	50	60	50	60
Rated Loading Pressure	kPa	20.0			
Airflow Volume	ℓ/min	150		200	
Power Consumption	W	125	155	210	250
Noise Level	dBA	45	47	46	48
Weight	kg	9.0			

HP-200

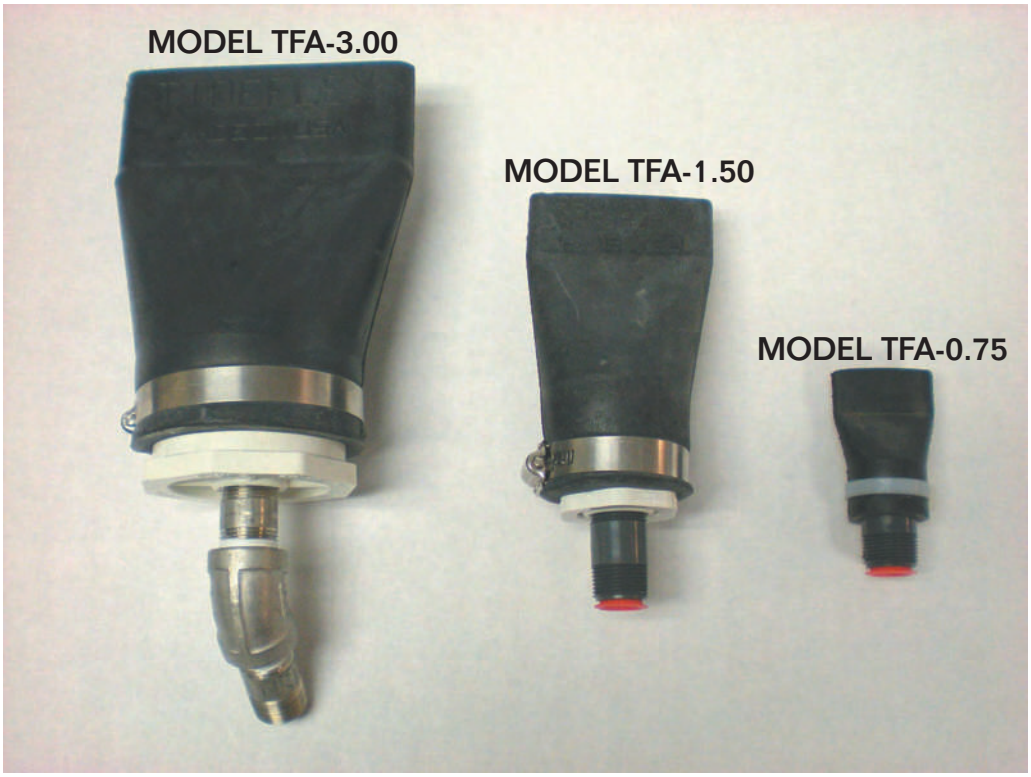


HIBLOW USA
www.hiblow-usa.com
1300 Tefft Court, Suite 8 Saline, Michigan 48176
P: 734-429-5618 F: 734-944-5163

Tideflex® Technologies
Division of Red Valve,Inc.

TIDEFLEX® AERATION COARSE BUBBLE DIFFUSERS

Installation, Operation, and Maintenance Manual



This manual outlines the installation procedures for individual diffuser units into existing piping systems. For diffuser installation into complete systems provided by Tideflex Technologies® refer to the systems Installation, Operation and Maintenance manual provided for the specific system.

IMPORTANT

Please review this manual prior to installation of the diffuser assemblies. The incorrect installation of these units can result in improper performance and reduced product life. Tideflex Technologies® can accept NO liability resulting from the improper use or installation of this product. If you have any questions or problems, please call the customer service department at (412) 279-0044. Thank you for using Tideflex Technologies® high performance products.

DIFFUSER COMPONENTS

The diffuser assemblies are comprised of five different products:

1. The elastomer duck bill molded body.
2. The internal reducer bushing.
3. The threaded nipple.
4. The connection band.
5. The flow-control orifice plug.

1. THE ELASTOMER BODY

The elastomer portion of the diffuser is a compression molded component and can be fabricated from the following synthetic elastomers: Neoprene, EPDM, Buna-N, Hypalon, PGR. The maximum allowable operating temperature of the elastomer for an air diffusion application is 120 degrees F for either the internal airflow or the external process liquid. Temperatures exceeding this limit can result in distortion, hardening, and reduced life of the elastomer.

2. THE INTERNAL REDUCER BUSHING

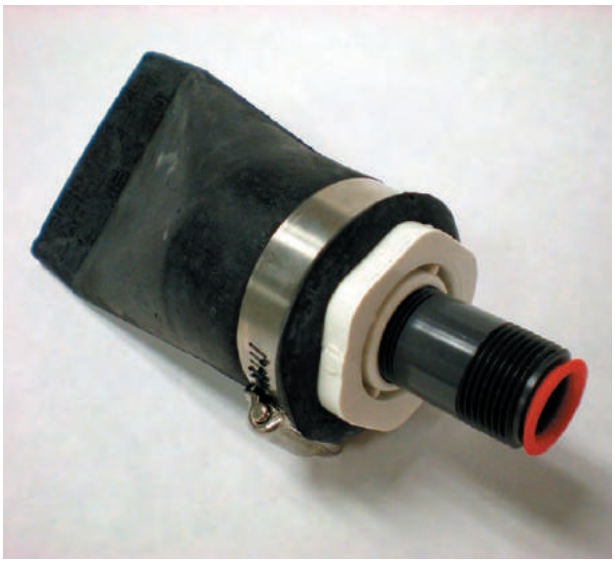
This bushing provides support for the elastomer portion and an internal threaded port for receiving the specified nipple connection size. This reducer bushing can be fabricated from either a molded thermoplastic material or tooled stainless steel.

3. THE THREADED NIPPLE

The nipple is typically an NPT thread and can be fabricated from PVC80 thermoplastic, 304SS or 316SS. The diameter and length of the nipple can vary; the standard is 3/4" diameter.

4. THE CONNECTION BAND

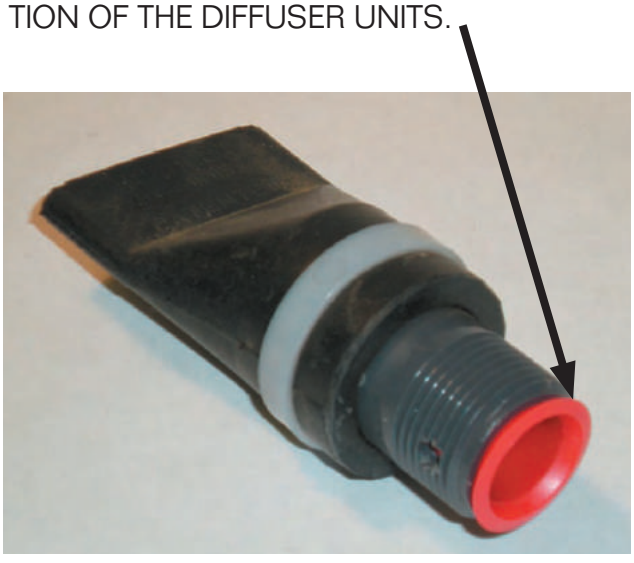
The connection band is fitted around the cuff portion of the elastomer unit and compresses the elastomer around the reducer bushing providing a water-tight seal. The connection band types include; Nylon Lock-Tie type, stainless steel worm gear (hose clamp) type, and stainless steel band-it type. These clamps are installed at the factory at the recommended compression.



5. THE FLOW CONTROL ORIFICE PLUG

The orifice plug provides additional headloss at the diffuser that is required when multiple diffusers are installed along a single air manifold. The internal bore diameter of these plugs can vary depending on the piping application. Standard bore diameters are provided by the factory which are applicable to manifolds up to 40 linear feet where multiple diffusers are installed. For manifold lengths greater than this consult the factory for recommendations on alternate plug sizes required. Model TFA-3.00 units may be provided without plugs as they are not required for these higher flow units. These plugs are fabricated from polyethylene plastic and are colored RED.

DO NOT REMOVE THE RED ORIFICE PLUGS, THEY ARE REQUIRED FOR PROPER OPERATION OF THE DIFFUSER UNITS.



DIFFUSER INSTALLATION

Follow the steps below for installation of the diffuser units:

ASSEMBLY INSPECTION

Check the diffuser bill opening by compressing the end points to observe the interior of the valve. Confirm that there are no restrictions from excess rubber material or foreign debris. Remove any of this material.

Diffusers are provided with a threaded male nipple connection. Check that nipple is securely threaded into bushing located in the inside cuff of the diffuser. For hose clamp type connections, check that the clamp is adequately tightened (if provided on the diffuser) around the PVC bushing.

NOTE: Do not over tighten hose clamp or damage to the rubber diffuser could occur, the maximum compression of the rubber at the clamp should not exceed 1/8" depth.

Check the influent end of the connection nipple to see if an internal orifice plug has been inserted into the nipple (Red Polyethylene Plug with internal bore). If no plug is present then check the shipping packaging for a separate package of these orifice plugs. Manually insert the orifice plugs into the nipple and firmly compress until the plug flange seats against the rim of the nipple. The plug flange will follow the threades of the FIPT receiving port when installing the diffuser locking this plug in place. Model TFA-3.00 diffusers may be provided without the orifice plug as it is not required for the higher airflow rates associated to this model. Models TFA-0.75 and TFA-1.50 should be equipped with orifice plugs.

INSTALLATION PROCEDURES

PVC NIPPLE ASSEMBLIES – Apply either liquid teflon or vegetable oil to the threads and thread into the FIPT socket connection on the manifold. Hand tighten the diffuser to maximum 10 lbs torque and rotate the diffuser slit opening horizontal.

STAINLESS STEEL NIPPLE ASSEMBLIES – Apply Teflon tape to the nipple threads and thread into the FIPT socket connection on the manifold until hand tight. Apply vise grips around the non-threaded center portion of the nipple and continue tightening until the diffuser slit opening is horizontal. Do not exceed 40 lbs torque during installation.

OPERATIONAL CHECK

Confirm all diffusers are installed at the same hydrostatic elevation and all units are oriented the same.

Fill the tank to a liquid level that is approximately 12 inches above the diffusers and apply air to the system at approximately 20% of the design air flowrate. Do not apply higher than the rated airflows for the diffusers. Inspect the diffuser connections for any air leaks at the threaded connections.

Visually observe the airflow distribution along each manifold run and confirm that there is even distribution of air through each diffuser. If excessively uneven airflow distribution is observed, confirm the orifice plugs have been installed in the diffuser nipple connections.

Fill the tank to the normal operational level and apply the design airflow to the system and observe the surface air discharge patterns; uniform distribution should be observed. The system operating airflow rate should not exceed the rated capacity of the diffusers as permanent damage to the elastomer portion can result.

DIFFUSER CAPACITY RATINGS

Model TFA-0.75	6 cfm [10.19 m3/hr]
Model TFA-1.50	12 cfm [20.39 m3/hr]
Model TFA-3.00	24 cfm [40.79 m3/hr]

Tideflex® Technologies Warranty

WARRANTIES - REMEDIES - DISCLAIMERS - LIMITATION OF LIABILITY
Unless otherwise agreed to in writing signed by Tideflex® Technologies, all Products supplied by Tideflex® Technologies will be described in the specifications set forth on the face hereof.

THE WARRANTIES SET FORTH IN THIS PROVISION ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OR TRADE).

Tideflex® Technologies Products are guaranteed for a period of one year from date of shipment, against defective workmanship and material only, when properly installed, operated and serviced in accordance with Tideflex® Technologies' recommendations. Replacement for items of Tideflex® Technologies' manufacture will be made free of charge if proved to be defective within such year; but not claim for transportation, labor or consequential damages shall be allowed. We shall have the option of requiring the return of the defective product to our factory, with transportation charges prepaid, to establish the claim and our liability shall be limited to the repair or replacement of the defective product, F.O.B. our factory. Tideflex® Technologies will not assume costs incurred to remove or install defective products nor shall we incur backcharges or liquidated damages as a result of warranty work. Tideflex® Technologies does not guarantee resistance to corrosion erosion, abrasion or other sources of failure, nor does Tideflex® Technologies guarantee a minimum length of service, or that the product shall be fit for any particular service. Failure of purchaser to give prompt written notice of any alleged defect under this guarantee forthwith upon its discovery, or use, and possession thereof after an attempt has been made and completed to remedy defects therein, or failure to return product or part for replacement as herein provided, or failure to install and operate said products and parts according to instructions furnished by Tideflex® Technologies, or failure to pay entire contract price when due, shall be a waiver by purchaser of all rights under these representations. All orders accepted shall be deemed accepted subject to this warranty which shall be exclusive of any other or previous warranty, and shall be the only effective guarantee or warranty binding on Tideflex® Technologies, anything on the contrary contained in purchaser's order, or represented by any agent or employee of Tideflex® Technologies in writing or otherwise, not withstanding implied warranties. TIDEFLEX® TECHNOLOGIES MAKES NO WARRANTY THAT THE PRODUCTS, AUXILIARIES AND PARTS ARE MERCHANTABLE OR FIT FOR ANY PARTICULAR PURPOSE.

BJM CORP.

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Visit our web site: www.bjmcorp.com

3/31/2003
0803
Supersedes
0802

TECHNICAL DATA
MODEL J400
BJM SUBMERSIBLE PUMP-CAST IRON

GENERAL DATA

MAX. FLOW: GPM (L/min)	66 GPM (249 L/min)
MAX. HEAD: ft (m)	35’ (10.6 m)
PUMP TYPE	DEWATERING
STRAINER OPENING	0.375”x0.1875” (9.5x4.7 mm) slot
IMPELLER DIAMETER: in (mm)	3.75” (95 mm)
DISCHARGE SIZE	2” NPT-MALE
PUMP NET WEIGHT[1]: lbs (kg)	30 lbs (13.6 kg)
SHIPPING WEIGHT: lbs (kg)	34 lbs (15.5 kg)

1- Does not include power cord.

CONSTRUCTION/MATERIAL DATA

MECHANICAL SEAL - UPPER	CARBON/CERAMIC
MECHANICAL SEAL - LOWER	SILICON CARBIDE/SILICON CARBIDE
MOTOR CASING	304 SS
PUMP VOLUTE	CAST IRON
IMPELLER- MULTI VANE	CAST IRON
STRAINER	304 SS
LIPSEAL & O-RINGS	BUNA-N
ROTOR SHAFT	304 SS
EXTERNAL HARDWARE	304 SS
QTY. OIL IN SEAL CHAMBER	5.1 U.S. FL. OZ. (150 C.C.)
BALL BEARING: PERM. LUBE. UPPER	6201
BALL BEARING: PERM. LUBE. LOWER	6201

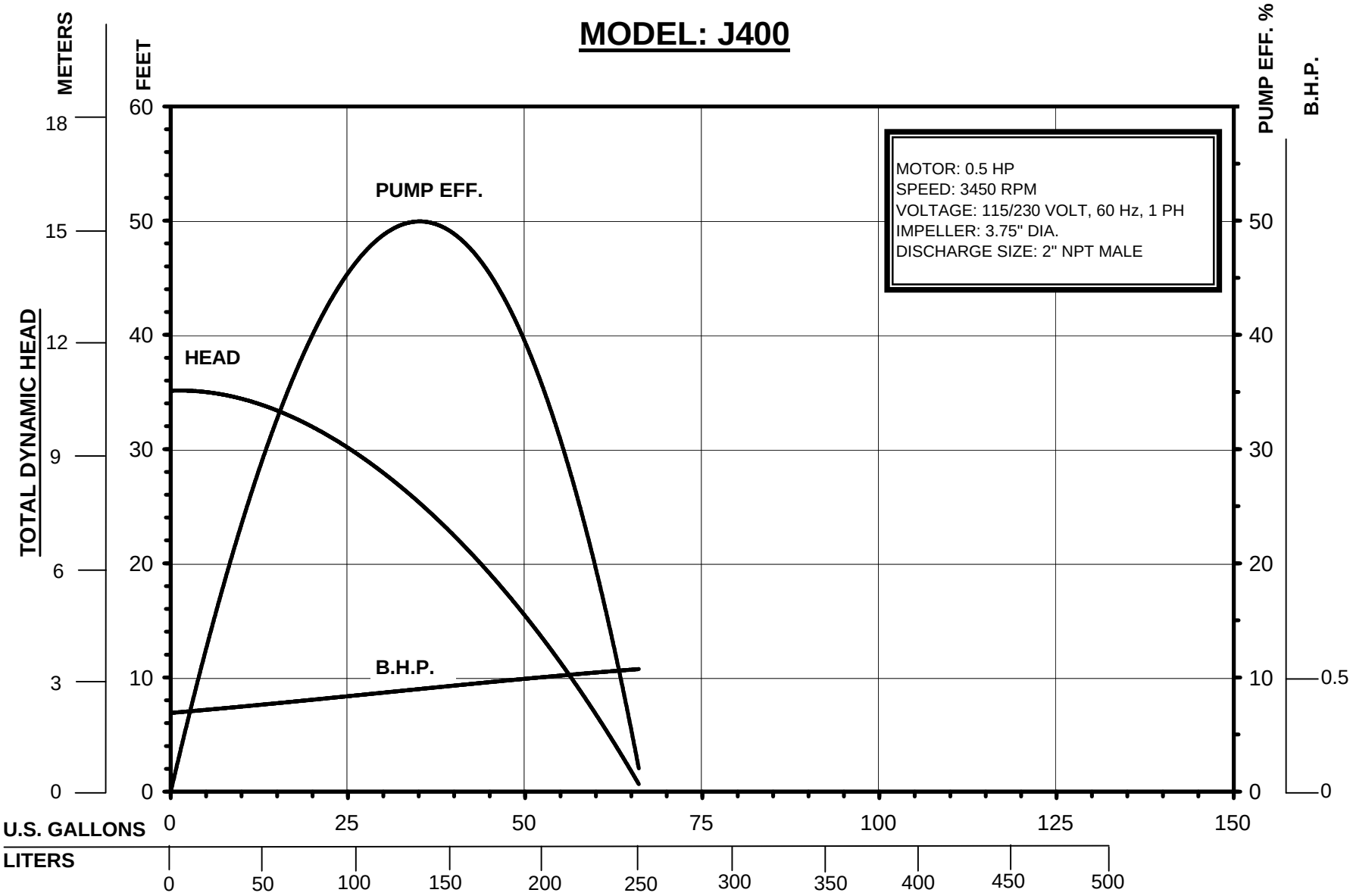
ELECTRICAL /MOTOR DATA

MOTOR: TYPE, RATING HP	SUBMERSIBLE, 0.5
MOTOR RPM	3450
MOTOR INSULATION CLASS	F
MOTOR SERVICE FACTOR	1.1
VOLTAGE[2]	115/230, 1 PH, 60 Hz
CURRENT F.L.A.	7/3.5
MOTOR PROTECTION	THERMAL BREAKER
POWER CORD[3]: GAGE; LENGTH	A.W.G. 16/3; 33’ (10 m)
MAXIMUM LIQUID TEMPERATURE	104°F (40°C)
MAXIMUM STATOR TEMPERATURE	230°F (110°C)

2- Available in other voltages (and in 50 Hz).
3- Available in different length.

REFER TO REVERSE SIDE FOR PUMP PERFORMANCE CURVES
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MODEL: J400



12/30/2002 supersedes priors

FLOW RATE PER MINUTE

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

TECHNICAL BROCHURE
BLSP03

LSPO3AT

LSPO3AV

LSPO7

LSP03/LSP07

SUBMERSIBLE SUMP PUMPS

GOULDS WATER TECHNOLOGY
a xylem brand

FEATURES

Corrosion-resistant construction

Stainless Steel motor casing and fasteners

Glass-filled thermoplastic impeller and casing.

Upper and lower heavy duty ball bearing construction.

Motor is permanently lubricated for extended service life and is powered for continuous operation. All ratings are within the working limits of the motor.

Hard coated 400 series stainless steel shaft for improved corrosion resistance.

Float switch is adjustable for various liquid levels. Easily removed for direct pump operation or switch replacement.

Complete unit is lightweight, portable and easy to service.

Available in manual and automatic versions. See next page for specific order numbers.

A double labyrinth lip seal system protects the motor. It consists of three lip seals and a V-ring in addition to an impeller counterblade system which keeps solid particles away from the seal unit.

AGENCY LISTINGS

Canadian Standards Association
File #LR114251

Underwriters Laboratories
File #83318

APPLICATIONS

Specially designed for the following uses:

- Basement draining
- Water transfer
- Dewatering

SPECIFICATIONS

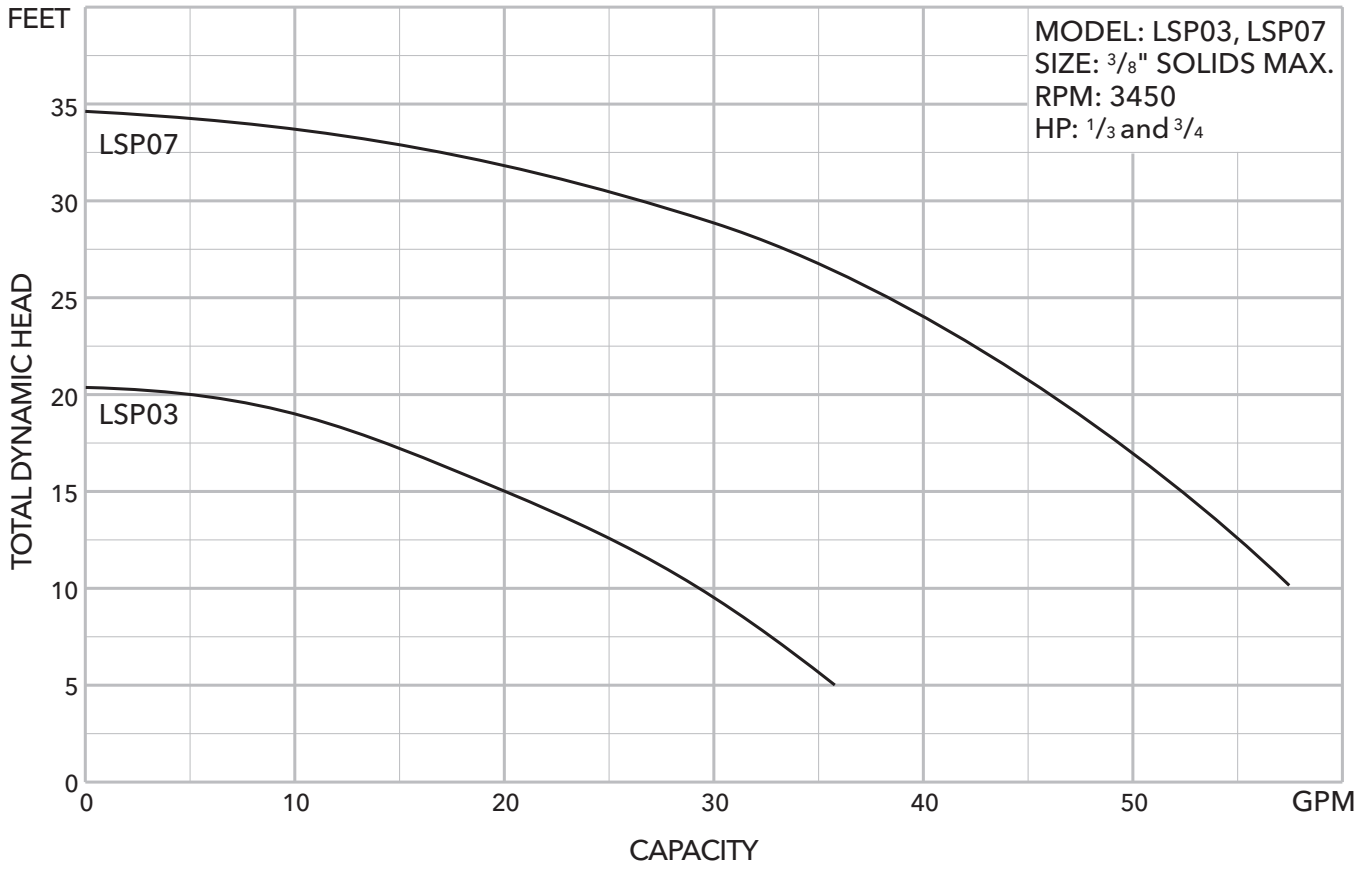
- Discharge size: 1 ½" NPT
- Capacities: to 57 GPM
- Maximum head: 34 feet TDH
- Maximum solids: ⅜" spherical
- Temperature: 104° F (40° C) maximum liquid temperature.
- Maximum pump submergence is 10 ft. for LSP03; 16 ft. for LSP07.

MOTOR

- Single phase, 3450 RPM, 60 Hz
  - LSP03, ⅓ HP, 115 V, 2.9 maximum amps
  - LSP07, ¾ HP, 115 V (7.1 amps) or 230 V (3.5 amps)
- Built-in thermal overload protection with automatic reset.
- Permanent-split-capacitor type
- Class B insulation
- Stainless steel shaft
- Air filled design
- Power cord length: LSP03; 10 feet standard, 20 feet optional, LSP07; 20 feet.

FLOAT SWITCH OPTIONS

- Models are available with a float switch. Several options for automatic operation.
- "AV" models are supplied with a vertical float switch.
- "A" models are supplied with a built in float switch.
- "AT" models are supplied with a piggy-back replaceable float switch.



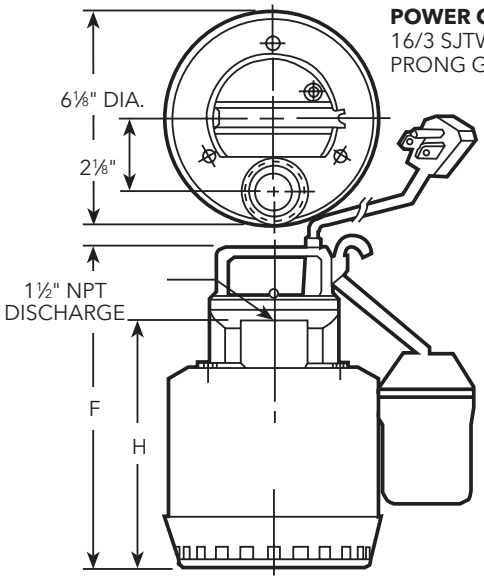
MODEL INFORMATION

Order No.	HP	Volts	Amps	Minimum Circuit Breaker	Phase	Float Switch Style	Cord Length	Discharge Connection	Min. On Level	Min. Off Level	Minimum Basin Diameter	Maximum Solids Size	Shipping Weight lbs/kg
LSP0311	⅓	115	2.9	10	1	Plug / No Switch	10'	1½"	Manual	Manual	9"	⅜"	11 / 5
LSP0311A						Built-In Wide Angle			11"	5"	12"		
LSP0311AT						Piggyback Wide Angle			11"	5"	12"		
LSP0311AV						Piggyback Vertical			8.5"	2"	12"		
LSP0311F						Plug / No Switch	20'		Manual	Manual	9"		
LSP0311AF						Built-In Wide Angle			11"	5"	12"		
LSP0311ATF						Piggyback Wide Angle			11″	5"	12"		
LSP0711F	¾	115	7.1	10	1	Plug / No Switch	20'	1½"	Manual	Manual	9"	⅜"	15 / 6.8
LSP0711AF						Built-In Wide Angle			12.5"	6.5"	12"		
LSP0711ATF						Piggyback Wide Angle			12.5"	6.5"	12"		
LSP0712F		230	3.5			Plug / No Switch			Manual	Manual	9"		
LSP0712AF						Built-In Wide Angle			12.5"	6.5"	12"		
LSP0712ATF						Piggyback Wide Angle			12.5"	6.5"	12"		

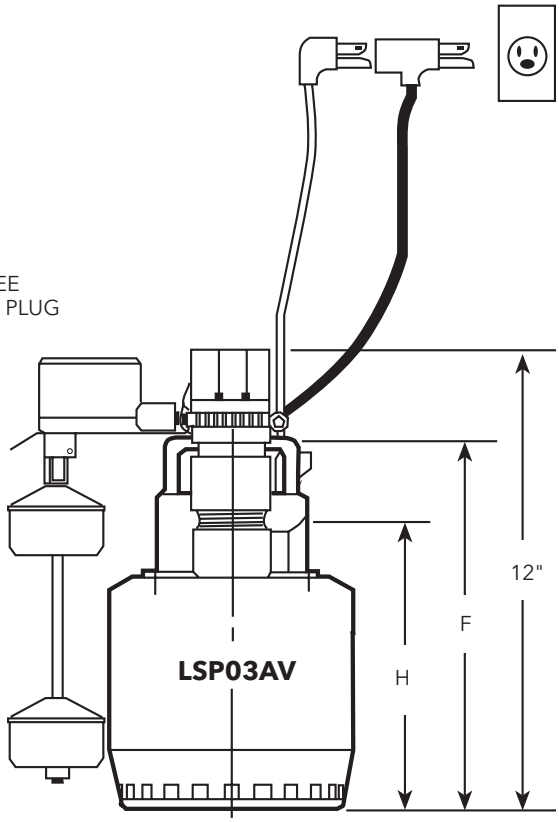
DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)

	F	H
LSP03	9¾	7⅝
LSP07	11¼	9⅛
LSP03AV	9¾	7⅝



POWER CORD:
16/3 SJTW WITH THREE
PRONG GROUNDING PLUG



xylem
Let's Solve Water

Xylem, Inc.
2881 East Bayard Street Ext., Suite A
Seneca Falls, NY 13148
Phone: (866) 325-4210
Fax: (888) 322-5877
www.xyleminc.com/brands/goulds watertechnology

MicroC 2000™

Environmental Operating Solutions

Materials Safety Data Sheets (MSDS) are provided with each delivery.
Read and understand MSDS prior to using MicroC 2000™.
If there are any questions, please call Environmental Operating Solutions, Inc. at (508) 743-8440.

Handling and Storage Guidelines

- Keep MicroC 2000™ containers (pails, drums and totes) **out of direct sunlight** whenever possible and **avoid extreme temperatures** (below 10° F and above 125° F)
- Keep MicroC 2000™ containers **tightly sealed** until they are ready for use. Do not loosen bungs or remove covers and caps on MicroC 2000™ containers prior to use.
- If MicroC 2000™ containers are stored outside, cover with tarp or shelter sufficient to **prevent over exposure to ultraviolet light.**

Putting MicroC 2000™ Online

- Most chemical metering pumps typically used to pump methanol or other electron donors (carbon sources) in wastewater treatment plants are compatible with MicroC 2000™. These include diaphram metering pumps, peristaltic pumps and general use pumps. *See viscosity information for cold weather applications*.
- Appropriate measures should be taken to avoid cross-contamination of MicroC 2000™. Such measures are described below:

1. **Mixing** – Like most chemicals, MicroC 2000™ should not be mixed with other chemicals including electron donors such as methanol, acetic acid, sodium acetate, sucrose solutions, ethanol or other chemicals
2. **Transfer** – If MicroC 2000™ is transferred into a day tank or other storage tank, the transfer pump, hoses and the tank itself must be cleaned thoroughly to prevent cross-contamination with other chemicals. Day tanks and storage tanks must be covered to minimize evaporative losses
3. **Dilution** – EOSi does not recommend that MicroC 2000™ be diluted with water as the physical and/or performance characteristics of the product *could* be compromised. Note: In some cases, small amounts of MicroC 2000™ are required and accurate dosing cannot be achieved unless the product is diluted due to metering pump constraints. Always consult an EOSi technician prior to diluting MicroC 2000™ for recommendations.

Metering MicroC 2000™ Totes

MicroC 2000™ can be drawn either from the spigot on the bottom of the tote ("bottom feed") or from the top of the tote ("top feed"):

Bottom Feed

- Traditional totes or Intermediate Bulk Containers (IBCs) generally have either one of two threads on the spigot: a 2" NPT or Metric. It is necessary to have adapters and fittings available to handle both thread types. Contact an EOSi technician for more information on locating and purchasing these adapters.
- To prevent leaking, avoid cross-threading fittings and use Teflon tape
- Open/loosen the 6" cap or 2" bung on the top of the tote to prevent a vacuum from developing within the tote. This may cause damage to the metering pumps or the tote itself

Top Feed

- Open the 6" cap or 2" bung on the top of the tote and insert chemical suction line

Empty MicroC 2000™ Containers

- Do not use MicroC 2000™ containers for storage of any other chemicals, wastewater or any liquid or solid material as such containers cannot be retrieved and a deposit fee will be assessed. This is to ensure the quality of our product and the safety of delivery personnel.

- A deposit fee will be assessed for any delivered drums and totes that cannot be returned within a reasonable amount of time.

Clean Up

- MicroC 2000™ is easily cleaned with warm or hot water and dish detergent.

USDA CERTIFIED BIOBASED PRODUCT PRODUCT 100%

MicroC 2000™

Environmental Operating Solutions

Product Description

MicroC 2000™ is a proprietary wastewater treatment chemical developed by Environmental Operating Solutions, Inc. MicroC 2000™ was designed specifically for use as an electron donor / carbon source for wastewater denitrification applications.

Physical properties / Specifications

Physical State	Liquid
Specific Gravity @ 20°C	1.22
Density (lbs/gal)	10.17
pH	4.75-6.75
Viscosity (centipoises)	~ 45 @ 20°C
Solubility in water	100%
VOC Concentration	0% (EPA 8260B)
Freezing Point	Below Zero Fahrenheit
Flash Point	None to boil (ASTM D93)
COD Value	1,040,000 mg/L
BOD5	844,000 mg/L
USDA Certified Biobased Product	YES

USDA CERTIFIED BIOBASED PRODUCT
PRODUCT 100%

Environmental Operating Solutions, Inc. • 508.743.8440 • www.eosenvironmental.com • info@eosenvironmental.com

Concept b Series

Economical metering pump solutions!

NSF 61/50 Approved

*The **ProMinent® Concept b** series covers a capacity range of **0.19 to 4.33 GPH (0.7 to 16.4 L/h)** at pressures up to **232 psi (16 bar)**.*
Its compact construction and features make it ideal for use in flow proportional or on/off control applications. The Concept b mounts easily onto a tank or wall bracket.
Adjustment of the pump capacity is via the stroke length in the range of 10-100 % or can be set at 1 of the 4 stroke frequency settings. This gives an adjustment ratio of 40:1.

Features & Benefits

- NSF 61/50 approved
- Low cost opens up opportunities in the most basic applications
- PVDF wetted ends eliminate compatibility concerns
- Integral bleed valve prevents “loss of prime”
- Lowest maintenance costs in its class
- External control via dry contact pulse (1:1)
- Wetted end materials: PP, Acrylic/PVC or PVDF

Applications

- Swimming pools
- Spas, fountains and spray pads
- Cooling towers
- Boiler feed applications
- General Chlorination
- Municipal and industrial wastewater
- Water disinfection
- Biocide feed
- “Pump on a drum” applications

Concept b Series

Technical data

Capacity Data

Pump Version	Capacity at Maximum Back Pressure				mL/ stroke	Max. Stroking Rate	Pre-Primed Suction Lift		Tubing Connectors O.D. x I.D.	Shipping Weight (approx.)	
	psig	(bar)	GPH	(L/h)		spm	ft.	(m)	(in.)	lbs.	(kg)
CNPb											
1000	145	(10)	0.19	(0.7)	0.07	180	20	(6)	1/4 x 3/16	3.97	(1.8)
1601	232	(16)	0.29	(1.1)	0.10	180	20	(6)	1/4 x 3/16	3.97	(1.8)
1002	145	(10)	0.63	(2.4)	0.19	180	16	(5)	1/4 x 3/16	3.97	(1.8)
1003	145	(10)	0.79	(3.0)	0.21	240	16	(5)	1/4 x 3/16	3.97	(1.8)
0704	102	(7)	1.03	(4.0)	0.41	180	13	(4)	1/4 x 3/16	3.97	(1.8)
0705	102	(7)	1.37	(5.2)	0.36	240	13	(4)	1/4 x 3/16	3.97	(1.8)
0309	44	(3)	2.38	(9.0)	0.83	180	20	(6)	3/8 x 1/4	3.97	(1.8)
0215	22	(1.5)	4.33	(16.4)	1.45	180	5	(1.5)	3/8 x 1/4	3.97	(1.8)

External pulse contact retrofit available as an option (P/N 1022000)

NSF 50 certification only applies to NPB0 & NPB2 liquid ends

Identity code pump configuration

CNPb — Concept PLUS

Version	Capacity	Version	Capacity
1000	0.19 gph (0.7 l/h), 145 psi (10 bar)	0704	1.03 gph (4.0 l/h), 102 psi (7 bar)
1601	0.29 gph (1.1 l/h), 232 psi (16 bar)	0705	1.37 gph (5.2 l/h), 102 psi (7 bar)
1002	0.63 gph (2.4 l/h), 145 psi (10 bar)	0309	2.38 gph (9.0 l/h), 44 psi (3 bar)
1003	0.79 gph (3.0 l/h), 145 psi (10 bar)	0215	4.33 gph (16.4 l/h), 22 psi (1.5 bar)

Liquid end material:

PP	Polypropylene
NP	Acryllic/PVC
PV	PVDF

O-rings:

B	Viton® seals
E	EPDM seals
T	PTFE seals

Liquid end version:

0	Non-bleed version, no valve spring
1	Non-bleed version, with valve spring
2	With bleed valve, no valve spring (except 0704 models)
3	With bleed valve, with valve spring

Connection:

M	1/4" x 3/16"
N	3/8" x 1/4"

Logo:

0	With ProMinent® logo

Power Supply:

A	1 ph 230 V 50/60 Hz (Euro plug)
D	1 ph 115 V 50/60 Hz (US plug)
4	1 ph 230 V 50/60 Hz (US plug) (consult factory for pricing)

Control Option:

0	Standard (w/o external control)
B	With external and level input retrofit kit, fitted, without level switch

Accessories:

1	With accessories (foot valve, injection valve, tubing)

Control Variant:

0	Standard

Approval:

01	CE
07	MET
11	MET + NSF 61

CNPb	1000	PP	B	0	M	0	A	0	1	0	01

 PN: 7750012 Concept_b.indd rev6 09/10/2021

ProMinent®

ProMinent Fluid Controls, Inc. (USA)
136 Industry Drive • Pittsburgh, PA 15275
(412) 787-2484 • email: sales@prominent.us
www.prominent.us

ProMinent Fluid Controls, Ltd. (Canada)
490 Southgate Drive • Guelph, N1G 4P5
(519) 836-5692 • Fax: (519) 836-5226 • Toll Free1-888-709-9933
email: sales@prominent.ca • **www.prominent.com**

SCL R20 / R30 / R40

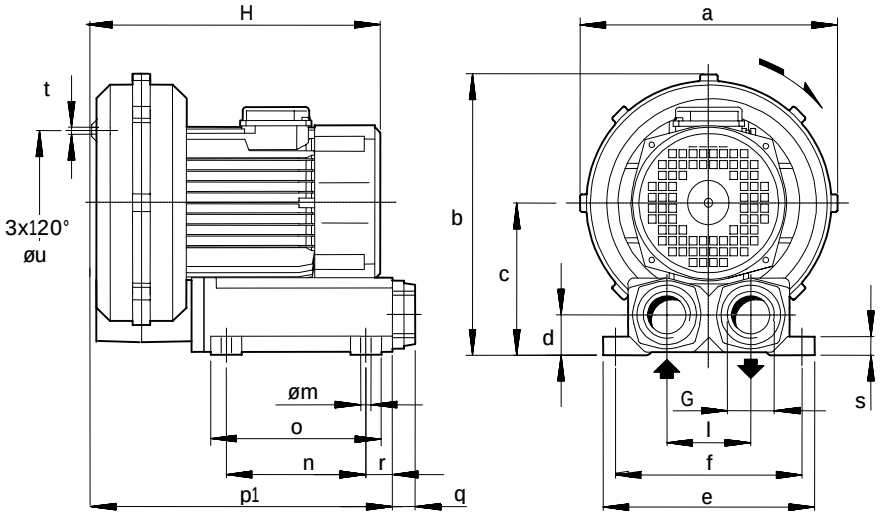
MD SERIES

SN 2464-7 1/2

STANDARD FEATURES
- Low weight cast aluminum construction.
- Quiet operation with integral inlet and outlet muffling.
- Recognized TEFC - cURus motor.
- High efficiency / low noise impeller design.
- No lubrication / maintenance required.
- Allowed ambient: +5 °F to +104 °F.
- Mountable in any plane.

OPTIONS
- Remote drive models (belt or coupling).
- Special voltages.
- Surface treatment or plating.
- Gas tight sealing.
- Special designs available.

ACCESSORIES
- Inlet and/or inline filters.
- Additional inlet/outlet silencers.
- Relief valves.
- Flow converting devices.
- Optionals connectors



Dimensions in inches.
Dimension for reference only.

Model	a	b	c	d	e	f	G	l	m	n	o	p1	q	r	s	t	u
R20-MD	11.14	12.17	6.57	1.85	9.25	8.27	1" ¼ NPT	3.54	0.39	5.91	7.87	13.58	0.71	1.77	0.87	M6	5.91
R30-MD	12.56	13.62	7.36	1.85	9.25	8.27	1" ¼ NPT	3.54	0.39	5.91	7.87	13.94	0.71	1.77	0.87	M6	7.09
R40-MD	13.78	14.65	7.76	1.85	9.25	8.27	1" ¼ NPT	3.54	0.39	5.91	7.87	14.33	0.71	1.77	0.87	M8	8.86

Model	Maximum flow Scfm		Installed power Hp		Maximum differential pressure Δp (In WG)		Noise level Lp dB (A) (1)		Overall dimensions H	Weight
	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	Inches	Lbs
R20-MD	41	35	1 ½	1 ½	161	161	68.5	66.5	13.39	48.5
R30-MD	65	54	2	2	140	170	72.2	69.2	15.58	57.3
			3	-	191	-	72.8	69.7	15.55	66.1
R40-MD	78	69	3	3	141	170	72.8	70.8	16.22	77.2
			4	4	201	201	73.3	71.3	17.09	88.2

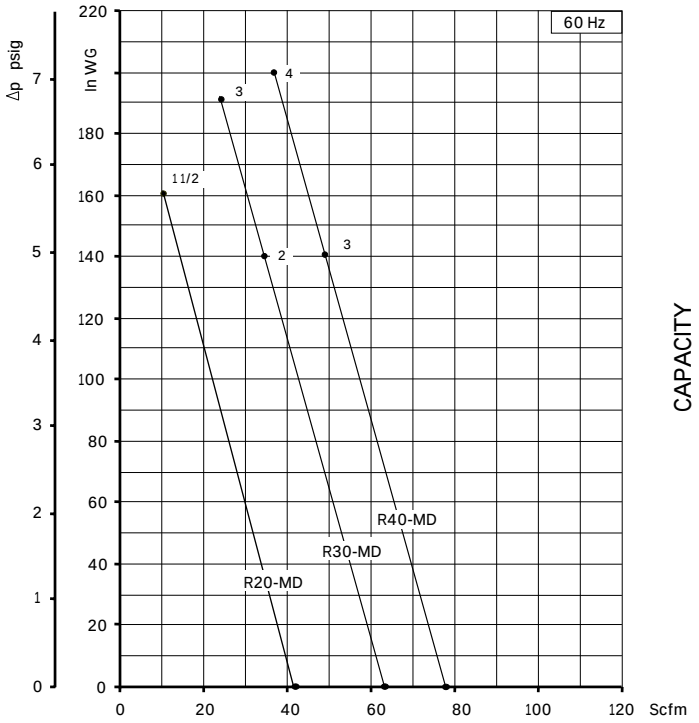
(1) Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744.

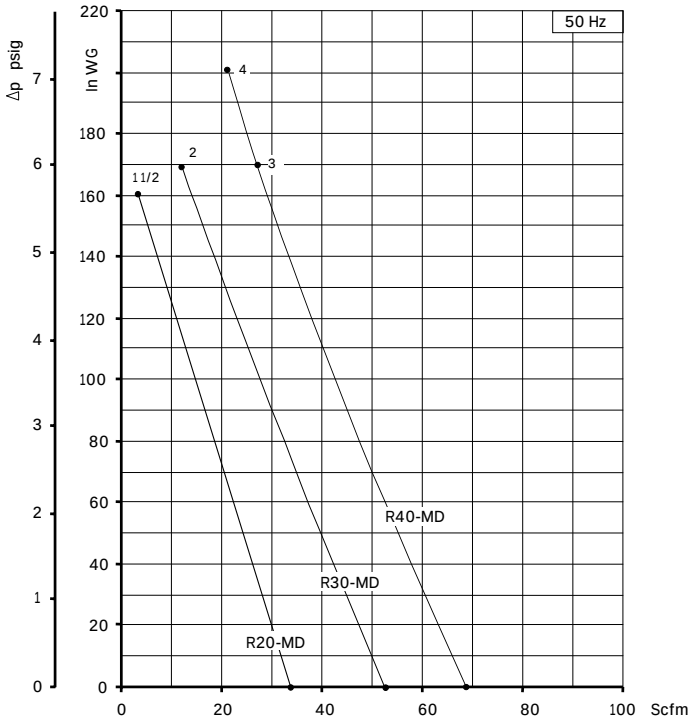
- For proper use, the blower should be equipped with inlet filter and relief valve; other accessories available on request.
- Ambient temperaturefrom +5° to +104°F.
- Specifications subject to change without notice.

SCL R20 / R30 / R40 MD SERIES

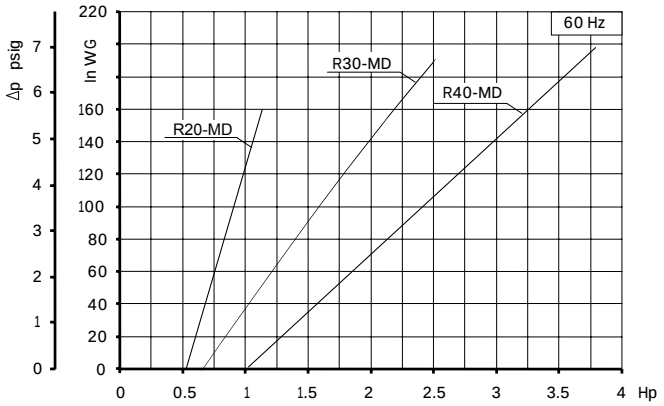
SN 2464-7 2/2

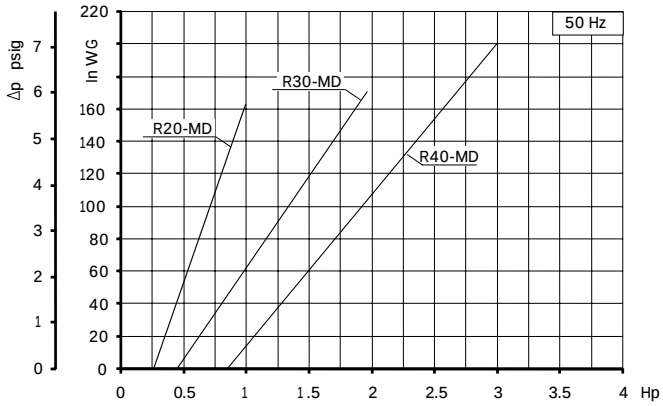
CAPACITY



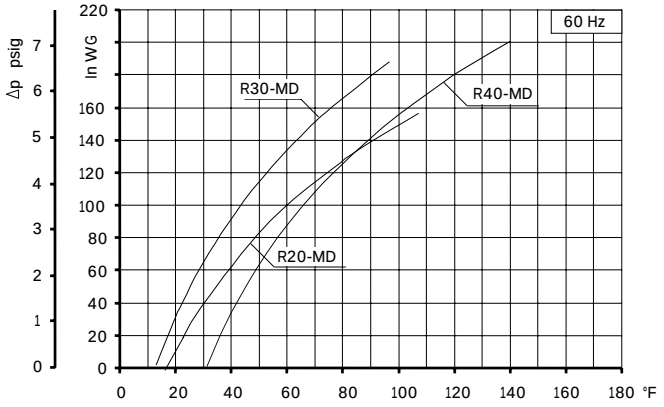


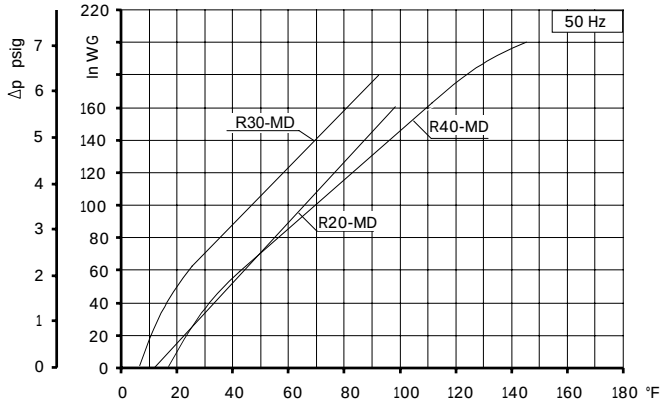
ABSORBED POWER





TEMPERATURE INCREASE





Curves refer to air at 68°F temperature and 29.92 In Hg atmospheric pressure (abs) measured at inlet port.
Values for flow, power consumption and temperature rise: +/-10% tolerance.
Data subject to change without notice.

Visit our website: www.bjmpumps.com

5/7/2007
0812
Supersedes
0811

TECHNICAL DATA
MODEL SV400
BJM SUBMERSIBLE PUMP-CAST IRON

GENERAL DATA

MAX. FLOW: GPM (L/min)	59 GPM (223 L/min)
MAX. HEAD: ft (m)	22' (6.7 m)
MAX. SUBMERSION DEPTH: ft (m)	200' (61 m) or limited to length of power cord
PUMP TYPE	NON CLOG VORTEX
MINIMUM SUBMERSION DEPTH FOR CONTINUOUS DUTY: in (mm)	10.5" (267 mm)
SOLID SIZE: in (mm)	1.5" (38 mm)
IMPELLER DIAMETER: in (mm)	3.21" (81.6 mm)
DISCHARGE SIZE	2" NPT-MALE
SLIDE RAIL SYSTEM	2" DISCHARGE
PUMP WEIGHT, without cable: lbs (kg)	34 lbs (15.5 kg)
SHIPPING WEIGHT: lbs (kg)	40 lbs. (18.2 kg)

CONSTRUCTION/MATERIAL DATA

MECHANICAL SEAL - UPPER	CARBON/CERAMIC
MECHANICAL SEAL - LOWER	SILICON CARBIDE/SILICON CARBIDE
MOTOR HOUSING	304 SS
PUMP VOLUTE	CAST IRON
IMPELLER	VORTEX, CAST IRON
LIP SEALS & O-RINGS	BUNA-N
ROTOR SHAFT	304 SS
EXTERNAL HARDWARE	304 SS
QTY. OIL IN SEAL CHAMBER	1.35 U.S. FL. OZ. (40 C.C.)
BALL BEARING: PERM. LUBE. UPPER	6201
BALL BEARING: PERM. LUBE. LOWER	6201

ELECTRICAL /MOTOR DATA

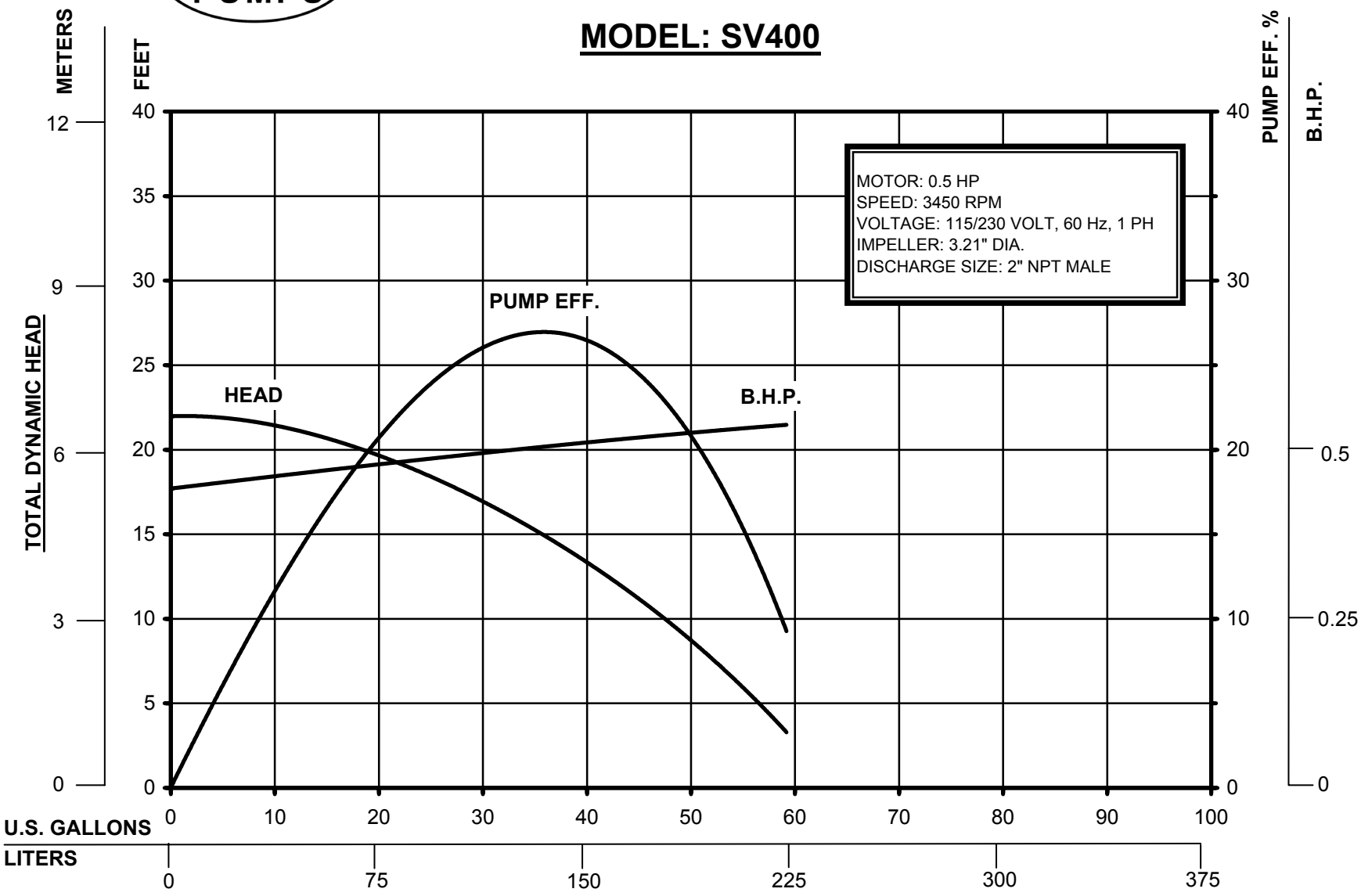
MOTOR: TYPE, RATING HP	SUBMERSIBLE, 0.5	
MOTOR RPM	3450	
MOTOR INSULATION CLASS	F	
MOTOR SERVICE FACTOR	1.1	
VOLTAGE[1] - 1 PH, 60 Hz	115V	230V
CURRENT F.L.A.	7.5	3.8
LOCKED ROTOR CURRENT (LRA)	24	12
MOTOR PROTECTION	THERMAL BREAKER	
POWER CORD: GAGE; LENGTH	A.W.G. 16/3; 33' (10m), STOW	
MAXIMUM LIQUID TEMPERATURE	104°F (40°C)	

1- Available in other voltages (and in 50 Hz).

123 Spencer Plain Road
Old Saybrook, CT. 06475, USA
(860)399-5937 - (877) BJM-PUMP - Fax: (860)399-7784

REFER TO REVERSE SIDE FOR PUMP PERFORMANCE CURVES
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MODEL: SV400



2/17/2006 supersedes priors

FLOW RATE PER MINUTE

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

APPENDIX F:

Groundwater Mounding Calculations

TABLE F-1: Groundwater Mounding Calculations

On-Site Sewage System Design and Water Resource Impact Study - Caledon Service Centre

BVD Holdings Caledon Inc.

Project 22-0162

August, 2022

Inputs:

ho	0.4	m
T	8	min/cm
K	0.864	m/day
t	7,300	days
L	14	m
W	30	m
Q	21	m^3/day
Bed Area	2400	m^2
I	0.008688	m/day
Sy	0.15	

Simplified Hantush Calculation

$$h_a = h_o + Z_m / 2$$

$$Z_m = IC(L/4)^n (1/(Kh_a))^{0.5n} (t/S_y)^{1-0.5n}$$

Constants

(L/W)	C	n
1	3.4179	1.7193
2	2.0748	1.7552
4	1.1348	1.7716
8	0.5922	1.7793

200 Day Estimate of Groundwater Mound

Estimate of Zm (m)	ha (m)	C	n	Zm (m)	Error (%)
0.6	0.70	2.0748	1.7552	0.61	2
0.61	0.70	2.0748	1.7552	0.61	-1
0.61	0.70	2.0748	1.7552	0.61	0
0.61	0.70	2.0748	1.7552	0.61	0
0.61	0.70	2.0748	1.7552	0.61	0

20 Year Estimate of Groundwater Mound

Estimate of Zm (m)	ha (m)	C	n	Zm (m)	Error (%)
1	0.90	2.0748	1.7552	0.76	-24
0.76	0.78	2.0748	1.7552	0.86	13
0.86	0.83	2.0748	1.7552	0.81	-5
0.81	0.81	2.0748	1.7552	0.84	3
0.84	0.82	2.0748	1.7552	0.83	-1