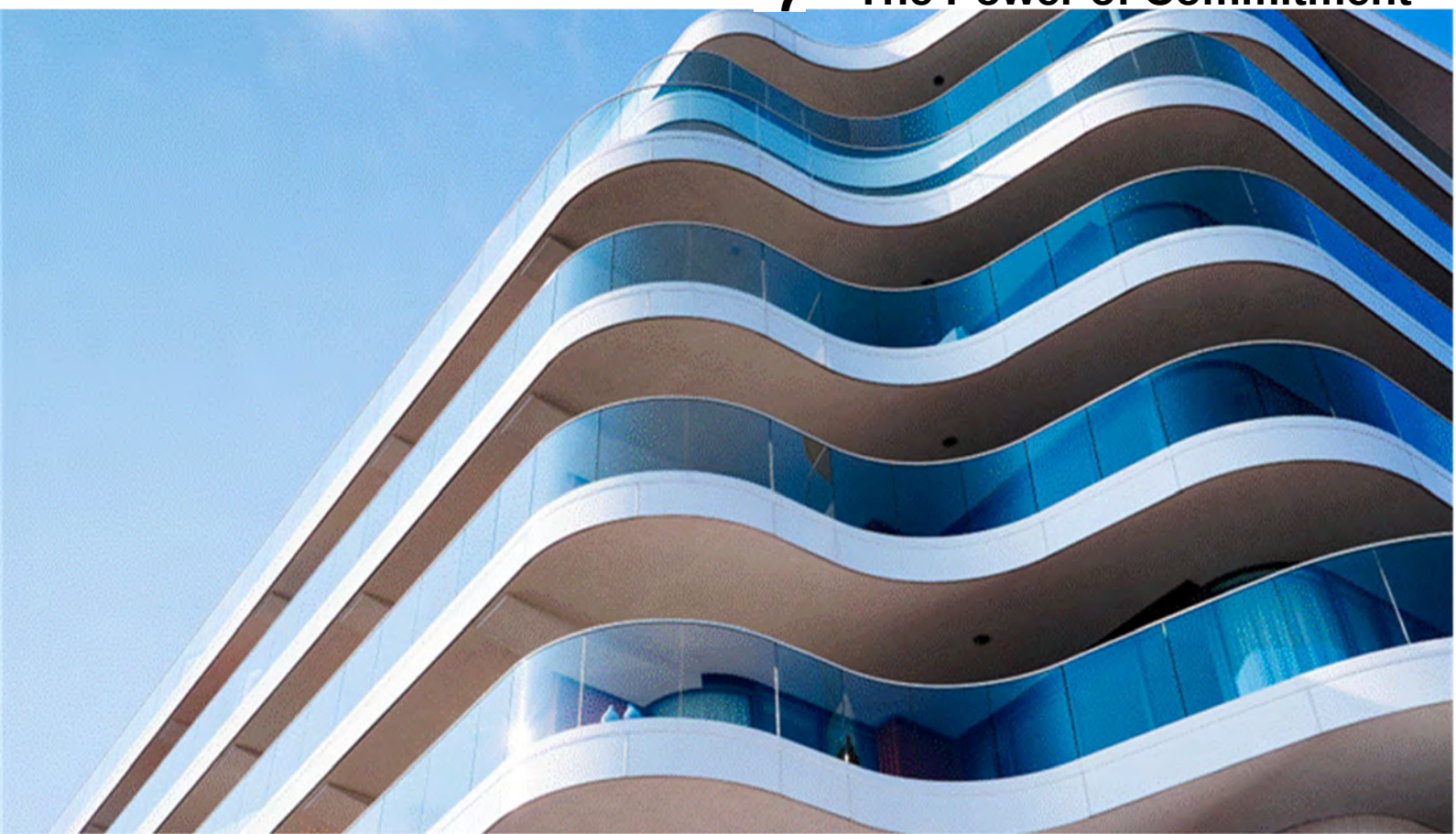
Source Water Protection Risk Assessment Report

Proposed Residential Development, Turner Street, Millbrook, Ontario

Veltri and Son Limited

12 April 2023

→ The Power of Commitment



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1. Introduction

GHD Limited (GHD) is pleased to provide the following Source Water Protection and Wellhead Protection Area Risk Assessment for a proposed residential development to be located north of King Street West at the end of Turner Street in Millbrook, Ontario (the Site). The assessment has been prepared to address the Township of Cavan-Monaghan's (TOCM) comments associated with the proposed development of the vacant lands identified on the **Site Location Plan, Figure 1**. The development is to include 56 single detached homes and 14 semi-detached homes (28 units total), two (2) stormwater ponds, open space and an internal road[1]. The development will be municipally serviced for water and sewer.

The Site encompasses an area of 10.686 hectares (ha) within the Baxter Creek sub-watershed of the Otonabee River and falls within the Otonabee Region Conservation Area (ORCA) and the Otonabee-Peterborough Source Protection Area. Currently, the Site is undeveloped.

The Site boundary is situated about 115 m at its closest point from the Millbrook Municipal Well Field and the nearest proposed residential home will be about 175 m from the well field. The well field includes three (3) municipal wells that are each about 30 m deep confined within the overburden.

The main objectives of the assessment are to examine the relevant hydrogeologic pathways and qualitatively evaluate the level of risk associated with the prescribed land use activities that may pose a threat to the quantity or quality of the Municipal Well Field, which provides the municipality with its drinking water supply, as prescribed by the Clean Water Act, 2006; and to propose appropriate risk reduction measures to ensure any new threat activities cease to be or never become a significant drinking water threat. The main tasks included:

- A Risk Assessment (RA) that examines the relevant hydrogeologic pathways and qualitatively evaluates the level of risk associated with a land use or land use activity that may pose a threat to the quantity or quality of a municipal drinking water supply; and,
- A Risk Management Plan (RMP) that describes the results of the RA and proposes planning for the mitigation and management of any identified risks.

The RA addresses the portions of the residential development within Wellhead Protection Areas (WHPAs), a Highly Vulnerable Aquifer (HVA), a Significant Groundwater Recharge Area (SGRA), an Intake Protection Zone (IPZ) and the Oak Ridges Moraine (ORM). The RA provides the following details:

- Description of the existing soil and groundwater conditions;
- Identification of sensitive features; and
- Assessment of potential threats to the municipal well source aquifer, and mitigation measures which can be implemented.

This Report is organized into the following Sections:

Section 1.0 – Introduction: Outlines the purpose, objectives and scope of work, and presents the report organization.

Section 2.0 – Background: Provides a description of the existing Site conditions, background information and surrounding land uses, as well as an outline of the proposed development. The regional environmental setting, including the physiography, topography, main surface water features surrounding the Site, and the surficial geology is presented.

[1] Preliminary Draft Plan. Part of Lot 11, Concession 5. Former Village of Millbrook, Township of Cavan now in the Township of Cavan-Monaghan, County of Peterborough. Prepared by D.G. Biddle & Associates Limited dated 31/03/2022.

Section 3.0 – Methodology: Describes the methodologies used to assess the site environmental conditions, and to determine potential impacts associated with the undertaking.

Section 4.0 – Local Setting: Provides a detailed description of the Site land use, geology, hydrogeology, and the hydraulic properties of the underlying stratigraphy, as well as assessment of anthropogenic (i.e., man-made) transport pathways.

Section 5.0 – Risk Assessment: Provides identification of the Site with respect to municipal drinking water sources and their associated Wellhead Protection Areas, vulnerability areas, threats assessment and any potential water quantity threats.

Section 6.0 – Risk Management: Includes information on prevention/ mitigation/ management measures, monitoring, and emergency response. Prevention information includes industry standards, regulations, best management practices, policies, etc. that are in place to help prevent contamination from the land use, as well as information on Low Impact Development techniques and how the Site will be maintained to ensure it operates as intended / designed.

Section 7.0 – Summary and Conclusions: Provides a summary of the study findings. The signatures of the staff members who prepared this report are provided in this section.

References and Statement of Limitations are provided following **Section 8** and **Section 9**.

The factual data, interpretations and preliminary recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. This report should be read in conjunction with the Statement of Limitations appended to this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

1.1 Terms of Reference

GHD was retained by Veltri and Son Ltd. to complete this source water protection plan assessment in accordance with our proposal reference no. PG-5494A dated November 18, 2022.

2. Background Information

2.1 Site Description

The Site is located at the north end of Turner Street in Millbrook, Ontario and is comprised of four (4) parcels that includes 2 Turner Street and three (3) unaddressed parcels. The general location of the Site is illustrated on the **Site Location Plan, Figure 1**. The Site is geographically described as Part Lot 11, Concession 5 in the Township of Cavan-Monaghan. The Site is irregular in shape and is bounded by existing, municipally serviced residential lots to the south and vacant, forested land to the east and north. A former Provincial penitentiary was located on the lands to the west and this property is now vacant of structures. The Site elevation ranges from 262 metres above sea level (masl) to 239 masl from west to east.

GHD has completed a geotechnical investigation[2], groundwater monitoring[3] and a slope assessment report[4] in support of the proposed development to assess subsurface conditions. Information obtained from these reports was utilized

[2] GHD Limited. Revised May 2020. Geotechnical Investigation Report – Proposed Residential Development – Turner Street, Millbrook, Ontario. Project No. 11178428-01
[3] GHD Limited. June 2020. Groundwater Monitoring Report – Proposed Residential Development – Turner Street, Millbrook, Ontario. Project No. 11206486-02
[4] GHD Limited. March 7, 2023. Geotechnical Investigation. Slope Stability Assessment – Proposed Residential Development, Turner Street, Millbrook ON.

for this Source Water Protection Assessment where appropriate. Test holes including boreholes and test pits have been advanced across the Site as shown on the **Test Hole Plan, Figure 2**.

According to the Township of Cavan-Monaghan Official Plan – Schedule 'A-1', the lands are zoned as future development. The Oak Ridges Moraine (ORM) crosses through a small portion of the Site along the western boundary as shown on **ORM Planning Area, Figure 3.** The Site is shown within a designated Rural Settlement Area as depicted on the **ORM Landform Conservation Area, Figure 4**. The majority of the Site does not fall within the ORM.

2.2 Proposed Development

The proposed development is for 56 single detached homes and 14 semi-detached homes as per the Preliminary Draft Plan and overlain on **Figure 2**. The proposed development will be municipally serviced. The servicing structures including watermain, sanitary and storm sewer connections, catch basins, manholes and inverts that may require excavations up to 4 metres. There will also be open space, stormwater ponds and access roads that will be asphalt paved.

2.3 Source Water Protection Policy

The Clean Water Act was passed by the Ontario government in 2006 to protect the sources of municipal drinking water from contamination or overuse. The Act requires that local communities, through local Source Protection Committees, assess existing and potential threats to their sources of municipal drinking water supplies and take action to reduce or eliminate these threats. This process is currently ongoing throughout the province.

A drinking water threat is defined in the Clean Water Act, 2006 as "an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water" (Section 2(1)).

Under the Clean Water Act, 2006 (as amended), there are 22 categories of potential threats representing numerous activities which can negatively affect the quality and / or quantity of drinking water. The following activities are prescribed as Drinking Water Threats under the Clean Water Act and its regulations:

1. The establishment, operation or maintenance of a waste disposal site within the meaning of a Part V of the *Environmental Protection Act*;
2. The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage;
3. The application of agricultural source material to land;
4. The storage of agricultural source material;
5. The management of agricultural source material;
6. The application of non-agricultural source material to land;
7. The handling and storage of non-agricultural source material;
8. The application of commercial fertilizer to land;
9. The handling and storage of commercial fertilizer;
10. The application of pesticide to land;
11. The handling and storage of pesticide;
12. The application of road salt;
13. The handling and storage of road salt;
14. The storage of snow;
15. The handling and storage of fuel;
16. The handling and storage of a dense non-aqueous phase liquid;

17. The handling and storage of an organic solvent;
18. The management of runoff that contains chemicals used in the de-icing of aircraft;
19. An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body;
20. An activity that reduces the recharge of an aquifer;
21. The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard; and
22. The establishment and operation of a liquid hydrocarbon pipeline.

The water budget process that was completed for the Trent Assessment Report did not identify any sub-watersheds that were sufficiently stressed to allow activities 19 and 20 to become significant drinking water threats in the Trent source protection areas. These activities will not be considered further.

The Clean Water Act, 2006 requires that policies must be written for areas where the prescribed threats are or would be a significant threat to municipal water supplies. At this Site is within the TOCM, the local Source Protection Committee has been established through the Trent Conservation Coalition Source Protection Committee (TCCSPC). Potential significant threats to municipal water supplies have been identified within vulnerable areas and recommended actions to reduce or eliminate these threats have been developed through the Trent Source Protection Plan (TSPP) (updated February 2, 2021).

The TCCSPC has identified prescribed activities which, under specific circumstances, constitute a potential significant threat to the local groundwater supply and has recommended specific policy measures to ensure these activities cease to be or never become a significant drinking water threat. The Clean Water Act requires that all existing and future “would be” significant threats be addressed in the source protection plan, regardless of the potential for them to occur. For each policy prepared by the TCCSPC, rationale and notes were included to support the decisions made.

The Source Protection Plan utilizes a number of policies and instruments to address existing and future activities, where they are or would be a significant drinking water threat under the Clean Water Act. The proposed SPP and policies include prohibition and risk management measures intended to:

1. Prohibit activities in the most vulnerable areas where the activity would be a significant drinking water threat if they were to be established; and,
2. Manage existing significant threat activities through the development of site-specific risk management plans (RMPs) that will ensure compliance with the requirements of the SPP.

As a provider of safe drinking water, the TOCM (owner of the municipal wellfield) and the City of Peterborough (operator responsible for the municipal wellfield) are required under Part IV of the Clean Water Act to enforce prohibition and risk management policies related to significant threats in the Trent Source Protection Plan.

The Risk Management Official (RMO) (currently Terri Cox of ORCA) appointed by Regional Council is responsible for enforcing and monitoring risk management policies that relate to significant threats in the SPP. Along with ORCA, TOCM will also have source protection considerations prior to the issuance of building permits and planning approvals.

Once the SPP are approved by the Province, all planning decisions, including those made by the Ontario Municipal Board, must be consistent with the Plan. Both the Region's and local Official Plans and Zoning Bylaws must be brought into conformity with the Trent Source Protection Plan. This will include policies for prohibition and risk management of activities specified in the Plan and will allow for the pre-screening by the RMO via Section 59 of the Clean Water Act.

As prescribed by regulation, the TOCM Official Plan package (dated June 26, 2013 and amended October 15, 2021) has identified restricted land uses (RLU) that are or would be a significant drinking water threat within vulnerable areas, the purpose of which is to ensure that a development proposal complies with significant threat policies, such as prohibition and risk management plans, before it is given approvals.

Under Section 3 (General Development Policies) of the TOCM Official Plan, applicable policies were reviewed including subsections 3.14 (Lot Creation), 3.17 (Oak Ridges Moraine), and 3.19 (Source Water Protection). Additional sections pertaining to the ORM were reviewed, including subsection 5.2 (Rural Areas) and section 6 (Natural Heritage System). Further, the Oak Ridges Moraine Conservation Plan (ORMCP) was also reviewed where applicable. These sections collectively outline incompatible land uses subject to a Risk Assessment and where a Risk Management Plan may be required. As illustrated on **ORM Landform Conservation Area, Figure 4** in this report, a small portion of the ORM is within the westernmost portion of the Site.

2.3.1 Source Water Protection Areas

The Site boundary is situated about 115 m, at its closest point, from the Millbrook municipal well field. The nearest residential dwelling for this proposed development will be about 175 m from the well field. The well field includes the following:

– Well No. 1 – 30 m deep, confined overburden well that is the main production well;
– Well No. 2 – 30 m deep, confined overburden well that is the standby well; and,
– Well No. 3 – 31 m deep, confined overburden well.

Based upon information reviewed, the municipal wells are confined below 9 to 10 m of clay / glacial till and provide about 669 m^3/day (669,000 L/day) on average servicing a population of about 2,195 people[5].

Due to the proximity of the municipal well field, small portions of the Site are within wellhead protection areas (WHPAs) as illustrated on **Wellhead Protection Areas, Figure 5.** WHPAs are areas around the wellhead that contributes source water to the municipal well, illustrating where groundwater is coming from to supply the municipal well(s) and how fast it is travelling through the ground toward the well. The size of the WHPAs is determined by how quickly water travels underground to the well, measured in years. The associated vulnerability scores are calculated from the Wellhead Protection Area (WHPA-A, B, C or D) and the intrinsic vulnerability, which is a measure of how easily a contaminant would travel from the surface to the water supply aquifer. The vulnerability of an aquifer may also be increased by any land use activity or feature that disturbs the surface above the aquifer, or which artificially enhances flow to that aquifer. Constructed or man-made preferential pathways (transport pathways) to aquifers such as large and small diameter wells and excavations can have a significant impact locally on the vulnerability of an aquifer. The following WHPAs are found on the Site:

– WHPA – B (travel time of up to and including 2 years for any water and pollutant within the aquifer to reach the municipal well(s)) and comprises about 10 percent of the Site in the southwestern area where about nine (9) residential lots are proposed;
– WHPA – C (travel time of up to and including 5 years for any water and pollutant within the aquifer to reach the municipal well(s)) and comprises about 0.2 percent of the Site in the southern area. There is no future development in this area (open space only); and
– WHPA – D (travel time of up to and including 25 years for any water and pollutant within the aquifer to reach the municipal well(s)) and comprises about 5 percent of the Site in the southeastern area of the Site where no future development is proposed (open space only).

The Site in not within a WHPA Q1 or Q2 refers to an area where activities that **take water without returning it** to the same source may be a threat (WHPA Q1) or refers to an area where activities that **reduce recharge** may be a threat (WHPA Q2). Neither of these wellhead protection areas apply.

GHD also reviewed other Source Protection Areas including HVAs, SGRAs and IPZs.

An HVA occurs where the subsurface material offers limited protection from contamination resulting from surface activities. A small southern portion of the Site is within an HVA as shown on **Figure 6**; however, this area is not within any of the developable area for the proposed subdivision.

[5] Otonabee Region Conservation Authority – Drinking Water Source Protection Act for Clean Water. Millbrook Municipal Well System. Revised 04/22.

SGRAs are defined as areas where water seeps into an aquifer from rain and melting snow, supplying water to the underlying aquifer. The majority of the Site is within a moderately vulnerable SGRA (score of 4), while a small portion of the south end is highly vulnerable (score of 6). There is no development proposed within the highly vulnerable area. The SGRAs are depicted on **Figure 7** for the Site.

An IPZ is the area around a surface water body that supplies a municipal water system that is vulnerable to potential contaminants threatening the source water. The IPZs are classified by time of travel zones that outline the amount of time it could take any contaminant released into the surface water to reach the municipal intake. There are areas classified as IPZ – 3 on the Site (**Figure 8**), the least concerning of the IPZs where the watershed may be impacted by an extreme event (i.e., a storm). The IPZ – 3 on Site has a vulnerability score of 0 – 3.9 (**Figure 9**) and a low risk of impacting surface water. It is noted that Millbrook does not utilize surface water as a drinking water source.

2.4 Oak Ridges Moraine

The western portion of the Site is situated on the ORM as shown on **Figure 3.** The ORM generally lies about 300 m above sea level and the surface is hilly with a knob and basin relief typical of an end moraine, typically composed of sand and gravel, though there are areas of glacial till.

The Oak Ridges Moraine Conservation Plan (ORMCP) was established in 2002 and governed under the Oak Ridges Moraine Conservation Act, 2001. It provides direction on land use and resource management for the land and water located within the moraine. As part of the Greenbelt, the Oak Ridges Moraine (ORM) is an environmentally sensitive, geological landform that stretches 160 kilometers from the Trent River to the Niagara Escarpment covering approximately 190,000 hectares.

The *Oak Ridges Moraine Conservation Act* of 2001 establishes the following objectives for the Oak Ridges Moraine Conservation Plan:

- protecting the ecological and hydrological integrity of the Oak Ridges Moraine Area;
- ensuring that only land and resource uses that maintain, improve or restore the ecological and hydrological functions of the Oak Ridges Moraine Area are permitted;
- maintaining, improving or restoring all the elements that contribute to the ecological and hydrological functions of the Oak Ridges Moraine Area, including the quality and quantity of its water and its other resources;
- ensuring that the Oak Ridges Moraine Area is maintained as a continuous natural landform and environment for the benefit of present and future generations;
- providing for land and resource uses and development that are compatible with the other objectives of the Plan;
- providing for continued development within existing urban settlement areas and recognizing existing rural settlements;
- providing for a continuous recreational trail through the Oak Ridges Moraine Area that is accessible to all including persons with disabilities;
- providing for other public recreational access to the Oak Ridges Moraine Area
- any other prescribed objectives;

The ORMCP divides the moraine into four (4) land use designations:

- Natural Core Areas (38% of the moraine);
- Natural Linkage Areas (24% of the moraine);
- Countryside Areas (30% of the moraine); and,
- Rural Settlement Area (8% of the Moraine).

At the Site, a small portion (~9.5% of the Site lands) reside within a Rural Settlement Area as illustrated on Figure 10 (ORM Land Use Designation). The remainder of the Site, about 90.5%, is not within the ORM and does not require a ORM land use designation. Rural Settlement Areas reflect a range of existing communities planned by municipalities

to reflect community needs and values. Urban uses and development as set out in municipal official plans are allowed.

2.5 Regional Setting

The Site is located to the northwest of the downtown area of Millbrook and has adjacent lands described as:

North: Forested, undeveloped lands;

East: Forested, undeveloped lands;

West: Former Provincial penitentiary now vacant of structures; and,

South: Residential lots. There are approximately 15 existing lots that are partially or wholly within the WHPA-A (highest risk); and nearly 40 existing lots that are partially or wholly within the WHPA-B. The WHPA-B is the highest risk wellhead protection zone that is within the Site with about nine (9) lots proposed within this zone.

The Site will be municipally serviced for sewer and serviced municipally for water from the Municipal Well Field.

2.5.1 Physiography and Topography

The Site is situated in the physiographic region known as the Peterborough Drumlin Field (Chapman and Putnam, 1984). The physiographic region is shown on the figure entitled **Physiography, Figure 11** indicating this area is within a sand plain with drumlinized till plains to the west.

The Site topography is sloped toward the east / southeast as illustrated on **Figure 12** and slopes away from the Municipal Well Field. The surface relief is nearly 25 m across the Site.

2.5.2 Geology and Hydrogeology

The surficial geology for the Site is shown on **Figure 13** and indicated to be comprised of:

– Foreshore-basinal deposits over the majority of the Site; and;
– Older alluvial deposits comprised of clay, silt, sand, gravel and possible organic material along the eastern edge of the Site.

The Quaternary geology for the Site and surrounding area is illustrated on **Figure 14.** The Site and immediate area is overlain by glaciofluvial ice-contact deposits that are comprised of gravel and sand till that include esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits.

The bedrock in the area consists of limestone of the Lindsay Formation, Trenton-Black River Group of the Middle Ordovician era and is expected to be over 70 m below the existing grade in this area.

3. Methodology

The following activities were undertaken to achieve the objectives of the project:

– **Review of available background information:** Topography, physiography, geology and hydrogeology mapping and report information, MECP well records, and the results of the Geotechnical Investigations (2018 and 2023) and groundwater monitoring (2020) completed on Site by GHD.
– **Subsurface investigation:** Geotechnical Investigations were completed in 2018 (report revised May 8, 2020) and 2023 (field work conducted January 12, 2023). The 2018 subsurface investigation involved advancement of ten (10) boreholes and ten (10) test pits to depths up to 9.6 m. The recent drilling involved the advancement of three (3) boreholes within the proposed storm water management ponds (**Figure 2**) to depths up to 6.6 m to

assess the shallow soil and ground water conditions at the Site. The details of the assessment and field investigation methodology and protocols are provided in the Geotechnical Investigation Reports. The results of the investigations have been considered, as appropriate, to the source water protection assessment.

– **Risk Assessment:** The Source Water Protection risk assessment was completed using the methodologies prescribed under the Clean Water Act Technical Rules (2010) in the following steps:
  - Identification of vulnerable areas and associated vulnerability scores on the Site;
  - Identification of the location of existing and proposed prescribed threat activities (water quality and quantity) in relation to vulnerable areas;
  - Assignment of threat level based on the MECP's Tables of Circumstances under the Clean Water Act – (i.e., risk level assigned based on a combination of vulnerable area (WHPA), vulnerability score and circumstances that make the activity a low, medium or significant drinking water threat);
  - Preparation of a short list of potential significant drinking water threats for which a policy in the Trent Source Protection Plan may apply;
  - Identification of prescribed threat policies proposed under the Trent Source Protection Plan (2015) to address significant drinking water threats (namely to identify prohibited activities and activities requiring a Risk Management Plan); and,
  - Qualitative assessment of risk level based on site-specific conditions and existing /proposed risk management measures.
– **Township of Cavan-Monaghan Official Plan and Oak Ridges Moraine Conservation Plan (ORMCP):** The Source Water Protection risk assessment was completed addressing the Township's Official Plan policies and the ORMCP.

4. Local Setting

Details of the subsurface conditions encountered at the Site are summarized below based on the previous and recent field work completed by GHD. The borehole locations are shown on **Figure 2** and the subsurface conditions are presented on the borehole logs including gradation results (**Appendix A**).

Based upon the geotechnical investigations completed by GHD, the overburden generally consisted of silty sand over glacial till with isolated layers of sand and gravel as well as clayey silt till observed within boreholes drilled at BH1-23 and BH2-23. Review of MECP well records within 250 m generally indicates the presence of sandy clay with variable amounts of gravel (interpreted to be glacial till) with some well records reporting sand gravel. The well records indicate overburden wells in this area as bedrock was not encountered. Some records in the area indicate the presence of clay, as illustrated on the cross-sections (**Figures 15, 16 and 17**) with variable amounts of sand and gravel which is interpreted to be glacial till.

4.1 Site Geology

The local geology and subsurface conditions are based upon the drilling that was conducted by GHD at the Site. The initial soils exploration investigation was conducted on July 17 and 18, 2018 by drilling ten (10) boreholes using a track-mounted drill rig. Boreholes extended to depths ranging from 4.1 to 9.6 m. Ten (10) test pits were also excavated to depths ranging from 2.7 to 3.7 m.

During the most recent subsurface investigation conducted by GHD on January 16 through 17, 2023, three (3) boreholes were drilled using a track-mounted drill rig. Boreholes extended to depths ranging from 6.1 to 6.6 m.

It should be noted that the boundaries between the strata have been inferred from the test hole observations. They generally represent a transition from one soil type to another, and should not be inferred to represent an exact plane of geological change. Further, conditions may vary between and beyond the test holes.

Based upon the drilling that was completed, the proposed development area is comprised generally of topsoil underlain by silty sand, followed by till comprised of sandy silt with varying amounts of gravel and clay. Bedrock was not encountered.

4.2 Site Hydrogeology

Groundwater seepage was observed at depths ranging between 0.8 to 7.6 m during drilling conducted on the Site; however, was not encountered in any of the test pits that were excavated in 2018. Single well response testing (i.e. hydraulic conductivity (K) testing) of the screened intervals from monitoring wells BH-1, BH-4 and BH-8 assessed the average horizontal K to be 2.7×10^{-6} m/sec indicative of silty sand and the upper range of till material. The K values groundwater flow through this material would be minimal. GHD did not observe artesian groundwater conditions in any of the test holes advanced during our field activities.

Seasonal water is expected to flow within the upper sandy layers, however limited vertical migration is expected within the till or low permeability lenses / layers such as the clayey silt till observed within two (2) of the test holes. Only a minor portion of the existing infiltration is expected to recharge the deeper aquifers that are confined below the till that provide for the municipal well field. Information from MECP well records indicate the presence of one (1) principal aquifer system:

– An overburden of sand and gravel aquifer below the till tapped by drilled wells.

There may be some unconfined shallow water table dug /bored wells in the area as one (1) well record indicated a dug / bored well.

Primary aquifer / aquitard units underlying the Site, based on the test holes and background information include the following:

– Recent Deposits (Silty Sand / Sand) – At shallower depths, this material was found to be generally unsaturated. More permeable conditions supporting water was encountered closer to the upper confines of the till layer. Perched seasonal groundwater may be found in this deposit and will fluctuate based on seasons.
– Glacial Till – There is generally expected to be some groundwater within sand seams / layers within the till itself. The volume of water within these seams / layers is generally expected to be limited. The till deposit observed by GHD was comprised of sandy silt as well as clayey silt with varying amounts of sand, gravel and clay. The till is generally expected to form an aquitard (i.e. confining layer) which overlies and protects the underlying aquifer from which the Millbrook Municipal Wellfield draws from.
– Confined Overburden Aquifer - The Millbrook Supply wells tap a confined overburden aquifer located beneath the glacial till aquitard encountered during GHD's subsurface investigations. According to an MECP Inspection Report (dated September 10, 2019), the Millbrook Municipal Well Field supply wells #1, #2 and #3 are flowing artesian wells that are screened in sandy gravel overburden (well #1) and clay and gravel overburden (wells #2 and #3). The municipal wells are screened within this confined aquifer at depths of about 30 m.

In relation to Source Water Protection, the relevant site specific hydrogeologic conditions of the Site are summarized as follows:

– The shallow stratigraphy within the proposed construction area up to 9.6 m consists of topsoil underlain by silty sand, followed by till comprised of sandy silt with varying amounts of gravel and clay. There was limited groundwater within the shallow sand layers and till layers, while greater quantities of groundwater were found within intermittent sand / sand and gravel layers within the till.
– The Site appears to be underlain by a till aquitard. This aquitard overlies and confines the source aquifer that the Millbrook Well Field draws from and protects the water supply aquifer from surface contaminants.
– The municipal wells are screened at depths of about 30 m. The source aquifer is confined and essentially isolated from the proposed shallow surface excavations and groundwater.
– The Oak Ridges Moraine runs along the west boundary of the Site (**Figure 14**).

– Portions of the Site are within WHPAs with time of travel to the Millbrook Water Supply wells ranging from 2 years to 5 to 25 years (**Figure 5**).
– A small area at the south end of the Site is identified as an HVA (**Figure 6**); however, falls outside of the actual development area.
– The Site area to be developed is within a Significant Groundwater Recharge Area of moderate vulnerability (score of 4). A small portion of the Site is within a high vulnerable area; however, this area is not proposed to be developed (**Figure 7**).

4.3 Anthropogenic Transport Pathways

In our opinion, the potential of an anthropogenic transport pathway is expected to be limited. Future sewers and basements are expected to be relatively shallow compared with the depths of the Millbrook Municipal Well Field. The stormwater ponds will be lined and will not infiltrate stormwater. The boreholes / monitoring wells advanced on the Site were completed to depths up to 9.6 m providing valuable information regarding the subsurface conditions. Any monitoring wells that are not used as part of a future groundwater monitoring program should be decommissioned in accordance with Ontario Regulation 903.

Based on the above, and on the depth of the source aquifer, it is considered unlikely there are any anthropogenic transport pathways for contaminants to reach the underlying municipal groundwater aquifer.

5. Risk Assessment

A Risk Assessment was completed, as prescribed under the Clean Water Act, 2006, for the Site to identify significant threats to the local water supply (i.e. the Millbrook Municipal Well Field) from proposed land use activities (there are currently no existing land use activities that warrant a risk assessment). Risks associated with the proposed development in relation to the ORM need to be assessed as the west boundary of the Site is located within the ORM. The ORMCP was reviewed and is discussed below. Drinking water threats include those land activities that may impair water quality or impact water quantity. From a quality perspective, there are a number of potential land use activities that could be a threat to the quality of source water as defined in the Clean Water Act (refer to **Section 2** of this report). These include:

– Application of road salt;
– The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage;
– Storage of snow;
– Pesticide use; and,
– Fertilizer use.

It is our opinion that the handling and storage of fuel is not a significant threat as the development does not include a bulk plant or fuel facility and there will be no private large quantity storage such as would be with a farm, contractor yard or heating oil tanks. It is expected that there will be small quantity usage for domestic use (i.e. gas storage in small volume containers for re-fuelling lawnmowers, snowblowers etc. that are exempt within the meaning of the Environmental Protection Act). For these reasons, handling and storage of fuel will not be carried forward.

Similarly, the handling and storage of an organic solvents or dense non-aqueous phase liquids (DNAPLs) is not considered as they are not anticipated to be present at significant volume for residential use. DNAPLs include dry cleaning chemicals and cleaning agents and organic solvents include paints, varnishes, adhesives or degreasing agents and in the production of dyes, polymers, plastics, textiles, printing inks etc., and are not considered applicable for this residential development.

Water quantity threats are defined in the Clean Water Act by water taking related to dewatering or irrigations systems or paving over recharge areas preventing the seepage of groundwater. As identified in **Section 2.3** of this report, the water budget process that was completed for the Trent Assessment Report did not identify any sub-watersheds that were sufficiently stressed to allow activities 19 and 20 to become significant drinking water threats in the Trent source protection areas; and therefore, there are no policies pertaining to water quantity source water protection are applicable.

Water threats are ranked significant, medium or low depending on vulnerability scores in sensitive areas. Those land use activities located within highly vulnerable areas, typically closest to the production well, are generally ranked as significant threats. The Trent Source Protection Plan details actions that ensure drinking water threats cease to be or never become significant risks to drinking water. Mandatory actions can only be assigned to land use activities identified as a significant drinking water threat as outlined in the regulation.

The Trent Source Protection Plan focuses on mandatory actions related to existing and future significant threats from land use activities within the highly vulnerable areas. Future land use activities that may be a significant threat are generally proposed to be controlled by prohibiting the activity within highly vulnerable areas. Risk management tools prescribed in Part IV of the *Clean Water Act* are generally the proposed approach to manage existing land activities.

Part IV powers allow a municipality to address specific activities that are threats to drinking water in wellhead protection areas where these threats are or could be significant. Where specified in the Trent Source Protection Plan, the Township and local municipalities will be required to:

– Enforce prohibition of an activity (Prohibition Section 57) by a Risk Management Official (RMO);
– Require a person to seek approval from the RMO prior to engaging in the activity and subject to routine inspections by Risk Management Inspectors (Risk Management Sections 56 and 58); or,
– Require a person to seek approval from the RMO prior to the issuance of a Planning Act or Building Code Act related permit (Restricted Land Use Section 59) as part of the complete application requirements under the Planning Act and as applicable law under the Building Code Act.

The Risk Management Official and Inspectors are responsible for enforcing and monitoring risk management plans that relate to significant threats in wellhead protection areas. The remaining threats will be managed using other tools such as Environmental Compliance Approvals and powers under the Building Code Act. A Risk Management Official has the authority to accept a Risk Assessment (RA) that concludes that an activity is not a significant drinking water threat at a specific location.

5.1 Identification of Vulnerable Areas

The Clean Water Act defines “vulnerable areas” as:

– A significant groundwater recharge area (SGRA);
– A highly vulnerable aquifer (HVA);
– A surface water intake protection zone; or
– A wellhead protection area (WHPA).

A portion of the Site along the west boundary is located within the Oak Ridges Moraine Conservation Planning Area and therefore, the ORM Conservation Plan needs to be considered. This area specifically, is designated as Rural Settlement Area.

The southwest and south area of the Site falls within various WHPAs with time of travel capture zone WHPA of the Municipal Well Field ranging from 2 years to 5 – 25 years. The southwest area of the Site falls within WHPA-B (2 year travel time); a very small area at the south end of the Site falls within WHPA-C (2 – 5 year travel time); and an area southeast on the Site is within WHPA-D (5 – 25 year travel time). The Site therefore has a WHPA vulnerability score ranging from 2 (low) for WHPA areas C and D to 10 (high) for WHPA area B.

A small area at the south end of the Site is identified as an HVA, as illustrated on **Figure 6**. No development is proposed to occur with the HVA area. The HVA area will not be considered further.

The majority of the Site is identified as a SGRA of moderate vulnerability (**Figure 7**) with a score of 4.

The north boundary and an area southeast on Site are classified as IPZ – 3 (**Figure 9**) with a low vulnerability score of 0 – 3.9. Within the northeastern area of the Site, and within the IPZ-3 area, a stormwater pond is proposed. The discharge of untreated stormwater includes facilities that are designed to discharge stormwater from a stormwater retention pond to land or surface water. The circumstances considered to determine if discharge of untreated stormwater from a stormwater retention pond is a significant drinking water threat are the size of the drainage area associated with the facility and the predominant land use in the drainage area. However, based upon the low vulnerability score for the IPZ-3 on this Site, no further risk assessment is required.

5.2 Oak Ridges Moraine

According to the Oak Ridges Moraine Conservation Plan, this area of the ORM is designated as a Rural Settlement Area and development, as set out in municipal official plans, is allowed. According to the TOCM official plan, the purpose of the ORM – Rural designation is to maintain the rural character of the area and to protect the lands from uncontrolled and scattered development.

Lands in the ORM are subject to the Natural Heritage System policies. The Natural Heritage System policies pertaining to the Site were reviewed. The policies include that new infrastructure must meet one of the following two objectives: i) Support agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted; or, ii) serve the significant growth and economic development expected in Southern Ontario by providing for the appropriate infrastructure connections among urban growth centers and between these centers and Ontario's borders. The proposed development for this Site meets these objectives.

The lands proposed for development are within 120 metres from the boundary of the ORM and therefore the development is subject to Section 6.7 of the TOCM official plan. Development within 120 metres of the ORM must ensure that it will not have an adverse impact on the ORM by establishing vegetation buffers and limiting grading and alteration of the natural landscape within the ORM. To limit impact on the ORM, the proposed residences for this development are located away from the west boundary of the Site as reasonably possible. The proposed conceptual plan has been reviewed by GHD, has residential development within the Rural Settlement Area and it is not anticipated that the development will have an adverse impact on the ecological integrity of the Natural Heritage System or the ORM.

Section 6.7.3 of the TOCM official plan protects Landform Conservation Areas within the ORM consisting of steep slopes, kames, kettles, ravines and ridges. There are none of these features within the area to be developed within the ORM area on the Site.

5.3 Identification of Potential Drinking Water Quality Threats

A land use inventory was completed for the proposed Site to identify potential drinking water threats as prescribed under the Clean Water Act, 2006. There are no existing activities threatening the water supply at this time. Thus, the land use inventory will focus on proposed (i.e., new or future) prescribed threat activities identified for the Site along with a qualitative evaluation of the threat level using the methodologies prescribed under the Clean Water Act Technical Rules (2010) and the Tables of Drinking Water Threats (MOE, 2009).

The following potential drinking water quality threats will be assessed based upon the risk scores that have been built into the Tables of Drinking Water Threats and Circumstances:

– Application of road salt and
– Sewage system or sewage works – stormwater management facility including storm sewers.

The following threats are identified as potentially existing; however, for various reasons are being ruled out and not considered further:

– Storage of Snow;
– Pesticide Use; and,
– Fertilizer Use.

The following outlines the threats and the reasons for not considering the threats for further review.

Storage of Snow

Significant Threat

- The storage of snow is a significant threat if the area upon which snow is stored (above grade or below grade storage) is more than 5 hectares within the WHPA-B area. This threat includes the following chemicals:
  – Above grade storage: Chloride, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1 or Sodium
  – Below grade storage: Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1 to F3, Sodium, Zinc or one or more of its compounds containing Zinc
- The storage of snow is a significant threat if the area upon which snow is stored is at least 0.01 but not more than 0.5 ha (below grade storage) within the WHPA-B area. This threat includes the following chemicals:
  – Lead or one or more of its compounds containing Lead, Nitrogen
- The storage of snow is a significant threat if the area upon which snow is stored is more than 0.5 ha but not more than 1 hectare (below grade storage) within the WHPA-B area. This threat includes the following chemicals:
  – Chloride, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1, Sodium
- The storage of snow is a significant threat if the area upon which snow is stored is more than 1 ha but not more than 5 hectares (above or below grade storage) within the WHPA-B area. This threat includes the following chemicals:
  – Above grade storage: Lead or one or more of its compounds containing Lead, Nitrogen
  – Below grade storage: Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1 – F3, Sodium, Zinc or one or more of its compounds containing Zinc.
- The storage of snow cannot be a significant threat for an IPZ-3 zone with a score of 0 – 3.9.

Moderate Threat

- The storage of snow is a moderate threat if the area upon which snow is stored is more than 5 ha (above grade storage) within the WHPA-B area. This threat includes the following chemicals:
  – Copper or one or more of its compounds containing Copper, Petroleum Hydrocarbons F3 and F4, Zinc or one or more of its compounds containing Zinc
- The storage of snow is a moderate threat if the area upon which snow is stored is at least 0.01 but not more than 0.5 ha within the WHPA-B area. This threat includes the following chemicals:
  – Above grade storage: Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1 – F3, Sodium, Zinc or one or more of its compounds containing Zinc
  – Below grade storage: Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Petroleum Hydrocarbons F1 – F4, Sodium, Zinc or one or more of its compounds containing Zinc

- The storage of snow is a moderate threat if the area upon which snow is stored is more than 0.5 ha but not more than 1 hectare (above grade storage) within the WHPA-B area. This threat includes the following chemicals:
  - Above grade storage: Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Lead or one or more of its compounds containing Lead, Nitrogen, Petroleum Hydrocarbons F1 – F3, Sodium, Zinc or one or more of its compounds containing Zinc
  - Below grade storage: Copper or one or more of its compounds containing Copper, Petroleum Hydrocarbons F1 – F4, Zinc or one or more of its compounds containing Zinc
- The storage of snow is a moderate threat if the area upon which snow is stored is more than 1 ha but not more than 5 hectares (above grade storage) within the WHPA-B area. This threat includes the following chemicals:
  - Chloride, Copper or one or more of its compounds containing Copper, Cyanide, Petroleum Hydrocarbons F1 – F3, Sodium, Zinc or one or more of its compounds containing Zinc
- The storage of snow cannot be a moderate threat for an IPZ-3 zone with a score of 0 – 3.9.

There are no low-risk threats related to snow storage for the Site based upon the vulnerability scores of the WHPA-B and IPZ-3.

The storage of snow is not a threat for the Site as snow storage within this residential development will not occur. Thus, the threat is removed and not considered further.

Pesticide Use

Significant Threat

- The application of pesticides to land is a significant threat if the total application area is greater than 10 ha within a WHPA-B. This threat includes the following chemicals:
  - Atrazine, Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), MCPA (2-methyl-4-chlorophenoxyacetic acid), MCPB (4-(4-chloro-2-methylphenoxy)butanoic acid), Mecoprop, Metalaxyl, Metolachlor or s-Metolachlor
- The application of pesticides to land is a significant threat if the total application area is 1 to 10 ha within a WHPA-B. This threat includes the following chemicals:
  - MCPA (2-methyl-4-chlorophenoxyacetic acid), Mecoprop

Moderate Threat

- The application of pesticides to land is a moderate threat if the area of land to which the pesticide is applied is less than 1 hectare within WHPA-B. This threat includes the following chemicals:
  - Atrazine, Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), MCPA (2-methyl-4-chlorophenoxyacetic acid), MCPB (4-(4-chloro-2-methylphenoxy)butanoic acid), Mecoprop, Metalaxyl, Metolachlor or s-Metolachlor, Pendimethalin
- The application of pesticides to land is a moderate threat if the total application area is greater than 10 ha within a WHPA-B. This threat includes the following chemicals:
  - Glyphosate, Pendimethalin
- The application of pesticides to land is a moderate threat if the total application area is 1 to 10 ha within a WHPA-B. This threat includes the following chemicals:
  - Atrazine, Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), Glyphosate, MCPB (4-(4-chloro-2-methylphenoxy) butanoic acid), Metalaxyl, Metolachlor or s-Metolachlor, Pendimethalin

Low Threat

- The application of pesticides to land is a low threat if the area of land to which the pesticide is applied is less than 1 hectare within WHPA-B. This threat includes the following chemicals:

- Glyphosate

The WHPA-B area is on the order of about 1 ha. The chemicals listed are generally for agricultural or commercial usage such as golf courses. These products are regulated and generally not used for domestic purposes. It is our opinion that the threat to the municipal well field, approximately 175 m from the nearest proposed residential lot, is minimal due to typical small quantity domestic pesticide use. Thus, in our opinion the threat is removed and not considered further.

Fertilizer Use

The application of fertilizer relates to agricultural usage as a percentage of managed land and livestock density. This does not apply to the proposed residential development.

The following table is provided to assess the threats of road salt and the stormwater pond to the municipal well field as a result of constructing the proposed residential development.

Table 1 Potential Drinking Water Quality Threats of Proposed Development

Prescribed Drinking Water Threat	Chemical Quantity Circumstance	Applicable Circumstances (Tables of Drinking Water Threats)	Applicable Area	Vulnerability Score	Type of Threat	Clean Water Act Risk Score	Applicability
Application of Road Salt	The % of impervious surface area is 80% or more	Road salt application in an area	WHPA – B	10	Chemical	Significant	Not appliable. Percentage of road surface area within WHPA-B is about 4.5%.
	The % of impervious surface area is at least 8%, but less than 80%		WHPA – B	10		Moderate	Not appliable. Percentage of road surface area within WHPA-B is about 4.5%.
	The % of impervious surface area is at least 1%, but less than 8%		WHPA – B, IPZ-1	10		Moderate	Percentage of road surface area for WHPA-B is within the range. The Site is not an IPZ-1 area. This risk score is, in our opinion, the most likely to apply.
	The % impervious surface area is less than 1%		WHPA – B	10		Low	Not applicable. The impervious surface area is less than the expected surface area for the subdivision.
The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage	Where the drainage area is >100 hectares and the predominant land use is rural, agricultural or low density residential	Storm water management facility designed to discharge storm water to land or surface water	WHPA-B	10	Chemical	Significant	Not appliable. Drainage area to stormwater ponds on the Site is much less than 100 ha
	Where the drainage area is <1 hectare and the predominant land use is rural, agricultural or low density residential		WHPA-B	10		Low	Not applicable. There will be no stormwater ponds within the WHPA-B.
	Where the drainage area is 10-100 hectares and the predominant land use is rural, agricultural or low density residential		IPZ-1	10		Significant	Not appliable. Site is not within an IPZ
	Where the drainage area is >100 hectares and the predominant		WHPA-B	10		Moderate	Not appliable. Drainage area to stormwater ponds on

Prescribed Drinking Water Threat	Chemical Quantity Circumstance	Applicable Circumstances (Tables of Drinking Water Threats)	Applicable Area	Vulnerability Score	Type of Threat	Clean Water Act Risk Score	Applicability
	land use is rural, agricultural or low density residential						the Site is much less than 100 ha
	Where the drainage area is 1 to <10 hectares and the predominant land use is rural, agricultural or low density residential	Storm water management facility designed to discharge storm water to land or surface water	WHPA-B	10	Chemical	Moderate	The size of the drainage area is applicable; however, there will be no stormwater ponds within the WHPA-B. In addition, the threat relates to Arsenic or one or more of its compounds containing Arsenic, Cadmium or one or more of its compounds containing Cadmium, Chromium VI, Lead or one or more of its compounds containing Lead, Mecoprop, Mercury or one or more of its compounds containing Mercury, Nitrogen. It is also very unlikely that these chemicals will be used in a residential development.
The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage	Where the drainage area is 10 to 100 hectares and the predominant land use is rural, agricultural or low density residential		WHPA-B	10		Moderate	Not applicable. Drainage area is expected to be too large and there will be no stormwater ponds within the WHPA-B. The chemicals for this threat relate to Aluminum or one or more of its compounds containing Aluminum, Arsenic or one or more of its compounds containing Arsenic, Cadmium or one or more of its compounds containing Cadmium, Chloride, Chromium VI, Copper or one or more of its compounds containing Copper, Lead or one or more of its compounds containing Lead, Mecoprop, Mercury or one or more of its compounds

Prescribed Drinking Water Threat	Chemical Quantity Circumstance	Applicable Circumstances (Tables of Drinking Water Threats)	Applicable Area	Vulnerability Score	Type of Threat	Clean Water Act Risk Score	Applicability
							containing Mercury, Nickel or one or more of its compounds containing Nickel, Nitrogen, one or more Polycyclic Aromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons F1 to F3, Zinc or one or more of its compounds containing Zinc.
The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage	Where the drainage area is <1 hectare and the predominant land use is rural, agricultural or low density residential	Storm water management facility designed to discharge storm water to land or surface water	WHPA-B	10	Chemical	Low	Not applicable. There will be no stormwater ponds within the WHPA-B. The chemicals for this threat relate to Aluminum or one or more of its compounds containing Aluminum, Arsenic or one or more of its compounds containing Arsenic, Cadmium or one or more of its compounds containing Cadmium, Chloride, Chromium VI, Copper or one or more of its compounds containing Copper, Lead or one or more of its compounds containing Lead, Mecoprop, Mercury or one or more of its compounds containing Mercury, Nickel or one or more of its compounds containing Nickel, Nitrogen, one or more Polycyclic Aromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons F1 to F3, Zinc or one or more of its compounds containing Zinc.
	Where the drainage area is 1 to <10 hectares and the predominant land use		WHPA-B	10		Low	Most applicable of the threats. The size of the drainage area is applicable; however, there will be no

Prescribed Drinking Water Threat	Chemical Quantity Circumstance	Applicable Circumstances (Tables of Drinking Water Threats)	Applicable Area	Vulnerability Score	Type of Threat	Clean Water Act Risk Score	Applicability
	is rural, agricultural or low density residential						stormwater ponds within the WHPA-B. Aluminum or one or more of its compounds containing Aluminum, Chloride, Copper or one or more of its compounds containing Copper, Glyphosate, Nickel or one or more of its compounds containing Nickel, one or more Polycyclic Aromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons F-F3, Zinc or one or more of its compounds containing Zinc.

The prescribed threat activities identified by GHD are the application of road salt and stormwater management associated with the Site. Based upon our assessment and review of the Table of Threats and Circumstances, the following is noted:

– Application of Road Salt:
  - Based on the information reviewed, the application of road salt is a low to moderate risk to the aquifer. The area of the development where road salt application is within the WHPA-B is a short stretch of road accessing the subdivision from Turner Street. Based upon the information reviewed and the current development concept, road salt application would not be considered a significant drinking water threat.
– The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage:
  - Based on the information reviewed, this threat is not applicable provided the stormwater ponds are not constructed within the WHPA-B area and at most, this threat is considered a low risk that can never be a significant drinking water threat.
  - GHD also recommends that the stormwater pond in close proximity of WHPA-B shall not be functioning as an infiltration pond as this may promote the infiltration of salt-impacted stormwater. The northernmost pond could be utilized for infiltration, if required. Ideally, infiltration should be limited to clean, stormwater from rooftops.

The policy includes a "Risk Management Plan (RMP)" under Source Water Protection, which in our opinion is not required for this Site. The Site is not expected to be a significant drinking water threat to the Millbrook Municipal Well Field and the supply wells. The potential threats to impact the municipal well field within the WHPA – B area based upon the Table of Threats and Circumstances are moderate to low.

The application of road salt is currently occurring in the area of the Municipal Well Field on a regular basis to provide safety to pedestrians and vehicles. The new stretch of road to which salt will be applied to access the subdivision and within WHPA-B is about 50 to 60 m in length. Also given the confined layer overlying the aquifer in which the municipal wells are sourced, the potential threat at the Site to directly impact the Millbrook supply wells, in our opinion, is expected to be low.

To reduce the risk of impact to the underlying aquifers, the existing monitoring wells on the Site, at depth of up to 6.1 m, shall be abandoned in accordance with Ontario Regulation 903.

The Risk Assessment identified potential drinking water quality threats at the Site, however, these threats are low risk and as such it is our opinion that a Risk Management Plan is not required.

5.4 Identification of Potential Drinking Water Quantity Threats

Activities related to the development of the Site are not anticipated to pose a significant threat to the drinking water quantity supply. Water takings associated with dewatering during the construction of the development could result in a temporary decline of shallow groundwater. Any suppression of the water table is expected to be short term and localized. There is expected to be negligible hydraulic connectivity between the upper unconfined water zone and the confined system tapped by the Millbrook water supply wells.

It is noted that any water takings of greater than 50,000 L/day and less than 400,000 L/day will require an Environmental Registry Activity Sector (EASR) permit to pump groundwater for construction dewatering or a Permit To Take Water (PTTW) Category 3 application to pump greater than 400,000 L/day. The EASR and PTTW are applied for and authorized through the MECP.

Finally, the Site is not within a WHPA-Q zone and therefore, no impacts to water quantity are expected from the Site development and activities listed above. There is no risk level associated with water quantity threats under the Trent Source Protection Plan. As indicated previously, the water budget process that was completed for the Trent

Assessment Report did not identify any sub-watersheds that were sufficiently stressed to become significant drinking water quantity threats in the Trent source protection areas.

In summary, the identification of potential drinking water quantity threats is not applicable and will not be an issue for the following reasons:

– The water takings related to the construction of the proposed development are expected to be of low volume;
– The Site is not within a WHPA-Q and according to the Trent SPP water quantity policies are not applicable, and;
– The Site is hydraulically isolated from the confined aquifer in which the municipal supply wells are located. Very little, if any, of the water from the Site is expected to infiltrate to the aquifer supplying the municipal supply wells.

6. Risk Management

In our opinion, a Risk Management Plan (RMP) under Source Water Protection is not required for this Site. There are no significant threats to groundwater quality or quantity from the proposed development. The threat of salt impacting the municipal water supply is considered to be a low threat as the stretch of road within the WHPA-B area of the Site is relatively short (50 to 60 m) compared with existing roadways in the area also within WHPA-A and WHPA-B that are treated with road salt. Alternatives for road salt could also be considered in order to reduce / eliminate the threat of road salt impact.

Our assessment of the stormwater management for the Site indicated that this is not a drinking water threat. Similarly, our assessment of pesticide / fertilizer usage and snow storage were also eliminated threats to the municipal well field.

Prior to construction, storm water management techniques should be incorporated to control additional surface water runoff and permit enhanced infiltration into the surrounding ground. Storm water management techniques will minimize the potential for groundwater impact and also minimize the amount of fine-grained soil particles becoming mobile and entering into down-gradient areas. Installation of strategically placed silt fences will filter any excess storm water runoff prior to entering the infiltration areas.

7. Summary and Recommendations

In relation to Source Water Protection, the relevant site specific hydrogeologic conditions of the Site are summarized as follows.

– Based upon the geotechnical investigations completed by GHD, the overburden generally consisted of silty sand over glacial till with isolated layers of sand and gravel as well as clayey silt till observed within some boreholes. Water seepage was observed during the drilling at depths of 0.8 to 7.6 m. No artesian conditions were observed in our test holes.
– The Site is underlain with low permeability soil expected to confine and protect the aquifer from which the Millbrook Municipal Well Field including supply wells #1, #2 and #3 obtain water. These wells are drilled to depths of approximately 30 m.
– The majority of the proposed development is not occurring within vulnerable areas, with the exception of the lots (approximately 9 lots) proposed in WHPA – B within the southwest area of the Site. The quality threat risk to the aquifer from the proposed development is considered to be low for the application of road salt. In our opinion, there are no other quality threats that are a risk to the underlying aquifer. There are no quality threats that can ever be a significant risk to the underlying aquifer based upon the proposed development.
– There are no water quantity threats based upon this proposed development.
– In our opinion, a risk management plan is not required for this development.

In our opinion, the development of this Site meets the policies of the Township of Cavan-Monaghan Official Plan, Oak Ridges Moraine Conservation Plan and Source Water Protection Plan and is suitable for this Settlement Area.

The following Statement of Limitations should be read carefully and is an integral part of this report. We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office. We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

All of Which is Respectfully Submitted,

GHD

Robert Neck, M.Eng., P.Geo. (Limited)
Senior Geoscientist

Steve Gagné, H.S.Bc.
Associate, Project Director

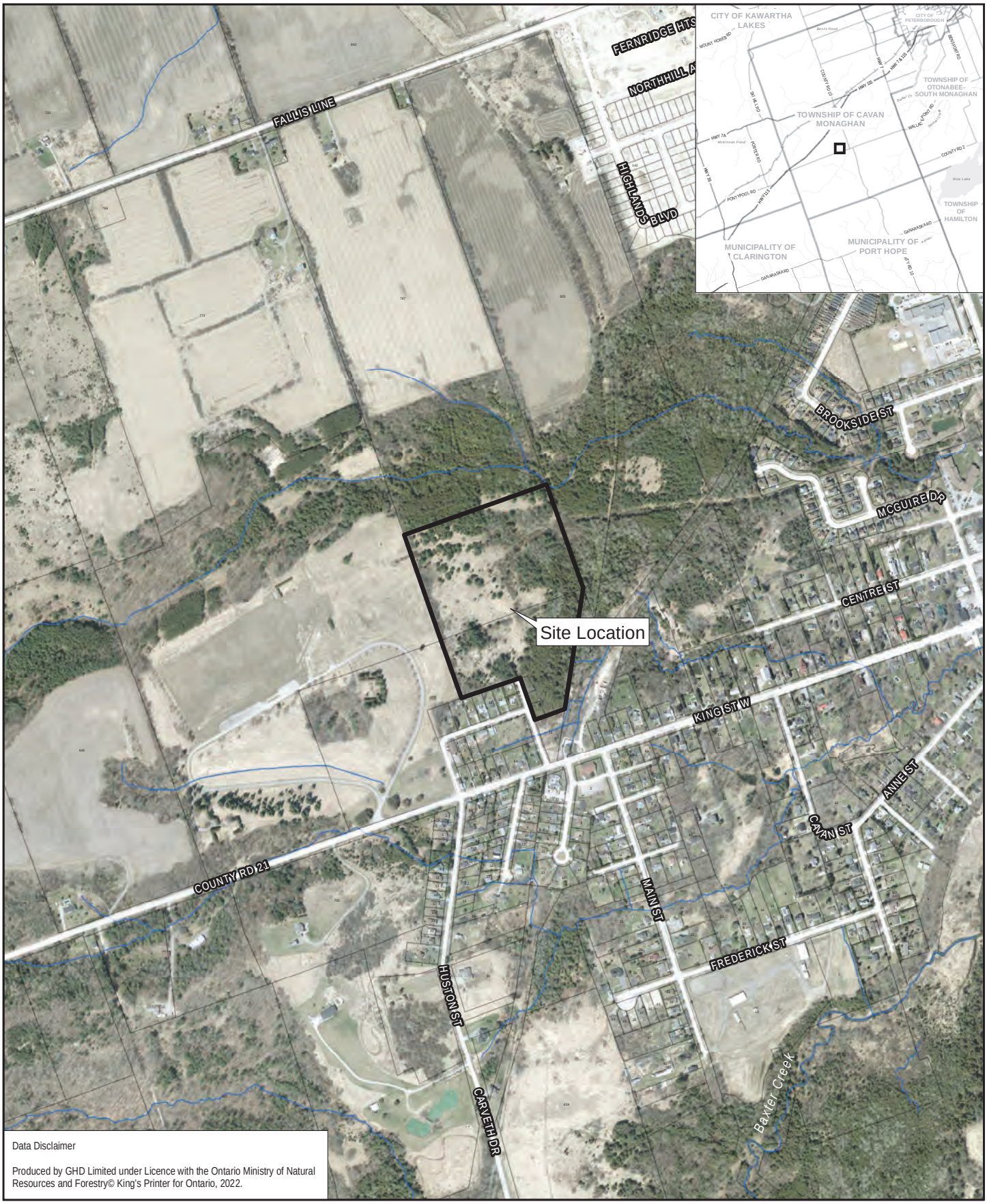
8. Limitations of the Investigation

This report is intended solely for Veltri and Son Ltd. and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The conclusions and recommendations made in this report are in accordance with our present understanding of the project, the current and proposed site use, surface and subsurface conditions, and are based on available information, a site reconnaissance on the date set out in the report, information gleaned from appropriate people and sources and the work scope approved by the Client and described in the report and should not be construed as a legal opinion. Therefore, our liability is limited to interpreting accurately the information made available to us and assessing the property information investigated. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of environmental engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

If conditions at the Site change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Figures



Data Disclaimer

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1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

Site Location Plan

Project No. 12599716
Revision No.
Date March 2023

Figure 1

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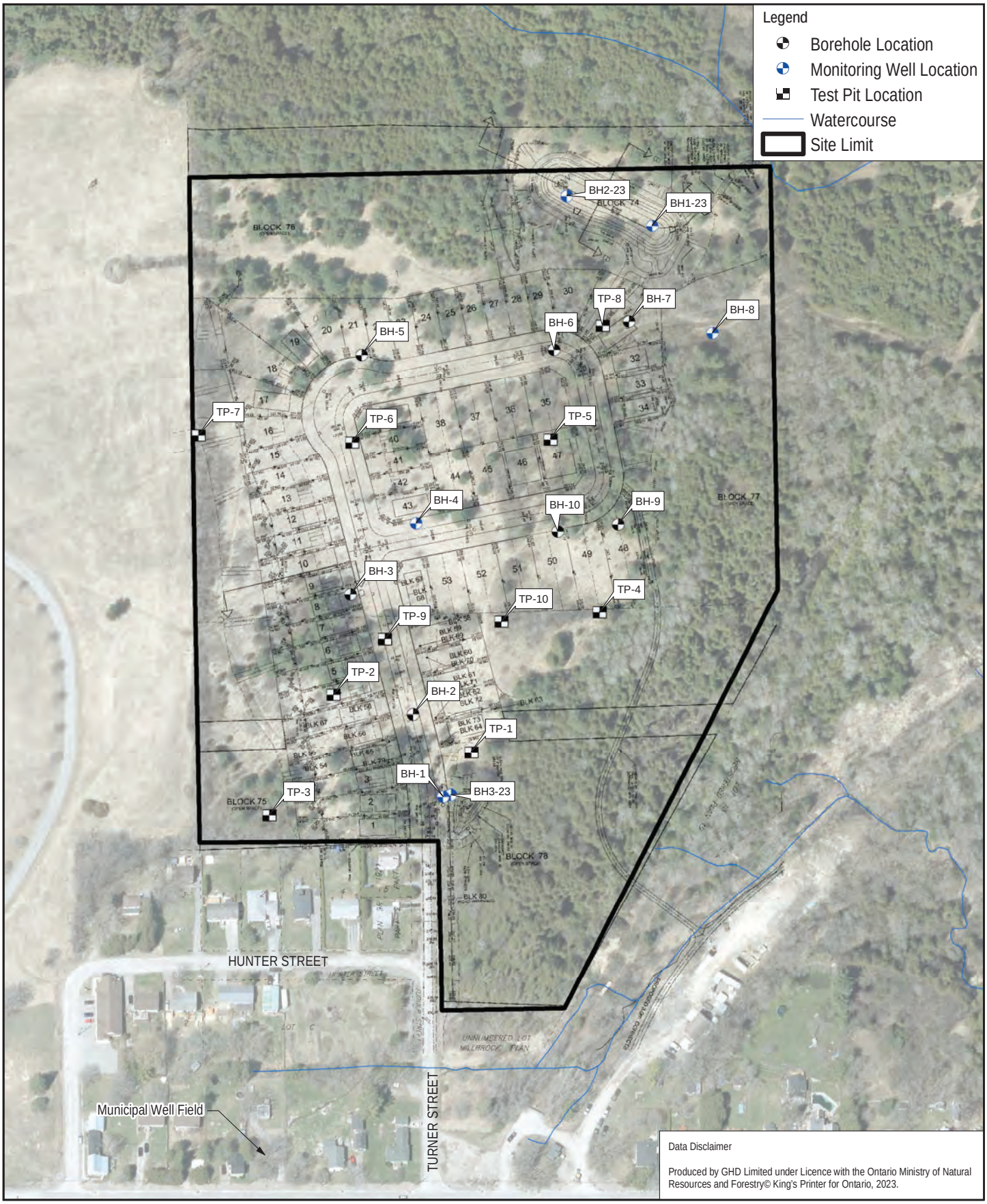
Print date: 14 Feb 2023 - 06:28

Data source: Image © County of Peterborough, 2018.



1 cm = 26 meters

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

Test Hole Plan

Project No. 12599716
Revision No.
Date March 2023

Figure 2

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Print date: 14 Feb 2023 - 07:22

Data source: Image © County of Peterborough, 2018.

1 cm = 100 meters

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

ORM Planning Area

Project No. 12599716
Revision No.
Date March 2023

Figure 3

O:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS013 - ORM Planning Area.mxd
Print date: 09 Jan 2023 - 10:58

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.

1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

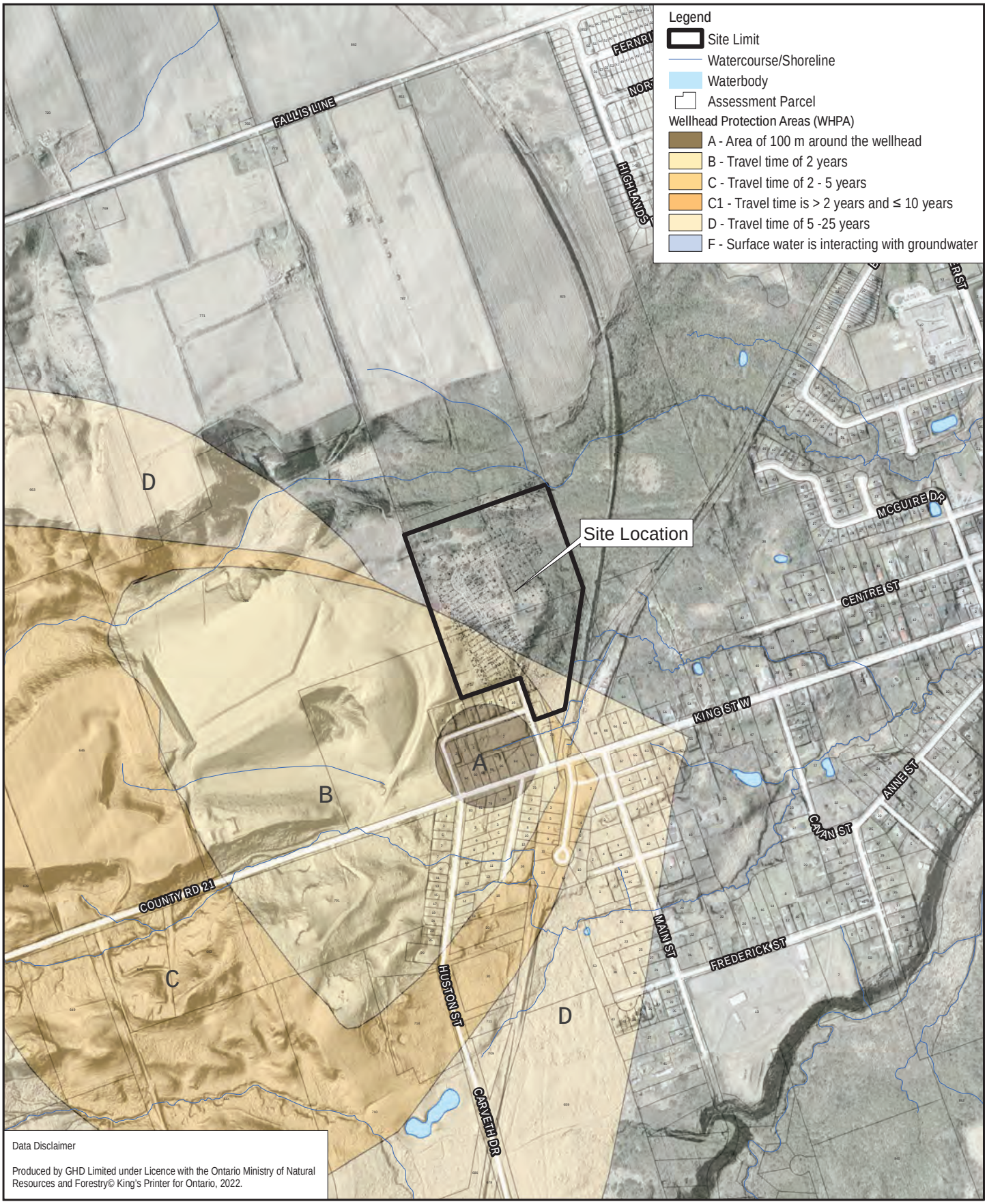
ORM Landform Conservation Area

Project No. 12599716
Revision No.
Date March 2023

Figure 4

O:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS015 - ORM Landform Conservation Area.mxd
Print date: 09 Jan 2023 - 11:09

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



Data Disclaimer

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1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

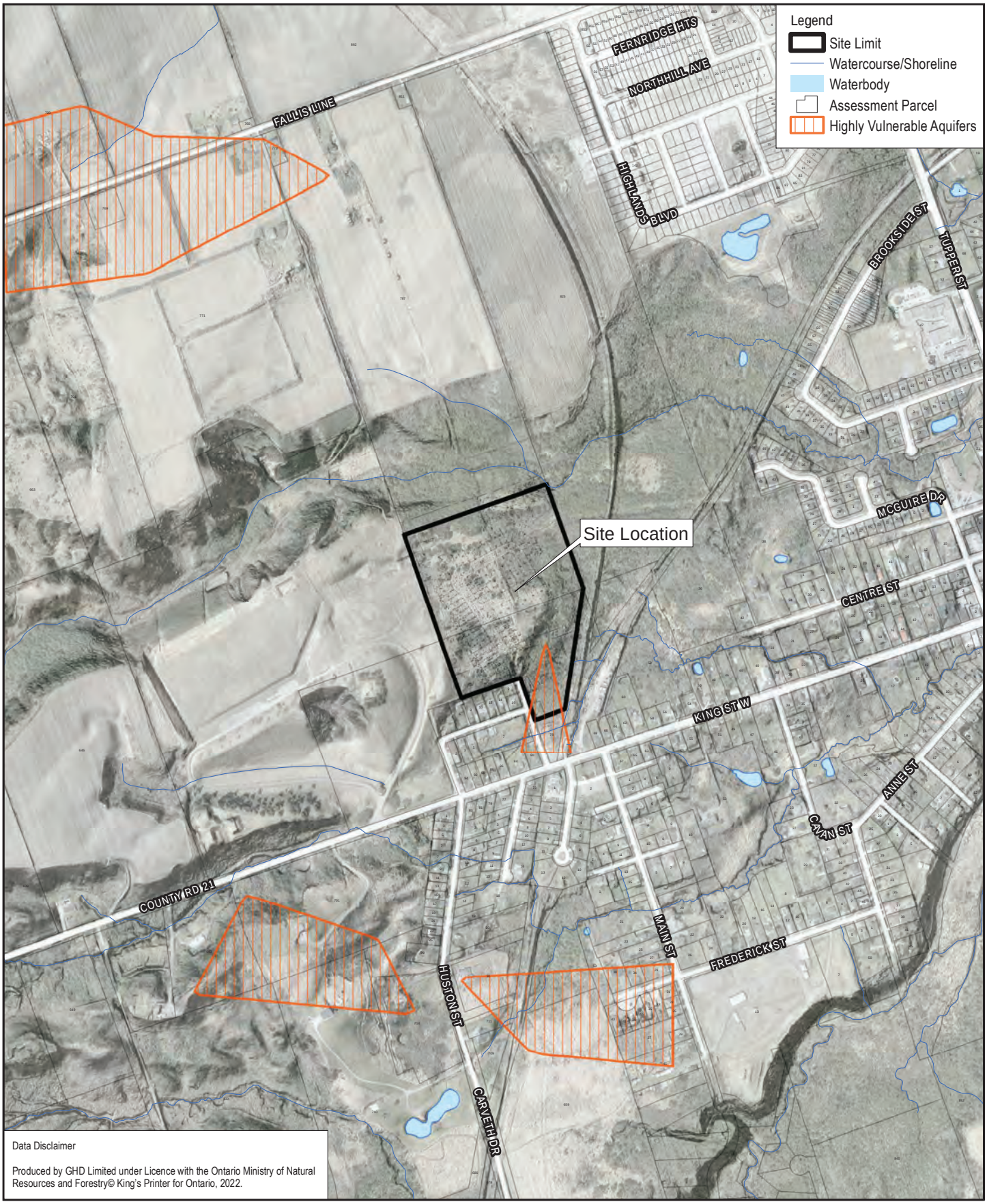
Wellhead Protection Areas

Project No. 12599716
Revision No.
Date March 2023

Figure 5

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS005- Wellhead Protection Areas.mxd
Print date: 15 Feb 2023 - 10:35

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

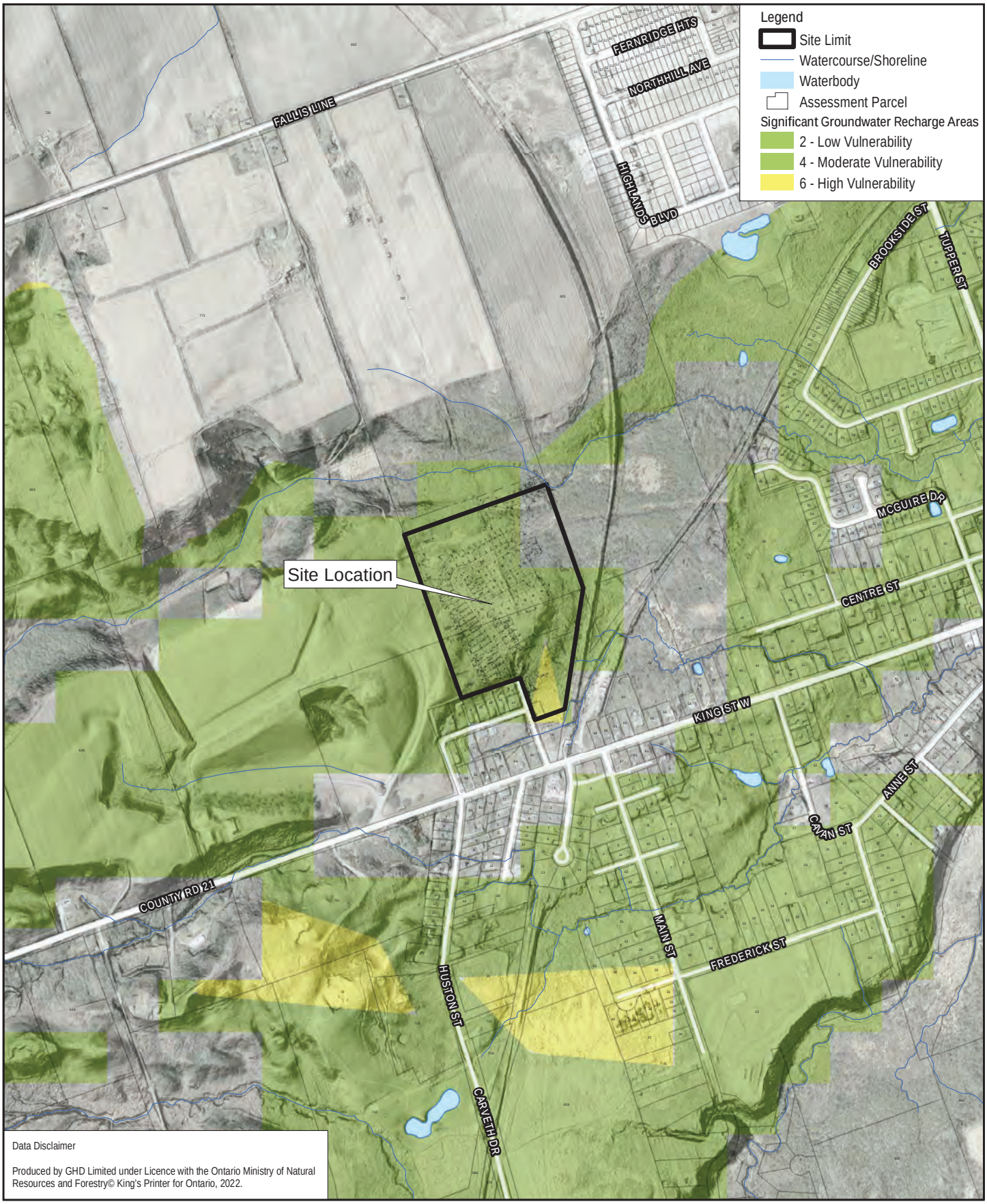
Highly Vulnerable Aquifers

Project No. 12599716
Revision No.
Date March 2023

Figure 6

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS006- Highly Vulnerable Aquifers.mxd
Print date: 15 Feb 2023 - 10:59

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

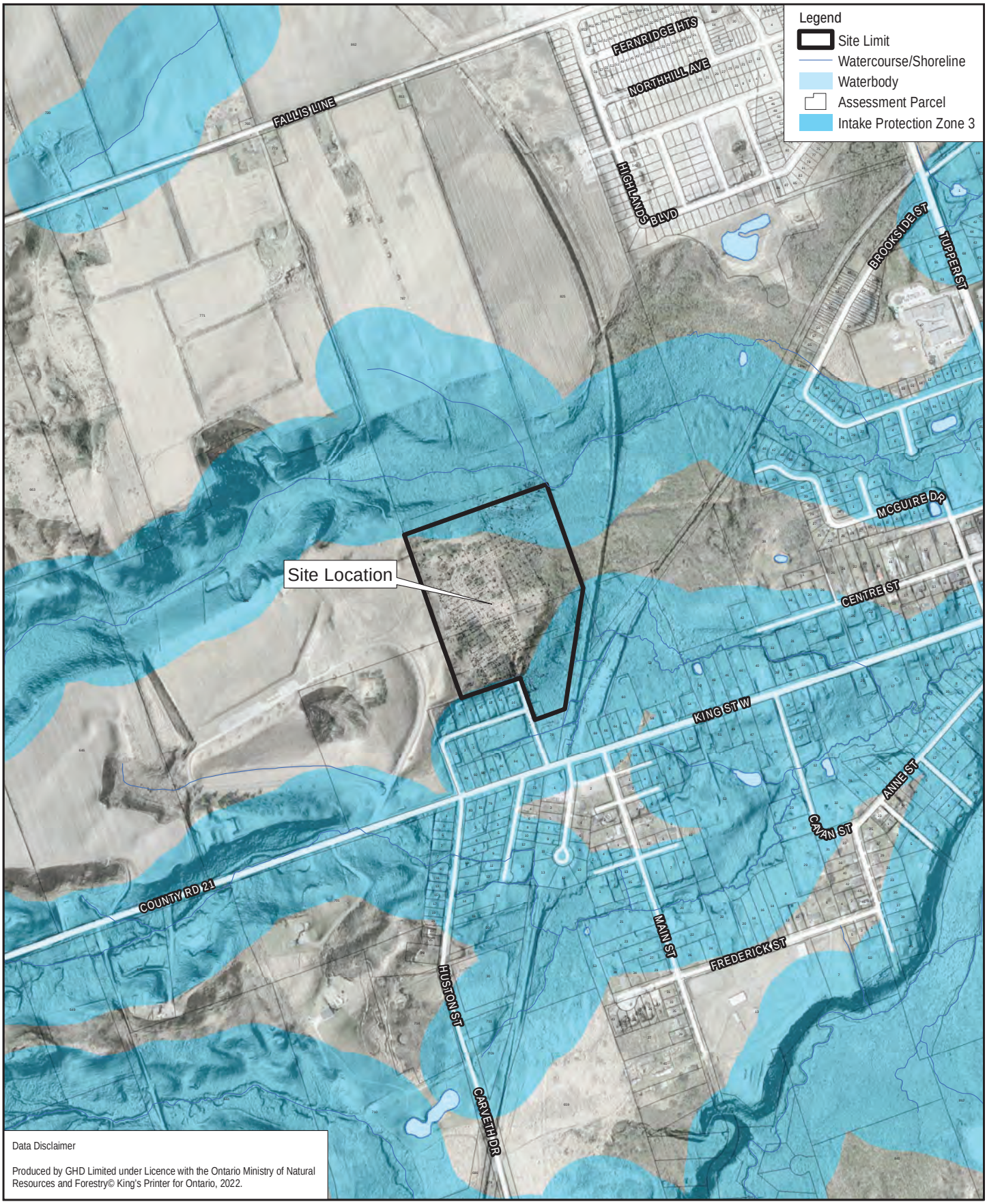
Significant Groundwater Recharge Areas

Project No. 12599716
Revision No.
Date March 2023

Figure 7

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS007- Significant Groundwater Recharge Areas.mxd
Print date: 15 Feb 2023 - 11:00

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



Data Disclaimer

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1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

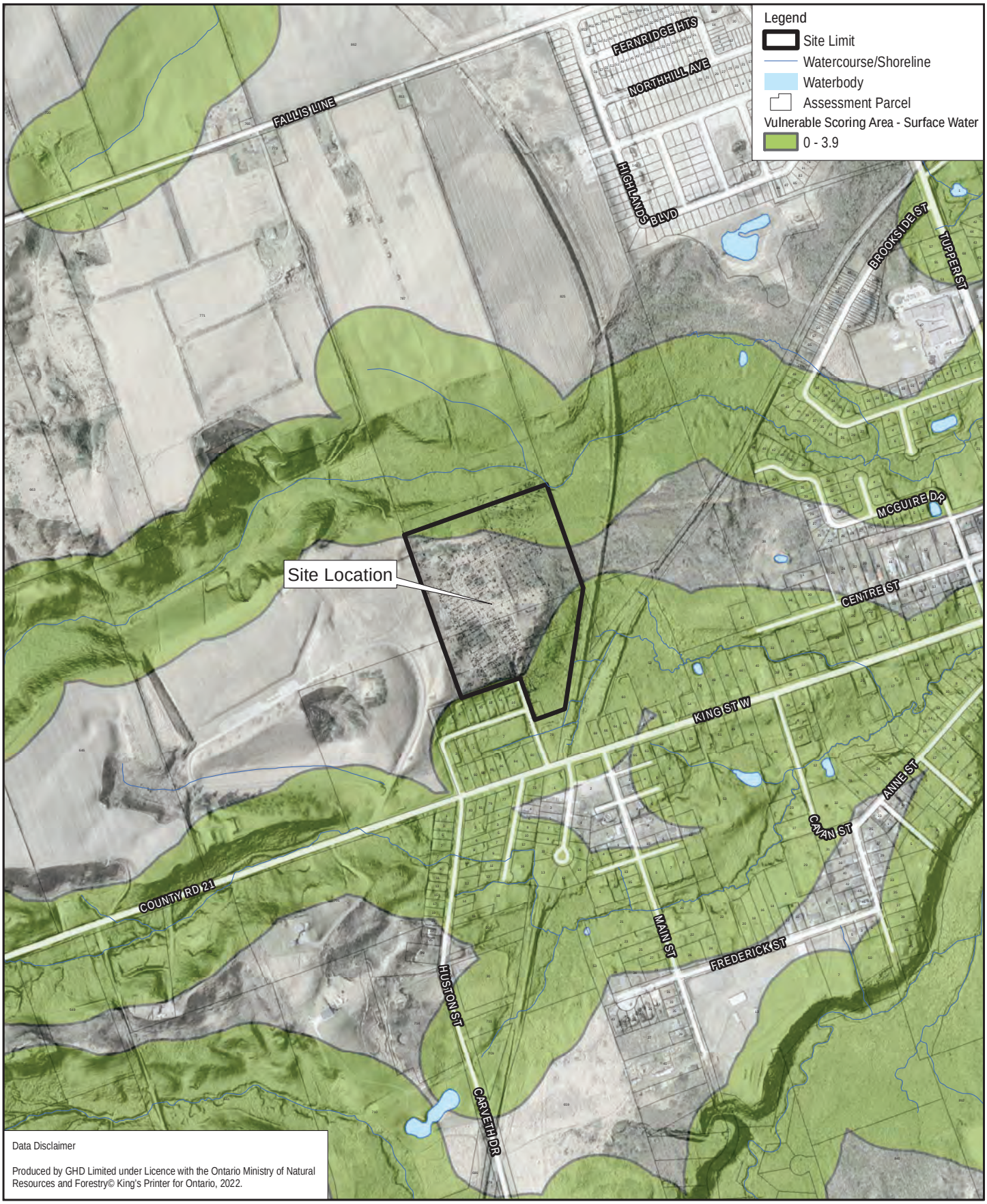
Intake Protection Zone

Project No. 12599716
Revision No.
Date March 2023

Figure 8

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS008 - Intake Protection Zone.mxd
Print date: 15 Feb 2023 - 11:27

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

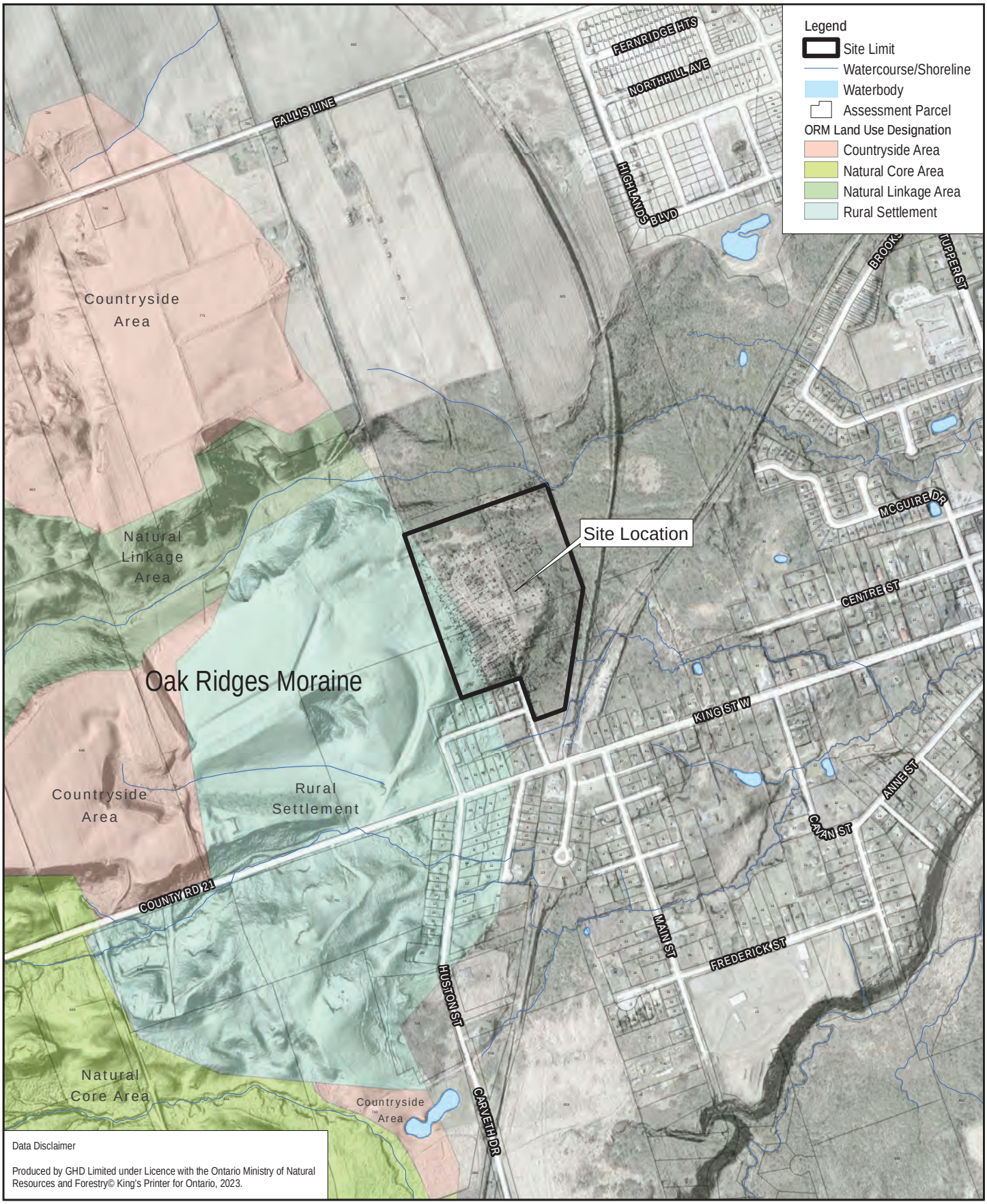
Vulnerable Scoring Area - Surface Water

Project No. 12599716
Revision No.
Date March 2023

Figure 9

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS008B - Vulnerable Scoring Area - Surface Water.mxd
Print date: 15 Feb 2023 - 11:26

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

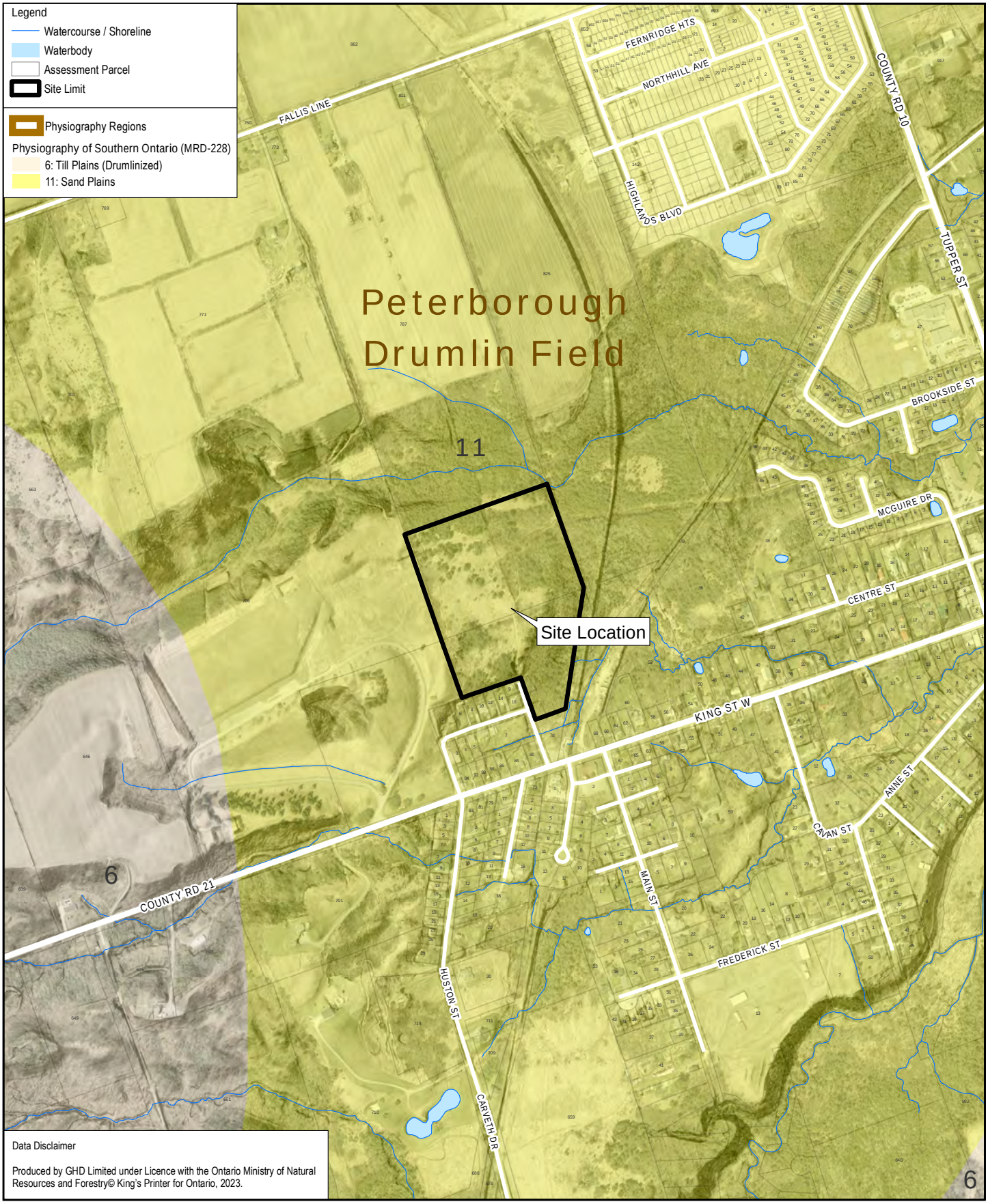
ORM Land Use Designation

Project No. 12599716
Revision No.
Date March 2023

Figure 10

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS014 - ORM Land Use Designation.mxd
Print date: 15 Feb 2023 - 11:39

Data source: Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application., Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

Physiography

Project No. 12599716
Revision No.
Date March 2023

Figure 11

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202302_SWP001_GIS009 - Physiography.mxd
Print date: 14 Feb 2023 - 07:37

Data source: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1.,

1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

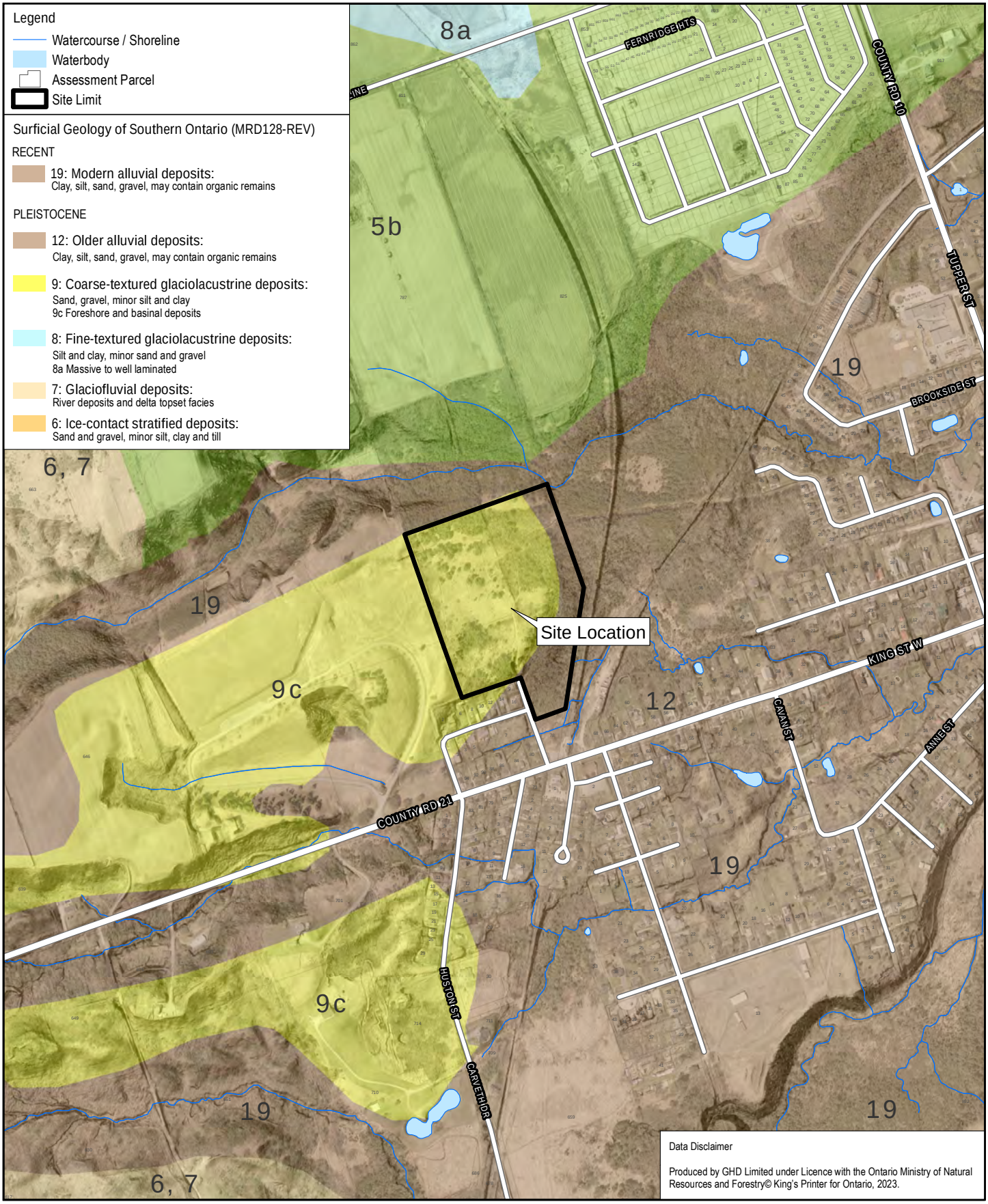
Regional Topography

Project No. 12599716
Revision No.
Date March 2023

Figure 12

O:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202212_SWP001_GIS011- Regional Topography.mxd
Print date: 08 Dec 2022 - 07:35

Data source: Image © County of Peterborough, 2018.



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

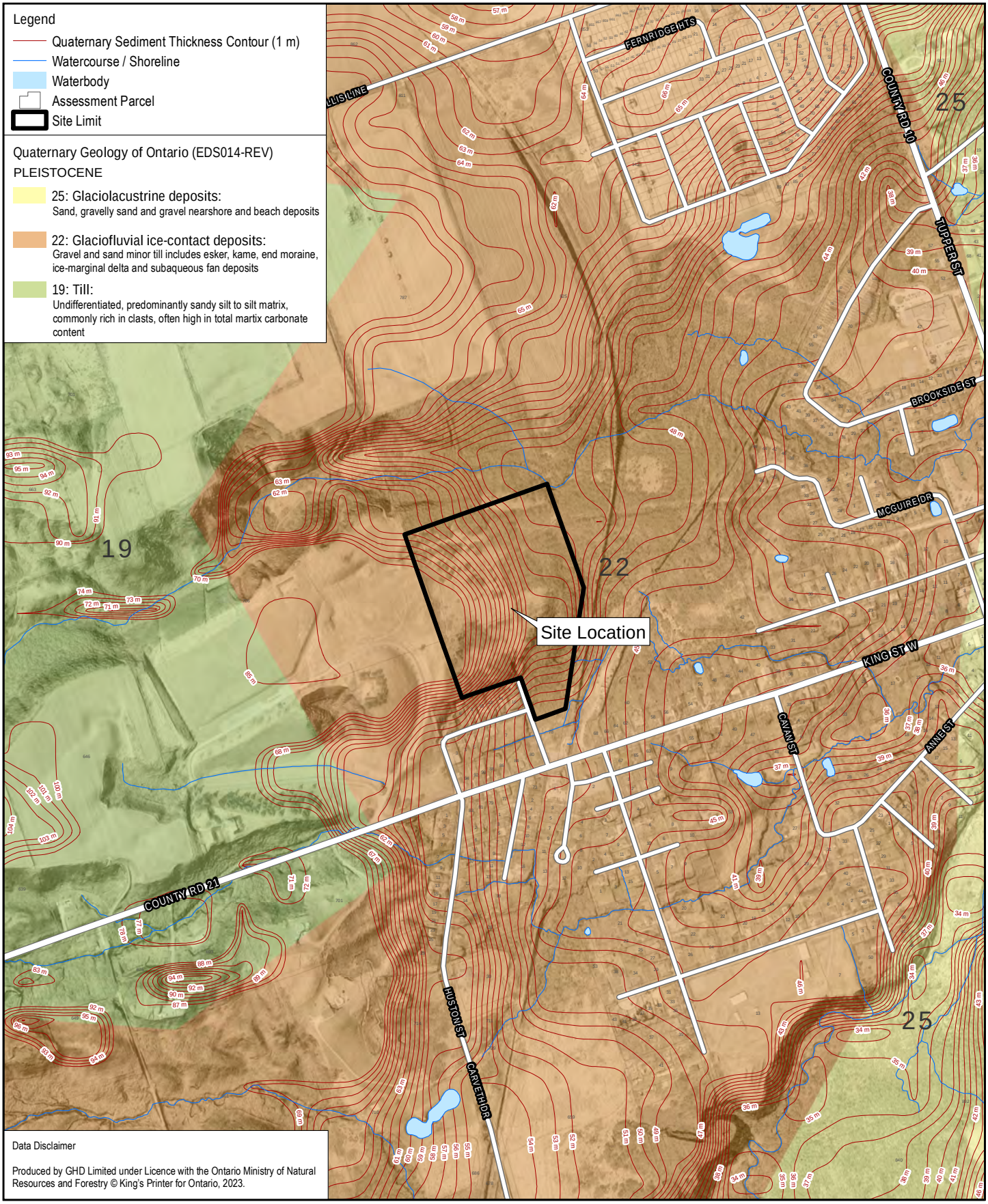
Surficial Geology

Project No. 12599716
Revision No.
Date March 2023

Figure 13

Q:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202302_SWP001_GIS010 - Surficial Geology.mxd
Print date: 14 Feb 2023 - 08:03

Data source: MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.,



1 cm = 100 meters

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

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Veltri and Son Limited
Turner Street, Millbrook, ON
Township of Cavan Monaghan
County of Peterborough

Source Water Protection Plan Assessment

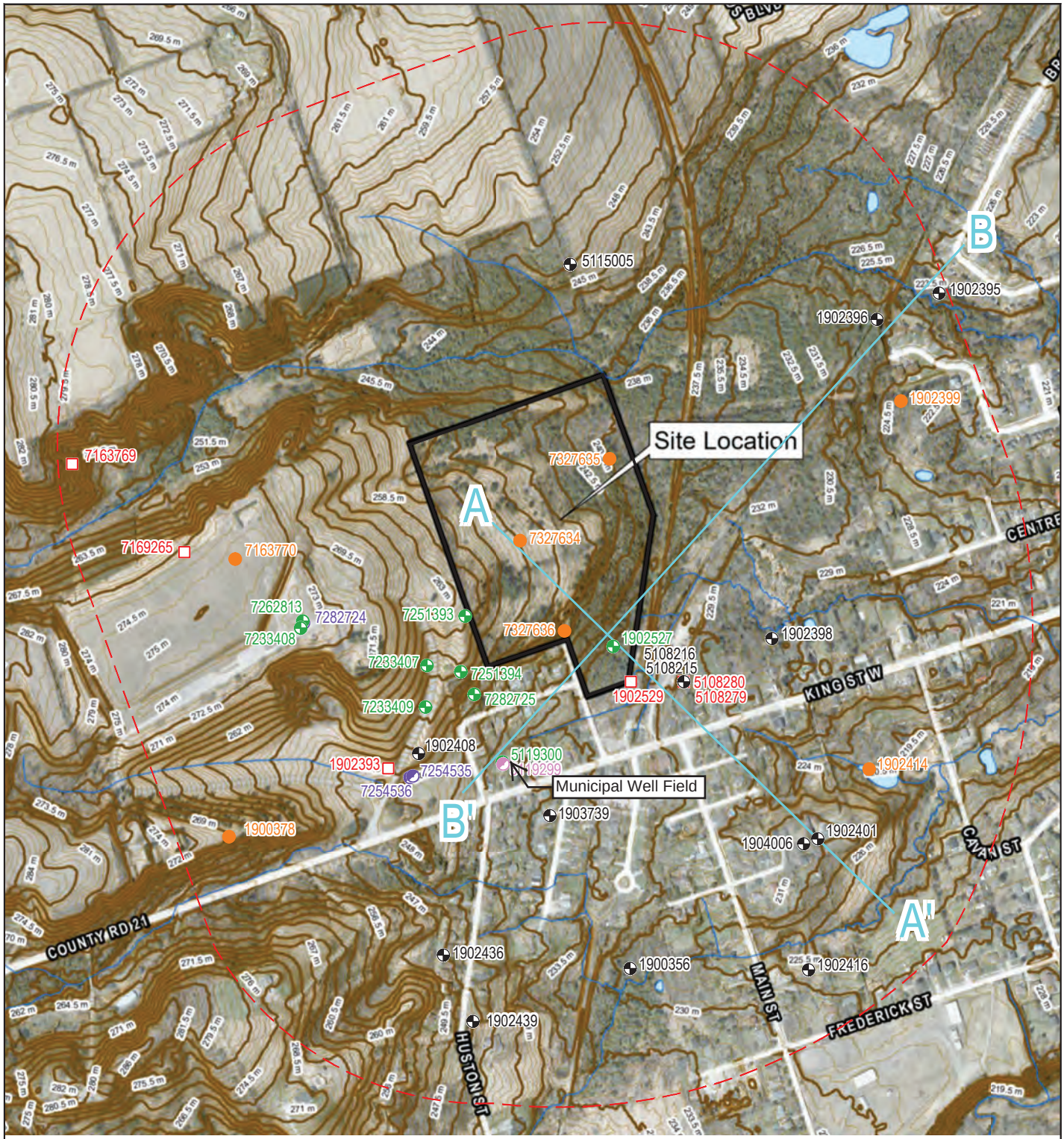
Quaternary Geology

Project No. 12599716
Revision No.
Date March 2023

Figure 14

O:\GIS\PROJECTS\12599000s\12599716\Layouts\202212_SWP001\12599716_202302_SWP001_GIS011 - Quaternary Geology.mxd
Print date: 14 Feb 2023 - 08:30

Data source: EDS014-REV: Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.,
Image © County of Peterborough, 2018; Quaternary Sediment Thickness Contour, ORMGP, 2022.



LEGEND

- 500 m RADIUS
- SITE LIMIT
- WATERCOURSE / SHORELINE
- WATER BODY
- ASSESSMENT PARCEL
- ABANDONED-OTHER
- ABANDONED-QUALITY
- OBSERVATION WELLS
- TEST HOLE
- WATER SUPPLY
- NO DATA; NOT A WELL

0 80 160 240m

1:8000

Coordinate System:
UTM with NAD83 datum,
Zone 17, Meter

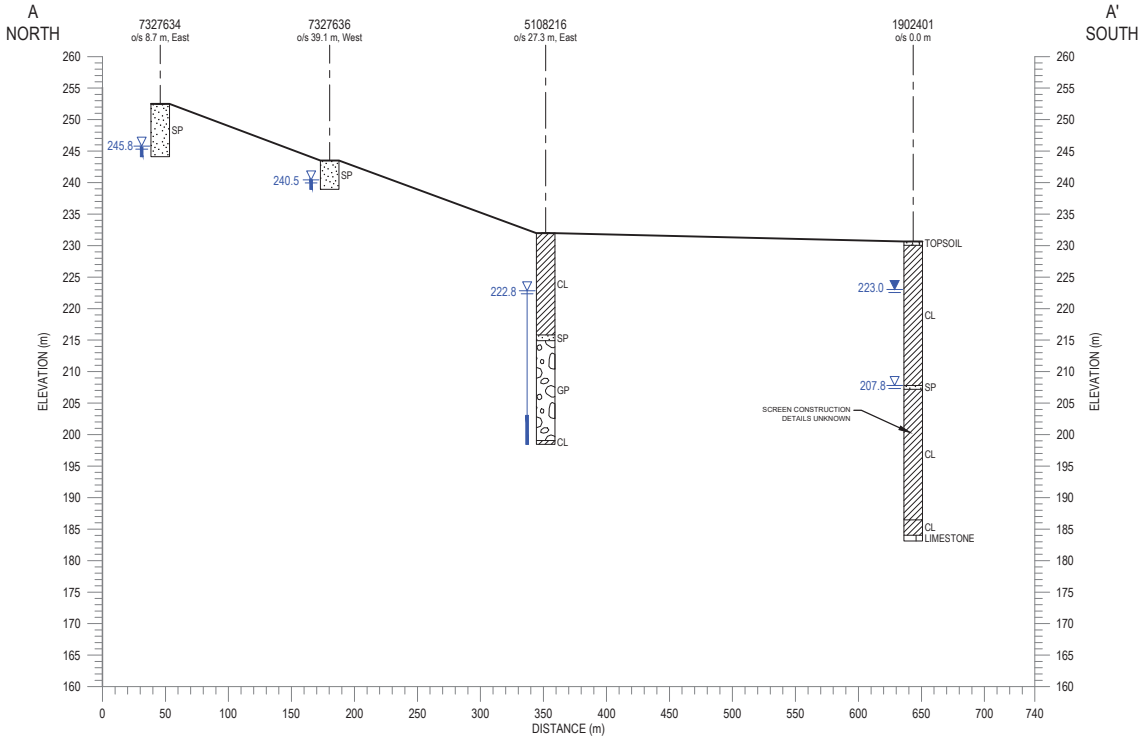
N

VELTRI AND SON LIMITED
TURNER STREET, MILLBROOK, ON
TOWNSHIP OF CAVAN MONAGHAN
COUNTY OF PETERBOROUGH
SOURCE WATER PROTECTION PLAN ASSESSMENT
GEOLOGIC CROSS-SECTION
LOCATION MAP

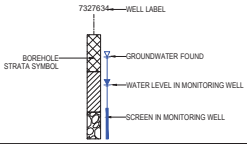
Project No. **12599716**
Date **March 2023**

Figure 15

Filename: \\ghdnet\ghd\CA\Peterborough\Projects\662\12599716\Digital_Design\ACAD\Figures\RPT001\12599716-GHD-00-00-RPT-EN-D101_WA-001.dwg
Plot Date: 10 December 2022 1:47 PM



LEGEND



HORIZONTAL
1:3000
0 30 60 90
VERTICAL
1:600
0 6 12 18

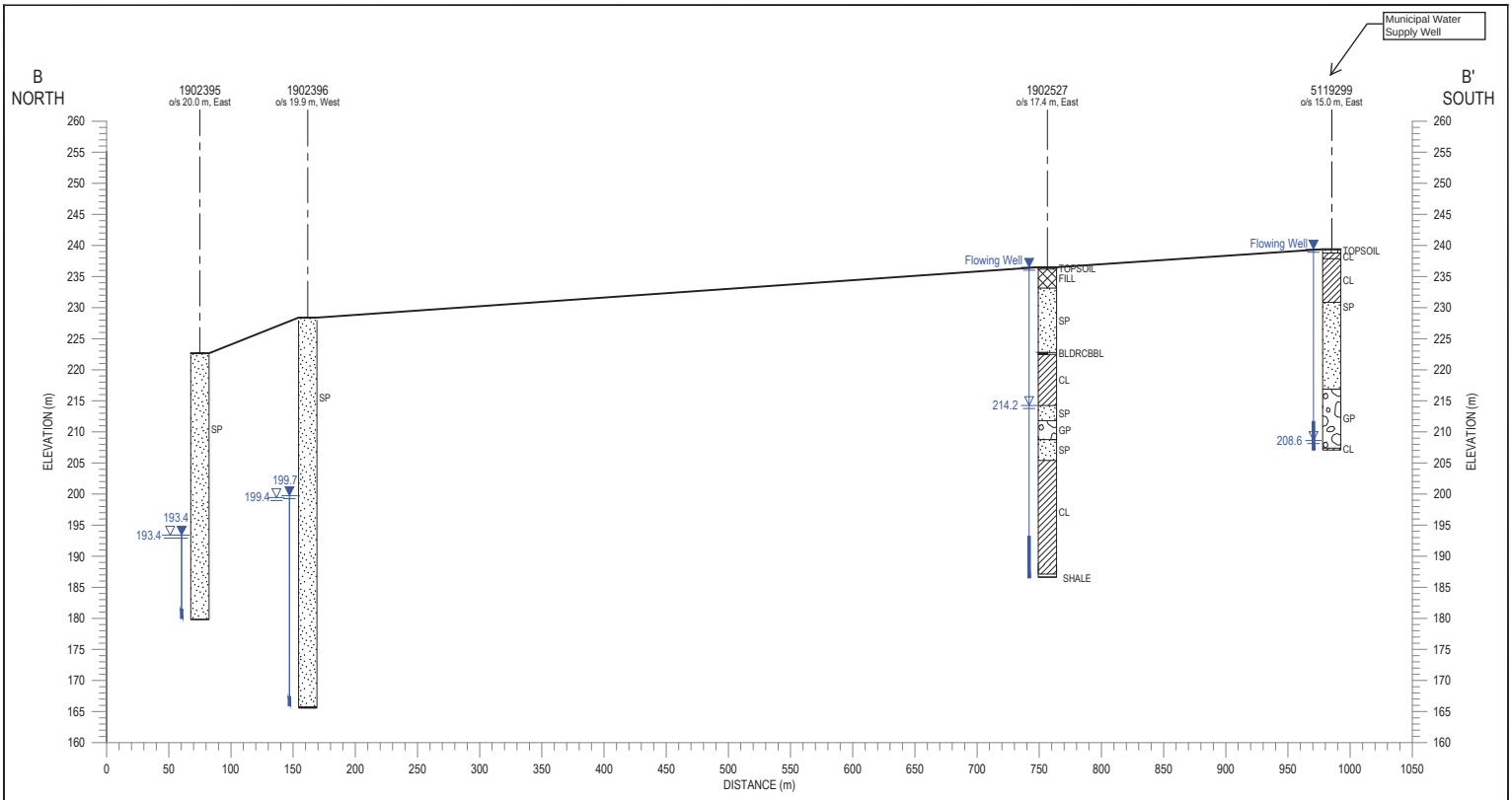
VELTRI AND SON LIMITED
TURNER STREET, MILLBROOK, ON
TOWNSHIP OF CAVAN MONAGHAN
COUNTY OF PETERBOROUGH
SOURCE WATER PROTECTION PLAN ASSESSMENT

GEOLOGIC CROSS-SECTION A-A'

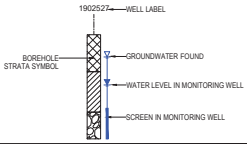
Project No. 12599716
Date March 2023

FIGURE 16

Filename: \\ghdnetghd\CAN\Peterborough\Projects\66\21259971\6\Digital_Design\ACAD\Figures\RPT001\12599716-GHD-00-00-RPT-EN-D101_WA-001.dwg
Plot Date: 16 December 2022 11:04 PM



LEGEND



HORIZONTAL
1:3000
0 30 60 90
VERTICAL
1:600
0 6 12 18

GHD

VELTRI AND SON LIMITED
TURNER STREET, MILLBROOK, ON
TOWNSHIP OF CAVAN MONAGHAN
COUNTY OF PETERBOROUGH
SOURCE WATER PROTECTION PLAN ASSESSMENT

GEOLOGIC CROSS-SECTION B-B'

Project No. 12599716
Date March 2023

FIGURE 17

Filename: \\ghdnet\ghd\CA\Peterborough\Projects\66\21259971\6Digital_Design\ACAD\Figures\RPT001\12599716-GHD-00-00-RPT-EN-D101_WA-001.dwg
Plot Date: 16 December 2022 11:06 PM

Appendices

Appendix A

Borehole Logs

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-1

BOREHOLE No.: BH-1
ELEVATION: 246.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 18 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (300mm)					
1				**SAND AND GRAVEL** - Light Brown Sand and Gravel, Moist, Compact	SS-1	75	2	3 7 9	16
2		0.8						9	
3	1.0	0.9		**TILL** - Brown Sandy Silt with Clay, Moist, Compact	SS-2	78	1	6 9 23	32
4				Grading Light Brown Sand and Gravel, Moist, Very Dense					
5								20	
6					SS-3	89	6	32 42	74
7	2.0								
8		2.4			SS-4a	100	5	14	49
9				Grading Brown Sandy Silt with Clay and Gravel, Moist, Compact	SS-4b		13	26 23	
10	3.0							12	
11					SS-5	100	11	15 17	32
12									
13	4.0								
14									
15		4.6		**SAND** - Light Brown Sand, Wet, Very Dense	SS-6a	100	18	12 18	56
16		4.9			SS-6b		14	48	
17	5.0	5.0		**TILL** - Brown Sandy Silt with Clay and Gravel, Moist, Compact					
18				END OF BOREHOLE					
19									
20	6.0								
21									
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29	9.0								
30									
31									
32									
33	10.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.64 m

Water at 4.0m upon completion

WL - 4.29m August 14, 2018

WL - 4.5 m August 22, 2018

Water first encountered at 4.6m

Borehole open upon completion

50mm Diameter monitoring well installed to 4.65m

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-2

BOREHOLE No.: BH-2
ELEVATION: 250.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Milbrook
LOGGED BY: J. McEachern DATE: 17 July 2018
DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / Field / Lab / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
				TOPSOIL (230mm)				1			
1		0.2		**SILTY SAND** - Brown Silty Sand, Occasional Cobble, Moist, Very Loose	SS-1	78	4	2 22	24	○ ×	
2											
3	1.0				SS-2	56	4	1 2 2	4	⊠	
4											
5								5			
6		1.8			SS-3	67	5	12 14	26	○ ×	
7	2.0			**TILL** - Light Brown to Grey Sandy Silt with Gravel, Moist, Compact							
8					SS-4	100	12	5 10 16	16	○ ×	Grain Size Analysis (SS-4): 2% Gravel 16% Sand 82% Silt and Clay 64% between 5-75 µm
9											
10	3.0	3.0		Grading Dense							
11					SS-5	100	11	15 18 22	40	○ ×	
12											
13	4.0										
14											
15								12			
16					SS-6	100	10	18 16	34	○ ×	
17	5.0										
18											
19											
20	6.0	6.1		Grading Very Dense				12			
21					SS-7	100	9	35 50=4"	100	○ ×	Borehole open and dry upon completion
22		6.6		END OF BOREHOLE							
23	7.0										
24											
25											
26	8.0										
27											
28											
29	9.0										
30											
31											
32											
33	10.0										

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-3

BOREHOLE No.: BH-3
ELEVATION: 255.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 18 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (10 20 30 40 50 60 70 80 90)	COMMENTS
		0.0		GROUND SURFACE							
		0.3		**TOPSOIL** (305mm)				1			
1				**SILTY SAND** - Light Brown Silty Sand Occasional Cobble, Moist, Very Loose	SS-1	100	5	1 29	30	○ ×	
2								8			
3	1.0				SS-2	100	3	2 2	4	⊗	Grain Size Analysis (SS-2): 0% Gravel 83% Sand 17% Silt and Clay 9% between 5-75 µm
4								2			
		1.5		Grading Gravel, Compact	SS-3	100	4	6 7	18	○ ×	
6								11			
7	2.0										
		2.3		Grading, Very Dense	SS-4	100	4	21 21	53	○ ×	
8								32			
9											
10	3.0				SS-5	100	9	27 23	56	○ ×	
		3.4		**TILL** - Brown Sandy Silt with Clay, some Gravel, Moist, Very Dense				33			
12											
13	4.0										
14											
		4.6		Grading Grey	SS-6	100	13	30 30	75	○ ×	
16								45			
17	5.0										
18											
19											
20	6.0				SS-7	100	9	14 27	72	○ ×	Borehole open and dry upon completion
		6.6		END OF BOREHOLE				45			
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29											
30	9.0										
31											
32											
33	10.0										

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-4

BOREHOLE No.: BH-4
ELEVATION: 250.9 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Milbrook
LOGGED BY: J. McEachern DATE: 17 July 2018
DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0	0.0		GROUND SURFACE					
1		0.3		**TOPSOIL** (300mm)	SS-1	100	9	1 2 2	4
2		0.8		**SILTY SAND** - Brown Silty Sand with Gravel, Moist, Very Loose				4	
3	1.0			**TILL** - Brown Sandy Silt Trace Gravel, Moist, Compact	SS-2	100	10	3 3 12	15
5		1.7		Grading Occasional Cobbles	SS-3	100	9	50=3"	100
6	2.0								
7		2.3		**SAND** - Brown Sand with Silt, Moist, Dense to Very Dense	SS-4	100	5	18 20 25	45
10	3.0				SS-5	100	5	17 50=2"	100
12		3.7		Grading Trace Gravel					
13	4.0								
15		4.6		**SAND AND GRAVEL** - Light Brown Sand and Gravel, Moist, Very Dense	SS-6	100	3	28 45 41	86
16	5.0								
18									
19	6.0				SS-7	80	2	18 50=4"	100
20									
21	7.0								
23									
24									
25		7.8		**SAND** - Brown Sand with Silt, Wet, Very Dense	SS-8	100	16	48 40 50=4"	100
26	8.0								
27									
28									
29	9.0								
30					SS-9a	100	14	4 23	100
31		9.4			SS-9b		8	50=4"	
32		9.6		**TILL** - Grey Silty Sand, Trace Gravel, Very Dense					
33	10.0			END OF BOREHOLE					

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.66 m

Grain Size Analysis (SS-2):
9% Gravel
21% Sand
70% Silt and Clay
43% between 5-75 µm

50mm standpipe installed to 1.43m
Dry on July 17/18
Dry on Aug.14/18
Dry on Aug.22/18

Water first encountered at 7.6m

WL - 7.81m August 14, 2018

WL - 7.9 m August 22, 2018

Borehole cave-in to 8m

50mm Diameter monitoring well installed to 8.38m

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-5

BOREHOLE No.: BH-5
ELEVATION: 252.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 17 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (W_P, W_l) / "N" Value (blows / 0.3 m) / △ Field / □ Lab / ◆ RQD / ◎ CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
				TOPSOIL (300mm)				2			
1		0.3		**SILTY SAND** - Brown Silty Sand, Moist, Very Loose	SS-1	100	5	2 3 4	5	⊠	
2											
3	1.0				SS-2	100	11	1 0 1	1	× ○	
4											
5		1.5		**TILL** - Brown Silty Sand Trace Gravel, Moist, Very Loose	SS-3	89	22	1 2 1	3	× ○	
6	2.0										
7											
8		2.6		Little Gravel, Compact	SS-4	100	14	9 12 14	26	○ ×	
9											
10	3.0	3.0		Grading, Dense	SS-5	100	12	13 14 30	44	○ ×	
11											
12											
13	4.0										
14											
15		4.6		**SAND** - Light Brown Sand Trace Gravel, Moist, Very Dense	SS-6	100	3	19 22 32	54	○ ×	Borehole open and dry upon completion
16	5.0	5.0		END OF BOREHOLE							
17											
18											
19											
20	6.0										
21											
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29	9.0										
30											
31											
32											
33	10.0										

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-6

BOREHOLE No.: BH-6

ELEVATION: 246.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 17 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / △ Field / □ Lab / ◆ RQD / ◎ CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.3		**TOPSOIL** (280mm)							
1				**SILTY SAND** - Light Brown Silty Sand, Moist, Loose to Very Loose	SS-1	100	1	2 2 4	6		
2								3			
3	1.0				SS-2	100	7	1 1 2	3		
4											
5											
6					SS-3	100	23	3 3 2	5		
7	2.0	2.0		Grading to Wet at 1.8m							Water first encountered at 1.8m (slight seepage)
8		2.3		**TILL** - Brown Silty Sand Trace Gravel, Wet, Compact	SS-4	100	14	6 4 8	12		
9											
10	3.0	3.0		Grading to Grey, with Clay	SS-5	100	17	3 5 5	10		
11											
12											
13	4.0										
14											
15		4.6		Grading, Very Dense	SS-6a		7	50=4"	100		
16		5.0			SS-7		4	100 50=3"			
17	5.0			END OF BOREHOLE							Borehole open and wet upon completion
18											
19											
20	6.0										
21											
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29	9.0										
30											
31											
32											
33	10.0										

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-7

BOREHOLE No.: BH-7
ELEVATION: 243.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 17 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
		0.4		**TOPSOIL** (380mm)	SS-1	100	7	2 1 5 8	6	
		0.8		**SILTY SAND** - Light Red/Brown Silty Sand, Moist, Loose	SS-2	100	15	4 4 6	10	
	1.0			**TILL** - Brown Silty Sand Trace Gravel some Clay, Moist, Compact	SS-3	100	15	4 6 10	16	
	2.0	2.3		Grading Grey	SS-4	100	16	3 5 7	12	Water at 2.4m upon completion
	3.0	3.2		**SILTY SAND** - Brown Silty Sand, Wet, Compact	SS-5	100	19	6 8 9	17	Water first encountered at 3.2m
	4.0	4.1		END OF BOREHOLE	SS-6	100	21	4 4 6	10	Borehole open upon completion
	5.0									
	6.0									
	7.0									
	8.0									
	9.0									
	10.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-8

BOREHOLE No.: BH-8
ELEVATION: 241.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 18 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0	0.0		GROUND SURFACE					
		0.2		**TOPSOIL** (200mm)					
1				**SILTY SAND** - Light Brown Silty Sand, Moist, Very Loose	SS-1	100	12	0 2 1	3
2		0.6		Grading Occassional Organics				2	
3	1.0				SS-2	100	14	2 2 3	5
4		1.4		Grading Wet, Compact					
5		1.7		**TILL** - Light Brown Silty Sand Little Clay and Gravel, Moist, Compact	SS-3a	100	13	7	10
6					SS-3b	100	22	6 4	
7	2.0								
8					SS-4	100		3 6 10	16
9									
10	3.0	3.0		Grading Grey				6	
11					SS-5	100	17	10 15	25
12									
13	4.0								
14									
15								5	
16					SS-6	100	16	7 9	16
17	5.0	5.0		END OF BOREHOLE					
18									
19									
20	6.0								
21									
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29	9.0								
30									
31									
32									
33	10.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.69 m

Water first encountered at 1.4m (slight seepage)

WL - 2.06m August 14, 2018

WL - 2.1 m August 22, 2018

50mm diameter monitoring well installed to 4.54m

Borehole open and wet upon completion

50mm standpipe installed to 1.47m
Dry on July 17/18
Dry on Aug.14/18
Dry on Aug.22/18

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-9

BOREHOLE No.: BH-9
ELEVATION: 245.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Milbrook

LOGGED BY: J. McEachern DATE: 18 July 2018

DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (W_P, W_l) / "N" Value (blows / 0.3 m) / RQD / CONE (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.2		**TOPSOIL** (180mm)							
1				**SILTY SAND** - Light Brown Silty Sand Trace Gravel, Moist, Compact to Dense	SS-1	75	6	3 5 6	11		
2								6			
3	1.0				SS-2	100	2	9 18 20	38		
4											
5								16			
6					SS-3	100	3	22	42		
7	2.0							20			
8								23			
9		2.6			SS-4	100	5	19 16	35		
10	3.0			Grading Brown Occasional Cobbles, Dense to Very Dense							
11					SS-5	100	6	14 34 50=3"	100		Water at 3.2m upon completion
12											Water first enountered at 3.4m
13	4.0										
14											Borehole Cave-in to 4.1m
15											
16		4.9			SS-6	100	6	28 37 42	79		
17	5.0	5.0		**TILL** - Light Brown Sandy Silt Little Gravel, Wet, Very Dense							
18				END OF BOREHOLE							
19											
20	6.0										
21											
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29	9.0										
30											
31											
32											
33	10.0										

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-10

BOREHOLE No.: BH-10
ELEVATION: 247.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Milbrook
LOGGED BY: J. McEachern DATE: 18 July 2018
DRILLING COMPANY: Land Shark Drilling METHOD: Solid Stem Augers and SPT
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
1		0.3		**TOPSOIL** (280mm)						
2				**SILTY SAND** - Light Brown Silty Sand, Moist, Compact	SS-1	50	5	2 2 8	10	
3	1.0	0.8		**TILL** - Light Brown Sandy Silt Trace Gravel, Moist, Compact	SS-2	100	15	9 9 10 12	22	
4										
5					SS-3	100	9	7 23 24	47	
6		1.8		Grading Sand with Gravel, Very Dense						
7	2.0				SS-4	100	2	18 21 36	57	Grain Size Analysis (SS-4): 2% Gravel 53% Sand 45% Silt and Clay
8										
9					SS-5	100	3	12 30 31	61	
10	3.0									
11										
12		3.7		Occasional Cobbles						
13	4.0									
14										
15					SS-6	100	1	50=3"	100	
16										
17	5.0									
18										Water first encountered at 6.1m
19										
20	6.0	6.1		**SAND AND GRAVEL** - Coarse Sand and Gravel, Wet, Very Dense	SS-7	100	11	16 27 29	56	Borehole open and wet upon completion
21		6.6		END OF BOREHOLE						
22										
23	7.0									
24										
25										
26	8.0									
27										
28										
29	9.0									
30										
31										
32										
33	10.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

BOREHOLE LOG GEOTECH 11178428-01, 18-07-19 BOREHOLE LOGS, JC GINT.GPJ GEOLOGIC.GDT 10/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-11

TEST PIT No.: TP-1
ELEVATION: 248.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOGGED BY: J.McEachern DATE: 14 August 2018
EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (300mm)				
1		0.3		**SILTY SAND** - Reddish Brown Silty Sand Trace Gravel, Occasional Cobbles and Boulders, Moist, Compact	GS-1	4	○	
2	0.5	0.6		Grading Light Brown, Dense				
3	1.0				GS-2	5	○	
4		1.4		Grading no Cobbles or Boulders				
5	1.5				GS-3	4	○	
6	2.0							
7					GS-4	5	○	
8	2.5							
9		2.7		Grading Occassional Cobbles and Boulders				
10	3.0				GS-5	5	○	
11		3.4		END OF TEST PIT				Test Pit open and dry upon completion
12	3.5							
13	4.0							
14								
	4.5							

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)

10 20 30 40 50 60 70 80 90

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-12

TEST PIT No.: TP-2
ELEVATION: 250.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOGGED BY: J.McEachern DATE: 14 August 2018
EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab)	COMMENTS
ft / m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90	
			TOPSOIL (250mm)				
1 / 0.5	0.3		**SILTY SAND** - Light Reddish Brown Silty Sand, Moist, Loose	GS-1	4	○	
3 / 1.0	1.1		Grading Occasional Cobbles and Boulders, Compact	GS-2	3	○	
5 / 1.5	1.5		Dense, Little Gravel	GS-3	3	○	
9 / 3.0				GS-4	11	○	
11 / 3.5	3.4		**TILL** - Light Brown Silty Sand Trace Gravel, Moist, Dense				
12 / 4.0	3.7		END OF TEST PIT				Test Pit open and dry upon completion

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-13

TEST PIT No.: TP-3
ELEVATION: 250.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) — △ Field □ Lab	COMMENTS
		0.0		GROUND SURFACE			10 20 30 40 50 60 70 80 90	
				TOPSOIL (180mm)				
		0.2		**SILTY SAND** - Light Reddish Brown Silty Sand Trace Gravel, Moist, Loose	GS-1	5	○	
1	0.5	0.6		Grading Brown				
2								
3	1.0	0.9		Grading Occasional Cobbles and Boulders, Compact	GS-2	1	○	
4					GS-3	3	○	
5	1.5							
6								
7	2.0				GS-4	5	○	
8	2.5							
9								
10	3.0				GS-5	4	○	
11		3.4		END OF TEST PIT				Test Pit open and dry upon completion
12	3.5							
13	4.0							
14								
	4.5							

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-14

TEST PIT No.: TP-4
ELEVATION: 247.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (230mm)				
		0.2		**SILTY SAND** - Light Reddish Brown Silty Sand Trace Gravel, Moist, Loose	GS-1	3		
1	0.5	0.6		Grading Light Brown				
3	1.0	0.9		Grading Occasional Cobbles and Boulders, Compact	GS-2	1		
6	2.0				GS-3	3		
8	2.5				GS-4	3		
10	3.0				GS-5	7		
11	3.5	3.4		**SANDY SILT** - Light Brown Sandy Silt with Sand, Moist, Compact	GS-6	24		Test Pit open and dry upon completion
12		3.7		END OF TEST PIT				
13	4.0							
14	4.5							

Moisture Content (%): 10 20 30 40 50 60 70 80 90

Shear test (Cu) △ Field / Sensitivity (S) □ Lab; ○ Water content (%); w_p w_l Atterberg limits (%)

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-15

TEST PIT No.: TP-5
ELEVATION: 246.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (360mm)				
		0.4		**SILTY SAND** - Light Reddish Brown Silty Sand, Moist, Loose	GS-1	2		
	0.5	0.6		Grading Brown	GS-2	3		
	1.0							
		1.4		**TILL** - Light Brown Silty Sand Trace Gravel, Moist, Dense	GS-3	13		
	1.5							
					GS-4	15		
	2.0	2.1		Grading Very Dense	GS-5	12		
	2.5							
		2.7		Grading Occasional Cobble	GS-6	11		
	3.0	3.0		END OF TEST PIT				Test Pit open and dry upon completion
	3.5							
	4.0							
	4.5							

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)

10 20 30 40 50 60 70 80 90

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-16

TEST PIT No.: TP-6
ELEVATION: 253.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOGGED BY: J.McEachern DATE: 14 August 2018
EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %
		0.0		GROUND SURFACE		
				TOPSOIL (250mm)		
		0.3				
1		0.4		**SILTY SAND** - Light Reddish Brown Silty Sand Trace Gravel, Moist	GS-1	7
	0.5			Grading Occasional Cobble and Boulders, Compact		
2		0.6		**TILL** - Light Brown Silty Sand Trace Gravel, Moist, Dense	GS-2	7
3	1.0					
4		1.4		Grading Brown, Compact	GS-3	2
5	1.5					
6	2.0					
7						
8	2.5				GS-4	3
9						
10	3.0	3.0		Grading Some Gravel, Dense	GS-5	2
11		3.4		Grading Occasional Cobble		
	3.5	3.4		END OF TEST PIT		
12						
13	4.0					
14						
	4.5					

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)
10 20 30 40 50 60 70 80 90

COMMENTS

Test Pit open and dry upon completion

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-17

TEST PIT No.: TP-7
ELEVATION: 259.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOGGED BY: J.McEachern DATE: 14 August 2018
EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator
NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
0.0	0.0		GROUND SURFACE			
	0.1		**TOPSOIL** (250mm)			
1 / 0.5			**SILTY SAND** - Light Reddish Brown Silty Sand Trace Gravel, Moist, Loose			
2	0.6		**SAND AND GRAVEL** - Brown Sand and Gravel Occasional Cobbles and Boulders, Moist, Loose	GS-1	1	
3 / 1.0				GS-2	2	
4	1.2		**SILTY SAND** - Brown Silty Sand, Moist, Compact	GS-3	3	
5 / 1.5						
6 / 2.0						
7	2.1		Grading Occasional Cobbles and Boulders			
8 / 2.5	2.4		Grading to coarse Sand and Gravel	GS-4	3	
9						
10 / 3.0	3.0		Grading to Some Gravel, Moist, Dense			
11 / 3.5				GS-5	2	Test Pit open and dry upon completion
12	3.7		END OF TEST PIT			
13 / 4.0						
14 / 4.5						

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)

10 20 30 40 50 60 70 80 90

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-18

TEST PIT No.: TP-8
ELEVATION: 244.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) / Sensitivity (S) ○ Water content (%) w_p w_l Atterberg limits (%) △ Field □ Lab — 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
		0.1		**TOPSOIL** (250mm)				
				SILTY SAND - Light Reddish Brown Silty Sand, Moist, Loose	GS-1	4	○	
	0.5	0.6		**TILL** - Light Brown Silty Sand Trace Gravel, Moist, Dense	GS-2	16	○	
	1.0				GS-3	16	○	
	1.5							
	2.0				GS-4	18	○	
	2.5	2.4		Grading Grey, Little Clay	GS-5	18	○	
		2.7		END OF TEST PIT				Test Pit open and dry upon completion
	3.0							
	3.5							
	4.0							
	4.5							

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-19

TEST PIT No.: TP-9
ELEVATION: 253.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) — △ Field □ Lab	COMMENTS
		0.0		GROUND SURFACE			10 20 30 40 50 60 70 80 90	
				TOPSOIL (300mm)				
1		0.3		**SILTY SAND** - Light Brown Silty Sand, Moist, Loose	GS-1	3	○	
	0.5	0.45		Grading Occasional Cobbles and Boulders, Compact				
2		0.55		Grading Brown Little Gravel	GS-2	2	○	
3	1.0							
4								
5	1.5				GS-3	8	○	
6								
7	2.0							
8	2.5							
9								
10	3.0				GS-4	2	○	
		3.2		END OF TEST PIT				Test Pit open and dry upon completion
11	3.5							
12								
13	4.0							
14								
	4.5							

REFERENCE No.: 11178428-01 ENCLOSURE No.: A-20

TEST PIT No.: TP-10
ELEVATION: 250.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited

PROJECT: Proposed Residential Development, Turner Street, Millbrook

LOGGED BY: J.McEachern DATE: 14 August 2018

EXCAVATION COMPANY: Les Brown Excavation Ltd. METHOD: Rubber Track Excavator

NOTES: Elevations from Drawing CGP-1 by D.G. Biddle & Associates Limited.

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (360mm)				
		0.4		**SILTY SAND** - Light Brown to Red Silty Sand, Trace Gravel, Moist, Loose	GS-1	2	○	
		0.8		**SAND** - Brown Sand and Gravel with Cobbles and Boulders, Moist, Compact	GS-2	2	○	
		2.1		**SILTY SAND** - Brown Silty Sand, Trace Gravel, Moist, Compact	GS-3	7	○	
					GS-4	5	○	
		3.2		END OF TEST PIT				Test Pit open and dry upon completion

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)

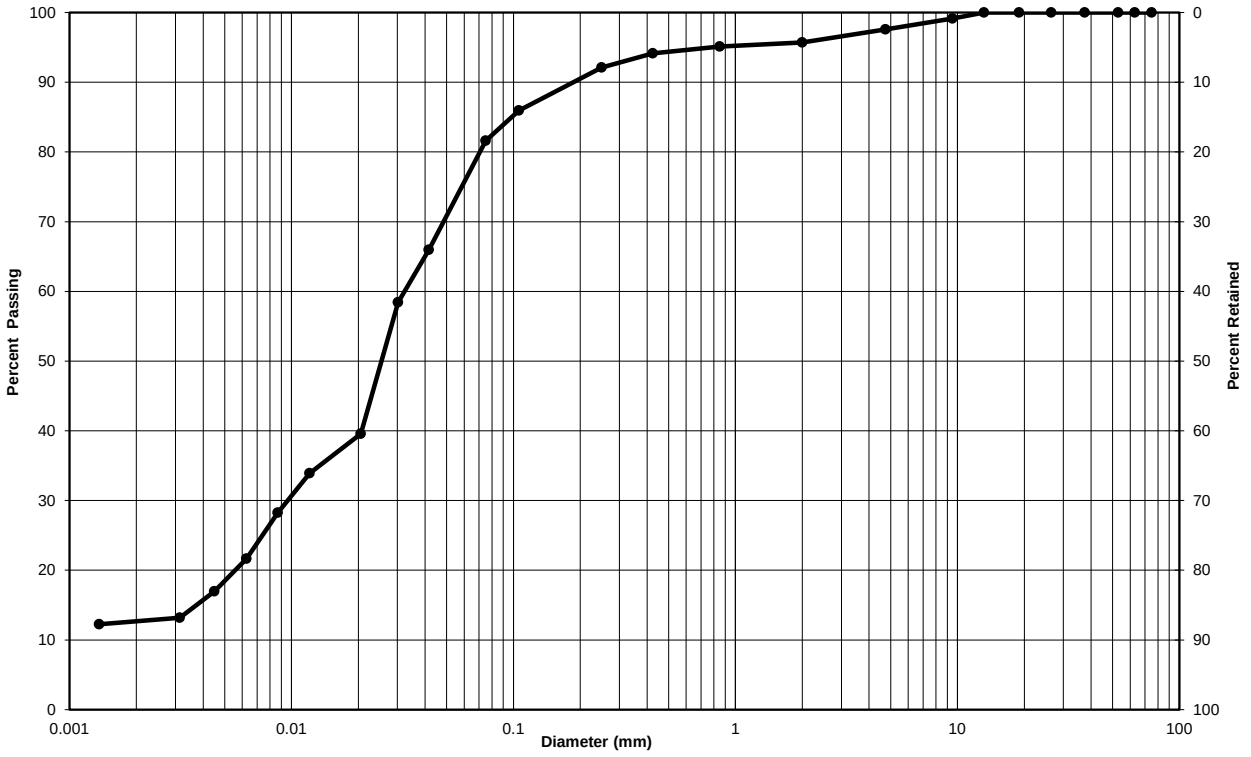
10 20 30 40 50 60 70 80 90

TEST PIT LOG GEOTECH 11178428-01, 18-07-19 TEST PIT LOGS, JC GINT.GPJ GEOLOGIC.GDT 11/9/18

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Veltri and Son Ltd.	**Lab no.:**	SS-18-46
Project/Site:	Turner Street, Millbrook	**Project no.:**	11176428-01

Borehole no.:	BH2	Sample no.:	SS4
Depth:	2.29-2.74m	Enclosure:	A-21



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	2	16	82

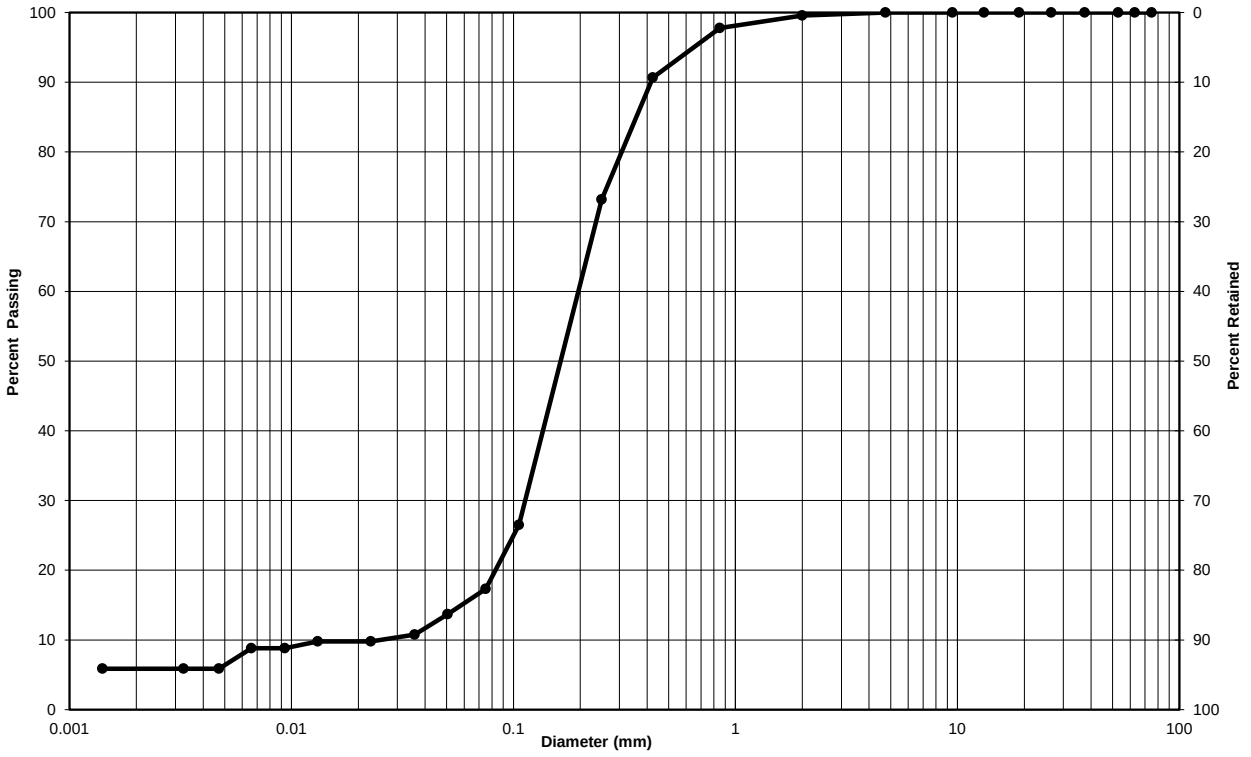
Remarks:

Performed by:	J. Sullivan	**Date:**	September 6, 2018
Verified by:		**Date:**	September 6, 2018

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Veltri and Son Ltd.	**Lab no.:**	SS-18-46
Project/Site:	Turner Street, Millbrook	**Project no.:**	11176428-01

Borehole no.:	BH3	Sample no.:	SS2
Depth:	0.76-1.22m	Enclosure:	A-22



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

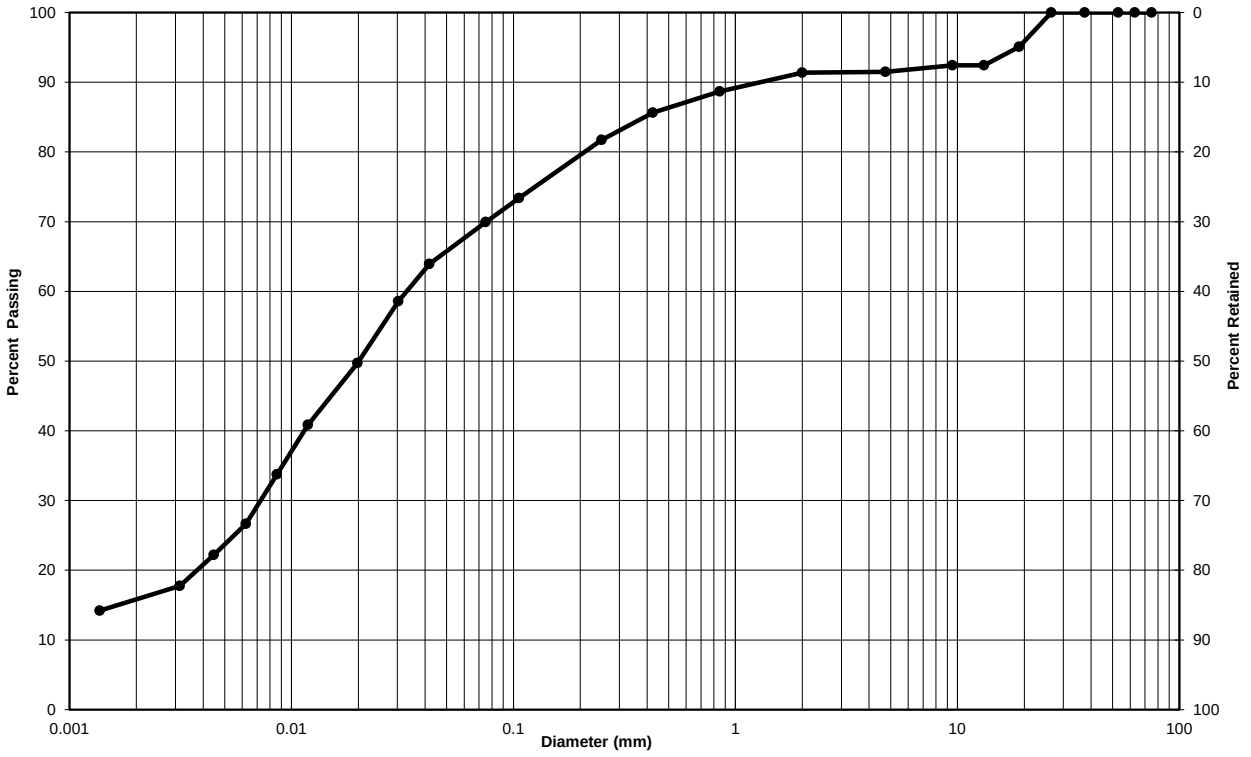
Soil Description	Gravel	Sand	Clay & Silt
	0	83	17

Remarks:

Performed by:	J. Sullivan	**Date:**	September 6, 2018
Verified by:		**Date:**	September 6, 2018

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Veltri and Son Ltd.	**Lab no.:**	SS-18-46
Project/Site:	Turner Street, Millbrook	**Project no.:**	11176428-01
Borehole no.:	BH4	Sample no.:	SS2
Depth:	0.76-1.22m	Enclosure:	A-23



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	9	21	70

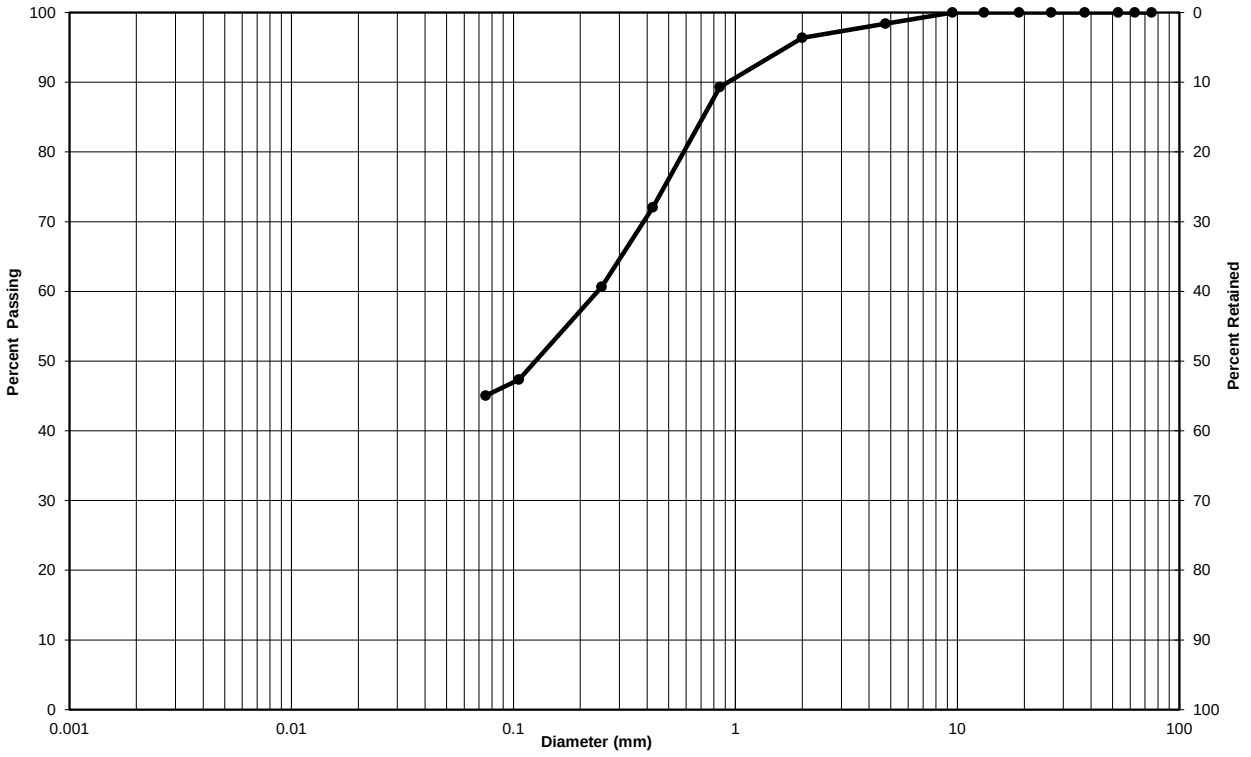
Remarks:

Performed by:	J. Sullivan	**Date:**	September 6, 2018
Verified by:		**Date:**	September 6, 2018

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Veltri and Son Ltd.	**Lab no.:**	SS-18-46
Project/Site:	Turner Street, Millbrook	**Project no.:**	11176428-01

Borehole no.:	BH10	Sample no.:	SS4
Depth:	2.29-2.74m	Enclosure:	A-24



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	2	53	45

Remarks:

Performed by:	J. Sullivan	**Date:**	September 6, 2018
Verified by:		**Date:**	September 6, 2018

REFERENCE No.: 12599718 ENCLOSURE No.: A-1

BOREHOLE No.: BH1-23
ELEVATION: 247.64 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOCATION: Turner Street, Millbrook, Ontario
DESCRIBED BY: Riley Sanford CHECKED BY: L. Ramos
DATE (START): 16 January 2023 DATE (FINISH): 16 January 2023

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- RC - ROCK CORE
- WATER LEVEL

NORTHING: 4891962 EASTING: 703058

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		247.64		GROUND SURFACE						
0		247.61		**TOPSOIL** (25 mm)						
1				**NATIVE:** SILTY SAND, trace gravel, light brown, moist, compact		SS-1	4	77	3-5-5-13	10
2										
3	1.0					SS-2	54	9	6-7-8-10	15
4										
5						SS-3	50	18	13-10-10	20
6										
7	2.0									
		245.35		CLAYEY SILT TILL, some sand, light brown, moist, compact		SS-4	75	17	5-9-12	21
8										
9										
10	3.0			Red mottling, wet						
11				**SS-5** 0% gravel, 13% sand, 66% silt, 21% clay		SS-5	83	16	5-11-13	24
12										
13	4.0									
14										
15				Moist, very dense						
16						SS-6	83	10	16-20-50	70
17	5.0									
18										
19										
20	6.0			Wet		SS-7	83	12	50 for 75mm	50+
		241.39		**END OF BOREHOLE at 6.2 mbgs**						
21				**NOTES:**						
22				- Borehole open upon completion						
23	7.0			- Groundwater seepage first encountered at 3.0 mbgs						
24				- mbgs denotes 'metres below ground surface'						
25				**WATER LEVELS:**						
26	8.0			- WL - 3.3 mbgs (Elev. 244.3m) on Jan. 16, 2023 (Upon Completion)						
27				- WL - 2.4 mbgs (Elev. 245.2m) on Jan. 23, 2023						
28										
29	9.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

1.05 m
2.26 m
1/23/2023
2.56 m
5.61 m

Monitoring Well

File: G:\12599716\WORKSHARE\FIELD\GINT\12599716 BOREHOLE LOGS RS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 2/3/23

REFERENCE No.: 12599718 ENCLOSURE No.: A-2

BOREHOLE No.: BH2-23
ELEVATION: 244.72 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOCATION: Turner Street, Millbrook, Ontario
DESCRIBED BY: Riley Sanford CHECKED BY: L. Ramos
DATE (START): 16 January 2023 DATE (FINISH): 16 January 2023

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- RC - ROCK CORE
- WATER LEVEL

NORTHING: 4891961 EASTING: 703103

Depth Feet	Depth Metres	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		244.72		GROUND SURFACE				%		
0				**NATIVE:**						
1				SILTY SAND, red-brown, moist, very loose		SS-1	67	11	1-1-0-1	1
2										
3	1.0			brown, loose		SS-2	58	15	2-2-5	7
4				**SS-2** 1% gravel, 73% sand, 26% clay & silt						
5						SS-3A	71	20	1-3-9	12
6		242.89				SS-3B		18	--	--
7	2.0			CLAYEY SILT TILL, some sand, brown, moist, compact						
8				**SS-4** 0% gravel, 15% sand, 53% silt, 32% clay Wet, dense		SS-4	88	19	9-21-17	38
9										
10	3.0			Loose		SS-5	96	21	1-1-6	7
11										
12										
13	4.0									
14										
15										
16						SS-6	100	26	0-1-3	4
17	5.0									
18										
19										
20	6.0			Moist, very dense						
21						SS-7	83	9	18-34-43	77
22		238.17		**END OF BOREHOLE at 6.6 mbgs**						
23	7.0			**NOTES:**						
24				- Borehole open and dry on completion						
25				- Groundwater seepage first encountered at 2.3 mbgs						
26	8.0			- mbgs denotes 'metres below ground surface'						
27				**WATER LEVELS:**						
28				- WL - Dry on Jan. 16, 2023 (Upon Completion)						
29	9.0			- WL - 2.3 mbgs (Elev. 242.4 m) on Jan. 23, 2023						

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

1.09 m
1/23/2023
2.62 m
2.93 m
5.97 m

Monitoring Well

File: G:\12599716\WORKSHARE\FIELD\GINT\12599716 BOREHOLE LOGS RS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 2/3/23

REFERENCE No.: 12599718 ENCLOSURE No.: A-3

GHD

BOREHOLE No.: BH3-23
ELEVATION: 244.18 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Veltri and Son Limited
PROJECT: Proposed Residential Development, Turner Street, Millbrook
LOCATION: Turner Street, Millbrook, Ontario
DESCRIBED BY: Riley Sanford CHECKED BY: L. Ramos
DATE (START): 17 January 2023 DATE (FINISH): 17 January 2023

LEGEND

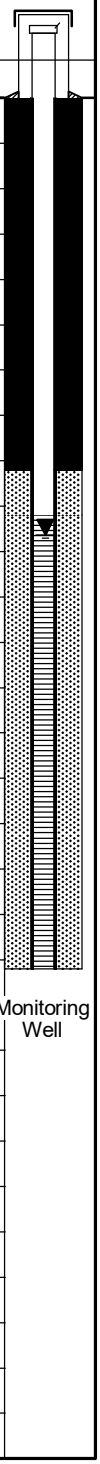
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- RC - ROCK CORE
- ▼ - WATER LEVEL

NORTHING: 4891657 EASTING: 703098

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
0		244.18		GROUND SURFACE						
0		244.07		**TOPSOIL** (100 mm)		SS-1A	33	19	1-3-5-5	8
1		243.97		**NATIVE:** SILTY SAND, trace gravel, brown, moist, compact		SS-1B		13	--	--
2				SANDY SILT TILL, trace clay, trace gravel, brown, moist, compact						
3	1.0			Wet		SS-2	58	14	12-11-15-14	26
4										
5				Moist, dense to very dense		SS-3	79	13	9-18-25	43
6	2.0									
7										
8										
9										
10	3.0			Wet		SS-4	83	15	20-27-27	54
11										
12										
13	4.0									
14										
15				- Approx. 200mm wet sand seam at 4.6 mbgs		SS-5A	83	22	25-37-37	74
16	5.0					SS-5B		20	--	--
17										
18										
19										
20	6.0			**SS-6** 0% gravel, 27% sand, 64% silt, 9% clay		SS-6	58	22	12-23-50	73
21		237.62		**END OF BOREHOLE at 6.6 mbgs**						
22				**NOTES:** - Borehole open on completion - Groundwater seepage first encountered at 0.8 mbgs - mbgs denotes 'metres below ground surface'						
23	7.0			**WATER LEVELS:** - WL - 3.2 mbgs (Elev. 241.0 m) on Jan. 16, 2023 (Upon Completion) - WL - 2.9 mbgs (Elev. 241.3 m) on Jan. 23, 2023						
24										
25										
26	8.0									
27										
28										
29	9.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) w_p w_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

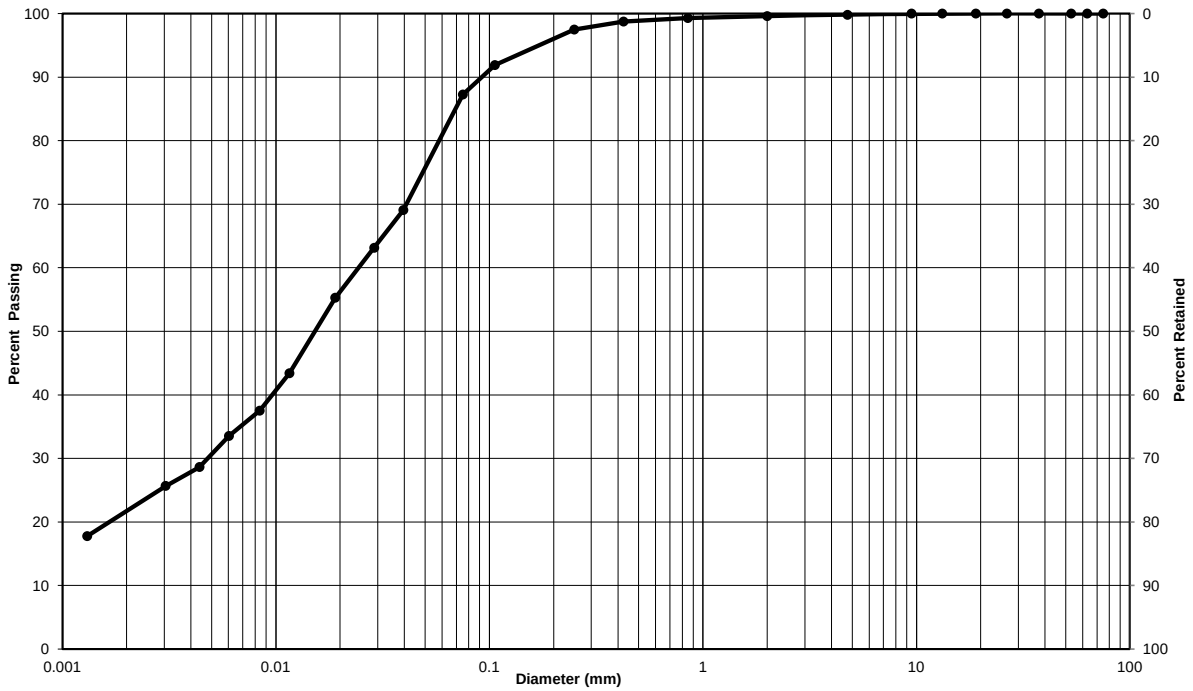


File: G:\12599716\WORKSHARE\FIELD\GINT\12599716 BOREHOLE LOGS RS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 2/3/23

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Veltri and Son Limited	**Lab No.:**	SS-23-03
Project/Site:	Geotech Investigation, Turner Street, Millbrook	**Project No.:**	12599716

Borehole No.:	BH1-23	Sample No.:	SS5
Depth:	3.0-3.5m	Enclosure:	B-1



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silt with clay and few sand	0	13	87
Silt-size particles (%) :	66		
Clay-size particles (%) (<0.002 mm):	21		

Additional laboratory reporting information available upon request.

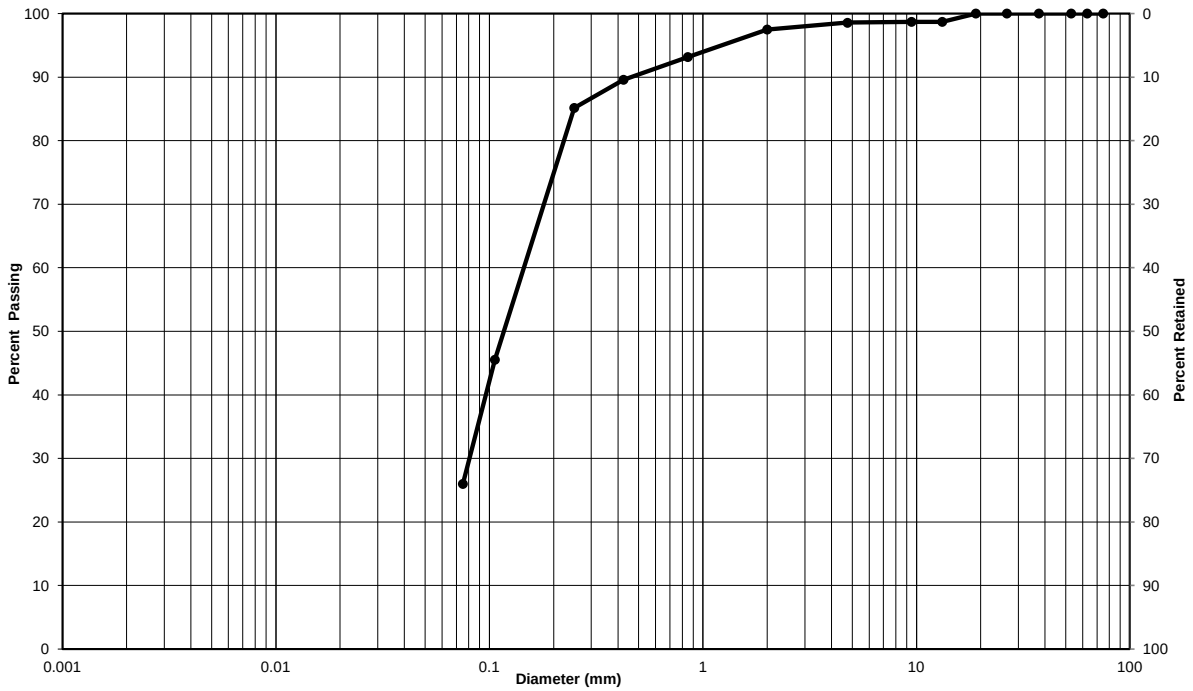
Remarks:

Performed by:	Josh Sullivan	**Date:**	February 2, 2023
Verified by:	Joe Sullivan	**Date:**	February 2, 2023
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Veltri and Son Limited	**Lab No.:**	SS-23-03
Project/Site:	Geotech Investigation, Turner Street, Millbrook	**Project No.:**	12599716

Borehole No.:	BH2-23	Sample No.:	SS2
Depth:	0.8-1.2m	Enclosure:	B2



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, trace gravel	1	73	26

Additional laboratory reporting information available upon request.

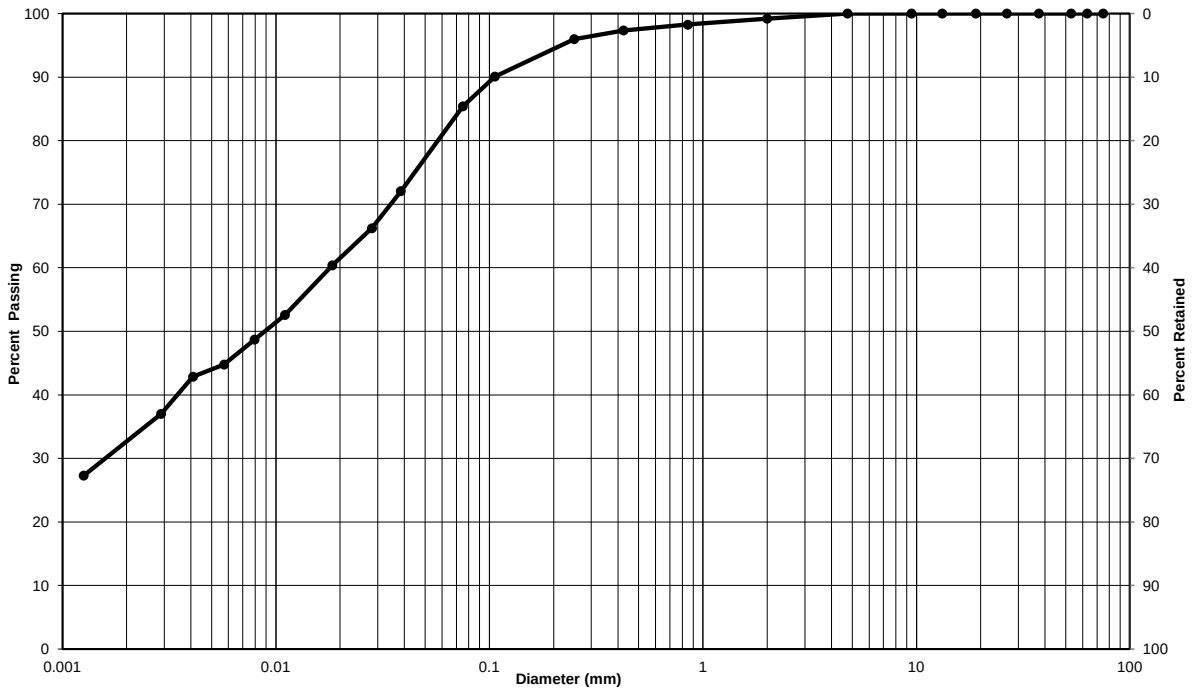
Remarks:

Performed by:	Josh Sullivan	**Date:**	February 2, 2023
Verified by:	Joe Sullivan	**Date:**	February 2, 2023
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Veltri and Son Limited	**Lab No.:**	SS-23-03
Project/Site:	Geotech Investigation, Turner Street, Millbrook	**Project No.:**	12599716

Borehole No.:	BH2-23	Sample No.:	SS4
Depth:	2.3-2.7m	Enclosure:	B3



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Clayey silt and few sand	0	15	85
Silt-size particles (%) :	53		
Clay-size particles (%) (<0.002 mm):	32		

Additional laboratory reporting information available upon request.

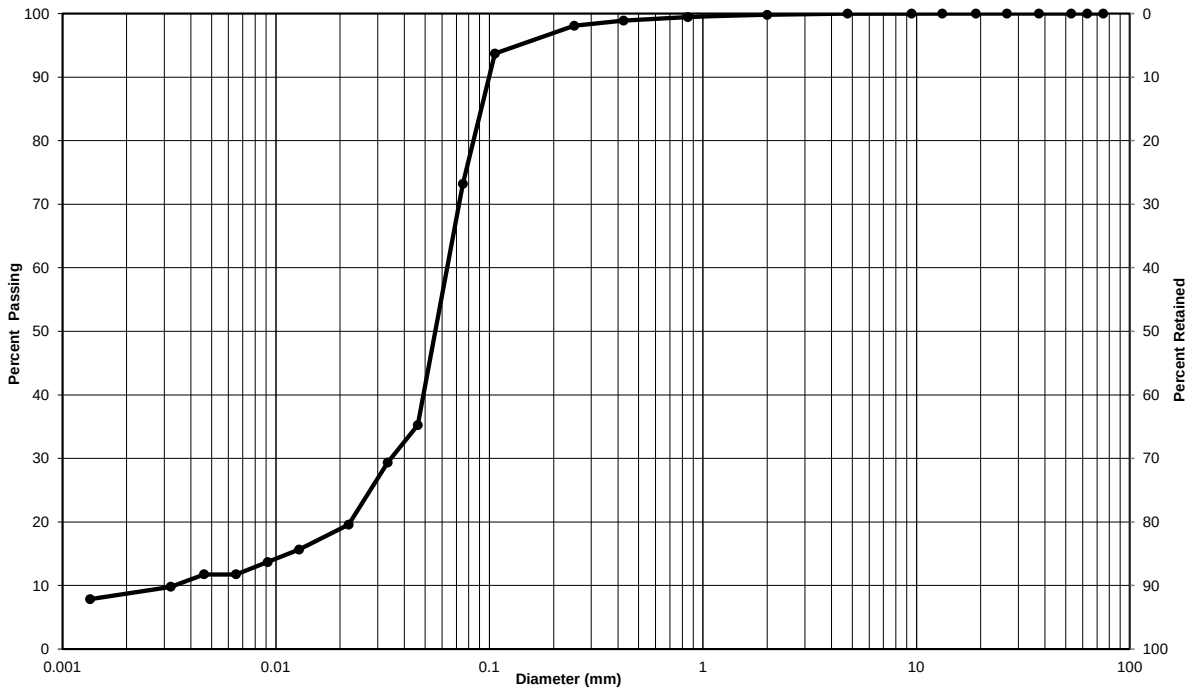
Remarks:

Performed by:	Josh Sullivan	**Date:**	February 2, 2023
Verified by:	Joe Sullivan	**Date:**	February 2, 2023
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Veltri and Son Limited	**Lab No.:**	SS-23-03
Project/Site:	Geotech Investigation, Turner Street, Millbrook	**Project No.:**	12599716

Borehole No.:	BH3-23	Sample No.:	SS6
Depth:	6.1-6.5m	Enclosure:	B4



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silt with sand and few clay	0	27	73
Silt-size particles (%) :	64		
Clay-size particles (%) (<0.002 mm):	9		

Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Josh Sullivan	**Date:**	February 2, 2023
Verified by:	Joe Sullivan	**Date:**	February 2, 2023
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON