GEOTECHNICAL INVESTIGATION

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
CORK STREET
MOUNT FOREST, ONTARIO

CMT Project 20-202.R01

Prepared for:

Sunvale Homes

July 7, 2020

CMT ENGINEERING INC.

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July 7, 2020 20-202.R01

Sunvale Homes
685 Riddell Road, Unit 106
Orangeville, Ontario
L9W 4Z5

Attention: Mr. John Welton

Dear Sir:

Re: Geotechnical Investigation
Proposed Residential Subdivision
Cork Street
Mount Forest, Ontario

As requested, CMT Engineering Inc. conducted a geotechnical investigation at the above referenced site, and we are pleased to present the enclosed report.

We trust that this information meets your present requirements and we thank you for allowing us to undertake this project. Should you have any questions, please do not hesitate to contact our office.

Yours truly,

Brandon R. Figg, C.Tech.

ks

1cc: Cobide Engineering Inc. - Travis Burnside, P.Eng.

TABLE OF CONTENTS

1.0 INTRODUCTION

The services of CMT Engineering Inc. (CMT Inc.) were retained by Mr. John Welton of Sunvale Homes to conduct a geotechnical investigation for the proposed subdivision to be located at Cork Street in Mount Forest, Ontario. The location of the site is shown on Drawing 1.

It is understood that the project will involve the construction of a new residential subdivision with associated roadways, underground utilities and stormwater management facilities.

The purpose of the geotechnical investigation was to assess the existing soil and groundwater conditions encountered in the boreholes. Included in the assessment are the soil classification and groundwater observations, as well as comments and recommendations regarding geotechnical resistance (bearing capacity); serviceability limit states (anticipated settlement); dewatering considerations; site classification for seismic site response; recommendations for site grading, site servicing, excavations and backfilling; recommendations for slab-on-grade construction; pavement design/drainage; soil design properties; slope stability assessment; and a summary of the laboratory results.

2.0 EXISTING SITE CONDITIONS

The site of the proposed new residential subdivision is located on the west side of Cork Street and north of Martin Street and currently comprises of an agricultural field, a forested area, as well as an area where previous grading work has been undertaken at the southeast corner of the property. The site is bounded by Cork Street to the east, Martin Street to the south, agricultural land and a recreation centre to the north, and forested land to the west.

3.0 FIELD AND LABORATORY PROCEDURES

The field investigation was conducted from June 3, 2020 to June 4, 2020 and comprised the advancement of seven (7) boreholes (referenced as Boreholes 1 to 7), utilizing a Geoprobe 7822DT drillrig operated by employees of CMT Drilling Inc. Boreholes 1 to 4, inclusive, were advanced within the existing agricultural land. Borehole 5 was advanced at the southeast corner of the property in an area that had previously been graded prior to the investigation. Borehole 6 was advanced south of Martin Street, off the existing trail to the west in the area of the proposed stormwater outlet, and Borehole 7 was advanced in a forested area just north of Martin Street in the area of the proposed pump station. Boreholes 1 to 4, inclusive, and Borehole 6 were advanced to approximate depths of 5.18 m (17.0 ft) below the ground surface, Borehole 5 was advanced to an approximate depth of 6.10 m (20.0 ft) below the ground surface, and Borehole 7 was advanced to an approximate depth of 8.23 m (27.0 ft) below the ground surface.

Standard penetration testing and sampling was carried out in all boreholes using 38 mm inside diameter split spoon sampling equipment and an automatic hammer, in accordance with ASTM D 1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". SPT soil sampling was generally conducted at 0.76 m (2.5 ft) intervals to 3.05 m (10.0 ft), and every 1.52 m (5.0 ft) thereafter, to borehole termination. Macro core (MC5) direct push sampling was generally conducted between the SPT soil samples conducted below 3.05 m (10.0 ft) depth. Technical staff from CMT Inc. observed the drilling operation and collected and logged the recovered soil samples. A small portion of each sample was placed in a sealed, marked jar for moisture content determinations.

Representative samples from the boreholes at the following depths were submitted to the CMT Inc. laboratory in St. Clements, Ontario for grain size analyses:

- Borehole 1 - depth 3.05 m to 3.66 m (10.0 ft to 12.0 ft)
- Borehole 5 - depth 3.66 m to 4.57 m (12.0 ft to 15.0 ft)
- Borehole 5 - depth 5.18 m to 6.10 m (17.0 ft to 20.0 ft)
- Borehole 7 - depth 3.05 m to 3.66 m (10.0 ft to 12.0 ft)

The borehole logs are provided in Appendix A and the resulting grain size analyses can be found in Appendix B.

The ground surface elevations of the boreholes were surveyed by CMT Inc. personnel, using laser survey equipment, following the completion of drilling. An existing sanitary manhole located on Martin Street south of the proposed Lots 41 and 42 was utilized as a benchmark, with a reported geodetic elevation of 410.58 m. The ground surface elevations at the boreholes ranged from approximately 406.76 m to 412.06 m. The locations of the boreholes and the temporary benchmark are shown on Drawing 2.

4.0 SUBSOIL CONDITIONS

The following paragraphs have been simplified in terms of major soil strata for the purposes of geotechnical design. The soil boundaries indicated have been inferred from non-continuous samples and observations of sampling and drilling resistance, and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions are anticipated to vary between and beyond the borehole locations.

The soils encountered in the boreholes are described briefly below and a more detailed stratigraphic description is provided on the borehole logs in Appendix A.

4.1. Topsoil/Buried Topsoil

Dark brown to black, silty, organic topsoil was encountered at the surface of all boreholes completed as part of this investigation. Buried topsoil was encountered below the sand and gravel and silty sand fill soils at Boreholes 5 and 6. The topsoil was considered to be very loose to loose, with SPT N-values ranging from 3 to 9 blows per 0.30 m (average 6 blows per 0.30 m). The topsoil was considered to be moist, with moisture contents ranging from about 11.6% to 24.6% (average 18.1%). The thickness of the topsoil was observed to range from about 100 mm to 1250 mm (average 430 mm) at the borehole locations. The thickness of the topsoil is anticipated to vary outside of the borehole locations. Materials noted as topsoil in this report were classified based on visual and textural evidence. Testing of organic content or for other nutrients was not carried out.

4.2. Sand and Gravel Fill/Silty Sand Fill

Brown sand and gravel fill and/or silty sand fill was encountered underlying the topsoil in Boreholes 5 and 6. The fill soils were considered to be compact, with SPT N-values ranging from 10 to 27 blows per 0.30 m (average 19 blows per 0.30 m). The fill soils were considered to be moist to wet, with moisture contents ranging from about 6.8% to 22.7% (average 14.8%). The fill ranged in thickness from 200 mm to 1090 mm (average 642 mm) at the borehole locations.

4.3. Sandy Silt

Brown, sandy silt with some gravel and clay was encountered underlying the topsoil in Boreholes 1, 2, 3, 4 and 7, underlying the gravel and sand in Borehole 2, underlying the buried topsoil in Borehole 5, as well as underlying the silty sand fill in Borehole 6. The sandy silt was considered to be very loose to compact, with SPT N-values ranging from 2 to 23 blows per 0.30 m (average 13 blows per 0.30 m). The sandy silt was considered to be moist to saturated, with moisture contents ranging from about 9.6% to 28.2% (average 18.9%).

4.4. Gravel and Sand

Brown gravel and sand, with trace silt and clay was encountered within the sandy silt in Borehole 2 and underlying the silty sand in Boreholes 3 and 7. The gravel and sand was considered to be compact to very dense, with SPT N-values ranging from 14 to 58 blows per 0.30 m (average 36 blows per 0.30 m). The gravel and sand was considered to be moist to saturated, with moisture contents ranging from about 6.4% to 20.7% (average 13.6%).

4.5. Sandy Silt Till

Brown to grey sandy silt till with some gravel and clay was encountered underlying the sandy silt in Borehole 1, as well as underlying the gravel and sand in Boreholes 3 and 7. The sandy silt was considered to be dense, with SPT N-values ranging from 31 to 40 blows per 0.30 m (average 36 blows per 0.30 m). The sandy silt till was considered to be moist to saturated, with moisture contents ranging from about 9.3% to 17.3% (average 13.3%).

4.6. Clayey Sandy Silt Till

Grey clayey sandy silt till, with trace gravel was encountered underlying the sandy silt till in Boreholes 1, 3 and 7, and underlying the sandy silt in Boreholes 5 and 6. The clayey sandy silt till was considered to be stiff to hard, with SPT N-values ranging from 15 to 38 blows per 0.30 m (average 27 blows per 0.30 m). The clayey sandy silt till was considered to be moist to saturated, with moisture contents ranging from about 11.7% to 30.3% (average 21.0%).

4.7. Groundwater

38 mm monitoring wells were installed in all boreholes as part of this investigation. The following table summarizes the borehole number, ground surface elevation, elevation of water level in the monitoring well, elevation of the wet to saturated soils, and the bottom of borehole elevation for each borehole:

Borehole No.	Ground Surface Elevation (m)	Approximate Elevation of Water in Monitoring Well (m) (Depth)	Approximate Elevation of Wet to Saturated Soils (m) (Depth)	Bottom of Borehole Elevation (m) (Depth)
BH1	411.05	410.13 (0.92)	410.29 to 402.82 (0.76 to 8.23) (termination)	405.87 (5.18)
BH2	407.75	405.27 (2.48)	406.99 to 402.57 (0.76 to 5.18) (termination)	402.57 (5.18)
BH3	408.96	407.75 (1.21)	408.20 to 404.39 (0.76 to 4.57)	403.78 (5.18)

Borehole No.	Ground Surface Elevation (m)	Approximate Elevation of Water in Monitoring Well (m) (Depth)	Approximate Elevation of Wet to Saturated Soils (m) (Depth)	Bottom of Borehole Elevation (m) (Depth)
BH4	409.39	407.79 (1.60)	408.63 to 406.34 (0.76 to 3.05)	404.21 (5.18)
BH5	412.06	409.62 (2.44)	410.26 to 405.96 (termination) (1.52to 6.10)	405.96 (6.10)
BH6	406.76	405.81 (0.95)	405.24 to 401.58 (termination) (1.52 to 5.18)	401.58 (5.18)
BH7	409.37	407.72 (1.65)	408.61 to 401.14 (0.76 to 8.23) (termination)	401.14 (8.23)

The relatively stiff and fine-grained clayey sandy silt till, as well as the sandy silt soils, have the potential to create perched water conditions in the overlying soils. It should be noted that some of the native soils had relatively high moisture contents and there is a potential for these soils to exhibit rapid dilatancy, seepage and sloughing of excavation walls during construction. Groundwater conditions (particularly perched water) are generally dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume.

Recommendations with respect to dewatering conditions are provided in Section 5.8 of this report.

4.8. Stormwater Discharge

It is understood that the storm sewer will outlet at the river shore. At this time, the proposed outlet design is unknown. In order to minimize the risk of erosion, installation of a drop structure could be utilized; however, this would require excavation and disturbance of the existing slope.

If the storm sewer will outlet over the bank, adequate protection against erosion must be provided. This can be achieved through the installation of a heavy geotextile filter fabric (such as Nilex 4553 or approved equivalent) and rip-rap. Geotextiles must be installed with sufficient overlap in the direction of flow to prevent erosion. Rip-rap must meet the physical property and gradation requirements of OPSS 1004. Installation of rip-rap should be in conformance with OPSS 511 as well as OPSD 810.010.

There are also other new products available that are designed to prevent erosion. As such, it may be advantageous to consult with a specialist in the slope stabilization field such as Tensar, Terrafix or Maccaferri.

5.0 DISCUSSION AND RECOMMENDATIONS

This section of the report provides CMT Inc.'s interpretation of the factual geotechnical data obtained during the investigation and is intended for the guidance of the owner and design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own independent interpretation of the factual subsurface information provided as it affects their proposed construction means and methods, equipment selection, scheduling, pricing, and the like.

It is understood that the project will involve the construction of a new residential subdivision with associated roadways, underground utilities and stormwater management facilities.

Utilizing the information gathered during the geotechnical investigation and assuming that the borehole information is representative of the subsoil conditions throughout the site, the following comments and recommendations are provided.

5.1. Serviceability and Ultimate Limit Pressure

Based on the information obtained from the boreholes, the following table provides a summary of the estimated geotechnical reaction at the Serviceability Limit State (SLS) and the factored geotechnical resistance at the Ultimate Limit State (ULS) at the various elevations, including soil type:

BH No.	Ground Surface Elevation (m)	SLS kPa (psf)	ULS kPa (psf)	Estimated Highest Founding Elevations (m)	Depth Below Existing Grade to Founding Elevation (m)	Soil Type
BH1	411.05	150 (3,000) 250 (5,000)	225 (4,500) 375 (7,500)	410.29 to 408.76 408.76 to 402.82 (termination)	0.76 2.29	Sandy Silt, Sandy Silt Till
BH2	407.75	150 (3,000)	225 (4,500)	406.23 to 402.57 (termination)	1.52	Sandy Silt, Gravel and Sand
BH3	408.96	150 (3,000) 250 (5,000)	225 (4,500) 375 (7,500)	407.44 to 404.77 404.77 to 403.78 (termination)	1.52 4.19	Sandy Silt, Gravel and Sand, Till

BH No.	Ground Surface Elevation (m)	SLS kPa (psf)	ULS kPa (psf)	Estimated Highest Founding Elevations (m)	Depth Below Existing Grade to Founding Elevation (m)	Soil Type
BH4	409.39	150 (3,000)	225 (4,500)	407.10 to 404.21 (termination)	2.29	Sandy Silt
BH5	412.06	150 (3,000) 250 (5,000)	225 (4,500) 375 (7,500)	409.01 to 407.49 407.49 to 405.96 (termination)	3.05 4.57	Sandy Silt, Till
BH6	406.76	150 (3,000) 250 (5,000)	225 (4,500) 375 (7,500)	405.24 to 403.71 403.71 to 401.58 (termination)	1.52 3.05	Sandy Silt, Till
BH7	409.37	150 (3,000) 250 (5,000)	225 (4,500) 375 (7,500)	407.85 to 404.80 404.80 to 401.14 (termination)	1.52 4.57	Sandy Silt, Gravel and Sand, Till

Based on the bearing capacities and elevations provided in the table above, suitable founding elevations for conventional foundations designed with an estimated bearing capacity of 150 kPa (3,000 psf) at SLS and 225 kPa (4,500 psf) at ULS range throughout the site, however suitable founding soils are typically found below the existing topsoil, fill soils, as well as loose/soft upper native soils.

Should footings be designed to be constructed at elevations higher than the elevations indicated in the table above, then structural fill will be required in order to achieve the design grades for the proposed foundations. The serviceability limit pressure for good quality granular structural fill placed and compacted in accordance with Section 5.4.4 of this report and constructed on approved competent native soil is estimated to be at least 150 kPa (3,000 psf) at SLS and 225 kPa (4,500 psf) at ULS. Alternatively, lean mix concrete fill could be utilized for this application.

Alternatively, footings could be stepped down to bear on approved undisturbed founding soils. Due to the presence of fill soils, it is imperative that the founding soils be assessed at the time of construction by qualified geotechnical personnel in order to confirm their founding suitability.

Footings founded on soil may be placed at a higher elevation relative to another footing provided that the slope between the outside face of the footings are separated by a minimum slope of 10 horizontal to 7 vertical (10H:7V) with an imaginary line projected from the underside of the footings.

It is recommended that structural foundation drawings be cross-referenced with site servicing drawings to ensure that service pipes do not conflict with building foundations (including the zone of influence down and away from the footings).With respect to the

Serviceability Limit State (SLS), the total and differential footing settlements are not expected to exceed the generally acceptable limits of 25 mm (1") and 19 mm (3/4") respectively.

All exterior footings must be provided with a minimum of 1.4 m of soil cover or equivalent thermal insulation in order to provide protection against frost action.

It should be noted that the native soils that exist at or below founding elevations may be in a wet/saturated state and may be too wet to provide suitable bearing for foundations without drainage or construction of a mud mat or granular drainage layer. It is imperative that the subgrade soils be inspected and approved by competent geotechnical personnel to ensure that the founding soils are suitable for bearing. Dewatering during construction may be required (see Section 5.8 of this report), along with the potential construction of a mud mat or granular drainage layer.

CMT Inc. would be pleased to review design drawings when they become available and provide further recommendations with respect to bearing and foundation elevations.

5.2. Seismic Site Classification

The site classification for seismic response in Table 4.1.8.4 of the 2012 Ontario Building Code relates to the average properties of the upper 30 m of strata. The information obtained in the geotechnical field investigation was gathered from the upper 5.18 m to 8.23 m of strata. Based on the information gathered in the geotechnical field investigation, the site classification for seismic site response would be considered Site Class D (stiff soils) for structures founded on the native soils or structural fill at the recommended founding elevations provided in Section 5.1 of this report. The structural engineer responsible for the design of the structure should review the earthquake loads and effects.

5.3. Soil Design Parameters

The following table provides estimated soil design parameters for imported granular fill, as well as the existing native soils encountered on-site. It should be noted that earth pressure coefficients (Ka, Kp, Ko) provided are for flat ground surface conditions and will differ for areas with slopes or embankments.

The estimated soil design parameters can be utilized for the design of perimeter shoring, foundations and retaining walls, as required.

Soil Type	Soil Density (kg/m^3)	Friction Angle (Degree)	Coefficient of Active Pressure (K_a)	Coefficient of Passive Pressure (K_p)	Coefficient of At-Rest Pressure (K_o)	Coefficient of Friction (μ)	Cohesion (Undrained) (kPa)
Imported Granular 'A'/ Granular 'B' (OPSS 1010)	2,100	34	0.28	3.54	0.44	0.45	0
Existing Fill	1,800	28	0.36	2.77	0.53	0.35	0
Sandy Silt	1,750	30	0.33	3.00	0.50	0.38	0
Gravel and Sand	1,900	34	0.28	3.54	0.44	0.45	0
Sandy Silt Till	1,800	32	0.31	3.25	0.47	0.41	0
Clayey Sandy Silt Till	1,800	32	0.31	3.25	0.47	0.41	0

5.4. Site Preparation

The site preparation for the proposed new residential subdivision is anticipated to include the removal of topsoil and vegetation, the subexcavation of all unsuitable fill and any native soils deemed not capable of supporting the design bearing capacity, removal or relocation of any existing services, followed by the placement of structural fill (as required) and site grading to achieve proposed grades.

5.4.1. Topsoil Stripping/Vegetation Removal

All existing topsoil, vegetation and trees (including tree root structures as well as any loose soils that are typically associated with root structures) must be removed from within the proposed building and driveway envelopes to expose approved competent subgrade soils. The topsoil may be used in landscaped areas where some settlement can be tolerated; otherwise, it should be properly disposed of off-site. It would also be sound construction practice to subexcavate all existing buried topsoil from the paved roadway and driveway areas; however, this may not be cost-effective. If the existing buried topsoil is left in place, provisions for the alterations to the design of the pavement structure should be included in the

tender documents. Review of the subgrade and potential changes to the design of the pavement structure, as required, will be addressed at the time of construction.

The volume of topsoil removed during the stripping process can be influenced by the equipment utilized for the stripping process as well as the moisture conditions at the time of stripping. If an excavator with a smooth bucket is utilized for stripping, there would generally be less potential for topsoil to become intermixed with the underlying, generally loose/soft subsoil and therefore less concern of over-excavation to remove all topsoil. If the topsoil is stripped with wheeled equipment or bulldozers, then there is an increased potential for the topsoil and subsoil to become intermixed, subsequently requiring additional excavation to remove all topsoil. This is further influenced by rutting which can occur during wet conditions.

5.4.2. Fill/Unsuitable Soil Removal

All existing fill, as well as any native soil that has inadequate bearing capacity or has been disturbed by construction processes and is deemed unsuitable to support foundations or slab-on-grades, must be subexcavated from within the proposed building envelopes to expose approved competent subgrade soils. It would also be sound construction practice to subexcavate all existing unsuitable fill from the paved roadway and driveway areas; however, this may not be cost-effective. At a minimum, thorough inspection will be required at the time of construction to assess the existing fill to ensure there is no buried topsoil or other deleterious materials within the prepared subgrade. Remedial action will also be required to further consolidate the existing fill if it is decided to leave it in place. If the existing fill is left in place, provisions for the alterations to the design of the pavement structure should be included in the tender documents. Review of the subgrade and potential changes to the design of the pavement structure, as required, will be addressed at the time of construction.

Prior to reusing excavated material on-site as potential bulk fill in the driveways, thorough field inspection and approval by qualified geotechnical personnel would be required to ensure that existing fill materials do not comprise organics, topsoil or other deleterious materials.

5.4.3. Removal/Relocation of Existing Buried Piping

Any existing tile drains (field tiles or municipal tile drains) that may be located within the proposed building and driveway envelopes must be completely removed to a minimum distance of 15.0 m (50.0 ft) outside of the construction envelopes. All drains that are terminated must be completely sealed with concrete or grout at termination points to prevent the migration of soils into pipe voids

which may result in potential settlement. Ideally, depending on flow direction, any existing tile drains (if present) should be redirected and reconnected outside of the building envelopes in order to maintain flow and prevent subsurface accumulation of water. It may be prudent (if feasible) to incorporate existing field tiles into the storm sewer system or a separate collection system, to assist in systematically draining the subsurface soils of the subdivision. All existing trench backfill material associated with the drains must be subexcavated and the subsequent excavation must be backfilled with approved soils placed in accordance with Section 5.4.4 of this report. The location of existing field tiles is commonly identified by lines of buried topsoil within the subgrade soils and/or water seeping up out of the ground following excavation. The field tiles are historically installed at 15.0 m (50.0 ft) intervals, however, this can vary from site to site.

5.4.4. Site Grading

Following removal of the topsoil, vegetation, as well as the subexcavation of the relatively loose fill and any native soils deemed unsuitable of supporting the design bearing capacity, the exposed subgrade must be proof-rolled, and any soft or unstable areas must be subexcavated and replaced with approved fill materials.

Any fill materials required to achieve the design grades should be placed according to the following procedures:

- Should the native subgrade soils at the design founding elevation in the proposed building envelope(s) comprise of wet or saturated soils, then a granular drainage layer constructed in accordance with Section 9.14.4 of the current Ontario Building Code (OBC) may be required. Alternatively, a lean mix concrete mud mat may be placed overlying the subgrade soils to provide a stable base;

- Prior to placement of any structural fill or bulk fill, the subgrade for the proposed building addition and driveways must be prepared large enough to accommodate a 1:1 slope commencing a distance of 1.0 m beyond the outside edge of the proposed foundation and pavement edge (where feasible) to the approved competent founding soils;

- Soils approved for use as structural fill must be placed in loose lifts not exceeding 0.3 m (12") in depth for granular soils (recommended fill material) and 0.2 m (8") in depth for silts and clays (not recommended for this application), or the capacity of the compactor (whichever is less);

- Imported granular fill materials (OPSS 1010 Type III Granular 'B' recommended for this application) can be compacted utilizing adequate heavy vibratory smooth drum compaction equipment;

- Fine-grained silt and clay soils (not recommended) must be compacted utilizing adequate heavy padfoot vibratory compaction equipment;

- Approved fill materials must be at suitable moisture contents to achieve the specified compaction. The wet to saturated soils encountered in the boreholes would generally be considered difficult for use as structural fill as they would require extensive air-drying in order to achieve the specified density. Soil moisture will also be dependent on weather conditions at the time of construction. Granular soils may require the addition of water in order to achieve the specified compaction;

- Approved structural fill materials that will support structures (including foundations, interior slab-on-grades, sidewalks and large expansive exterior slabs) must be compacted to 100% standard Proctor maximum dry density (SPMDD). The native clayey sandy silt/clayey silt/clayey silt and sand soils are not recommended for use as structural fill as they can be subject to excess void space and potential settlement if not properly placed and compacted;

- Approved bulk fill (foundation wall backfill, bulk fill under slab-on-grades that will not support footings or heavy point loading, bulk fill for driveways) must be compacted to a minimum 98% SPMDD. It would be expected that the native sandy silt soils would be suitable for use as bulk fill; however, depending on the time of year and weather conditions when construction takes place, soils excavated at depth may require air-drying in order to achieve the specified density;

- Granular 'B' subbase and Granular 'A' base materials for the paved parking areas must be compacted to 100% SPMDD.

Based on the subsurface conditions observed in the boreholes, wet to saturated soils will likely be encountered, depending on the depth of excavation, location and time of year. As such, for soils excavated from within the zone of saturation, significant air-drying along with working of the soils may be required in order to achieve the specified compaction. Utilizing the existing soils during site grading may be more achievable if work is completed during the generally drier summer months. It should be noted, however, that due to the nature of some of the soils, during hot dry weather, the addition of water might be required in order to achieve the specified compaction. Reuse of excavated soils on-site will be subject to approval from qualified geotechnical personnel.

It should also be noted that the native soils encountered in the boreholes were observed to become very dense/hard with depth (SPT N-values in excess of 50 blows per 0.30 m) and may prove difficult to excavate with conventional excavating equipment. It is imperative that should the very dense/hard soils be utilized as fill, that the material must be broken down (pulverized) to minimize void space and reduce the potential for settlement. Problems associated with compacting very dense/hard soils include the potential for long-term settlement due to excessive void space caused by the generally blocky structure of the excavated soils. As such, the very dense, blocky material must **not** be used as structural fill. The contractor must have equipment on-site that can effectively break down (pulverize) the very dense excavated soil into workable sizes (as required). Backfilling utilizing this material must be performed in thin lifts with considerable compactive effort applied, thereby reducing the void space and minimizing long-term settlement. This process could be difficult and time-consuming.

5.5. Foundation Subgrade Preparation

The native soils encountered in the boreholes are sensitive to change in moisture content and can become loose/soft if the soils are subjected to additional water or precipitation, as well as severe drying conditions. The native subgrade soils could also be easily disturbed if traveled on during construction. Once they become disturbed, they are no longer considered adequate for the support of shallow foundations. As noted above, the native soils that exist at potential founding elevations may be in a wet/saturated state and may be too wet to provide suitable bearing for foundations without drainage or construction of a mud mat or granular drainage layer. It is imperative that the subgrade soils be inspected and approved by competent geotechnical personnel to ensure that the founding soils are suitable for bearing. Dewatering during construction may be required (see Section 5.8 of this report), along with the potential construction of a mud mat or granular drainage layer.

To ensure and protect the integrity of the founding soils during construction operations, the following is recommended:

- During construction, the subgrade should be sloped to a sump (as required) located outside the building footprints (if feasible) in the excavation to promote surface drainage of rainwater or seepage and the collected water should be pumped out of the excavations. It is critical that all water be controlled (not allowed to pond) and that the subgrade and foundation preparations commence in dry conditions;

- Should the native subgrade soils at the design founding elevation in the proposed building envelopes comprise saturated soils, then a granular drainage layer, constructed in accordance with Section 9.14.4 of the current Ontario Building Code (OBC) may be required;

- Construction equipment travel and foot traffic on the founding soils should be minimized;

- If construction is to be undertaken during subzero weather conditions, the founding native soils and any potential fill materials must be maintained above freezing;

- Prior to pouring concrete for the foundations, the founding soils must be cleaned of all disturbed or caved materials;

- The foundation formwork and concrete should be installed as soon as practical following the excavation, inspection and approval of the founding soils. The longer that the excavated soils remain open to weather conditions and groundwater seepage, the greater the potential for construction problems to occur;

- If it is expected that the founding soils will be left open to exposure for an extended period of time, it is recommended that a 75 mm concrete mud slab be poured in order to protect the structural integrity of the founding soils.

5.6. Slab-on-Grade/Modulus of Subgrade Reaction

Prior to the placement of the granular base for any slab-on-grade construction, the subgrade soils should be proof-rolled. Any soft or weak zones, as well as the unsuitable fill in the subgrade, should be subexcavated and backfilled with approved fill materials (see Sections 5.4.4 and 5.10 of this report).

The following table provides the estimated modulus of subgrade reaction (k) for imported granular fill, as well as the native soils encountered on-site:

Soil Type	Estimated Modulus of Subgrade Reaction (k)
Imported Sand and Gravel (OPSS 1010)	81,000 kN/m^3 (300 lb/in^3)
Sandy Silt	41,000 kN/m^3 (150 lb/in^3)
Gravel and Sand	68,000 kN/m^3 (250 lb/in^3)
Sandy Silt Till	54,000 kN/m^3 (200 lb/in^3)
Clayey Sandy Silt Till	27,000 kN/m^3 (100 lb/in^3)

In dry conditions, floor slabs can be founded on a minimum thickness of 150 mm (6") of Granular 'A' (OPSS 1010) and compacted to 100% SPMDD. Alternatively, (particularly in wet conditions), 150 mm (6") of 19 mm clear crushed stone (OPSS 1004) should be used instead of Granular 'A'. Utilizing 19 mm clear crushed stone for the slab-on-grade base can assist in providing a moisture barrier by reducing the potential for capillary rise of moisture from the subgrade soils. Compactive effort is required to consolidate the clear stone. The 19 mm clear crushed stone should meet the physical property and gradation requirements of OPSS 1004.

It is recommended that areas of extensive exterior slab-on-grade (sidewalks and accessibility ramps) be constructed with a Granular 'B' subbase (450 mm) and a Granular 'A' base (150 mm), as well as incorporating subdrains, to promote rapid drainage and reduce the effects of frost heaving. This is particularly critical at barrier-free access points. Alternatively, structural frost slabs could be designed and constructed, or sufficient thermal insulation could be provided, at all door entrances and areas of barrier-free access.

5.7. Excavations

All excavations must be carried out in accordance with Ontario Regulation 213/91 (Reg 213/91) of the Occupational Health and Safety Act and Regulations for Construction Projects.

Type 2 Soils - In general, the native sandy silt, sandy silt till and clayey sandy silt till soils encountered in the boreholes, in a drained state (not saturated), would be classified as Type 2 soils under Reg 213/91. Type 2 soils must be sloped from within 1.2 m of the bottom of the excavation at a minimum gradient of 1 horizontal to 1 vertical. Soils underlain by Type 3 or Type 4 soils that are exposed in the excavation must be treated accordingly as Type 3 or Type 4 soils (see below). Soils in a saturated condition (if encountered) must be treated as Type 4 soils, addressed below.

Type 3 Soils - In general, the existing fill materials (backfill of existing foundations and services) as well as the native gravel and sand in a drained state (not saturated), would be classified as Type 3 soils under Reg 213/91. The Type 3 soils must be sloped from the bottom of the excavation at a minimum gradient of 1 horizontal to 1 vertical. Soils underlain by Type 4 soils that are exposed in the excavation must be treated accordingly as Type 4 soils (see below). All saturated soils encountered must be treated as Type 4 soils, as described below.

Type 4 Soils - In general, any wet to saturated soils would be classified as Type 4 soils under Reg 213/91. Type 4 soils must be sloped from the bottom of the excavation at a minimum gradient of 3 horizontal to 1 vertical.

If it is not practical to excavate according to the above requirements, then a trench support system (designed in accordance with the Ontario Health and Safety Act Regulations) may be utilized. When using a temporary trench support system consisting of trench boxes to reduce the lateral extent of the excavations, it should be noted that the support system is intended primarily to protect workers as opposed to controlling lateral soil movement. Any voids between the excavation walls and the support system should be immediately filled to reduce the potential for loss of ground and to provide support to existing adjacent utilities and roadways, and it is recommended that the excavation be carried out in short sections, with the support system installed immediately upon excavation completion.

5.8. Construction Dewatering Considerations

Wet to saturated soils, as well as accumulated groundwater was observed in the boreholes conducted as part of this investigation. It should also be noted that the relatively fine-grained sandy silt till and/or clayey silt till soil typically encountered in the lower zone of the boreholes may have the potential to create perched water conditions. As such, it is critical that provisions for site dewatering be part of the site development and construction process.

Seepage control requirements and groundwater conditions during construction are generally dependent on the amount of precipitation, control of surface water, the time of year, the area of work on the site, and the depth of the excavations, and can fluctuate significantly in elevation and volume. As required, seepage should generally be adequately controlled using conventional construction dewatering techniques such as pumping from properly filtered sump pits. However, if heavy seepage occurs, it may be necessary to increase the number of pumps during construction. Some seepage and sloughing should be expected from the wet to saturated layers of buried topsoil, existing fill and sandy silt soils.

Dewatering should be performed in accordance with OPSS 517 and the control of water must be in accordance with OPSS 518. It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. Collected water should discharge a sufficient distance away from the excavation to prevent re-entry. Sediment control measures must be installed at the discharge point of the dewatering system to avoid any potential adverse impacts on the environment.

5.9. Service Pipe Bedding

The native soils encountered in the geotechnical investigation are generally considered suitable for indirect support of the site service pipes. Should instability due to saturated soil conditions be encountered, it may be necessary to increase the thickness of the

granular base and utilize 19 mm clear stone to create an adequate supporting base for the service pipes and/or manholes. Due to the wet to saturated conditions encountered in the boreholes, it would be recommended to backfill all sections of buried piping as soon as possible to prevent uplift. Pipe embedment, cover and backfill for both flexible and rigid pipes should be in accordance with all current and applicable OPSD, OPSS and OBC standards and guidelines and as follows:

Flexible Pipes – The pipe bedding should be shaped to receive the bottom of the pipe. If necessary, pipe culvert frost treatment should be undertaken in accordance with OPSD-803.031. The trench excavations should be symmetrical with respect to the centre-line of the pipe. The granular material placed under the haunches of the pipe must be compacted to 100% SPMDD prior to the continued placement and compaction of the embedment material. The homogeneous granular material used for embedment should be placed and compacted uniformly around the pipe. Should wet conditions be encountered at the base of the trench, then the pipe bedding should consist of 19 mm clear stone (meeting OPS Specifications) wrapped completely in a geotextile fabric such as Terrafix 270 or equivalent. The general contractor is responsible to protect service piping from damage by heavy equipment.

Rigid Pipes - In general, the pipe installation recommendations for rigid pipes are the same as those for flexible pipes, except that the minimum bedding depth below a rigid pipe should be $0.15D$ (where D is the pipe diameter). In no case should this dimension be less than 150 mm or greater than 300 mm.

5.10. Perimeter Building Drainage, Foundation Wall Backfill and Trench Backfill

In order to assist in maintaining a dry building with respect to surface water seepage, it is recommended that exterior grades around the buildings be sloped down and away at a 2% gradient or more, for a distance of at least 1.5 m to 2.0 m (depending on side yard setbacks). Any surface discharge rainwater leaders must be constructed with solid piping that discharges with positive drainage at least 1.5 m away from the building foundations and/or beyond sidewalks to a drainage swale or appropriate storm drainage system.

The founding elevations for the proposed structures were not available at the time of preparation of this report. CMT Inc. can provide further recommendations for building drainage once the design drawings are completed and the founding elevations have been confirmed.

It should be noted that based on the observations in the boreholes, there is potential for perched water conditions. The construction of foundations, slabs-on-grade, and deep structures such as sump pits within or below zones of saturation will require design of site-specific waterproofing and dewatering systems constructed in accordance with the 2012 OBC. It is recommended that a good quality sump pump be utilized, and that the

system be equipped with a battery backup in the event of power failure, (keeping in mind that a battery backup system does not typically have a long run time).

If it is expected that the new residences will have basements, an exterior perimeter drainage system comprising perforated drainage pipe with a factory installed filter sock, bedded in 19 mm clear crushed stone (OPSS 1004) and wrapped in a geotextile filter fabric such as Terrafix 270R (or equivalent) must be installed at an elevation that is below the proposed slab-on-grade elevation and provided with positive drainage into a sump pit. The portion of the piping that connects the exterior weeping tile system into the sump pit must comprise solid piping to prevent exterior water from being introduced into the interior subslab stone. It may be prudent to install perforated drainage pipe on the interior as well to provide an outlet for any water that may collect in the subslab stone (particularly during the construction phase of the project). It is also recommended that a capped cleanout port(s) be extended up to the ground surface elevation to provide future access (if required). The rainwater leaders must not be connected to the perimeter weeping tile system. Foundation wall and slab-on-grade dampproofing and/or waterproofing must conform to current OBC regulations. If required, it would be recommended that a waterproofing supplier/specialist be consulted to recommend an appropriate product and installation requirements that would be suited to this site.

Depending on the groundwater conditions at the design founding elevations, it may be necessary to install a granular drainage layer to provide a suitable base for the foundations. This will depend on the bearing capacity required for the founding strata. If required, the granular drainage layer must conform to the requirements listed in Section 9.14.4 of the OBC 2012.

In order to reduce the effects of surficial frost heave in areas that will be hard surfaced, it is recommended that the exterior foundation backfill consist of free-draining granular material such as approved on-site sand or sand and gravel or imported Granular 'B' Type I or Type III (OPSS 1010), with a maximum aggregate size not exceeding 100 mm, and that it extend a minimum lateral distance of 600 mm out from the foundation walls and/or beyond perimeter sidewalks and entranceway slabs. It is critical that particles greater than 100 mm in diameter are not in contact with the foundation wall to prevent point loading and overstressing. The backfill material used against the foundation walls must be placed so that the allowable lateral capacities of the foundation walls are not exceeded. Where only one side of a foundation wall will be backfilled, and the height of the wall is such that lateral support is required, or where the concrete strength has not been achieved, the wall must be braced or laterally supported prior to backfilling. In situations where both sides of the wall are backfilled, the backfill should be placed in equal lifts, not exceeding 200 mm differential on each side during backfill operations and the backfill should be compacted to a minimum of 100% SPMDD.

The native mineral soils, as well as approved fill materials (non-organic) are generally considered suitable for reuse as trench backfill and bulk fill in the driveways; however, any wet soils encountered may require air-drying in order to achieve the specified

compaction. Air-drying cannot typically be achieved during winter construction; therefore, depending on the time of year that construction takes place, it may be more feasible to utilize an imported granular fill for this project.

Backfilling operations should be carried out with the following minimum requirements:

- Adequate heavy smooth drum or padfoot vibratory compaction equipment should be used for the compaction and to break down any large blocky pieces of soil;
- Loose lift thicknesses should not exceed 0.3 m (12") for granular soils or 0.2 m (8") for silt soils or the capacity of the compactor (whichever is less);
- The soils must be at suitable moisture contents to achieve compaction to a minimum 95% SPMDD in non-structural bulk fill areas. Service trenches excavated within the zone of influence of footings for structures must be compacted to a minimum of 100% SPMDD;
- It is recommended that inspection and testing be carried out during construction to confirm backfill quality, thickness and to ensure that compaction requirements are achieved;
- Service trench backfill materials may consist of approved excavated soils with no particles greater than 100 mm and no topsoil or other deleterious materials;
- If construction operations are undertaken in the winter, strict consideration should be given to the condition of the backfill material to make certain that frozen material is not used.

5.11. Pavement Design/Drainage

All existing topsoil (including buried topsoil), vegetation (including tree root structures as well as any loose soils that are typically associated with root structures), fill, and any soils containing organics or other deleterious material, must be stripped/subexcavated from within the driveways and any other paved areas. It is recommended to either subexcavate any existing loose subgrade materials or provide further consolidation with vibratory compaction equipment in order to prepare a proper, stable subgrade. As noted above, it would also be sound construction practice to subexcavate all existing buried topsoil from the paved roadway and driveway areas. If the existing buried topsoil is left in place, provisions for the alterations to the design of the pavement structure should be included in the tender documents. Review of the subgrade and potential changes to the design of the pavement structure, as required, will be addressed at the time of construction.

Prior to placement of the new granular base, the subgrade must be proof-rolled, and any soft or unstable areas should be subexcavated and replaced with suitable drier materials. The subgrade should be graded smooth (free of depressions) and properly crowned to ensure positive drainage, with a minimum grade of 3% toward the drainage outlet or curb line. When service pipes are installed, pipe bedding and backfilling should be undertaken as indicated in Sections 5.9 and 5.10 of this report.

Rapid drainage of the pavement structure is critical to ensure long-term performance and to help minimize frost heave. The requirement for subdrains will be dependent on the composition of the prepared roadway subgrade soils. Should the subgrade soils comprise fine-grained, frost-susceptible soils, then it is recommended to install subdrains, provided gravity drainage to a suitable outlet can be provided. It is recommended to install minimum 100 mm diameter perforated subdrains to collect and redirect water beneath the pavement surface. Subdrains should be designed and installed in accordance with OPSS 405 and OPSD 216.021. If Granular 'A' bedding (OPSS 1010) is utilized, the subdrains should be equipped with a factory installed filter sock. If 19 mm clear stone (OPSS 1004) is utilized as bedding for the subdrain, then the bedding must be wrapped completely with geotextile filter fabric such as Terrafix 270R (or equivalent) and a factory installed filter sock is not required. Installation of rigid subdrains allows for better grade control and less potential for damage during installation; however, it would be expected that there would be higher cost implications associated with the installation of rigid subdrains over flexible subdrains. Positive drainage through grade control of subdrains is critical, as improperly installed subdrains can turn drainage systems into reservoirs, which can fuel frost action. The subdrains will hasten the removal of water, thereby reducing the risk and effects of frost heaving and load transfer in saturated conditions. It is suggested that, at a minimum, subdrains be installed through all low areas of the parking lot and ideally along the edge of the pavement as well to prevent water from entering the subbase. The subdrains should be installed in a 0.3 m (1.0 ft) by 0.3 m (1.0 ft) trench in the subgrade and bedded approximately 50 mm (2") above the bottom of the trench. The subgrade must be prepared with positive drainage to the subdrains and the subdrains must be installed with positive drainage into a catch basin structure or other suitable outlet.

Should the subgrade comprise free-draining granular soils (minimum 1.0 m thick with positive drainage at the interface with any less permeable soils), then the installation of subdrains may not be required.

The native subgrade soils are sensitive to change in moisture content and can become loose or soft if the soils are subject to inclement weather and seepage or severe drying. Furthermore, the subgrade soils could be easily disturbed if traveled on during construction. As such, where this material will be exposed, it is recommended that the granular subbase be placed immediately upon completion of the subgrade preparation to protect the integrity of the subgrade soils.

It is expected that the roadways will be subject to light traffic (personal vehicles) as well as heavy traffic (delivery trucks, maintenance and emergency vehicles). Based on the anticipated loading, the following pavement design is provided:

Material	Recommended Thickness For New Pavement	
	Light Duty	**Heavy Duty**
Asphaltic Concrete	HL3 - 40 mm (1.5") HL4 or HL8 - 50 mm (2.0")	HL3 - 50 mm (2.0") HL4 or HL8 - 60 mm (2.5")
Granular 'A' Base (OPSS 1010)	150 mm (6.0")	150 mm (6.0")
Granular 'B' Subbase (OPSS 1010)	400 mm (16.0")	450 mm (18.0")

Should wet to saturated conditions be encountered during construction, site assessments may be required at the time of construction to determine what options can be undertaken to construct a stable roadway base. These options may include subexcavation and increasing the thickness of the Granular 'B' subbase, the use of reinforcing geotextile and/or geogrid, or a combination of all. As such, it is recommended that provisions for subexcavation and disposal of wet soils, importing and placing additional Granular 'B' (OPSS 1010), as well as supply and placement of a reinforcing geotextile (Terrafix 270R or equivalent) and geogrid (Tensar BX1200 or equivalent) should be included in the tender documents.

The granular base and subbase materials must conform to the physical property and gradation requirements of OPSS 1010 and must be compacted to 100% SPMDD. Asphaltic concrete should be supplied, placed and compacted to a minimum 92.0% Marshall maximum relative density, in accordance with OPSS 1150 and OPSS 310.

Construction joints in the surface asphalt must be offset a minimum of 150 mm to 300 mm (6" to 12") from construction joints in the binder asphalt so that longitudinal joints do not coincide.

Frost tapers must be constructed at any changes from light traffic to heavy traffic areas within the roadways, parking areas and driveways. If it is anticipated that heavy equipment (such as loader and dump trucks) will be utilized for snow removal, it would be recommended that the heavy traffic pavement structure be utilized throughout the all roadways.

Where new asphalt is joined into existing asphalt, it is recommended that the existing asphalt be sawcut in a straight line prior to being milled to a depth of 40 mm and a width of 150 mm as per OPSD 509.010. It is recommended that a tackcoat in conformance with OPSS 308 be applied to the edge and surface of all milled asphalt prior to placement of new asphalt.

The pavement should be designed to ensure that water will not pond on the pavement surface. If the surface asphalt is not placed within a reasonable time following placement of the binder asphalt, it is recommended that the catch basin lids are set at a lower elevation or apertures provided to allow surface water to drain into the catch basins and not accumulate around the catch basins. The strength of the pavement structure relies on all of the components to be in place in order to provide the design strength; therefore, it is strongly recommended that the surface asphalt be placed shortly after placement of the binder asphalt so as to avoid undue stress on the binder asphalt by not having the complete pavement structure in place.

It should be noted that, currently, asphalt mixes tend to be more flexible and, as such, there is a tendency for damage to occur from vehicles turning their steering wheels or applying excessive brake pressure. The damage can occur from both passenger vehicles as well as large vehicles. The condition is further intensified during hot weather. In high traffic/tight turning areas, it is recommended that rigid Portland cement pavement be considered.

It is understood that it is standard construction practice for residential developments to not place the surface course asphalt until the construction of the houses is completed, however this would not be recommended. Pavement structures are designed to act as a unit, and leaving out the surface course asphalt reduces the pavement structure capabilities at a time when the roadways typically see the highest loading they will ever see due to concrete trucks, tri-axle dump trucks and excavation equipment moving throughout the subdivision. It would be recommended to install the full pavement structure prior to construction of the houses or place a sacrificial surface course of asphalt.

5.12. Excess Soil Management

5.12.1. Chemical Testing was NOT Undertaken

Generally, if surplus soils are to be exported off-site, it will be necessary to perform chemical analysis of the soils. Chemical analysis was not undertaken as part of this geotechnical investigation. Should chemical analysis tests be required, the required tests vary and will be dependent on the disposal site utilized by the general contractor.

Most commonly, the soils are tested for the following:

- F1-F4, VOC's, BTEX as per O. Reg. 153/04 as amended by R511
- SVOC as per O. Reg. 153/04 as amended by R511
- Metals/Inorganics as per O. Reg. 153/04 amended by R511

The chemical analysis results are then compared to Ontario Regulation 153/04 - as amended by O.Reg. 511 – April 15, 2011 Standards = [Suite] – ON-511-T1/T2-SOIL-RPI.

5.12.2 TCLP Requirement

If soils are transported to a landfill facility, additional chemical testing in accordance with Ontario Regulation 347, Schedule 4, as amended to Ontario Regulation 558/00, dated March 2001, Toxicity Characteristic Leaching Procedure (TCLP) will be required.

When transporting soils off-site, the following is recommended:

- All chemical analyses and environmental assessment reports must be fully disclosed to the receiving site owners/authorities, whom must agree to receive the material;
- An environmental consultant must confirm the land use at the receiving site is compatible to receive the material;
- An environmental consultant must monitor the transportation and placement of the materials to ensure that the material is placed appropriately at the pre-approved site;
- The excess materials may not be transported to a site that has previously had a Record of Site Condition (RSC) filed, unless the material meets the criteria outlined in the RSC.

It should be noted that landfill sites will generally only accept laboratory test results that have been completed within 30 days of exporting. Therefore, it is recommended that provisions for chemical analysis be included in the tender documents. It should also be noted that the laboratory testing generally takes five (5) working days to process with a regular turnaround time.

6.0 SITE INSPECTION

Qualified geotechnical personnel should supervise excavation inspections as well as compaction testing for structural filling, site grading and site servicing. This will ensure that footings are founded in the proper strata and that proper material and techniques are used and the specified compaction is achieved. CMT Engineering Inc. would be pleased to review the design drawings and provide an inspection and testing program for the construction of the proposed development.

7.0 LIMITATIONS OF THE INVESTIGATION

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings and specifications are complete, or if the proposed construction should differ from that mentioned in this report.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the test locations only. It is therefore assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

It should be noted that this report specifically addresses geotechnical aspects of the project and does not include any investigations or assessments relating to potential subsurface contamination. As such, there should be no assumptions or conclusions derived from this report with respect to potential soil or water contamination. Soil or water contamination is generally caused by the presence of xenobiotic (human-made) chemicals or other alteration processes in the natural soil and groundwater environment. If necessary, the investigation, assessment and rehabilitation of soil and water contaminants should be undertaken by qualified environmental specialists.

The samples obtained during the geotechnical investigation will be stored for a period of three months, after which time they will be disposed of unless alternative arrangements are made.

This report is intended solely for the client named. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the reliability of such third parties. The factual data, interpretation, and recommendations in this report pertain to a specific project as described in this report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, deviates from the assumptions stated herein, CMT Inc. should be given an opportunity to confirm that the recommendations are still valid. The subject geotechnical exploration and this report address only the geotechnical aspects of the proposed project; potential environmental impacts or related issues are beyond the defined scope of this work and have not been addressed.

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

Prepared by:

Brandon R Figg, C.Tech.
Senior Soil Technician

Reviewed by:

Nathan Chortos, P.Eng.
Senior Geotechnical Engineer

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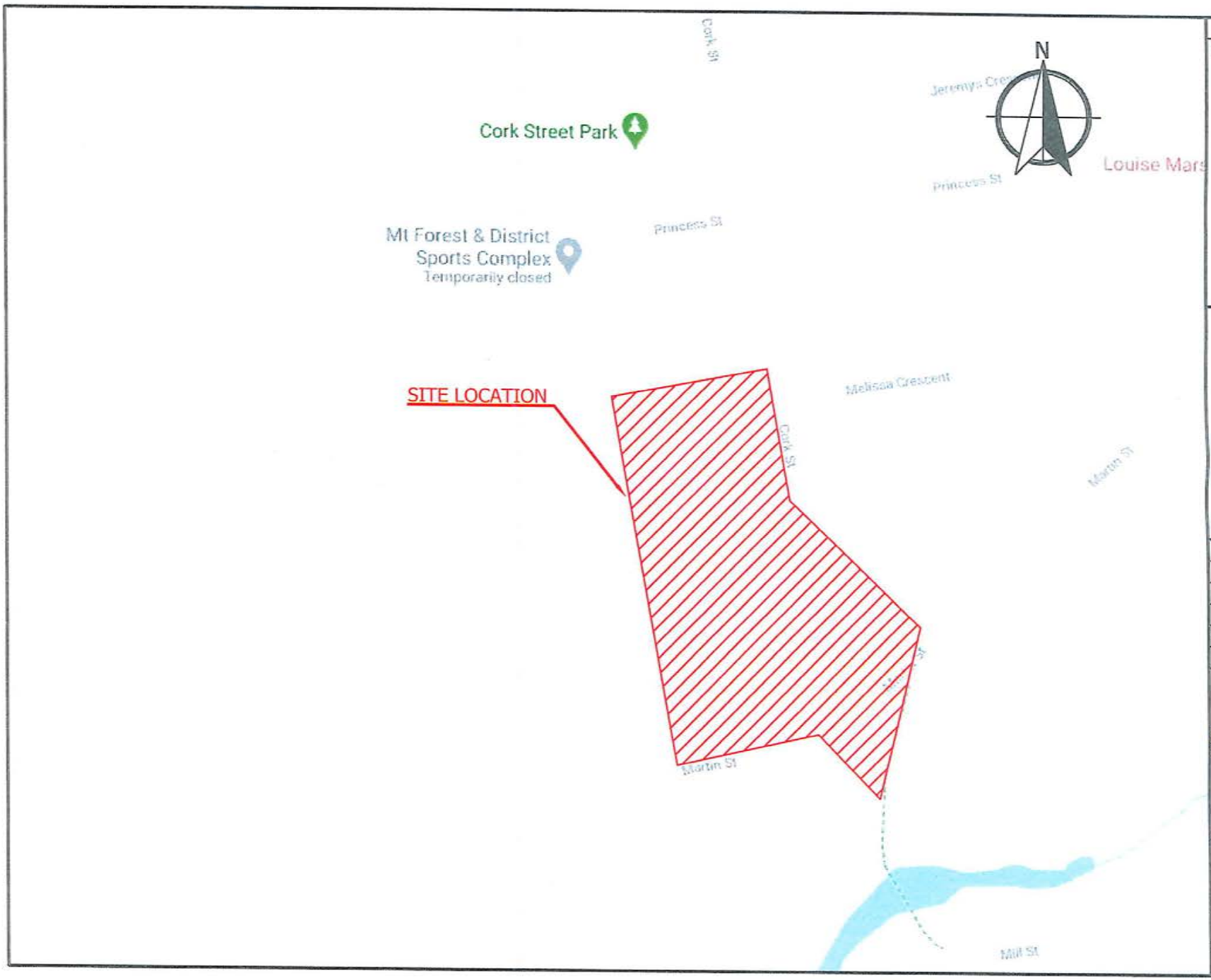


NOTES:

1. BASE MAP PROVIDED BY GOOGLE MAPS

NO.	DESCRIPTION	DATE

REVISIONS

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

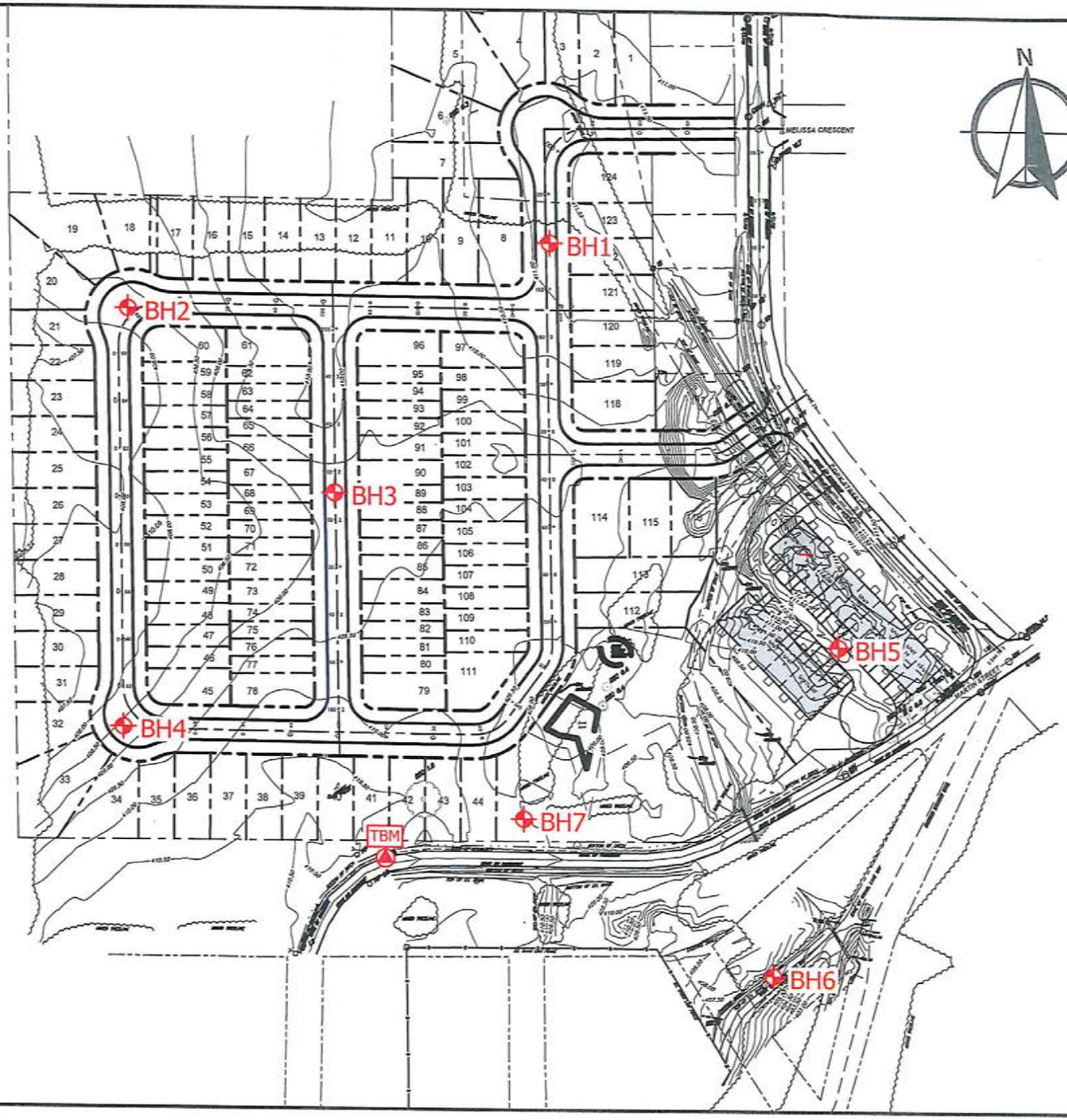
PROJECT:

Geotechnical Investigation
Proposed Mount Forest Subdivision
Cork Street,
Mount Forest, Ontario

DRAWING TITLE:

SITE LOCATION MAP

PROJECT NO.:	DATE:
20-202	June 25, 2020
SCALE:	DRAWING NO.
N.T.S.	1



NOTES:

1. DRAWING PROVIDED COBIDE ENGINEERING INC..

CMT Borehole - 2020

Temporary Benchmark

NO.	DESCRIPTION	DATE

REVISIONS

CMT ENGINEERING INC.
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PROJECT:

Geotechnical Investigation
Proposed Mount Forest Subdivision
Cork Street,
Mount Forest, Ontario

DRAWING TITLE:

SITE PLAN SHOWING
BOREHOLE LOCATIONS

PROJECT NO.:	DATE:
20-202	June 25, 2020
SCALE:	DRAWING NO.
N.T.S.	2

APPENDIX A

BOREHOLE LOGS

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH1

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-3-20
GROUND ELEVATION: 411.05 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)	WELL DIAGRAM
		TOPSOIL: Loose, dark brown, silty organic topsoil, moist (175mm)	0.00, 411.05						38mm Riser
		SANDY SILT : Compact, brown, sandy silt, trace clay and gravel, moist	0.18, 410.88	SPT 1	49	5	14.4		
1				SPT 2	87	14	9.7		Bentonite Seal Groundwater was measured at 0.92 m (El. 410.13 m) June 17, 2020
2				SPT 3	100	19	9.6		
		SANDY SILT TILL: Dense, brown, sandy silt till, some gravel and clay, moist with wet seams	2.29, 408.76	SPT 4	100	40	9.3		
3				SPT 5	100	31	10.1		#3 Sand Pack
4				MC5 6	100		10.7		38mm Screen
		CLAYEY SANDY SILT TILL: Dense, grey, clayey sandy silt till, trace gravel, moist	4.42, 406.63						
5				SPT 7	87	38	13.5		

Groundwater was measured at approximately 0.92 m (El. 410.13 m) on June 17, 2020.

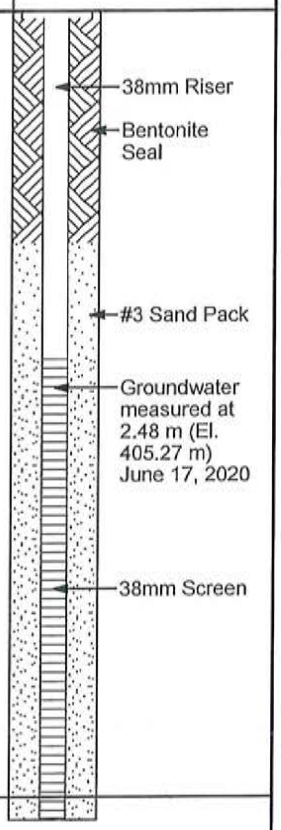
Bottom of borehole at 5.18 m, Elevation 405.87 m.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH2

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-3-20
GROUND ELEVATION: 407.75 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
		TOPSOIL: Loose, dark brown, silty organic topsoil, moist (225mm)	0.00, 407.75					
		SANDY SILT: Loose to compact, brown, sandy silt, trace clay and gravel, moist to wet	0.23, 407.53	SPT 1	87	4	17.9	
1				SPT 2	100	4	22.4	
2				SPT 3	100	15	18.5	
				SPT 4	87	14	20.9	
3		**GRAVEL AND SAND:** Compact, brown, gravel and sand, trace silt and clay, wet to saturated becoming grey	3.05, 404.70	SPT 5	67	27	20.7	
4			3.37, 404.38	MC5 6	87		6.4	
5		**SANDY SILT:** Compact, brown, sandy silt, some gravel and clay, saturated	4.57, 403.18	SPT 7	87	23	20.6	



WELL DIAGRAM

Groundwater was measured at approximately 2.48 m (El. 405.27 m) on June 17, 2020.

Bottom of borehole at 5.18 m, Elevation 402.57 m.

CMT ENGINEERING INC.
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St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH3

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-3-20
GROUND ELEVATION: 408.96 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)	WELL DIAGRAM
		TOPSOIL: Loose, dark brown, silty organic topsoil, moist (225mm)	0.00, 408.96						
		SANDY SILT: Loose, brown, sandy silt, trace clay and gravel, moist to wet	0.23, 408.74	SPT 1	100	5	21.2		38mm Riser
1				SPT 2	13	4	17.8		Bentonite Seal
		GRAVEL AND SAND: Compact to very dense, brown, gravel and sand, trace silt and clay, saturated	1.52, 407.44	SPT 3	33	14	6.5		Groundwater measured at 1.21 m (El. 407.75 m) June 17, 2020
2				SPT 4	87	21	12.9		
3				SPT 5	75	58	8.1		#3 Sand Pack
4				MC5 6	87		17.3		38mm Screen
		SANDY SILT TILL: Dense, brown, sandy silt till, some gravel and clay, saturated	4.19, 404.77						
5		**CLAYEY SANDY SILT TILL:** Dense, grey, clayey sandy silt till, trace gravel, moist	4.57, 404.39	SPT 7	100	38	11.7		

Groundwater was measured at approximately 1.21 m (El. 407.75 m) on June 17, 2020.

Bottom of borehole at 5.18 m, Elevation 403.78 m.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH4

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-3-20
GROUND ELEVATION: 409.39 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)	WELL DIAGRAM
		TOPSOIL: Loose, dark brown, silty organic topsoil, moist (250mm)	0.00, 409.39						
		SANDY SILT: Very loose to compact, brown, sandy silt, trace clay and gravel, moist to saturated	0.25, 409.14	SPT 1	70	3	14.1		38mm Riser
1				SPT 2	87	4	17.0		Bentonite Seal
2				SPT 3	0	2			Groundwater measured at 1.60 m (El. 407.79 m) June 17, 2020
3				SPT 4	70	14	14.3		#3 Sand Pack
				SPT 5	87	18			
4		becoming grey	4.32, 405.07	MC5 6	89		14.7		38mm Screen
5				SPT 7	100	14	28.2		

Groundwater was measured at approximately 1.60 m (El. 407.79 m) on June 17, 2020.

Bottom of borehole at 5.18 m, Elevation 404.21 m.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH5

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-4-20
GROUND ELEVATION: 412.06 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
		TOPSOIL: Loose, dark brown, silty organic topsoil, moist (175mm)	0.00, 412.06	SPT 1	100	10	11.7	
		SAND AND GRAVEL FILL: Compact, brown, sand and gravel fill, with organics, moist	0.18, 411.89					
1		**TOPSOIL:** Compact, black, silty organic topsoil, moist	0.76, 411.30	SPT 2	13	9	8.9	
		SILTY SAND FILL: Very loose, brown, silty sand fill, moist	1.52, 410.54	SPT 3	33	3	24.6	
2		**TOPSOIL:** Very loose, black/grey, silty organic topsoil, moist to wet	1.80, 410.26					
				SPT 4	87	5	11.6	
3								
		SANDY SILT: Compact, brown, sandy silt, trace clay and gravel, moist to wet	3.05, 409.01	SPT 5	75	10	11.0	
4				MC5 6	87			
		CLAYEY SANDY SILT TILL: Dense, brown, clayey sandy silt till, trace gravel, wet	4.57, 407.49	SPT 7	100	36	12.2	
5		becoming grey	5.18, 406.88	MC5 8			13.2	
6								

WELL DIAGRAM: 38mm Riser; Bentonite Seal; Groundwater measured at 2.44 m (El. 409.62 m) June 17, 2020; #3 Sand Pack; 38mm Screen

Groundwater was measured at approximately 2.44 m (El. 409.62 m) on June 17, 2020.

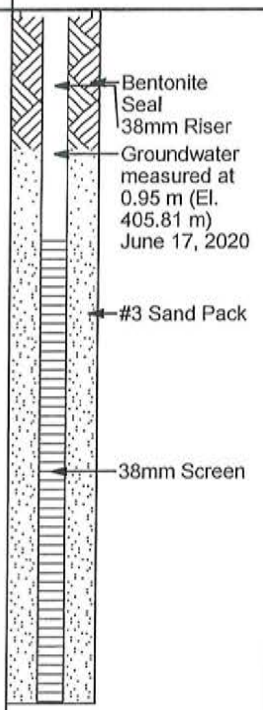
Bottom of borehole at 6.10 m, Elevation 405.96 m.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH6

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-4-20
GROUND ELEVATION: 406.76 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
	TOPSOIL: Loose, dark brown, silty organic topsoil, moist (125mm)	0.00, 406.76					
	SAND AND GRAVEL FILL: Compact, brown, sand and gravel fill, moist	0.13, 406.64					
	TOPSOIL: Compact, black, silty organic topsoil, moist	0.33, 406.43					
1	**SILTY SAND FILL:** Compact, brown, silty sand fill, moist	0.43, 406.33	SPT 1	100	14	22.7	
			SPT 2	13	27	6.8	
2	**SANDY SILT:** Compact, brown, sandy silt, trace clay and gravel, with sand and gravel seam, wet	1.52, 405.24	SPT 3	33	17	15.4	
3	**CLAYEY SANDY SILT TILL:** Compact, grey, clayey sandy silt till, trace gravel, with wet sand seams, wet	2.49, 404.27	SPT 4	87	15	17.0	
			SPT 5	75	29	14.4	
4			MC5 6	87		16.1	
5			SPT 7	100	29	14.0	



WELL DIAGRAM

Groundwater was measured at approximately 0.95 m (El. 405.81 m) on June 17, 2020.

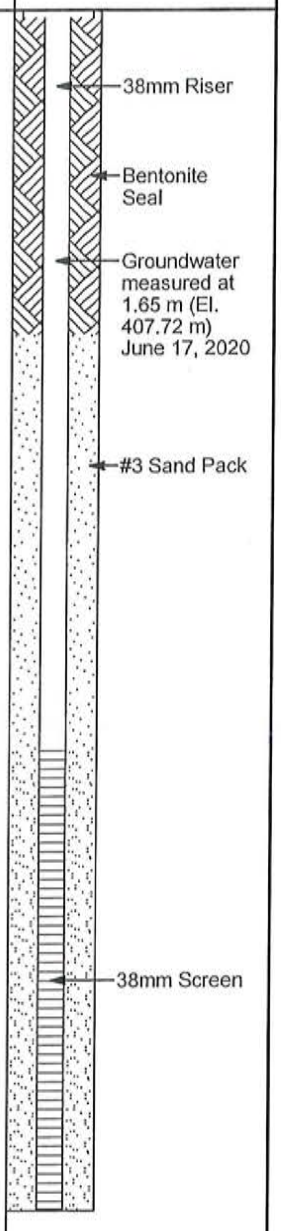
Bottom of borehole at 5.18 m, Elevation 401.58 m.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH7

PROJECT: Proposed Mount Forest Subdivision
PROJECT ADDRESS: Cork Street
PROJECT LOCATION: Mount Forest, ON
PROJECT NUMBER: 20-202
DRILLING DATE: 6-4-20
GROUND ELEVATION: 409.37 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BRF
DRILLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
0	**TOPSOIL:** Loose, dark brown, silty organic topsoil, moist (375mm)	0.00, 409.37					
	SANDY SILT: Loose to compact, brown, sandy silt, trace clay and gravel, moist to wet	0.38, 409.00	SPT 1	100	3	22.7	
1			SPT 2	100	6	16.3	
2			SPT 3	87	13	18.0	
			SPT 4	100	15		
3	**GRAVEL AND SAND:** Compact, brown, gravel and sand, trace silt and clay, saturated	2.74, 406.63					
			SPT 5	100	14	12.2	
4			MC5 6	100		12.1	
	SANDY SILT TILL: Compact, brown, sandy silt till, some gravel and clay, with wet sand seams, moist to saturated	4.41, 404.96					
	CLAYEY SANDY SILT TILL: Compact, grey, clayey sandy silt till, trace gravel, moist to saturated	4.57, 404.80	SPT 7	92	37	12.0	
5			MC5 8	100		18.2	
6			SPT 9	87	29	26.9	
7			MC5 10	100		30.3	
8			SPT	100	22		



WELL DIAGRAM

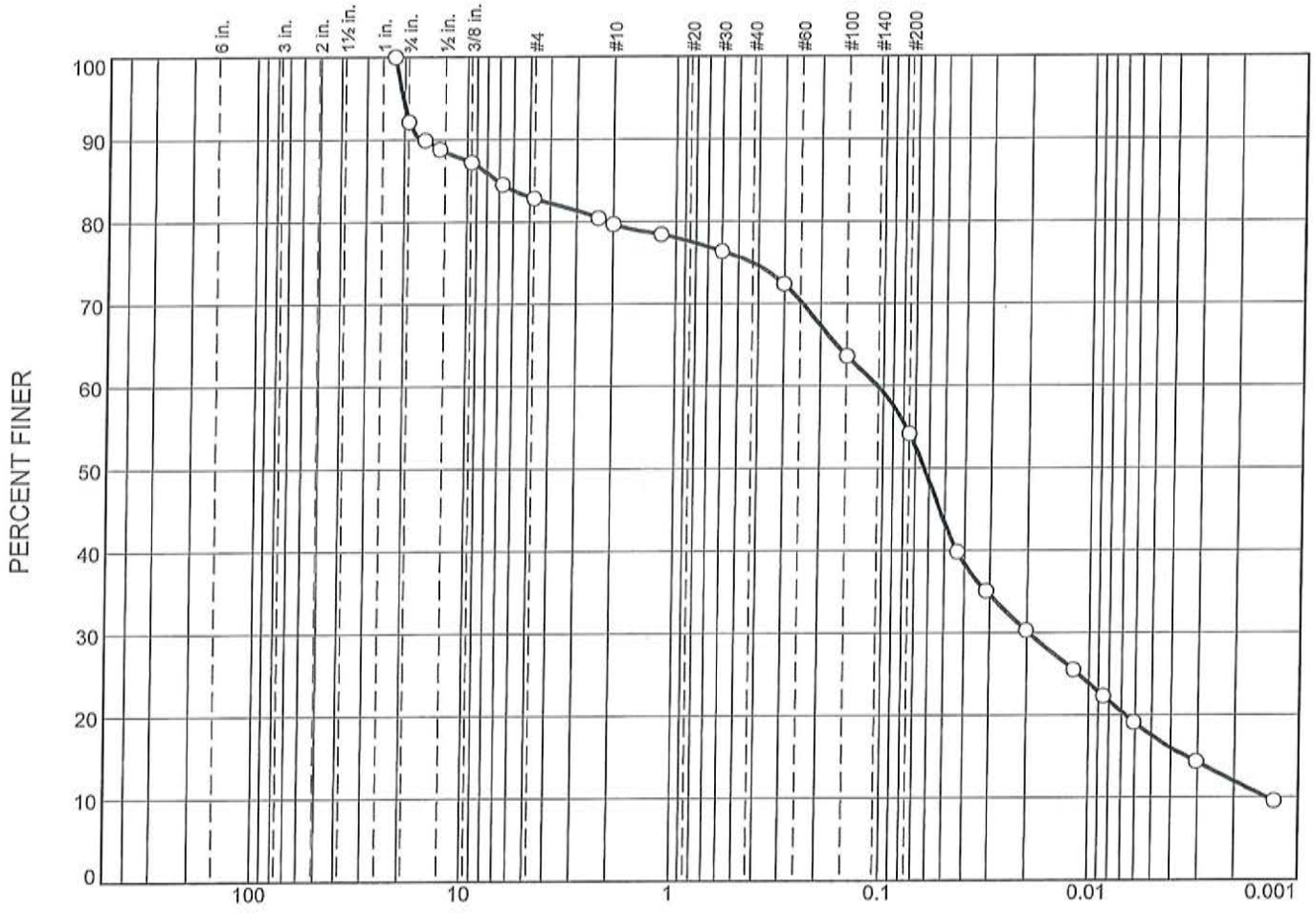
Groundwater was measured at approximately 1.65 m (El. 407.72 m) on June 17, 2020.

Bottom of borehole at 8.23 m, Elevation 401.14 m.

APPENDIX B

GRAIN SIZE ANALYSES

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	7.8	9.4	3.1	4.8	20.7	42.3	11.9

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	5	3.05-3.66m	sandy silt, some gravel and clay	ML
				Sampled by BF of CMT Engineering Inc., June 3, 2020	
				Tested by MS of CMT Engineering Inc., June 9, 2020	

CMT Engineering Inc.

St. Clements, ON

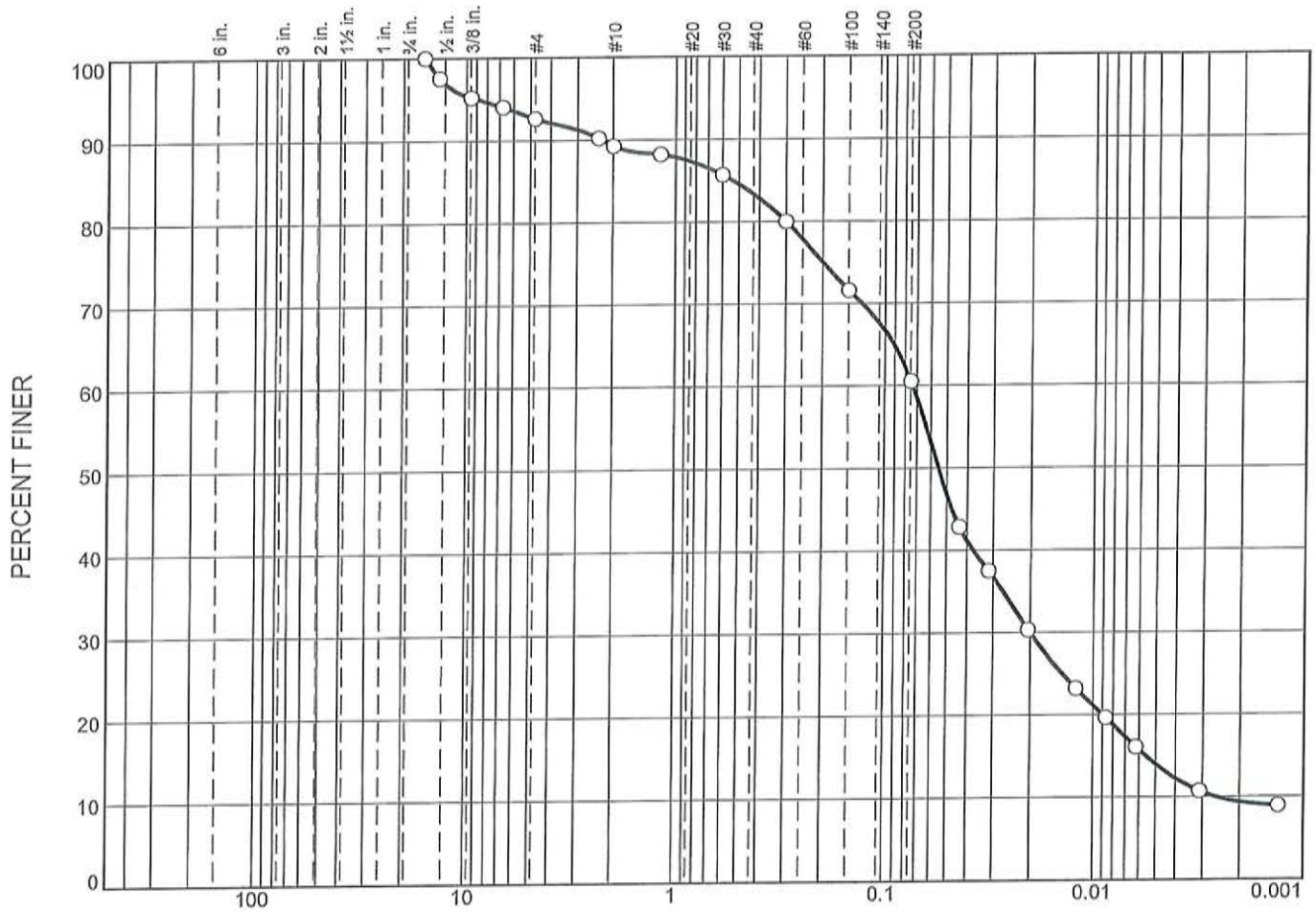
Client: Sunvale Homes Inc.

Project: Cork Street Residential Subdivision
Mount Forest, Ontario

Project No.: 20-202

Figure 1

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	7.4	3.3	6.0	22.8	51.1	9.4

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH5	6	3.66-4.57m	sandy silt, trace clay and gravel	ML
				Sampled by BF of CMT Engineering Inc., June 3, 2020	
				Tested by MS of CMT Engineering Inc., June 9, 2020	

CMT Engineering Inc.

St. Clements, ON

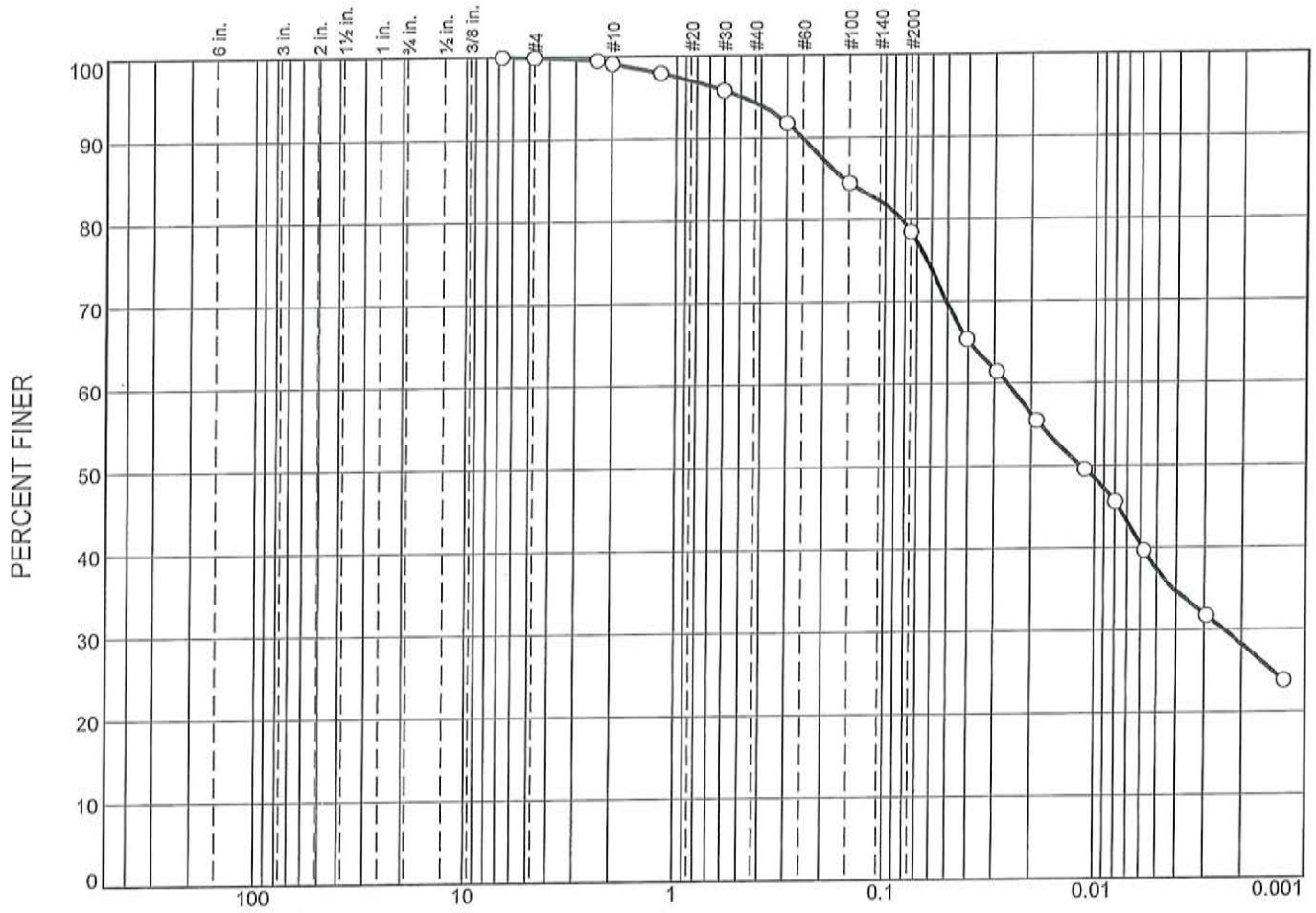
Client: Sunvale Homes Inc.

Project: Cork Street Residential Subdivision
Mount Forest, Ontario

Project No.: 20-202

Figure 2

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.8	4.8	15.8	50.3	28.2

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH5	8	5.18-6.10m	clayey, sandy silt, trace gravel	ML
				Sampled by BF of CMT Engineering Inc., June 3, 2020	
				Tested by MS of CMT Engineering Inc., June 9, 2020	

CMT Engineering Inc.

St. Clements, ON

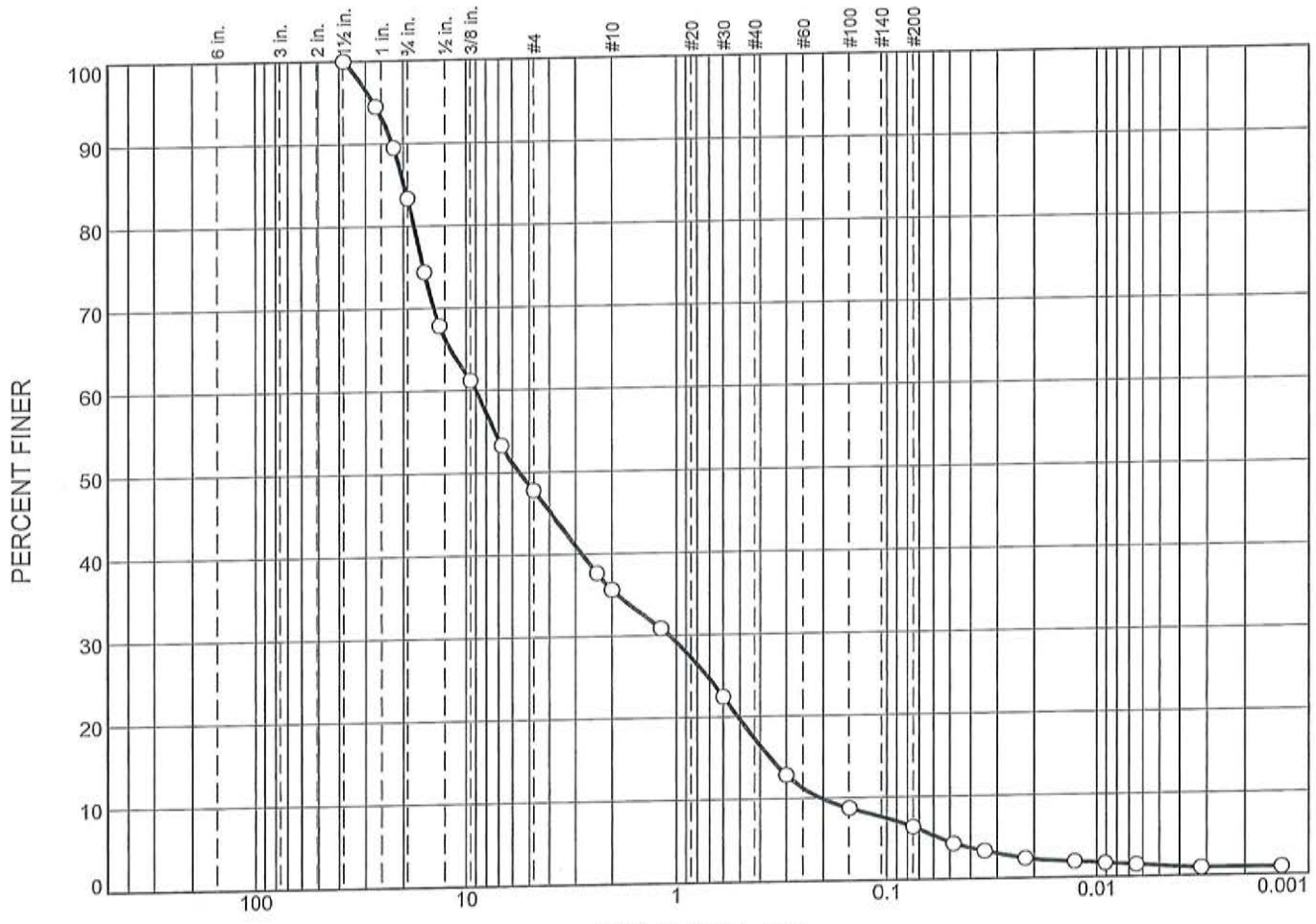
Client: Sunvale Homes Inc.

Project: Cork Street Residential Subdivision
Mount Forest, Ontario

Project No.: 20-202

Figure 3

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	16.6	35.6	12.2	18.3	10.9	5.5	0.9

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH7	5	3.05-3.66m	gravel and sand, trace silt and clay	GP-GM
				Sampled by BF of CMT Engineering Inc., June 3, 2020	
				Tested by MS of CMT Engineering Inc., June 9, 2020	

CMT Engineering Inc.

St. Clements, ON

Client: Sunvale Homes Inc.

Project: Cork Street Residential Subdivision
Mount Forest, Ontario

Project No.: 20-202

Figure 4

APPENDIX C

WELL LOG RECORDS

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 294980

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization	**Email Address**
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number
CAN	ON	L9W4Z5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FIELD	360 m NW OF MARTIN & CORK ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
MOUNT FOREST	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520326	4868732	**Test UTM in Map**	

Other

3. Overburden and Bedrock Material *

Well Depth * 17 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Sand	Silt		0	17

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	5	3\8 HOLEPLUG	0.06
5	17	#2 SAND	0.15

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.5	Plastic	0.06	0	7

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	7	17

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	17	3.9

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

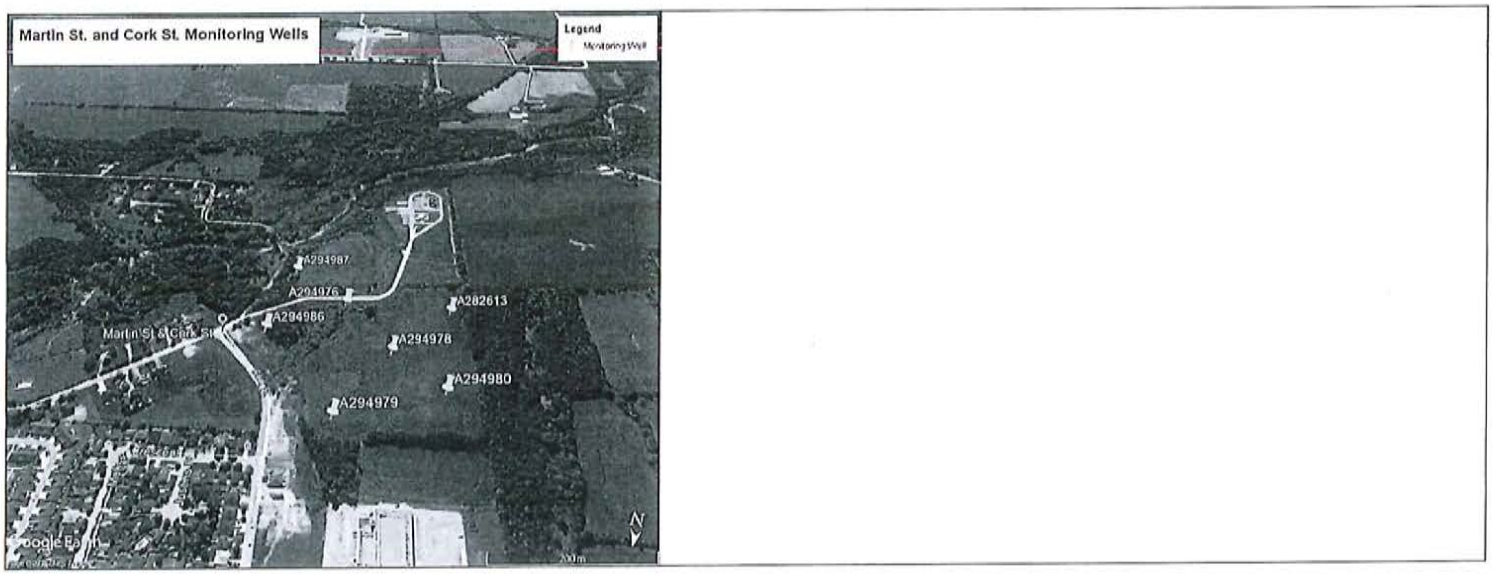
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2020.06.23 12:14:13 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

5TC9 AJSV

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A294979

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization	**Email Address**
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number
CAN	ON	L9W4Z5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FIELD	240m N OF CORK AND MARTIN ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
MOUNT FOREST	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520481	4868809	**Test UTM in Map**	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Till			0	12
Brown	Sand	Gravel		12	13.5
Grey	Till			13.5	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	4	3/8 HOLEPLUG	0.05
4	15	#2 SAND	0.13

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.56	Plastic	0.06	-3	5

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	5	15

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	3.9

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

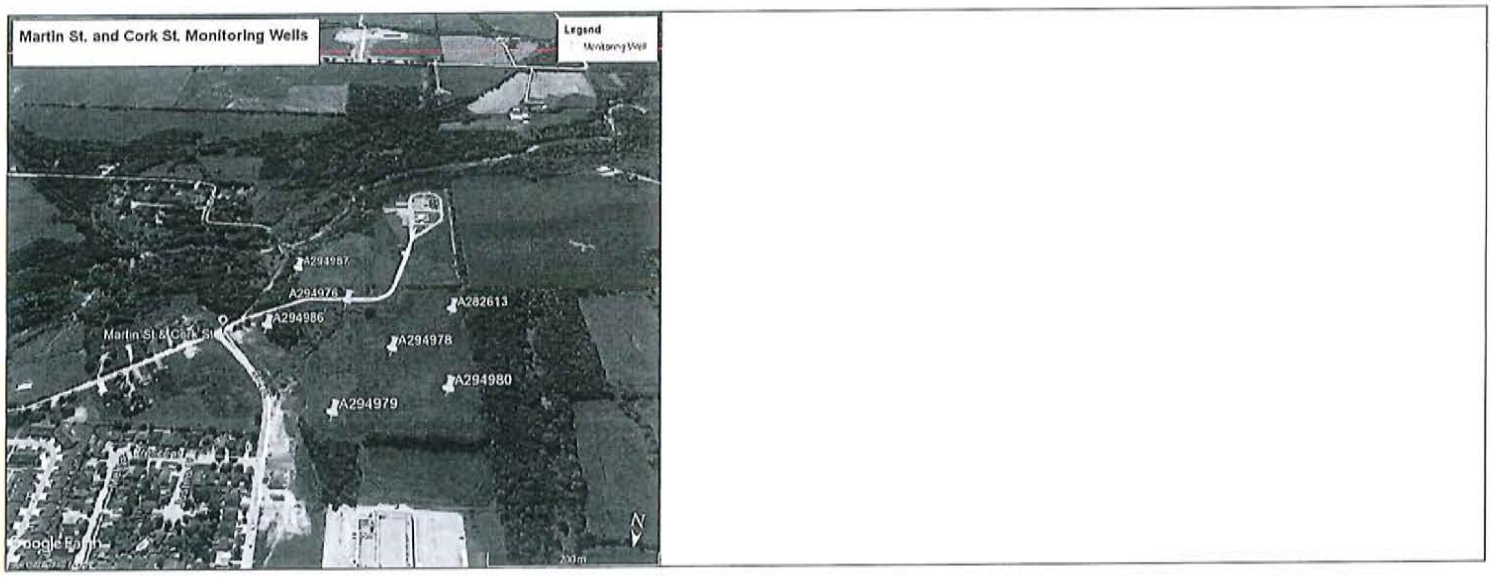
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/06

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2020.06.23 12:23:21 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

DPE6 NDMC

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 294978

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number
CAN	ON	L9W4Z5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FIELD	275m W OF MARTIN & CORK ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
MOUNT FOREST	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520417	4868675	**Test UTM in Map**	

Other

3. Overburden and Bedrock Material *

Well Depth * 17.5 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Till			0	15
Grey	Till			15	17.5

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	5	3\8 HOLEPLUG	0.06
5	17.5	#2 SAND	0.15

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify)

6. Well Use *

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

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.56	Plastic	0.06	-3	7.5

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	7.5	17.5

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	17.5	3.9

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

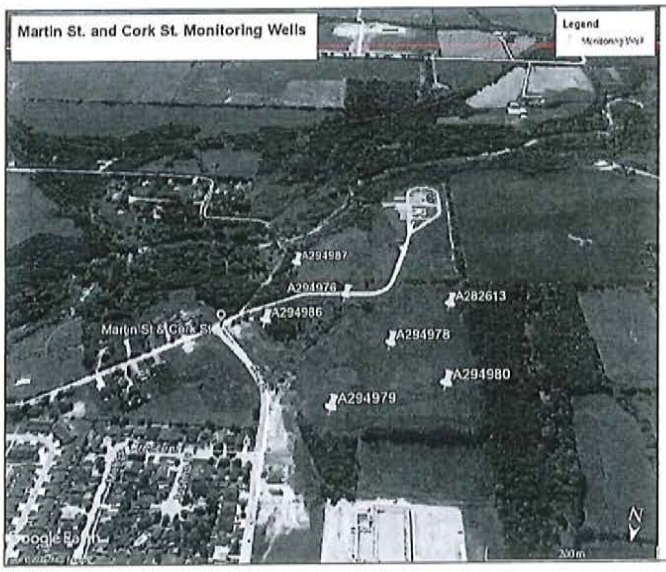
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.nrt

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2020.06.23 12:32:17 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

749D VQWE

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 282613

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization	**Email Address**
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village	
106	685	RIDDELL	ORANGEVILLE	
Country	**Province**		**Postal Code**	**Telephone Number**
CAN	ON		L9W4Z5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FIELD	365M W OF MARTIN AND CORK ST	
Lot	**Concession**	**County/District/Municipality**	
City/Town		**Province**	**Postal Code**
MOUNT FOREST		Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520334	4868572	**Test UTM in Map**	

Other

3. Overburden and Bedrock Material *

Well Depth * 17 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Till			0	12
Grey	Till			12	17

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	5	3\8 HOLEPLUG	0.06
5	17	#2 SAND	0.15

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify)

6. Well Use *

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

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.5	Plastic	0.06	-3	7

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	7	17

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	17	3.9

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

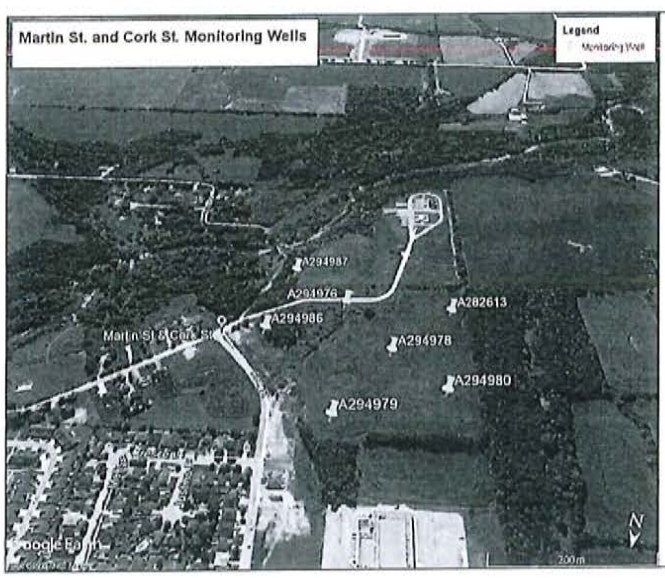
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2020.06.23 12:41:43 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

3NTS YKTH

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 294976

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FIELD	195M W OF MARTIN AND CORK ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
MOUNT FOREST	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520508	4868588	**Test UTM in Map**	

Other

3. Overburden and Bedrock Material *

Well Depth * 26 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Sand	Gravel		0	12
Grey	Silt	Till		12	26

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	13	3/8 BENTONITE	2.5
13	26	#2 SAND	2.5

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.5	Plastic	0.06	-3	16

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	16	26

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	26	3.25

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

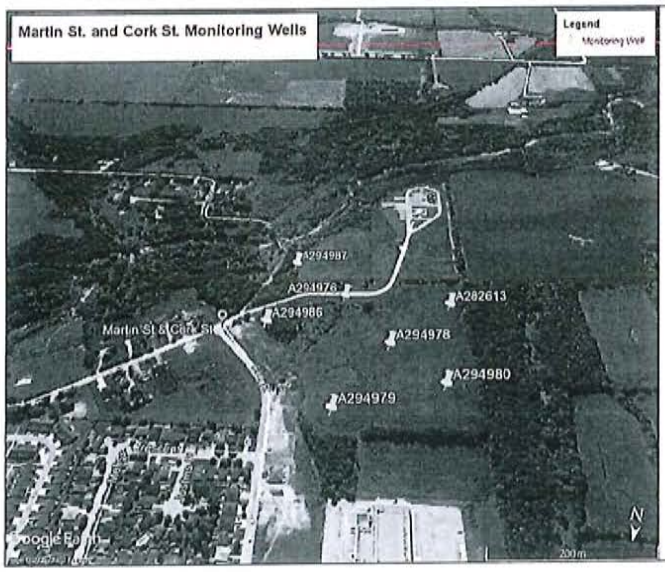
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC.	7366

Business Address

Unit Number	Street Number	Street Name *
	1011	INDUSTRIAL CRESESNT

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
HOPKINS	WYATT	4119

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
HOPKINS	WYATT	GINGER__13@LIVE.COM

Signature		Date Submitted (yyyy/mm/dd)
Wyatt Hopkins	Digitally signed by Wyatt Hopkins Date: 2020.06.23 13:28:42 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

BLM8 GVP7

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A294987

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
SUNVALE HOMES	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number
CANADA	ONTARIO		

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FEILD	166m SW OF MARTIN & CORK ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
MOUNT FOREST	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520612	4868524	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Fill			0	5
Grey	Silt			5	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	4	3/8 BENTONITE	0.78
4	15	#2 SAND	1.7

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.5	Plastic	0.06	-3	5

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	5	15

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	3.25

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

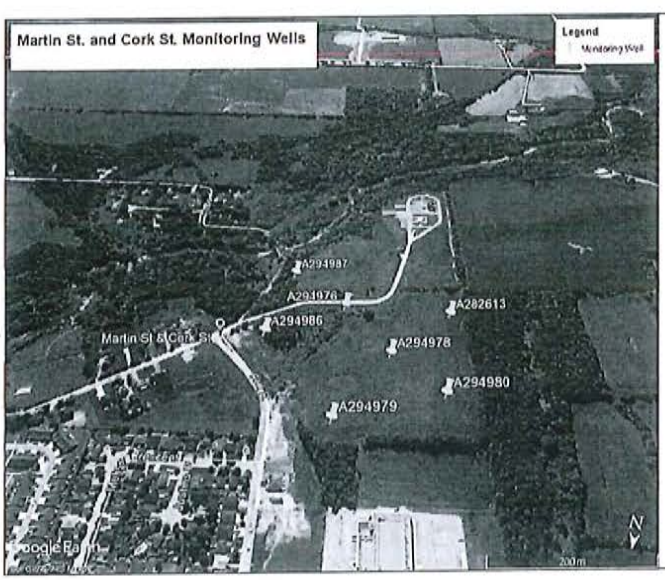
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CTM DRILLING INC.	7366

Business Address

Unit Number	Street Number	Street Name *
	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
HOPKINS	WYATT	4119

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
HOPKINS	WYATT	GINGER__13@LIVE.COM

Signature		Date Submitted (yyyy/mm/dd)
Wyatt Hopkins	Digitally signed by Wyatt Hopkins Date: 2020.06.23 14:03:41 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

A6RY C7D3

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A294986

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
SUNVALE	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
106	685	RIDDELL	ORANGEVILLE

Country	Province	Postal Code	Telephone Number
CANADA	ON		

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	FEILD	65m W OF MARTIN & CORK ST	

Lot	Concession	County/District/Municipality

City/Town	Province	Postal Code
	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	520622	4868671	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 20 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Silt			0	16
Grey	Silt			16	20

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	9	3/8 BENTONITE	1.7
9	20	#2 SAND	2.1

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1.5	Plastic	0.06	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.56	Plastic	10	10	20

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh	☐ Untested	☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	3.25

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

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

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

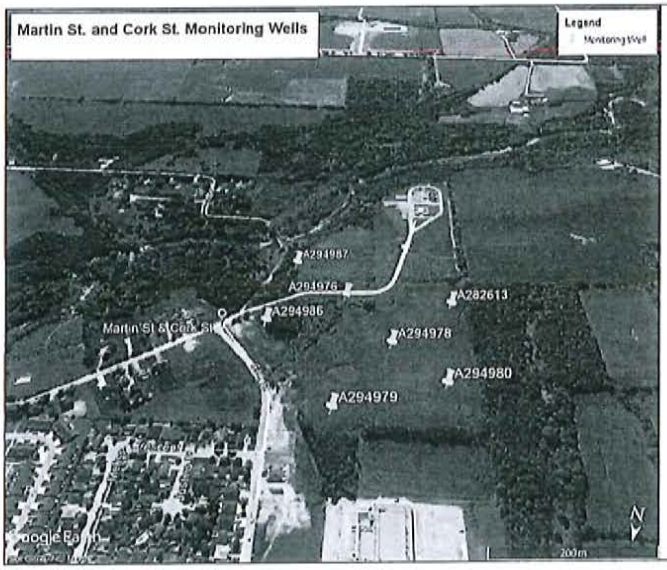
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2020/06/03

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	INFO@CMTINC.NET

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
HOPKINS	WYATT	4119

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
HOPKINS	WYATT	GINGER__13@LIVE.COM

Signature		Date Submitted (yyyy/mm/dd)
Wyatt Hopkins	Digitally signed by Wyatt Hopkins Date: 2020.06.23 14:18:46 -04'00'	2020/06/23

17. Ministry Use Only

Audit Number

2VPX 59QR