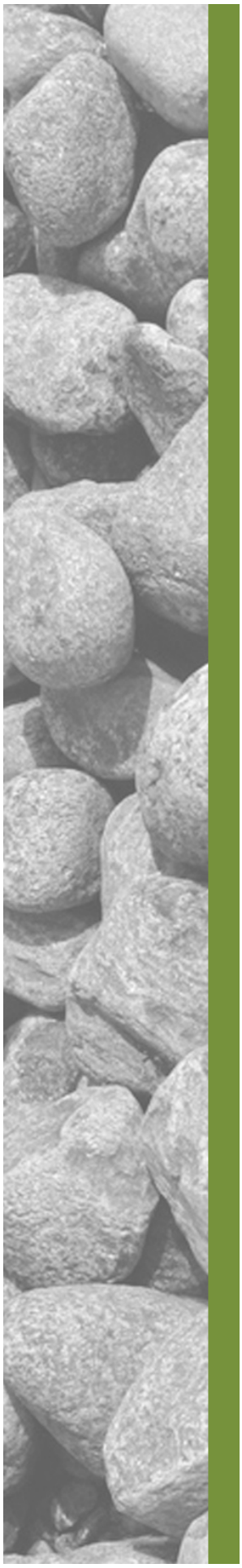
Appendix A

Hydrogeological Level Assessment

Groundwater Science Corp.



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Hydrogeologic Assessment
Paton Aggregates and Soils Ltd.
Proposed Trafalgar Expansion Pit
Part Lot 17, Concession 2 NTR
Municipality of Thames Centre
County of Middlesex

Prepared For:

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March 2026

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1.0 INTRODUCTION

This report presents the results of a hydrogeologic assessment completed for the Paton Aggregates and Soils Ltd. proposed Trafalgar Expansion Pit (study site). The proposal is for below water extraction at the site.

This hydrogeological assessment addresses the requirements of the Aggregate resources of Ontario standards: *A compilation of the four standards adopted by Ontario Regulation 244/97 under the Aggregate Resources Act* (MNRF, August 2020).

This assessment, and report, was completed on behalf of the applicant to provide supporting information to be included as part of the necessary approval applications.

1.1 LOCATION

The proposed pit is located within Part Lot 17, Concession 2 NTR, Municipality of Thames Centre (former North Dorchester), County of Middlesex, Ontario. The study site location is shown on **Figure 1**.

The site would be operated as an extension of the existing Trafalgar Pit (Licence #626167), located immediately west of the site. The proposed pit area is currently an agricultural field. Surrounding land use includes operating gravel pits in addition to agricultural and rural residential properties.

1.2 STUDY SCOPE

1.2.1 Summary of Provincial Standards

This study utilizes the current ARA related groundwater reporting standards *(Aggregate Resources of Ontario: Technical reports and information standards*, MNRF, August 2020) for a Class A Pit proposing to excavate below the maximum predicted water table.

The standards include the following water table assessment:

> *2.1 Maximum predicted water table report*
>
> *A report must be prepared that details how the maximum predicted water table is identified in metres above sea level, relative to the proposed depth of excavation at the site.*
>
> *The maximum predicted water table shall be determined by monitoring the ground water table at the site for a minimum of one (1) year to account for seasonal variations and influences due to precipitation, unless alternative information already exists (e.g. previous hydrogeological study, existing well data) to support a determination of the maximum predicted water table by a qualified person.*
>
> *An alternative method may be used for sites determining the maximum water table in Precambrian rocks of the Canadian Shield where it is difficult to determine the elevation of the water table. In such cases, the maximum predicted water table may be assumed at an elevation (metres above sea level) that is a minimum of 2.5 metres below the deepest sump or pond on the site, provided a qualified person develops and oversees a drilling and monitoring program to determine if the ground water table would be intercepted at the assumed maximum predicted water table.*

The number of drill holes and seasonal monitoring frequency shall be determined by a qualified person based on site conditions.

The standards also include the following site groundwater characterization and impact assessments:

2.5. Water report

Excavation at a pit proposed above the water table may not occur within 1.5 metres above the maximum predicted water table. Excavation at a quarry proposed above the water table may not occur within 2 metres above the maximum predicted water table.

Applications proposing to excavate below the maximum predicted water table must complete the following:

Water report level 1:

Determine the potential for impacts to ground water and surface water resources and their uses (e.g. water wells, ground water aquifers, surface water courses and bodies, springs, discharge areas) and identify if the proposed site is in a Wellhead Protection Area for Quantity (WHPA-Q) set out in an applicable source water protection plan under the Clean Water Act. If so, identify applicable source water protection policies and mitigation measures that will be implemented at the site.

Water report level 2:

Where the results of Level 1 have identified a potential for impacts from the aggregate site on ground water and/or surface water resources and their uses, an impact assessment is required. The assessment is to determine the significance of the effect and the potential for mitigation.

The assessment must address the potential effects of the operation on any ground water and surface water features located within the zone of influence, including but not limited to:

a) water wells (includes all types e.g. municipal, private, industrial, commercial, geothermal and agricultural)

b) springs (e.g., place where ground water flows out of the ground)

c) ground water aquifers;

d) surface water courses and bodies (e.g., lakes, rivers, brooks)

e) wetlands

The assessment must include but not be limited to the following:

f) a description of the physical setting including local geology, hydrogeology, and surface water systems;

g) proposed water diversion, discharge, storage and drainage facilities;

h) water budget (e.g. how water is managed on-site);

i) the possible positive or negative impacts that the proposed site may have on the water regime;

The Level 2 water report must also contain:

j) monitoring plan(s); and

k) technical support data in the form of tables, graphs and figures, usually appended to the report.

The "maximum predicted water table report" provides an assessment of the water table elevation at the site relative to the proposed extraction. The Level 1 report examines the site relative to identified Source Protection well head groundwater quantity protection areas (WHPA-Q) to address quantity protection policies. In addition, the Level 1 report examines the extraction plan relative to the identified water table conditions and provides a general discussion of potential for impact in order to determine the need for a Level 2 report and "scope" the issues to be examined.

The Level 2 report provides a detailed groundwater characterization, examines the type and scale of any potential extraction related impacts, and, based on that assessment identifies any potential for adverse effects on groundwater and surface water resources (and their uses). The need for monitoring and/or mitigation is also assessed. If necessary, the Level 2 report also provides recommendations regarding monitoring and/or mitigation.

The Level 1 and Level 2 hydrogeological reports are typically referenced by the Natural Environment Report (NER), which is also required as part of the ARA application.

1.2.2 Impact Assessment Approach

As part of the licensing process for the site some County of Middlesex or Municipality of Thames Centre planning applications may also occur.

A Hydrogeological Study (HS) related to groundwater and natural environment feature protection can be required as part of the planning application process. The HS should also address identified Source Protection information needs.

This report follows a typical HS approach, which is identified as follows:

- an outline of the study methodology
- a description of the topographic setting, local surface water drainage and natural environment features (including springs, wetlands, etc.);
- a description of reported local water well locations;
- a description of the geologic and hydrogeologic setting (including aquifers, groundwater/surface water interaction, water budget, etc.);
- a summary of Source Protection status of the site and adjacent area;
- a description of the proposed extraction;
- an examination of the potential impact of the proposed extraction (impact assessment), including pre and post water balance calculations;

- an assessment of measures that may be needed to mitigate impacts and ensure environmental feature protection; and,
- conclusions and recommendations.

This study addresses anticipated HS planning requirements for the proposed Trafalgar Expansion Pit.

2.0 METHODOLOGY

This assessment included a background information review to characterize the site setting, detailed site-specific fieldwork to characterize local conditions, and, the use of specific analysis methods for the water budget and impact assessment.

Standard hydrogeologic field and analysis methods are used for this study. The specific methodologies used for each step of the characterization and analysis are outlined in the respective sections of this report.

2.1 INFORMATION REVIEW

As part of this study the following information sources were used:

1) Harrington McAvan Ltd.; *Paton Aggregates and Soils Ltd. Trafalgar Expansion Pit Site Plans.*

2) Terrastory Environmental Consulting Inc., 2026; *Natural Environment Report, Aggregate Resources Act Application, Trafalgar Pit Extension, Municipality of Thames Centre*.

3) Groundwater Science Corp, January 2017; *Hydrogeologic Assessment D & J Paton Bros Ltd Proposed Trafalgar Road Pit, Lot 16 & 17, Concession 2 NTR, Municipality of Thames Centre, County of Middlesex*.

4) Groundwater Science Corp, March 3, 2026; *Trafalgar Road Pit (Licence No. 626167), 2025 Groundwater Monitoring Report*.

5) Ministry of Agriculture, Food and Agribusiness and Ministry of Rural Affairs AgMaps interactive mapping application website, available at: *https://www.ontario.ca/page/how-use-agmaps*.

6) Ministry of the Environment Conservation and Parks (MECP) published Water Well Records, available at: *https://www.ontario.ca/page/map-well-records*.

7) Ministry of the Environment Conservation and Parks (MECP) Source Protection Atlas interactive mapping application, available at: *https://www.ontario.ca/page/source-protection*.

8) Ontario Geological Survey OGSEarth published geological mapping (KML files viewed on Google Earth); available online at: *http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth*

9) Geographic Data Information obtained through Land Information Ontario (LIO) and licensed under the Open Government Licence – Ontario; available online at: *https://geohub.lio.gov.on.ca/*

Additional general references used are noted in the text of this report.

3.0 BACKGROUND REVIEW

The local site setting is shown in **Figure 2**. The proposed licenced area encompasses a ridge of land (primary sand/gravel deposit) that extends southeast from the existing pit. The existing pit operation has removed much of the (kame-like) ridge within that property.

The Trafalgar Expansion Pit is bordered on the west by the existing pit, to the north by an agricultural field and to the east and south by woodland areas. The existing Trafalgar Road Pit fronts onto Trafalgar Road. Operational pits are located on the lands north of Trafalgar Road and the adjacent property east of the site.

3.1 SITE TOPOGRAPHY AND DRAINAGE

Please refer to the Site Plan for specific topographic information at the property. Site topography is also shown on **Figure 3**. No surface water features (creeks, drainage channels, ponds or wetlands) occur within the proposed licence.

The topographic high point occurs at approximately 297.2 meters above sea level (mASL), along the ridge near the existing Trafalgar Road Pit. From this point the ridge slopes in a radial manner to the north, east and south. Slopes are moderate to steep, with base elevations of approximately 283 to 284 mASL along the south edge of the site, and 285 to 286 mASL along the east and north edges of the site.

On-site sheet-flow runoff would follow the ridge slope, moving off-site, primarily to flat-lying agricultural fields (to the north and south), where additional infiltration is expected. Some runoff would be directed to woodlands (south and east), however available detailed topographic mapping (see Site Plan) suggests most site runoff would be captured by enclosed drainage areas and infiltrated.

No water courses are identified within 120 m of the site. The closest mapped water course consists of a portion of Caddy Creek, south of the site at distance of 630 m.

3.2 NATURAL ENVIRONMENT FEATURES

There are no identified natural environment features (creeks, wetlands, other natural water bodies) within the proposed licenced area.

Wetlands are identified and mapped (Terrastory) as shown on **Figure 3** and on the Site Plan. For the purposes of the hydrogeological assessment wetland areas are grouped and numbered from #1 to #4 (see **Figure 3**). All of these wetland areas are part of the North Dorchester Swamp PSW.

Wetland Area #1 is located to the northwest of the site, within the existing Trafalgar Road Pit. This wetland is described (Terrastory) as a “maple mineral deciduous swamp” (SWDM3). Water levels in this feature are monitored through the Trafalgar Road Pit licence. Water levels are observed to range from approximately 281 mASL (seasonal low) to 282.4 mASL (seasonal high). The wetland floor is approximately 282.1 mASL. Downward hydraulic gradients predominate within this feature, indicating groundwater does not contribute significantly to the wetland hydroperiod. As illustrated later in this report, this wetland is located cross-gradient of the proposed extraction area and therefore is not expected to be impacted by water level effects that may be associated with the proposed Trafalgar Expansion Pit below water extraction. In addition, the potential surface

water catchment area associated with Wetland Area #1 is largely contained within the adjacent pit, therefore runoff contribution to the wetland would not be significantly affected by the proposed extraction.

Wetland Area #2 is located northeast of the site, within the lands between the site and the adjacent pit to the east. This wetland and pond area is described (Terrastory) as a combination of "silver maple mineral deciduous swamp" (SWDM3-2), "cattail mineral shallow marsh" (MASM1-1), and "duckweed floating-leaved shallow aquatic" (SAF1-3). This wetland occurs at an elevation just below 284 mASL (see Site Plan). This wetland is located approximately 75 m upgradient of the proposed below water extraction. As illustrated later in this report, groundwater levels within the proposed Trafalgar Expansion Pit site are significantly lower than the Wetland Area #2 elevation, indicating a "perched" condition on relative to the site. This condition is likely related to local geologic conditions and the east-west decline in the elevation of the underlying silt deposit surface. This wetland is supported by very localized runoff, primarily from the immediate surrounding agricultural fields, in addition to some seasonal groundwater inputs from the lands to the east. Based on the local topography, runoff contribution to the wetland would not be significantly affected by the proposed extraction. The potential water level effects due to below water extraction are discussed in **Section 8**.

Wetland Area #3 is located near the southeast corner of the site, within the woodland and consists of 2 wet depression "pockets". These wetlands are described (Terrastory) as "mixed mineral meadow marsh" (MAMM3-1) and "reed canary grass mineral shallow marsh" (MASM1-14) respectively. Wetland elevations are approximately 283 mASL (Site Plan). As illustrated later in this report, Wetland Area #3 is located cross-gradient of the proposed extraction area and therefore is not expected to be impacted by water level effects that may be associated with the proposed below water extraction. In addition, the potential surface water catchment area associated with Wetland Area #3 is largely contained within the adjacent wooded slopes, therefore runoff contribution to the wetland would not be significantly affected by the proposed extraction

Wetland Area #4 is located near the southwest corner of the site. This wetland area is described (Terrastory) as a combination of "yellow birch organic deciduous swamp" (SWDO3-2) and "white cedar – hardwood mineral mixed swamp" (SWMM1-1). Wetland elevations are approximately 278.8 to 280 mASL. This wetland is located approximately 75 m downgradient of the proposed below water extraction. As illustrated later in this report, Wetland Area #4 is developed on the underlying silt deposit, and is directly supported by the water table aquifer. The potential water level effects due to below water extraction are discussed in **Section 8**.

Additional portions of the North Dorchester Swamp PSW occur at lower elevations further south and southwest of the site.

3.3 PRIVATE WATER WELLS AND LOCAL GROUNDWATER USE

Local water supply has been assessed through a number of hydrogeologic studies we have completed for the surrounding pits (Trafalger Road Pit, Hunt Road Pit, Payne Pit). The following summary is based on both current MECP water well records, and, the results of previous door-to-door water well surveys.

Reported local water well record locations are shown on **Figure A1** (**Appendix A**). A total of 10 well records are shown within 500 m of the site, however 7 of those records correspond to monitoring wells installed at adjacent pits. One record, reported to be located southeast of the site, is plotted incorrectly and corresponds to a residence located on Gore Road, further south of the site. The remaining 2 well records represent private water supplies, both records are included in **Appendix A**. Well record number 4102843 corresponds to a bedrock well completed to a total depth of 41.1 m. Well record number 4107968 also corresponds to a bedrock well completed to a total depth of 41.5 m. Bedrock was encountered at an approximate depth of 32 m. The overburden is reported to consist predominantly of fine-grained material (silt/clay), with surficial sand/gravel (to a depth of 11 m) encountered at one location.

Within 500 m of the site there are 5 residences on 4 properties, consisting of: 6351 Trafalgar Street; 6508 Trafalgar Street (Payne Pit property); 6545 Trafalgar Street (site is within this ownership parcel); and, 6741/6745 Trafalgar Street (side-by-side residences in Hunt Road Pit parcel). Based on reported locations and previous water well surveys well record #4102843 corresponds to 6741/6745 Trafalgar Street (shared well), and, well record #4107968 corresponds to 6565 Trafalgar Road. No well records are available for, and no door-to-door survey responses were received from, the 2 other residences within 500 m of the site . Based on other reported shallow wells in the area it is assumed that both 6351 Trafalgar Street and 6508 Trafalgar Street rely on shallow (dug or bored) wells within the surficial sand/gravel aquifer in this area.

3.4 SURFICIAL GEOLOGY

Geologic mapping is shown on **Figure 4** based on information published by the Ontario Geological Survey and distributed through *OGSEarth* (viewable on Google Earth).

According to mapping available for the area, including summaries provided in the Upper Thames River Source Protection report and by *OGSEarth*, the site is located within a sand/gravel deposit (i.e. ice-contact stratified deposits, sand and gravel, minor silt, clay and till) within a Till Plain. A Till deposit is mapped at the north edge of the property parcel and extending northward, described as stone poor sandy silt to silty sand - textured till on Paleozoic terrain. South of the site Organic Deposits (peat, muck, marl) are mapped within the wetland areas. Based on the expected depositional sequence, the till units underlie the sand/gravel deposits (and organic deposits).

3.5 BEDROCK GEOLOGY

The underlying bedrock at the site is the limestone of the Dundee Formation. Bedrock elevation is reported to be approximately 250 mASL, with a general southward slope.

3.6 SOURCE PROTECTION SUMMARY

There are no well head protection areas (WHPA), or WHPA-Q area, identified at the site or in the immediate area of the site (Source Protection Atlas interactive mapping application). The closest WHPA identified is approximately 2 km northeast of the site, for the village of Thamesford. The area of the site is classified as a significant recharge area, likely due to the surficial soil types present. In addition, due to both the geologic

characterization and relatively shallow water table, the site and surrounding area is also identified as a Highly Vulnerable Aquifer, with a designated vulnerable area activity threat category of moderate to low.

4.0 FIELD WORK

Field work completed as part of this assessment includes site inspections, drilling and monitoring well installation and development, response testing, and, water level monitoring.

4.1 DRILLING AND MONITORING WELL INSTALLATION

In order to collect geologic information and establish a site groundwater monitoring network drilling was completed at 3 locations within the expansion property (MW4, MW5, and MW6) in November 2024. These wells expand on the existing Trafalgar Road Pit water table monitoring network (MW1 to MW3 and DP1 to DP3). Borehole logs are included in **Appendix B**. Monitoring locations are shown on **Figure 2** and **Figure 3**.

The drilling was completed by Marathon Underground Constructors Corporation (Breslau) under the direction of Groundwater Science Corp. Boreholes were advanced using hollow stem augers, and soil samples were obtained using either auger cuttings or a split spoon sampler. Monitoring wells, consisting of nominal 5 cm (2 inch) diameter PVC pipe and machine slotted screens, were installed at each location. The wells were installed through the augers to the desired depth (generally screened across the water table as encountered), and a silica sand-pack placed over the screened interval. The remainder of the annual space was sealed with bentonite.

Each well was developed using a Waterra® inertial pump, until a stabilized response was observed and discharge water cleared, in order to ensure the monitor functions as intended.

The expansion pit monitor elevations were surveyed relative to the established monitors at the existing Trafalgar Road Pit. Installation details are summarized in **Appendix C**.

Based on the extraction experience at the adjacent Trafalgar Road Pit, the core of the ridge is made up of a sand deposit. Drilling results at MW4 and MW6 indicate that along the northeast and southwest flanks of the ridge this sand deposit is underlain by either silt or silty sand. The drilling results at MW5 suggest that the surficial soils transition to silty sand to the southeast. The drilling results are discussed further in **Section 5** of this report.

4.2 WATER LEVEL MONITORING RESULTS

Regular (generally monthly) water level measurements at the Trafalgar Expansion Pit monitors MW4, MW5 and MW6 began in November 2024, and are ongoing. The monitoring databased at the existing Trafalgar Road Pit, which includes both an initial monthly measurement period and subsequent quarterly frequency, extends back to 2016 (9 years). The monitoring results are summarized in **Appendix C**.

Based on the Trafalgar Expansion Pit monitoring results, observed high water table conditions across the site occurred in May 2025. High water table elevations applicable to the proposed licence are summarized in **Table 1**.

High Water Table Elevation (mASL)	
Location	High Water Table
MW4	283.39
MW5	282.72
MW6	282.21

Table 1: High Water Table Elevations

Interpreted high water table contours for the site and existing pit area, based on the measured water level elevations in May 2025, are shown in **Figure 5**. Note that these contours are generated based on the combined monitoring network at both the existing pit and the expansion site.

Total observed seasonal to annual water table fluctuation at the site is between 0.7 m (at MW1) and 0.8 m (at MW3 and MW4), which is considered with the typical range for this area. Additional discussion regarding water levels at the site is provided in **Section 5.0**.

4.3 RESPONSE TESTING

Response tests within the surficial sand deposits were completed at MW1, MW2 and MW3 as part of previous studies, as reported in 2017.

Locations MW1 and MW2 represent the relatively clean sand deposit in this area, with a (geometric mean) K value of 1.77 x 10^{-4} m/s. Location MW3 represents the silty sand deposit in this area, with a correspondingly lower K value of 6.31 x 10^{-6} m/s.

The underlying silt to silt till unit is expected to have a much lower hydraulic conductivity value, potentially in the range of 1 x 10^{-7} m/s 1 x 10^{-8} m/s.

5.0 HYDROGEOLOGIC SETTING

The hydrogeologic setting of the site is discussed in context of the known regional setting, information review undertaken for this site, and, monitoring and assessment completed as part of this study.

In order to illustrate the hydrogeologic setting in the area of the site 2 schematic cross-sections were developed based on reported topographic contours, water well records and site-specific drilling results. The section locations are shown on **Figure 6**. The cross-sections are included as **Figure 7** and **Figure 8**.

Section A (**Figure 7**) runs north to south, through the ridge and within the western portion of the site and to the margin of Wetland Area #4. The section illustrates the local variation in topography and geology, with the surficial sand deposit overlying a silt to silt till which represents a fine-grained depositional package which extends to bedrock. The proposed extraction depth is shown, extraction will extend to, but not into, the silt to silt till deposit. The predicted final extraction pond level is also shown, note that the section is off-set to the water table hinge-line at the site, therefore the pond level as shown lies above the water table elevation as illustrated.

The surficial sand and gravel in this area forms a local unconfined aquifer where saturated. The primary groundwater function of the proposed extraction area is recharge. This recharge supports local groundwater conditions and off-site flow. The underlying fine-grained depositional package limits vertical flow and promotes horizontal flow.

As shown, Wetland Area #4 is developed directly on the silt deposit, and is directly supported by the local water table system, which will be the primary source of water supporting, for example, the wetland hydroperiod duration. Conditions at Wetland Area #3 are expected to be similar. However, based on the lack of actual stream development, the overall discharge volume to surface in this area is limited. These wetlands are developed in depressions and likely act as groundwater flow-through features. Caddy Creek, much further south (670+ m) of the site, is most likely the primary discharge point for the local shallow groundwater flow system.

Section B (**Figure 8**) runs southwest to northeast, through the ridge from Wetland Area #4 to Wetland Area #2, and includes Hunt Road Pit monitor MW3. Note that the vertical scale is enlarged relative to Section A, and so presents a more detailed examination of the shallow system. Again, the section illustrates the local variation in topography and geology, with the surficial sand deposit overlying a silt to silt till. The proposed extraction depth and predicted final pond level is shown.

As illustrated in Section B, and discussed above, Wetland Area #4 is developed on the silt deposit and is supported by the water table system. Wetland Area #2 however is developed within the sand deposit at an elevation well above the water table within the Trafalgar Expansion Pit site, as measured at MW4. Comparing geologic and water level information from Trafalgar Expansion Pit MW4 to Hunt Road Pit MW3 indicates that the silt deposit elevation declines significantly below Wetland Area #2. Similarly, the water table declines between the two monitors (water table follows the silt deposit surface), creating a “perched” condition at the wetland relative to the groundwater system at the Trafalgar Expansion Pit site.

Monitoring at Hunt Road PitMW3, east of Wetland Area #2, shows water table levels vary from well above to just below the wetland surface. This indicates that the wetland is supported seasonally by the water table system flowing from northeast to southwest (from the Hunt Road Pit site to the Trafalgar Expansion Pit site). A review of local topographic contours (Site Plans for both pits) this wetland is also supported by very localized runoff, primarily from the immediate surrounding agricultural fields.

Local water wells utilize both the shallow and deep (bedrock) aquifer systems.

6.0 PROPOSED EXTRACTION

The following general description of the proposed Trafalgar Expansion Pit extraction is provided as a framework for the impact analysis. For specific details regarding existing site conditions or the extraction plan please refer to the Site Plan(s).

The existing approved Trafalgar Road Pit licenced area is approximately 27.3 hectares (ha) in size, with a permitted extraction area of approximately 20.5 ha.

The proposed Trafalgar Expansion Pit (new) licenced area is approximately 11 ha in size. The proposed expansion pit extraction area is approximately 9.4 ha.

The expansion is to be operated essentially as an eastward extension of the existing pit. Above water extraction is expected to begin from the common boundary and proceed generally eastward. The proposed extraction would also extend below the water table to form a permanent pond, beginning at the east edge of the expansion site and proceeding back toward the existing pit. Within the proposed expansion site the permanent pond, including the associated shallow peripheral wetland areas, has an area of 6.9 ha.

Below water extraction would occur using an excavator (or equivalent). The sand extracted from below water will be placed in windrows at the edge of the excavation pond, where it will drain and either infiltrate back into the ground or flow back into the pond. The excavated material will be left to dry before screening and loading.

The maximum extent of the proposed new pond is shown on **Figure 9**. In relation to the water table contours shown on **Figure 5**, MW4 is immediately upgradient of the pond and MW6 is immediately downgradient of the pond. Based on the setting the final maximum pond level elevation is projected to be an average between the upgradient and downgradient water table contours, at approximately 282.75 mASL. The pond bottom elevation (maximum excavation depth) shown on the Rehabilitation Plan is 278 mASL. Therefore, a final maximum pond depth of approximately 4.75 m is anticipated.

Post extraction drainage within the total rehabilitated area would be maintained on-site, directed toward the proposed pond. This water would be retained (and infiltrated) on-site. There are no other proposed water use, diversion, storage or drainage facilities on-site.

As shown on the Site Plan, a spills response program will be in place at the pit.

7.0 MAXIMUM PREDICTED WATER LEVEL REPORT

The proposed extraction would occur within unconsolidated surficial sand and gravel deposits. Therefore, the following definitions are used:

> *"ground water table" means*
>
> *a) for unconsolidated surficial deposits, the ground water table is the surface of an unconfined water-bearing zone at which the fluid pressure in the unconsolidated medium is atmospheric. Generally, the ground water table is the top of the saturated zone.*
>
> *"maximum predicted water table" means the maximum ground water elevation (metres above sea level) predicted by a qualified person who has considered conditions at the site and mean annual precipitation levels.*

The water table at the site was measured and determined by the installation and monitoring of 3 water table wells on the perimeter of the proposed licenced area, supported by additional wells located within the existing pit. The measured water table at the site corresponds to the top of the saturated zone within the unconfined surficial sand and gravel aquifer.

At the proposed Trafalgar Expansion Pit the maximum predicted water table elevation is shown on **Figure 5** and is summarized in **Table 1**.

The maximum predicted water table elevation varies across the proposed expansion site extraction area from approximately 282.2 mASL (at MW6) to 283.4 mASL (at MW4).

8.0 WATER REPORT LEVEL 1

The purpose of the Water Report Level 1 is to identify if the site is within a WHPA-Q area (and identify if related Source Protection Policies should be implemented), and, to determine the potential for adverse effects to groundwater and surface water resources and their uses (e.g. water wells, ground water aquifers, surface water courses and bodies, springs, discharge areas).

Based on our review of publicly available information, the Trafalgar Expansion Pit site and is not located within an identified WHPA-Q area as set out in an applicable source water protection plan under the Clean Water Act.

The new pond will act as a groundwater flow-through feature. Based on the size and location of the proposed new below water extraction no change in the overall (regional to intermediate scale) groundwater flow direction would be anticipated. Some very localized water level changes may occur near the pond perimeter.

Potential physical changes to the groundwater system related to the proposed extraction that should be assessed include: temporary water table effects during below water table extraction; long-term changes to the water table at the edges of the proposed pond; and, changes in the overall site water balance due to the extraction.

Based on the fact that shallow groundwater flow at the site does not support any cool to cold water surface water habitat in the immediate area, there is no interpreted thermal sensitivity in the downgradient flow system. Therefore, a thermal impact assessment is not required.

To assess the significance of potential on-site water table effects due to the proposed extraction on water wells and natural environment features in the area of the site, a Water Report Level 2 evaluation is required. The Level 2 evaluation is included as **Section 9** of this report.

9.0 WATER REPORT LEVEL 2

The Level 2 evaluation is completed to examine issues related to the potential for the proposal to affect the local water table or water balance at the site. In addition, any potential related impacts to local aquifers, water wells and natural environment features (springs, surface water courses and bodies and wetlands) are also assessed.

9.1 POTENTIAL IMPACTS

The potential for impact is examined in the context of the site setting, existing extraction and proposed new extraction.

9.1.1 Site Water Balance

The water balance assessment area consists of the proposed licence (11 ha). Water balance calculations are included in **Appendix D**.

The water balance is based on long-term average climate monthly conditions (1991 – 2020 Climate Normals) reported by Environment Canada for LONDON (station/area). The reported average annual precipitation is approximately 961.6 mm/year.

Evapotranspiration rates for existing and future land surfaces are calculated using the Thornthwaite and Mather method, assuming a Soil Moisture Retention of 75 mm (representative of moderately deep-rooted crops on fine sand). The annual Actual Evapotranspiration rate at the site is estimated to be 546.3 mm/yr. A free water surface (pond) evaporation rate of 618.45 mm/yr is estimated based on the calculated Potential Evapotranspiration rate.

Land surface runoff and infiltration rates at the site (farm fields in) are estimated in accordance with MECP development application guidelines (*Hydrogeological Technical Information Requirements for Land Development Applications*, April 1995) and stormwater management guidelines (*Stormwater Management Planning and Design Manual*, March 2003).

Within the MECP methodology, the difference between precipitation falling on the land surface within the assessment area (direct input) and evaporation/evapotranspiration (direct initial output) is termed the water "surplus". The calculated surplus value for the site is 415.3 mm/yr.

Surplus water within an assessment area can either infiltrate to recharge the groundwater system or form surface water runoff. Land surface runoff rates at the site are calculated according to the MECP development application guidelines methodology, which assigns an infiltration factor to apply to the water "surplus" in order to calculate recharge. The infiltration factor depends on individual factors related to topography, soil type and vegetation/cover. Based on a characterization of the site (hilly land, open sandy loam soil, cultivated lands) an infiltration factor of 0.7 (70%) is estimated. The remainder of the surplus (30%) becomes runoff.

Based on the infiltration/runoff factors the existing average annual groundwater recharge volume is estimated to be 27,410 m^3/yr (0.87 L/s). This equates to a site average unit recharge rate of 0.249 m/yr. Total average annual runoff is estimated to be 18,273 m^3/yr.

We note that most of the runoff generated on the site would move toward adjacent farm fields or enclosed drainage areas within the woodlands.

After extraction, all runoff would be retained within the site and directed toward the proposed pond. The total proposed pond area is approximately 6.9 ha. Based on the retention of runoff and expected evaporation rates, the annual site recharge after rehabilitation is projected to be 40,705 m^3/yr (1.29 L/s at the site). This equates to a site unit recharge rate of 0.370 m/yr.

The calculation indicates an increase in recharge would be expected due to runoff retention off-setting the potential increase in evaporation associated with the proposed pond.

The site water balance does indicate that on a site-specific basis no net loss would be expected within the groundwater system at the Trafalgar Expansion Pit area. Therefore, no significant negative effect on water availability is expected within the groundwater system due to the proposed new extraction. Overall, moderate to high groundwater recharge rates within the Source Protection identified Significant Groundwater Recharge Area will be maintained.

9.1.2 Temporary Water Table Effects

The below water excavation at the Trafalgar Expansion Pit is expected to have a maximum extraction rate estimated to be on the order of 500 m^3/day. Actual extraction would be limited by demand or equipment used, and would likely be lower.

The removal of aggregate from below the water table results in an inflow of water to replace the solid material removed, forming a pond. As the aggregate is removed by excavator from the working edge of the pond, it is stockpiled adjacent to the pond and most of the retained groundwater drains back into the excavation. Using an average sand and gravel aquifer porosity of 0.3, 70% of the extracted volume is aggregate and 30% is groundwater. It is generally assumed that a water volume equivalent of 5% of the aquifer volume can be retained and removed with the aggregate, and 25% drains back into the excavation (per Golder Associates, August 2006; *Water Consumption Study* prepared for the Ontario Stone, Sand & Gravel Association). Therefore, an estimated total of 75% of the aggregate volume removed during excavation must be replaced by water inflow. The water filling the excavation can be groundwater inflow from the surrounding aquifer, direct precipitation or precipitation runoff from the surrounding area.

This effect is often analyzed as an equivalent pumping assuming all of the water flowing into the excavation is groundwater. However, it is important to note that little actual water is removed from the site. The “pumping” is essentially an intermittent transfer of water from the aquifer to the pond, generally resulting in a short-term water table decline in the vicinity of the excavation. Prior to extraction water is “stored” within the porosity of the sand and gravel deposit (generally assumed to be 30%). Once the aggregate is removed, the on-site storage volume increases within the extracted area (pond). The drawdown is short-term in that “recovery” occurs between excavation periods (overnight and on weekends); and, during rainfall recharge events.

Measurable drawdown at the pond and within the surrounding aquifer can occur in response to aggregate removal during the initial stages of extraction. However, as the

extraction pond enlarges and off-setting effects such as daily recovery and occasional precipitation recharge events begin to occur, actual drawdown at, and adjacent to, the pond becomes more difficult to measure. Once the pond is established the pond volume tends to buffer instantaneous pond level drawdown related to the aggregate removal. As a conservative approach for this impact analysis, it is assumed that below water extraction would occur on a continual basis for 90 days with no daily recovery or recharge events.

For the purposes of this discussion a theoretical maximum "equivalent pumping" effect at the proposed pond was assessed using the Aqtesolv® pumping test analysis program. The assessment simulates pumping within the sand and gravel aquifer from the pond using an analytical model consisting of 8 equally spaced small diameter wells (cumulative drawdown) along the perimeter of the circle (as per *Construction Dewatering and Groundwater Control, New Methods and Applications, Third Edition*, Powers et al; 2007).

A forward Neuman unconfined aquifer analysis was completed using the following site-specific assumptions (in addition to the typical analytical assumptions associated with the Neuman method):

- aquifer thickness (b) of 4.75 m (pond depth), extends laterally in all directions;
- aquifer K = 1.8 x 10^{-4} m/s, Kz/Kr = 0.1;
- T = Kb = 0.00086 m^2/s, S = 0.25 (drainable porosity);
- 90 day below water table extraction period, average pond depth of 4.75 m;
- below water table extraction of 500 m^3/day;
- groundwater inflow (75% of extraction volume) Q = 375 m^3/day (0.26 m^3/min) averaged over 90 day extraction period;
- after 90 days pond area is 9,474 m^2, equates to a circle of radius 54.9 m;
- drawdown simulated using 8 wells (each 0.1 m radius) equally spaced along the outside of a circular "excavation pond" of radius 54.9 m, individual pumping rates of 0.033 m^3/min; and,
- no precipitation recharge for analysis period.

The program output for the extraction pond is included in **Appendix E**. The drawdown analysis calculated the expected water level decline in an idealized aquifer at distances of 50 m, 75 m, 100 m, and 200 m from the excavation. As illustrated by the analysis results, the expected drawdown within the aquifer system decreases with distance from the pond edge and will recover after the extraction ends each season. Note that the analysis does not include recharge, therefore the drawdown prediction plot continues after the 90-day period. However, by that time we would expect recharge effects to moderate water levels.

Under the "worst case scenario" of 90 days of continual extraction at the proposed pond and no recharge, the maximum water table change at 50 m, 75 m and 100 m distance is projected to be approximately 0.62 m, 0.48 m, and, 0.37 m respectively. At 200 m distance less than 0.2 m drawdown is projected over the 90-day period.

Note that the assumptions used for the analysis are conservative in that: the assumed extraction rate is likely an overestimate; water table effects over the entire extraction period are assumed to radiate immediately from the full extent of the pond (whereas actual water table effects will slowly develop from the initial below water extraction area and would not reach the full pond extent for some time); some water level recovery would be expected

during non-operational periods (overnight and during weekends); and, some natural recharge would typically be expected during the extraction period. Any direct precipitation or recharge would reduce "drawdown", therefore actual water table effects are typically less than projected using an equivalent pumping approach. Also, due to seasonal recharge, the water table recovery after operations cease is more rapid than predicted by the analysis.

It is also important to note that the extraction pond represents an increase in storage, and there will be an increase in rainfall water volume retained on-site during fall and spring (outside of the annual operating period), specifically during snowmelt. This storage volume tends to reduce the daily response of the pond and water table to extraction

9.1.3 Long Term Water Table Effects

As the below water table extraction forms a pond, a level (pond) water surface replaces what was previously a sloping water table within the aquifer. In most cases the pond level is typically lower than the water table was on the upgradient side, and higher than the water was on the downgradient side. This typically causes a water table decline immediately upgradient of the pond and rise immediately downgradient of the pond. The magnitude of change is dependent on the final pond level, which in this setting would be the average of the original upgradient and downgradient elevations.

Based on the existing water table slope and the projected final pond level, a potential water table decline of approximately 0.5 m can be expected along the north edge of the proposed pond. As illustrated by the drawdown analysis, the effect of this decline is expected to dissipate relatively quickly with distance.

Wetland Area #1 and Wetland Area #3 are both cross-gradient (along the pond hinge-line) and therefore long-term water level effects are not expected at these features.

Wetland Area #2 is in a "perched" condition relative to the proposed below water extraction, with the underlying silt aquitard (base of surficial aquifer) rising eastward from the Trafalgar Expansion Pit site to the Hunt Road Pit site. This condition, in addition to recharge that occurs east of Wetland Area #1, will be the primary control on east-west groundwater flow and water table elevations in this area. Based on the relative position and expected continued seasonal groundwater inputs to the wetland, no significant change in water availability or water levels are expected at Wetland Area #2.

Wetland Area #4 is located downgradient of the proposed below water extraction. Based on the expected pond equilibration and water balance results, both water levels and water input volumes are expected to be maintained in the long-term.

As noted in **Section 9.1.1**, the overall volume of groundwater recharge is expected to increase, therefore the magnitude of groundwater flow leaving the site, and available in the shallow system, is not expected to change significantly. This indicates that although some localized water level changes may occur, the overall volume of groundwater (or water availability in the area) will be maintained.

9.1.4 Potential Impact To Water Wells and Groundwater Use

The maximum expected drawdown effects are projected to be small in magnitude and would largely be contained within the overall land parcel and agricultural field area. In

addition, as the extraction pond expands, the potential for short-term drawdown effects is reduced. Therefore, no extraction related impacts are anticipated at local water wells (shallow or deep). As indicated by the water balance, overall water availability at the site will not be significantly affected.

However, in order to track water table elevations as extraction proceeds a monitoring program is recommended. In addition, we recommend a standard water well interference complaint and mitigation response requirement be included as a condition of the Site Plan to reassure local residents that water supplies are protected.

Based on the setting; scale and extent of projected groundwater volume and level changes; and, proposed monitoring program, there is no significant potential for negative impacts to local water wells or water supplies associated with the proposed Trafalgar Expansion Pit.

9.1.5 Potential Impact to Natural Environment Features

Groundwater recharge volume and availability at, and near, the site is not expected to be significantly affected. In addition, temporary drawdown influences and/or long-term water level changes are not expected to extend to local natural environment features (upgradient or downgradient). Based on the water balance analysis overall groundwater input to more distant features, such as Caddy Creek, will also be maintained.

Therefore, based on this assessment there is no significant potential impact to local natural environment features associated with the proposed Trafalgar Pit Expansion.

9.2 MONITORING, MITIGATION AND CONTINGENCY PLAN

Although no well interference is predicted or expected, in order to provide assurance to local residents, the following general recommendation, consistent with the February 2004 *Protocol To Address Environmental Complaints, Pit and Quarry Applications in the Province of Ontario, Between the Ministry of Natural Resources and Ministry of Environment* (MNR(F) Policies and Procedures Manual, April 2006) should also be shown on the Site Plan to ensure that water well interference complaints, if made during the life of the ARA Licence, are dealt with appropriately:

> *Where the Ministry of Natural Resources and Forestry with the assistance of the Ministry of the Environment Conservation and Parks, according to existing water well interference complaint protocols, has determined that the operation of the pit has caused any well water to be adversely affected, the licensee shall, at the licensee's expense, either deepen the well or replace the well to ensure that historic water production quality standards are maintained for that well. If this pit operation has caused a water supply problem, the licensee shall, at their expense, ensure a continuous supply of potable water to the affected landowner.*

In order to confirm water table elevations at the site, the following monitoring program is recommended:

1. *Water level measurements shall be obtained on a quarterly (seasonal) basis at MW4, MW5, and MW6, as accessible.*
2. *The monitoring results will be summarized annually by the Operator and made available to MNR upon request.*

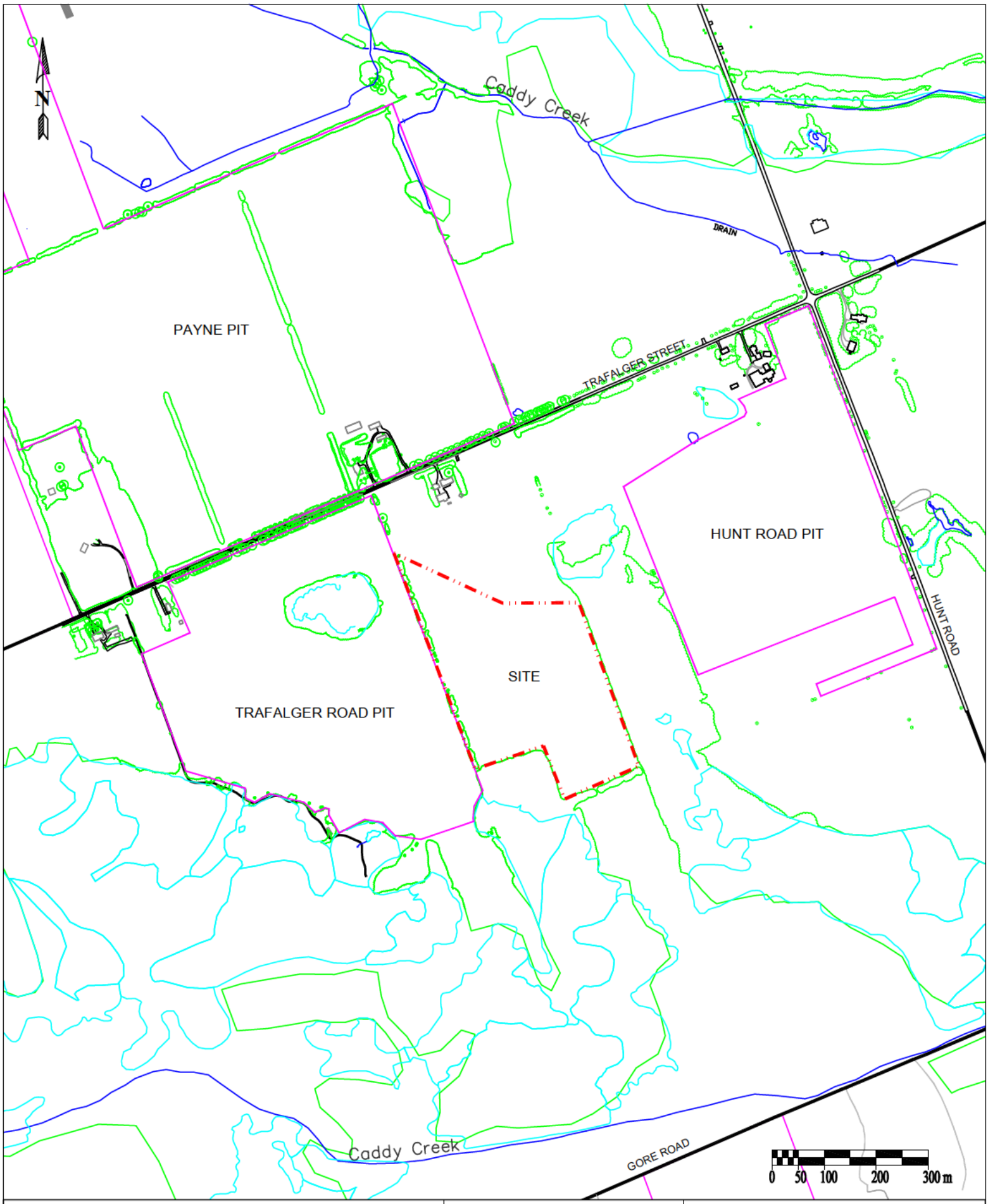
10.0 CONCLUSIONS

Based on the results of the impact assessment, and, proposed monitoring and mitigation plan, there are no potential for significant adverse effects to groundwater and surface water resources and their uses; and, there is no potential for significant impacts to local groundwater aquifers, natural environment features or water supply associated with the proposed Trafalgar Expansion Pit.

All of which is respectfully submitted,

Andrew Pentney, P.Geo.
Senior Hydrogeologist
Groundwater Science Corp.

Figures



Site (approx.) — other licenced areas

vegetation lines, wetlands, water bodies & watercourses, roads, buildings, etc. as shown

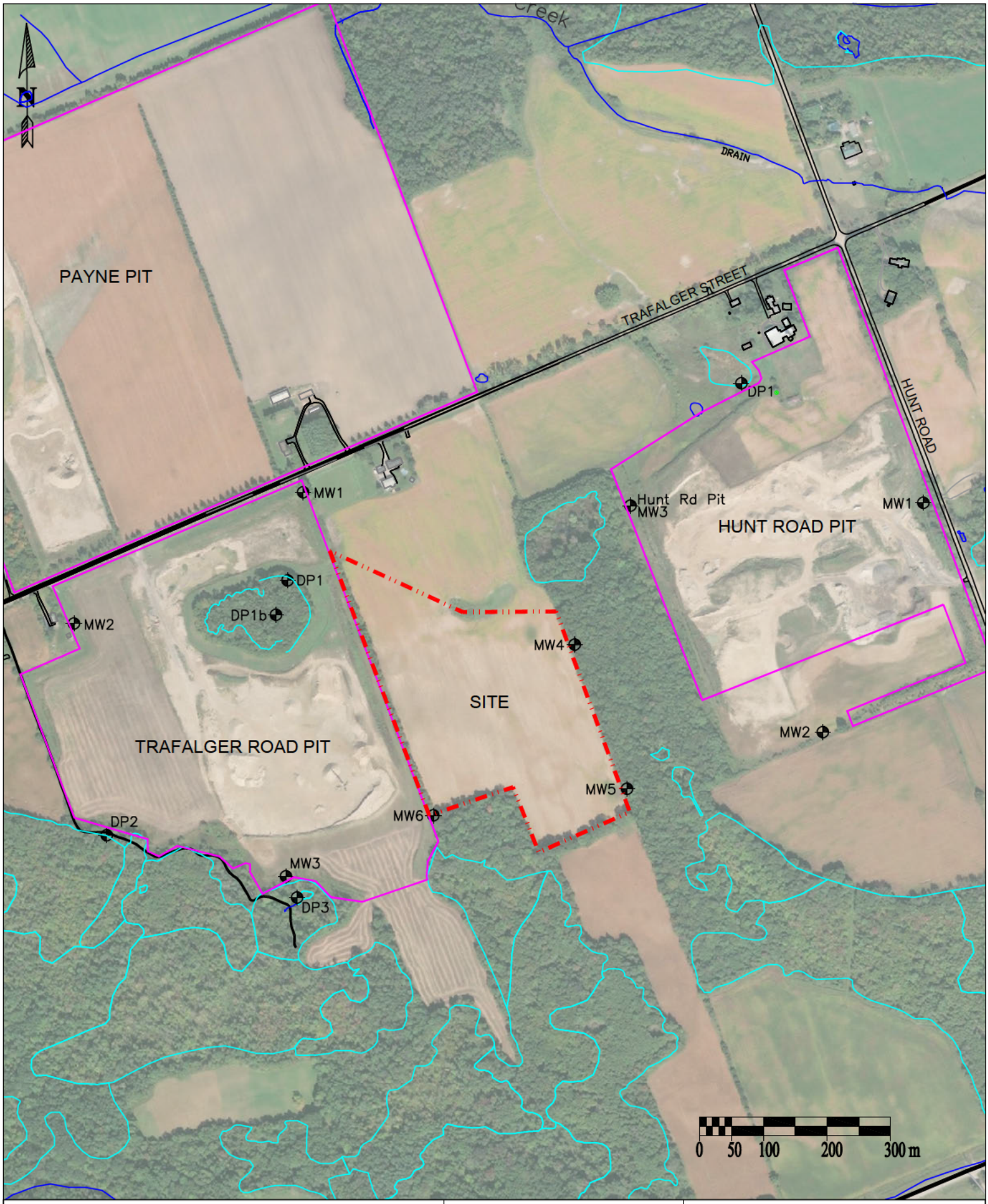
Modified from: geographic data obtained through Land Information Ontario

March 2026
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 1: Site Location

Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit



Site (approx.) — other licenced areas

monitoring locations (MW, DP) as shown

wetlands, water bodies & watercourses, roads, buildings, etc. as shown air photo: Esri Imagery (May 2025)

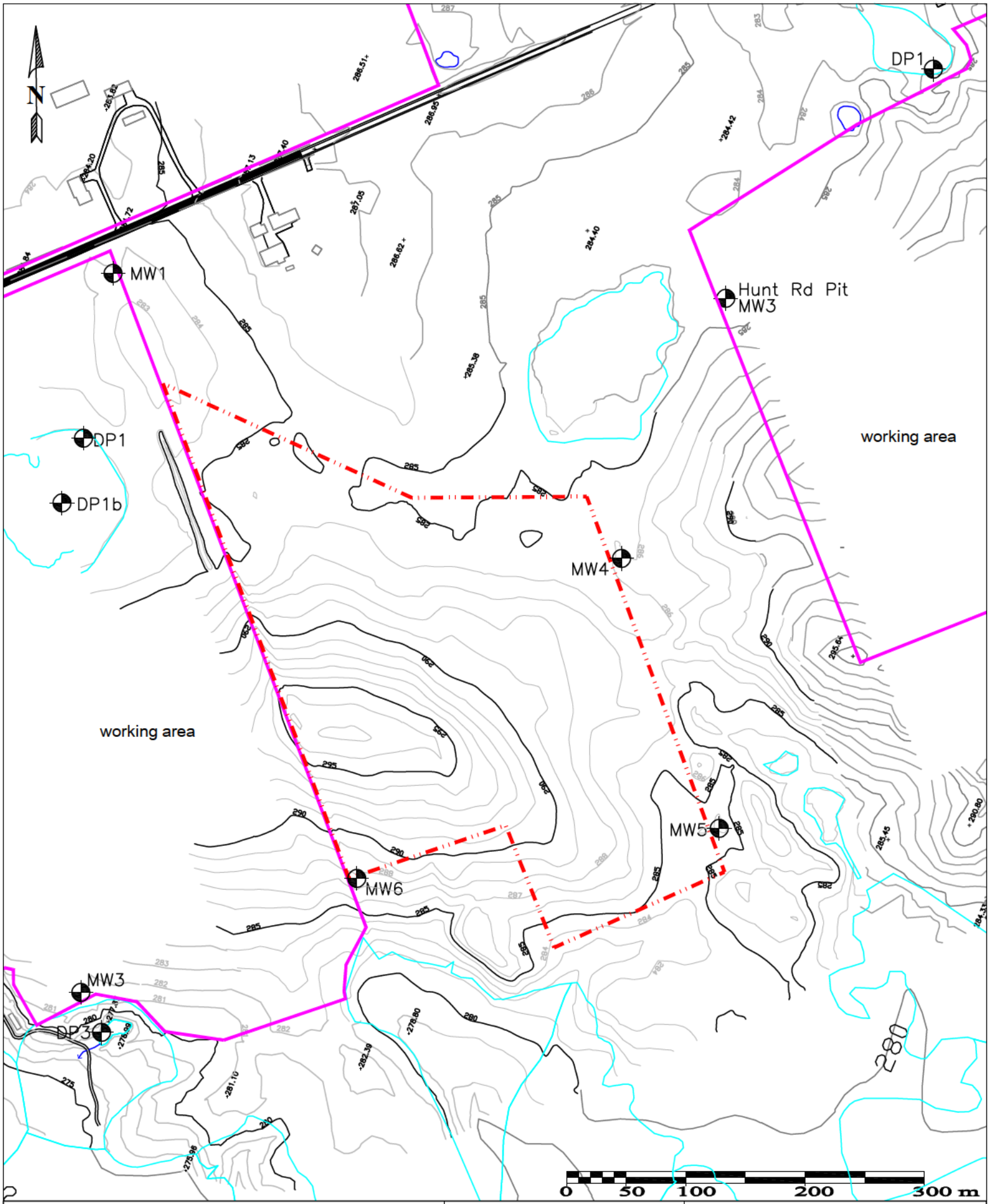
Modified from: geographic data obtained through Land Information Ontario

March 2026
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 2: Site Setting

Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit



Site (approx.) — other licenced areas

monitoring locations (MW, DP) as shown

vegetation lines, wetlands, water bodies & watercourses, roads, buildings, topographic contours (mASL), etc. as shown

Modified from: geographic data obtained through Land Information Ontario

March 2026
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 3: Site Topography

Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit

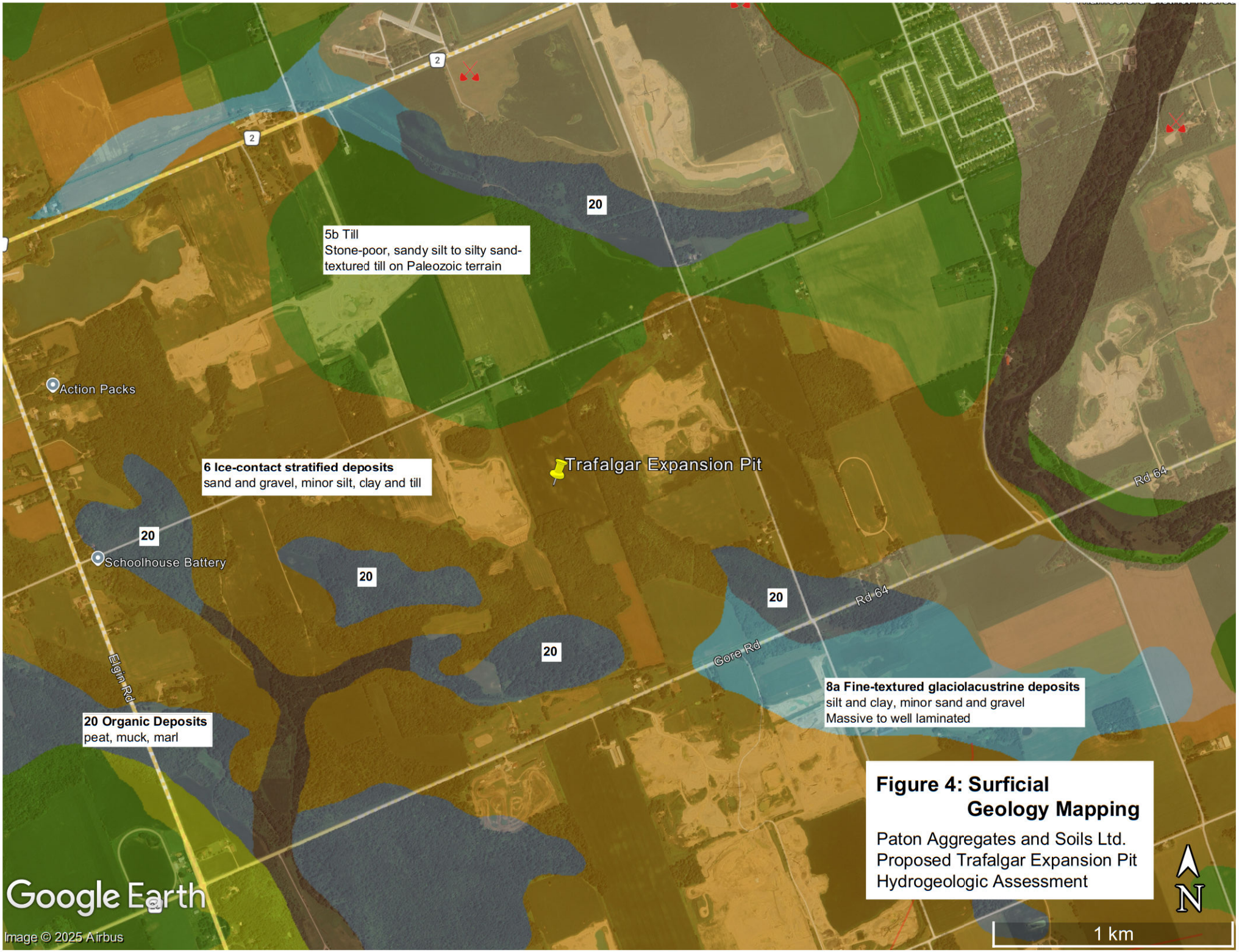
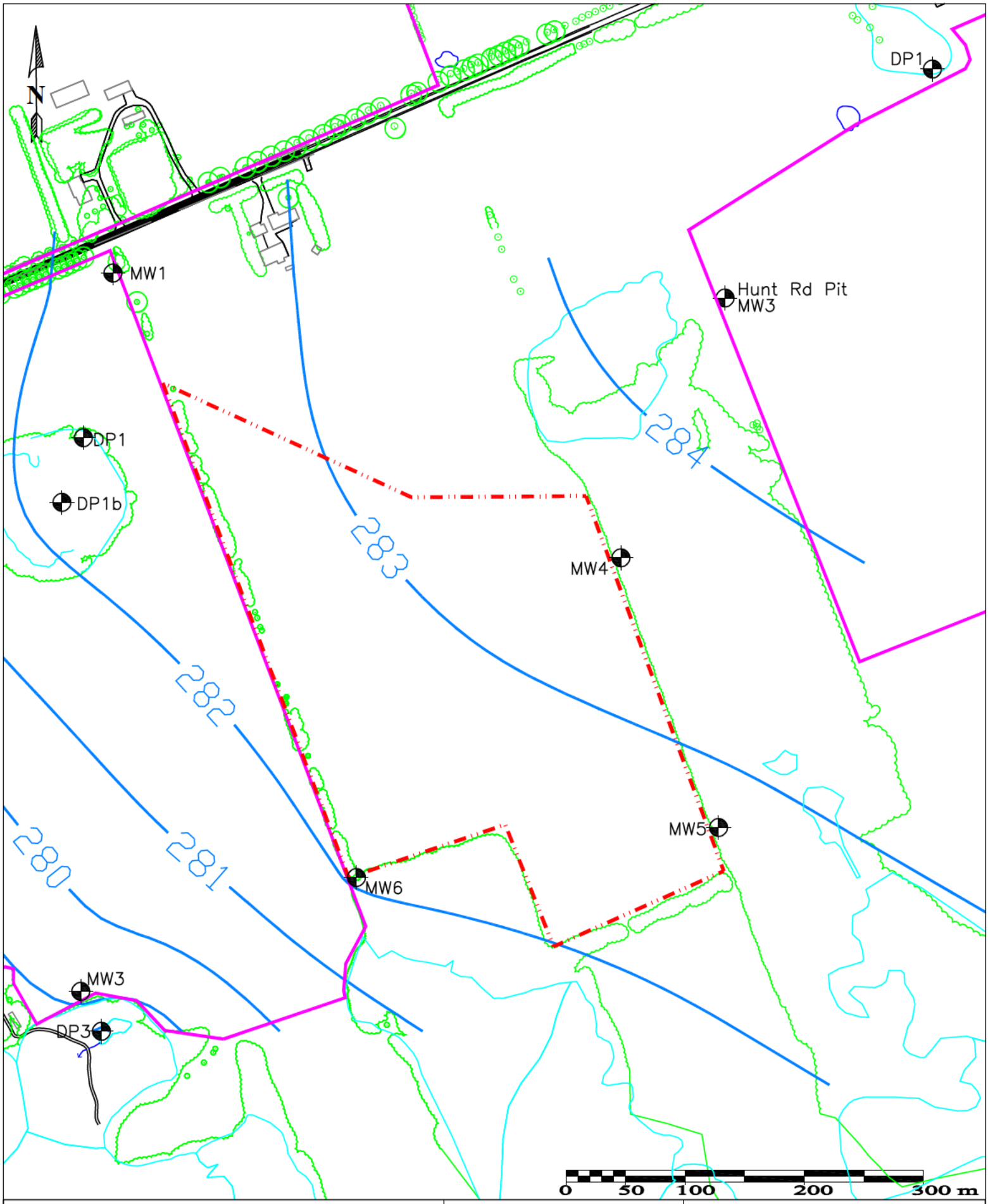


Figure 4: Surficial Geology Mapping

Paton Aggregates and Soils Ltd.
Proposed Trafalgar Expansion Pit
Hydrogeologic Assessment



Site (approx.) — other licenced areas

monitoring locations (MW, DP) as shown

vegetation lines, wetlands, water bodies & watercourses, roads, buildings, water table contours (mASL), etc. as shown

Modified from: geographic data obtained through Land Information Ontario

March 2026

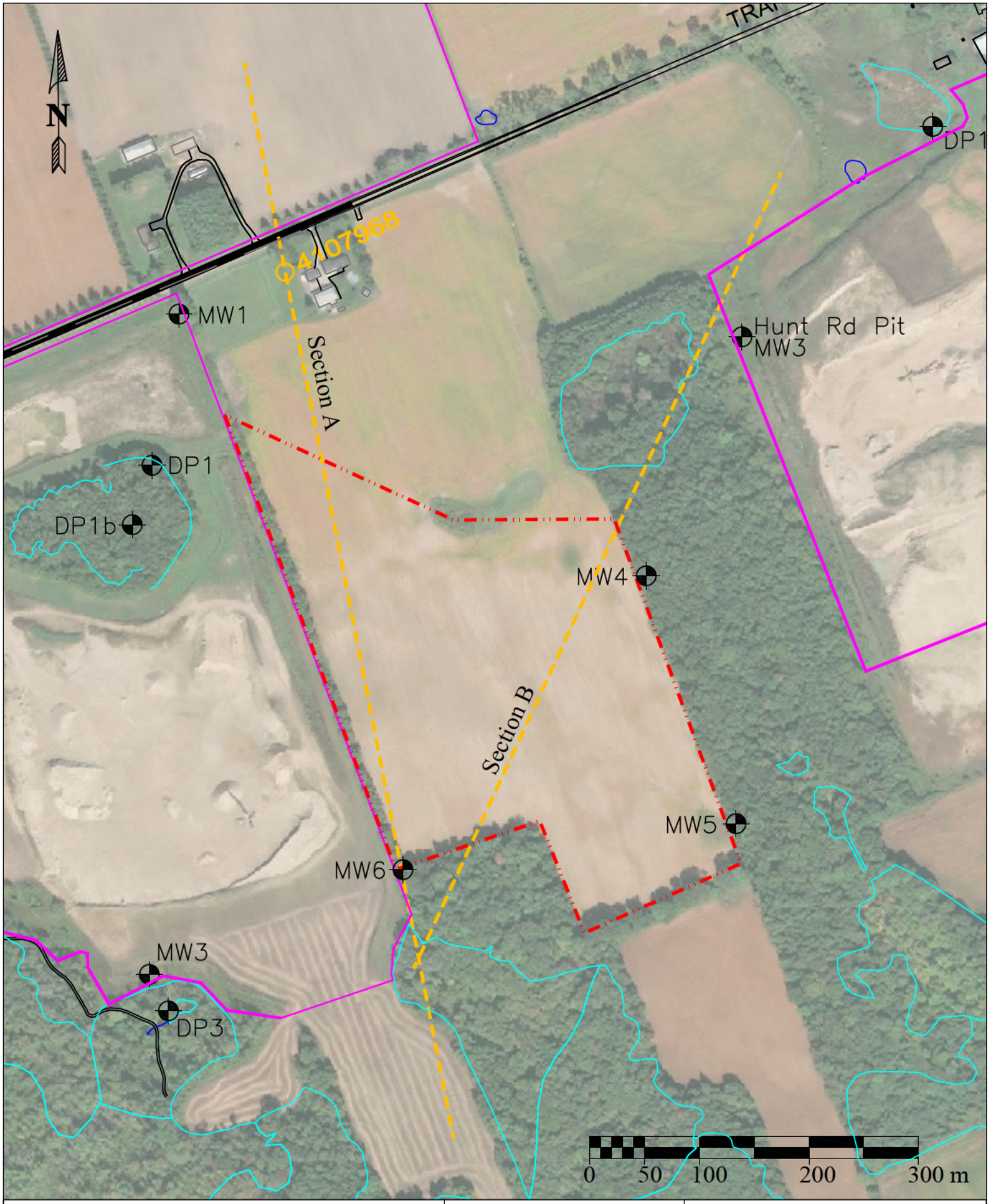
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 5: High Water Table Conditions

Paton Aggregates and Soils Ltd.

Trafalgar Expansion Pit



Site (approx.) — other licenced areas

section lines

wetlands, water bodies & watercourses, roads, buildings, reported well record location, etc. as shown air photo: Esri Imagery (May 2025)

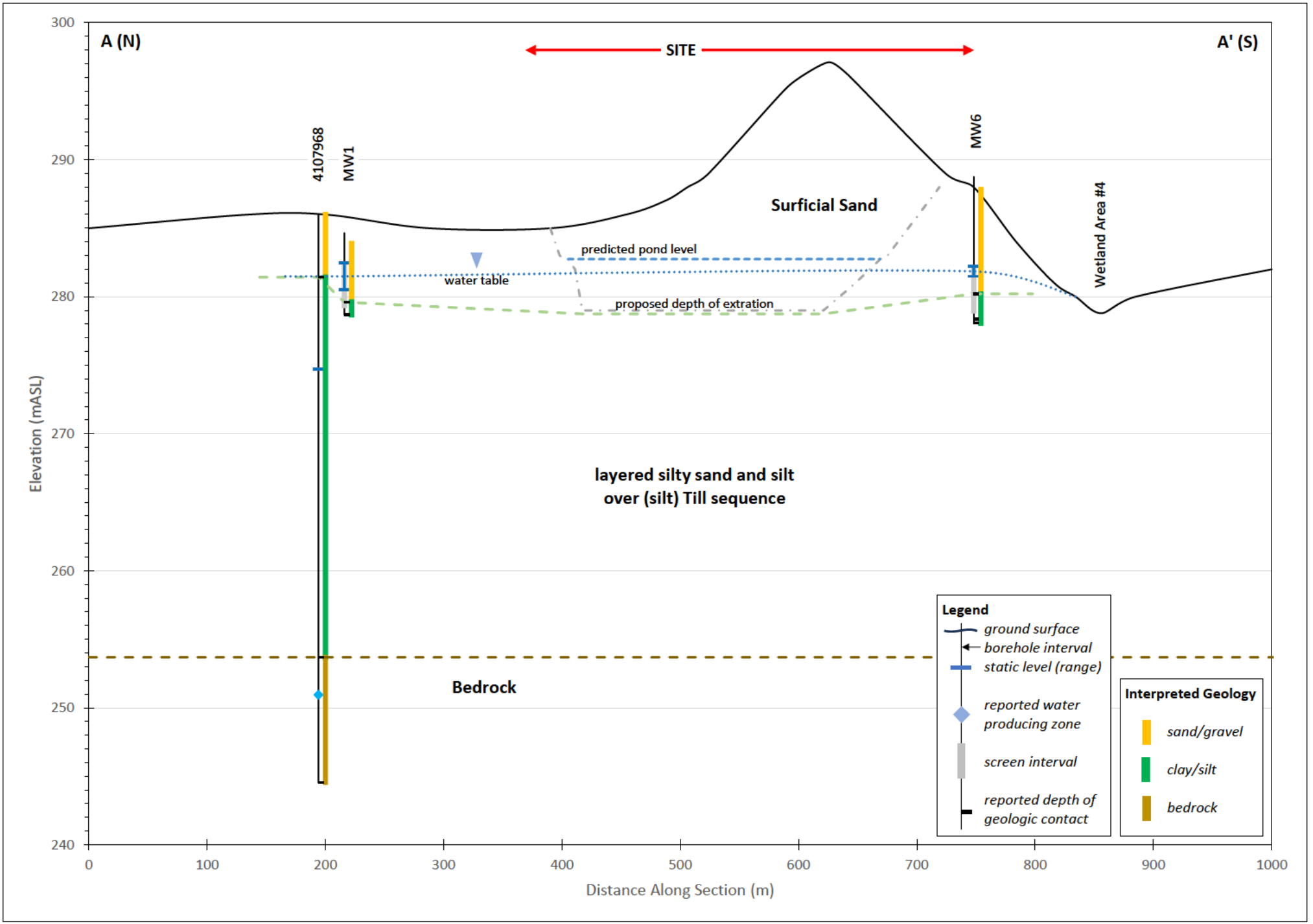
Modified from: geographic data obtained through Land Information Ontario

March 2026
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 6: Schematic Section Locations

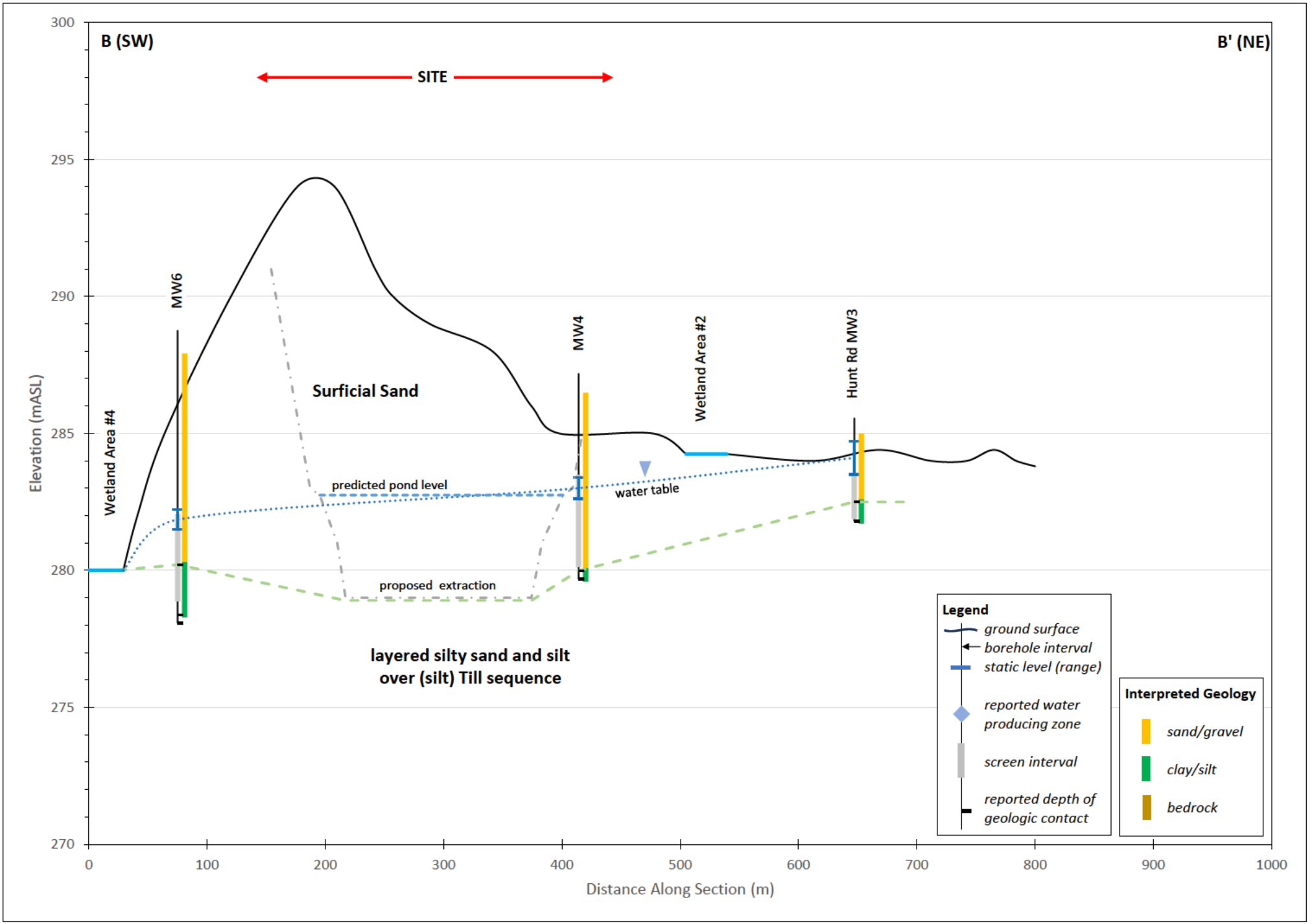
Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit



Paton Aggregates and Soils Ltd
Proposed Trafalgar Expansion Pit

Figure 7: Schematic Section A

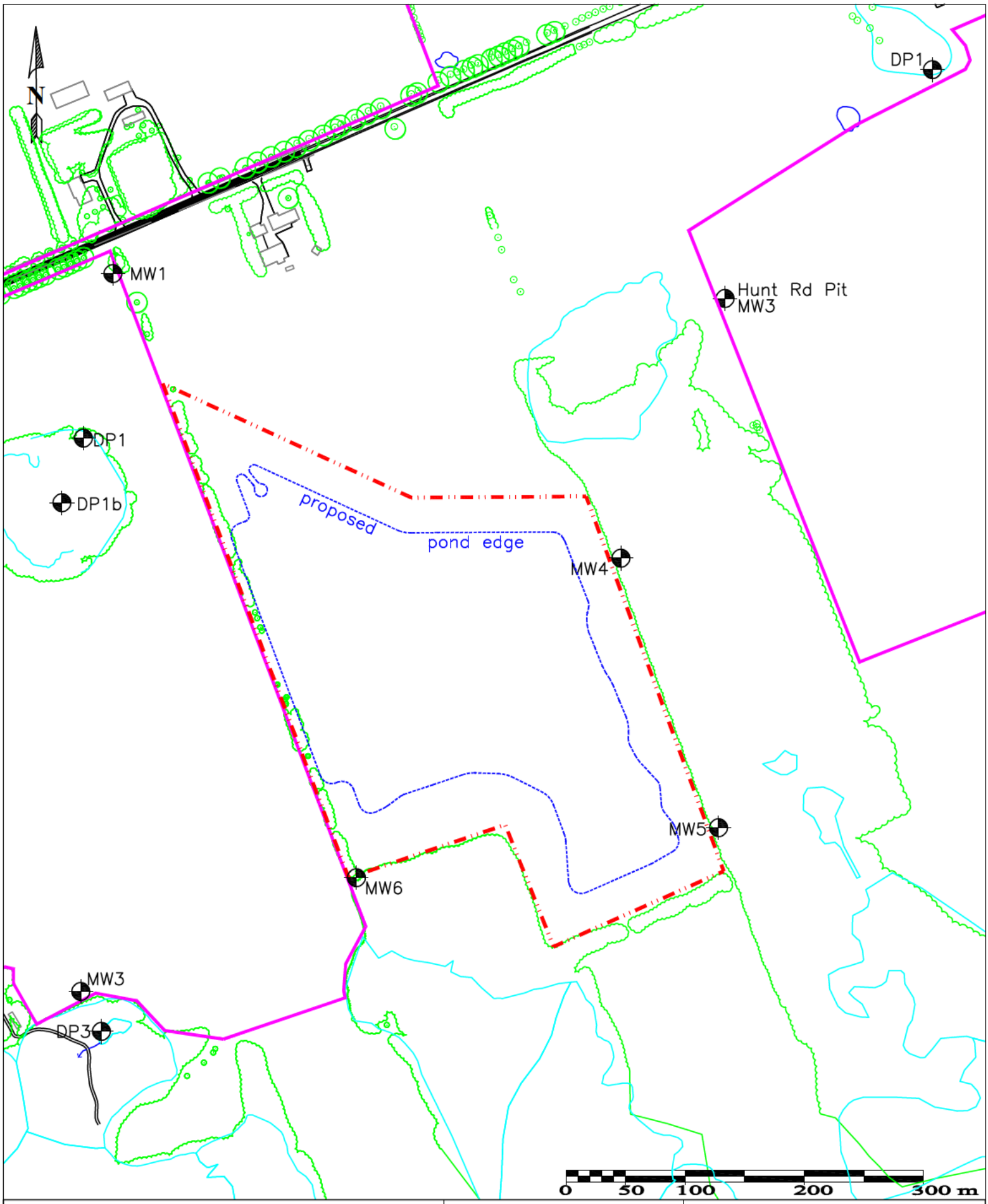
Groundwater Science Corp.
Hydrogeological Assessment



Paton Aggregates and Soils Ltd
Proposed Trafalgar Expansion Pit

Figure 8: Schematic Section B

Groundwater Science Corp.
Hydrogeological Assessment



Site (approx.) — other licenced areas

monitoring locations (MW, DP) as shown

vegetation lines, wetlands, water bodies & watercourses, roads, buildings, etc. as shown

Modified from: geographic data obtained through Land Information Ontario

March 2026

Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 9: Proposed Pond

Paton Aggregates and Soils Ltd.

Trafalgar Expansion Pit

Appendix A
Water Well Record Review

generalized study area (approximate)

reported water well record locations and references as shown

monitoring wells circled

January 2026
scale: as shown

Figure A1: Reported Water Well Record Locations Near The Site

GROUNDWATER SCIENCE CORP.

Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit

UTM 17 Z 498420 E
5 R 4764760 N
Elev. 45 R 0890 - 525
Basin 23

Thames River North
Conc - II
Lot - 18.

40P3a

ONTARIO

RECEIVED
JAN 20 1955
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

41 No. 2843

The Well Drillers Act
Department of Mines, Province of Ontario

Water Well Record

County or Territorial District. Middlesex ..... Township, ~~Village, Town or City~~. North Dorchester
Con. II ..... Lot. 18 ..... Street and Number (if in Village, Town or City) .....
Owner. [redacted] ..... Address .....
Date Completed. 6 (day) Aug (month) 1954 (year) ..... Cost of Well (excluding pump) .....

Pipe and Casing Record

Casing diameter(s). 4" Steel
Length(s) of casing(s). 104'
Type of screen.
Length of screen.
Distance from top of screen to ground level.
Is well a gravel-wall type?

Pumping Test

Date.
Static level. 36'
Pumping level. 90
Pumping rate. 180 Gals per hr
Duration of test. 5 hrs
Distance from cylinder or bowls to ground level. 90

Water Record

Kind (fresh or mineral). Fresh
Quality (hard, soft, contains iron, sulphur, etc.). Soft
Appearance (clear, cloudy, coloured). Clear
For what purpose(s) is the water to be used? Stock & Domestic
How far is well from possible source of contamination? 150'
What is the source of contamination? Barn yard
Enclose a copy of any mineral analysis that has been made of water

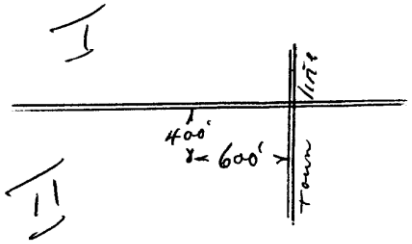
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
135'	Fresh	99'

Well Log

Overburden and Bedrock Record	From	To
Yellow Sand	0 ft.	10 ft.
Coarse Sand & stones		28
Boulders & sand		36
Clay & stone		64
Fine sand		66
Clay & stone		72
Water Bearing Sand & Gravel		73
Hard pan & stones		103
Badley & Sand		104
Brown limestone		135

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside?
Drilling Firm.
Address.
Name of Driller. Wm. Dale ..... Address. 1270 Hilton Ave. London
Date. ..... Licence Number. 476
Wm. Dale
Signature of Licensee

FORM 5

CSS.58

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

40P/3A

Ontario

S.P.N.

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 4107968 | MUNICIP. 41005 | CON. TR N | 02

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: NORTH DORCHESTER
CON., BLOCK, TRACT, SURVEY, ETC.: 2 NE¼ T.R.N
LOT: 017
DATE COMPLETED: DAY 08. MO. 03 YR. 77
ADDRESS OF WELL OWNER: [redacted] BOX 314 BOBCAYGEON, ONT.
64600 | 4 | ELEVATION 0936 | 4 | BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BLACK	LOAM			0	2
BROWN	SAND	CLAY		2	15
BLUE	CLAY	GRAVEL + STONES		15	106
GREY	LIMESTONE			106	136

31 | 0002892 | 0915628 05 | 0106305 1 1 1 2 | 0136215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0115	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0106
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		106	0135
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

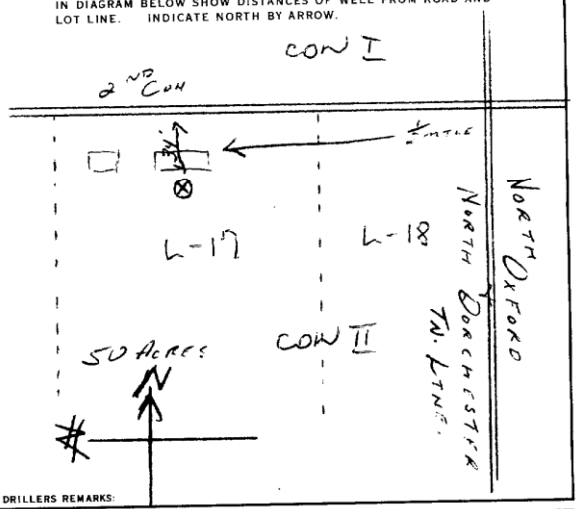
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 0005 GPM
DURATION OF PUMPING: 04 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
037 FEET	132 FEET	132 FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 132 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 130 FEET
RECOMMENDED PUMPING RATE: 0005 GPM
GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

0

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED ☐ OTHER

METHOD OF DRILLING

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: WAYNE STONER | LICENCE NUMBER: 4809
ADDRESS: RR #3 DENFIELD, ONT.
NAME OF DRILLER OR BORER: Same | LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Wayne Stoner | SUBMISSION DATE: DAY 8 MO. 3 YR. 77

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 4809 | DATE RECEIVED: 310577
DATE OF INSPECTION: 30/11/77 | INSPECTOR: J
REMARKS: WELL PIT - NOT PUMPING YET. CASING IS SEALED. PIT IS 8" ABOVE GRADE - CASING ENTERS NEARLY REPLACES TILE LID.
DWR
WWR

NH

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

Appendix B
Borehole Logs

BOREHOLE LOG

Borehole: MW1

Project: Trafalgar Pit
Location: Northeast corner of field, along tree line
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: April 25, 2016
Supervisor: DN
Elevations TOC: 284.66 mAMSL
GS: 283.88 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description	Monitor Installation
0	0	A				**Topsoil**	protective casing, cement and bentonite (holeplug) seal at surface
		A				**Sand** - red brown uniform fine sand, dry	
	1						
5		A				- consistent drilling, material as above	water level 1.77 mBGS April 25, 2016
	2					- damp to wet by 8'	silica sand pack
10	3	A				- consistent drilling, material as above	screen length 3.0 m nominal 5.1 cm diameter PVC riser and slotted screen
	4						
		A				**Till**	
15		S	1	4.6 to 5.2	0.30	- brown-grey stony silt till, dry, dense	native material
	5					**End of hole at 5.2m**	
	6						
20							
	7						
25							
	8	A					
	9						
30							
	10						
35							
	11						
	12						
40							

Groundwater Science Corp.

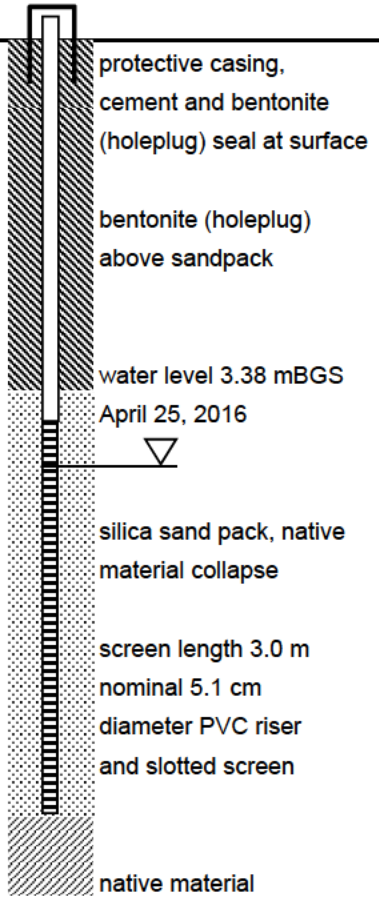
BOREHOLE LOG

Borehole: MW2

Project: Trafalgar Pit
Location: SW corner of severed house property
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: April 25, 2016
Supervisor: DN
Elevations TOC: 284.02 mAMSL
GS: 283.27 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description	Monitor Installation
0	0	A				**Topsoil**	protective casing, cement and bentonite (holeplug) seal at surface
						Silt - brown sandy silt, dry	
		A				**Sand and Gravel**	
	1					- brown medium to coarse sand and gravel	
5		A				- heterogeneous, dry	bentonite (holeplug) above sandpack
	2						
							water level 3.38 mBGS April 25, 2016
10	3	A				- consistent drilling, material as above	
	4						silica sand pack, native material collapse
						- damp to wet returns by 4.6m	
15		S	1	4.6 to 5.2	0.61	- brown medium to coarse sand and gravel	screen length 3.0 m nominal 5.1 cm diameter PVC riser and slotted screen
	5	A				- consistent drilling, material as above	
						Till	
20	6	S	2	6.1 to 6.7	0.36	- grey silt till, dense, dry	native material
	7					**End of Hole at 6.7 m**	
25							
	8						
	9						
30							
	10						
35							
	11						
	12						
40							



Groundwater Science Corp.

BOREHOLE LOG

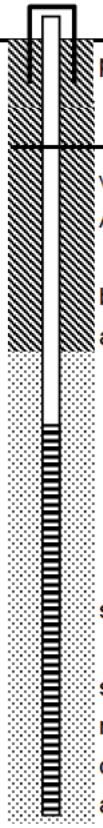
Borehole: MW3

Project: Trafalgar Pit
Location: southern side of farm field, along treeline
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: April 25, 2016
Supervisor: DN
Elevations TOC: 282.07 mAMSL
GS: 281.27 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description
0	0	A				**Topsoil**
						Sand
		A				-fine red-brown sand, dry
	1					
5		A				- consistent drilling, material as above
	2					
						Silty Sand
		A				- wet, brown to red-brown silty fine sand
10	3					
	4	A				- consistent drilling, material as above
15		S	1	4.6 to 5.2	0.56	- wet, brown to red-brown silty fine sand
	5					
20	6					**End of Hole at 6.1 m**
	7					
25						
	8					
30	9					
	10					
35						
	11					
40	12					

Monitor Installation



protective casing, cement seal at surface

water level 2.13 mBGS April 25, 2016

bentonite (holeplug) above sandpack

silica sand pack

screen length 3.0 m nominal 5.1 cm diameter PVC riser and slotted screen

Groundwater Science Corp.

BOREHOLE LOG

Borehole: MW4

Project: Trafalgar pit extension
Location: eastern treeline, near wetland
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: Nov 18 2024
Supervisor: DN
Elevations TOC: 287.17 mAMSL
GS: 286.4 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description	Monitor Installation
0	0	A				**Sand** - dark brown fine soft sand, dry	protective casing; bentonite (holeplug) seal at surface
	1	A					
5		A					
	2	S	1	1.5 to 2.1	0.51	- light brown fine to medium sand, with trace gravel, dry	
		A					
10	3	S	2	3.0 to 3.7	0.46	wet at 11'	water level 3.49 mBGS November 18, 2024
	4	A				- grey, fine to medium sand, wet with trace gravel layers	silica sandpack
15		S	3	4.6 to 5.2	0.61		
	5	A					screen length 3.0 m nominal 5.1 cm diameter PVC riser and slotted screen
20	6	S	4	6.1 to 6.7	0.61		
						Silt - grey sandy silt	
	7					**End of Hole at 6.7m**	
25		A					
	8						
30	9						
	10						
35							
	11						
40	12						

GROUNDWATER SCIENCE CORP.

BOREHOLE LOG

Borehole: MW5

Project: Trafalgar pit extension
Location: Southeast corner of property
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: Nov 18 2024
Supervisor: DN
Elevations TOC: 284.97 mAMSL
GS: 284.1 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description	Monitor Installation
0	0	A				**Silty Sand** brown to grey silty fine sand	protective casing; bentonite (holeplug) seal at surface
		A					
	1						
		A					
5		S	1	1.5 to 2.1	0.41	wet 5'	water level 1.70 m BGS September 18, 2024
	2						
						trace grey clay lenses	native material collapse, and silica sandpack (#2 sand)
		A					
10	3	S	2	3.0 to 3.7	0.25		
						silty fine sand, getting coarser with depth, wet	
	4						
		A					
15		S	3	4.6 to 5.2	0.61		screen length 3.0 m nominal 5.1 cm diameter PVC riser and slotted screen
	5						
						End of Hole at 5.2m	
20	6						
	7						
25							
	8						
30	9						
	10						
35							
	11						
40	12						

GROUNDWATER SCIENCE CORP.

BOREHOLE LOG

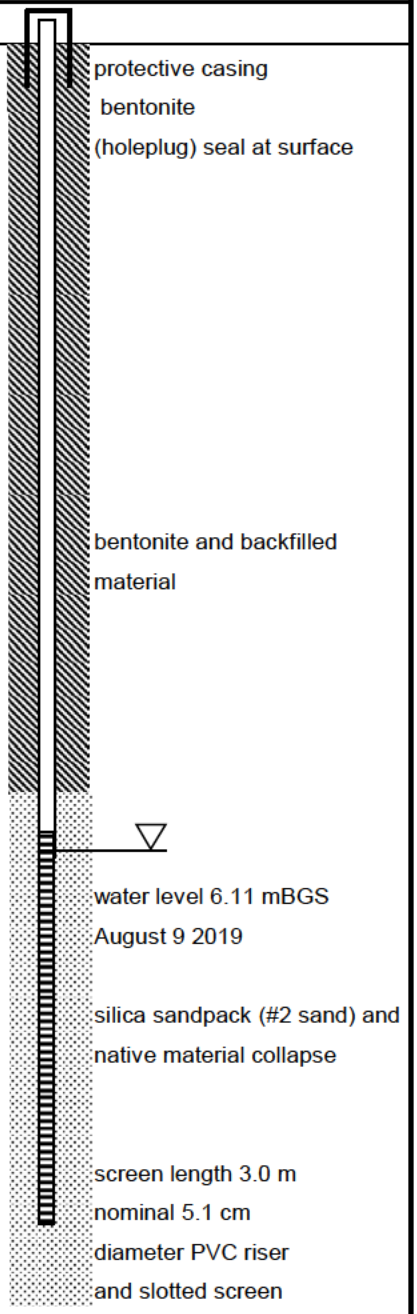
Borehole: MW6

Project: Trafalgar pit extension
Location: western property line at bushlot
Method: Hollow Stem Auger
Samples: split spoon (S) and auger cuttings (A)

Date: Nov 18 2024
Supervisor: DN
Elevations TOC: 288.75 mAMSL
GS: 287.8 mAMSL

Depth Ft.	Depth m.	Sample type	Sample no.	Sample Interval (metres)	Sample Rec.	Description
0	0	A				**Sand**
						fine brown sand, dry
		A				
	1					
		A				
5		S	1	1.5 to 2.1	0.41	fine to medium browns and, trace gravel, dry
	2					
		A				
10	3	S	2	3.0 to 3.7	0.51	
						fine grey sand, dry, trace gravel
	4					
		A				
15		S	3	4.6 to 5.2	0.46	
	5					
		A				wet at 21'
20	6	S	4	6.1 to 6.7	0.61	
	7					
		A				
25		S	5	7.6 to 8.2	0.61	**Silty Sand**
	8					fine grey sand with silt lenses, wet
	9	A				
30		S	6	9.1 to 9.8	0.61	
						Silt - grey sandy silt
	10					**End of Hole at 9.8m**
35						
	11					
	12					
40						

Monitor Installation



GROUNDWATER SCIENCE CORP.

PROJECT: 12-1134-0175

RECORD OF BOREHOLE BH-3

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: November 26, 2012

DATUM: GEODETIC

(CONTINUOUS SAMPLING EQUIPMENT)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
												MW-3
0	POWER AUGER / HOLLOW STEM WITH SAMPLE BARREL	GROUND SURFACE		284.9				285				
		TOPSOIL		0.0 / 284.4								Concrete
				0.5	1	1	SC					Granular bentonite
1		Brown fine to medium SAND, trace to some silt						284				Enc WL Nov. 26 12
						2A	SC					Filter sand
2				282.5	2			283				51mm Diam. Slot 10 Schedule 40 PVC Screen
				2.4		2B	SC					
		Grey SILTY FINE SAND		281.9				282				
3		END OF BOREHOLE		3.1								Groundwater encountered at about elev. 283.5m during drilling on November 26, 2012.
								281				Water level measured in well at elev. 283.5m on November 26, 2012.
4												
5												
6												
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: ST
CHECKED:

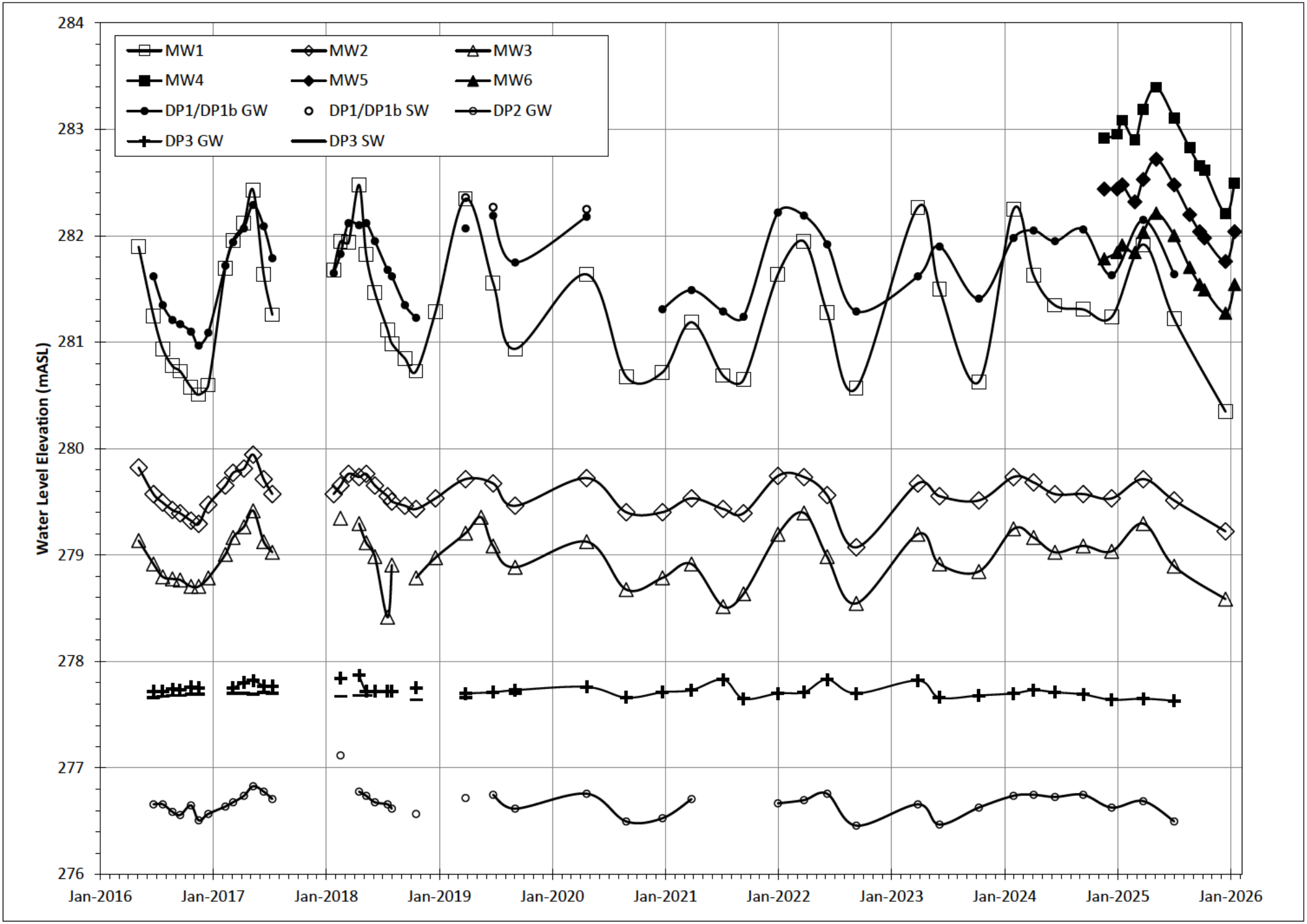
LDN_BHS_10 12-1134-0175.GPJ 18/12/12 DATA INPUT: LMK

Hunt Road Pit MW3 (BH3)

Appendix C
Water Level Monitoring Results

	Water Level Elevation (mASL)													
Date	MW1	MW2	MW3	MW4	MW5	MW6	DP1 GW	DP1 SW	DP1B GW	DP1B SW	DP2 GW	DP2 SW	DP3 GW	DP3 SW
5-May-16	281.90	279.82	279.14	#N/A	#N/A	#N/A	#N/A	#N/A	-	-	#N/A	#N/A	#N/A	#N/A
22-Jun-16	281.25	279.57	278.92	#N/A	#N/A	#N/A	281.62	dry	-	-	276.66	dry	277.72	277.66
22-Jul-16	280.94	279.49	278.80	#N/A	#N/A	#N/A	281.35	dry	-	-	276.66	dry	277.72	277.67
22-Aug-16	280.78	279.42	278.78	#N/A	#N/A	#N/A	281.21	dry	-	-	276.59	dry	277.74	277.68
16-Sep-16	280.73	279.39	278.77	#N/A	#N/A	#N/A	281.17	dry	-	-	276.56	dry	277.73	277.68
21-Oct-16	280.58	279.32	278.71	#N/A	#N/A	#N/A	281.10	dry	-	-	276.65	dry	277.76	277.69
15-Nov-16	280.51	279.29	278.71	#N/A	#N/A	#N/A	280.97	dry	-	-	276.51	dry	277.75	277.69
16-Dec-16	280.60	279.47	278.79	#N/A	#N/A	#N/A	281.09	dry	-	-	276.57	dry	frozen	dry
9-Feb-17	281.70	279.65	279.01	#N/A	#N/A	#N/A	281.72	dry	-	-	276.64	dry	frozen	dry
6-Mar-17	281.96	279.77	279.17	#N/A	#N/A	#N/A	281.94	dry	-	-	276.68	dry	277.75	277.70
10-Apr-17	282.12	279.81	279.27	#N/A	#N/A	#N/A	282.07	dry	-	-	276.74	dry	277.80	277.70
10-May-17	282.43	279.94	279.42	#N/A	#N/A	#N/A	282.29	dry	-	-	276.83	dry	277.82	277.69
13-Jun-17	281.64	279.71	279.13	#N/A	#N/A	#N/A	282.09	dry	-	-	276.78	dry	277.77	277.71
11-Jul-17	281.26	279.57	279.03	#N/A	#N/A	#N/A	281.79	dry	-	-	276.71	dry	277.77	277.70
25-Jan-18	281.68	279.57	#N/A	#N/A	#N/A	#N/A	281.65	dry	-	-	#N/A	#N/A	#N/A	#N/A
16-Feb-18	281.95	279.65	279.35	#N/A	#N/A	#N/A	281.83	dry	-	-	277.12	dry	277.84	277.67
14-Mar-18	281.94	279.76	#N/A	#N/A	#N/A	#N/A	282.12	frozen	-	-	#N/A	#N/A	#N/A	#N/A
17-Apr-18	282.48	279.73	279.30	#N/A	#N/A	#N/A	282.10	dry	-	-	276.78	dry	277.87	277.68
10-May-18	281.83	279.76	279.12	#N/A	#N/A	#N/A	282.12	dry	-	-	276.74	dry	277.72	277.68
7-Jun-18	281.47	279.65	278.99	#N/A	#N/A	#N/A	281.95	dry	-	-	276.68	dry	277.72	dry
18-Jul-18	281.12	279.55	278.42	#N/A	#N/A	#N/A	281.68	dry	-	-	276.66	dry	277.72	dry
1-Aug-18	280.99	279.50	278.91	#N/A	#N/A	#N/A	281.62	dry	-	-	276.62	dry	277.72	dry
12-Sep-18	280.85	279.46	#N/A	#N/A	#N/A	#N/A	281.35	dry	281.77	dry	#N/A	#N/A	#N/A	#N/A
18-Oct-18	280.73	279.43	278.79	#N/A	#N/A	#N/A	281.23	dry	281.49	dry	276.57	dry	277.75	277.64
20-Dec-18	281.29	279.53	278.98	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27-Mar-19	282.35	279.71	279.21	#N/A	#N/A	#N/A	282.17	282.36	282.07	282.36	276.72	dry	277.70	277.66
16-May-19	#N/A	#N/A	279.36	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24-Jun-19	281.56	279.67	279.09	#N/A	#N/A	#N/A	282.14	282.29	282.19	282.27	276.75	dry	277.71	dry
3-Sep-19	280.94	279.46	278.89	#N/A	#N/A	#N/A	281.65	dry	281.75	dry	276.62	dry	277.73	277.70
21-Apr-20	281.64	279.72	279.13	#N/A	#N/A	#N/A	282.12	282.26	282.18	282.25	276.76	dry	277.76	dry
27-Aug-20	280.68	279.40	278.68	#N/A	#N/A	#N/A	281.20	dry	#N/A	#N/A	276.50	dry	277.66	dry
22-Dec-20	280.72	279.40	278.79	#N/A	#N/A	#N/A	281.34	dry	281.31	dry	276.53	dry	277.71	dry
26-Mar-21	281.19	279.53	278.92	#N/A	#N/A	#N/A	281.75	dry	281.49	dry	276.71	dry	277.73	dry
6-Jul-21	280.69	279.43	278.52	#N/A	#N/A	#N/A	281.06	dry	281.29	dry	dry	dry	277.83	dry
10-Sep-21	280.65	279.39	278.64	#N/A	#N/A	#N/A	281.03	dry	281.24	dry	dry	dry	277.65	dry
30-Dec-21	281.64	279.74	279.20	#N/A	#N/A	#N/A	281.99	282.12	282.22	282.09	276.67	dry	277.70	dry
24-Mar-22	281.95	279.73	279.40	#N/A	#N/A	#N/A	282.18	282.30	282.19	282.29	276.70	dry	277.71	dry
7-Jun-22	281.28	279.56	278.99	#N/A	#N/A	#N/A	282.00	282.14	281.92	282.11	276.76	dry	277.83	dry
9-Sep-22	280.57	279.07	278.55	#N/A	#N/A	#N/A	281.08	dry	281.29	dry	276.46	dry	277.70	dry
27-Mar-23	282.27	279.67	279.20	#N/A	#N/A	#N/A	281.76	dry	281.62	dry	276.66	dry	277.82	dry
5-Jun-23	281.50	279.55	278.92	#N/A	#N/A	#N/A	281.93	dry	281.90	dry	276.47	dry	277.66	dry
10-Oct-23	280.63	279.51	278.85	#N/A	#N/A	#N/A	281.21	dry	281.41	dry	276.63	dry	277.68	dry
30-Jan-24	282.25	279.73	279.25	#N/A	#N/A	#N/A	282.02	282.14	281.98	282.09	276.74	dry	277.70	dry
4-Apr-24	281.63	279.68	279.17	#N/A	#N/A	#N/A	282.14	282.25	282.05	282.12	276.75	dry	277.73	dry
12-Jun-24	281.35	279.57	279.03	#N/A	#N/A	#N/A	282.11	282.22	281.95	282.01	276.73	dry	277.71	dry
11-Sep-24	281.31	279.57	279.09	#N/A	#N/A	#N/A	281.96	282.20	282.06	281.86	276.75	dry	277.69	dry
18-Nov-24	#N/A	#N/A	#N/A	282.91	282.44	281.78	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
12-Dec-24	281.24	279.53	279.04	#N/A	#N/A	#N/A	281.66	dry	281.63	dry	276.63	dry	277.64	dry
30-Dec-24	#N/A	#N/A	#N/A	282.95	282.44	281.84	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
15-Jan-25	#N/A	#N/A	#N/A	283.08	282.48	281.91	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25-Feb-25	#N/A	#N/A	#N/A	282.90	282.32	281.84	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24-Mar-25	281.92	279.71	279.30	283.18	282.53	282.03	282.12	282.27	282.15	282.19	276.69	dry	277.65	dry
5-May-25	#N/A	#N/A	#N/A	283.39	282.72	282.21	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2-Jul-25	281.22	279.51	278.90	283.10	282.48	282.00	281.65	dry	281.64	dry	276.50	dry	277.63	dry
21-Aug-25	#N/A	#N/A	#N/A	282.82	282.20	281.70	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Sep-25	#N/A	#N/A	#N/A	282.65	282.04	281.54	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
8-Oct-25	#N/A	#N/A	#N/A	282.61	281.98	281.49	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
15-Dec-25	280.35	279.22	278.59	282.20	281.76	281.27	fr	dry	fr	dry	dry	dry	fr	dry
13-Jan-26	#N/A	#N/A	#N/A	282.49	282.04	281.54	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

notes: mASL = metres above mean sea level #N/A = not availale (no access or not measured)



Paton Aggregates and Soils Ltd.
Trafalgar Expansion Pit

Figure C1: Water Level Hydrograph

Groundwater Science Corp.
Monitoring Program

Appendix D
Water Balance Calculations

SMR = Soil Moisture Retention (mm)					
Soil Type	Vegetation Type				
	Shallow Rooted Crops (e.g. beans)	Moderately Deep Rooted Crops (e.g. corn)	Deep Rooted Crops (e.g. pasture)	Orchards	Closed Mature Forest
Fine Sand	50	75	100	150	250
Fine Sandy Loam	75	150	150	250	300
Silt Loam	125	200	250	300	400
Clay Loam	100	200	250	250	400
Clay	75	50	200	200	350

Source: *Instructions and Tables For Computing Potential Evapotranspiration And The Water Balance,* C.W. Thornthwaite and J.R. Mather, 1957

Estimated Evapotranspiration Values (mm) using Environment Canada LONDON 1991 to 2020 Climate Normals

Month	Daily Average Temperature (C.)	Average Monthly Precipitaiton (mm)	PET	AET (75 mm SMR)	Surplus
January	-5.4	78.6	0	0	78.6
February	-4.8	62.8	0	0	62.8
March	0.1	67.4	0	0	67.4
April	6.8	88.5	33.6	33.6	54.9
May	13.5	88.8	79.38	79.38	9.4
June	18.8	85.9	115.2	110.9	-25.0
July	21.0	80.5	135.45	107.5	-27.0
August	20.1	66.9	118.8	78.9	-12.0
September	16.3	92.7	81.12	81.12	11.6
October	9.9	82.6	42.75	42.75	39.9
November	3.6	87.7	12.15	12.15	75.6
December	-2.0	79.2	0	0	79.2
Annual Total (mm):		961.6	618.5	546.3	415.3

Source: *Computer Program for Estimating Evapotranspiration Using the Thornthwaite Method* , United States Department of Commerce, National Oceanic and Atmosphere Administration (NOAA) Technical Memorandum ERL GLERL-101 (November 1996)

MOE Infiltration Factors

Topography Factor							
Classification	Criteria					Slope (%)	Value of Infiltration Factor
Flat land	Average Slope Not Exceeding:	0.6	m per	1	km	0.06	0.3
Rolling land	Average slope of:	2.8	m per	1	km	0.28	0.2
	to:	3.8	m per	1	km	0.38	
Hilly land	Average slope of:	28	m per	1	km	2.8	**0.1**
	to:	47	m per	1	km	4.7	

Soil Factor	
Soil Type	Value of Infiltration Factor
Tight impervious clay	0.1
Medium combinations of clay and loam	0.2
Open sandy loam	**0.4**

Cover Factor	
Classification	Value of Infiltration Factor
Cultivated lands	**0.1**
Woodland	0.2

Source:
MOEE Hydrogeological Technical Information Requirements for Land Development Applications,
Ontario Ministry of the Environment and Energy, April 1995

Proposed Trafalgar Expansion Pit - Site Scale Recharge Water Balance

Purpose:

To assess present and future recharge contributions to the local groundwater system within the site, (defined by the proposed Licence boundary).

Assumptions:

- climate conditions at the site are represented by 1981 to 2010 climate normals as reported by Environment Canada for London area
- Agricultural area actual evapotranspiration rate calculated (as AET) using the Thornthwaite method assuming 75 mm Soil Moisture Retention (moderately deep rooted crops on fine sand soil) for both existing and future conditions.
- existing runoff rates estimated using MOE Infiltration Factors (*MOEE Hydrogeological Technical Information Requirements For Land Development Applications*, April 1995) for hilly landscape, sandy soils, cultivated land.
- future open water (pond) evaporation rates are represented by PET using the Thornthwaite method
- proposed Licence is approximately 11 ha.
- under existing conditions all runoff moves off-site, post-extraction all runoff remains on-site
- no existing pond on-site, proposed future pond is approximately 6.9 ha.

1) Water Balance Components

Infiltration Factor for land surface (i.e. no ponds / open water)

Hilly Land	0.1	Rolling Land	0.2	
Open Sandy Loam	0.4	Open Sandy Loam	0.4	
Cultivated Lands	0.1	Cultivated Lands	0.1	
Factor:	0.6	Factor:	0.7	% of surplus becomes infiltration recharge
	0.4		0.3	% of surplus becomes runoff

General Site Recharge Calculation (includes pond areas)

surplus = precipitation - evapotranspiration
site recharge = precipitation - evapotranspiration - runoff - pond evaporation

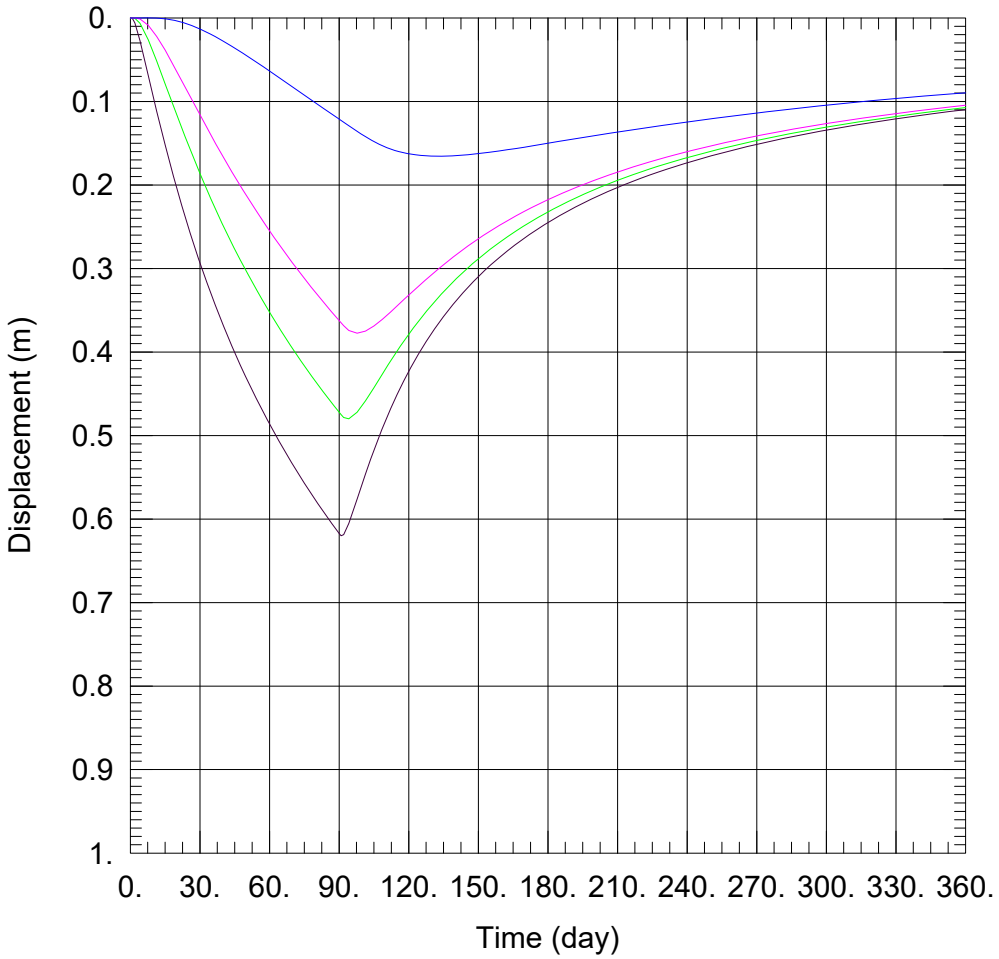
2) Estimate of Existing Rainfall Recharge

Precipitation Rate =	0.9616	m/yr
PET =	0.6185	m/yr
AET =	0.5463	m/yr
Water Surplus =	0.4153	m/yr
Recharge Rate =	0.249	m/yr
Runoff Rate =	0.166	m/yr
"Site" =	11	ha
=	110,000	m^2
Precip. "Input" =	105,776	m^3/yr
Crop Evapotrans. "Loss" =	60,093	m^3/yr
Runoff "Loss" =	18,273	m^3/yr
Existing Recharge =	27,410	m^3/yr
Annual Recharge Rate =	0.249	m/yr
=	0.87	L/s

3) Estimate of Post-Rehabilitation Recharge

Pond Evaporation Rate =	0.6185	m/yr
Extraction Pond Area =	6.9	ha
=	69,000	m^2
Precip. "Input" =	105,776	m^3/yr
Crop Evapotrans. "Loss" =	22,398	m^3/yr
Pond Evap. "Loss" =	42,673	m^3/yr
Runoff "Loss" =	0	m^3/yr
Future Recharge =	40,705	m^3/yr
Annual Recharge Rate =	0.370	m/yr
=	1.29	L/s

Appendix E
Drawdown Projection



PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: Paton Aggregates and Soils Ltd
Location: Trafalgar Expansion Pit
Test Well: DD simulation

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
1	0	54.9
2	16.1	93.7
3	54.9	109.8
4	93.7	93.7
5	109.8	54.9
6	93.7	16.1
7	54.9	0
8	16.1	16.1

Observation Wells

Well Name	X (m)	Y (m)
▫ 50 m	159.8	54.9
▫ 75 m	184.8	54.9
▫ 100 m	209.8	54.9
▫ 200 m	309.8	54.9

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 0.00086 m^2/sec
S = 0.25
Sy = 0.1
Kz/Kr = 0.1

Appendix F
Qualifications

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Andrew Pentney, B.Sc., P.Geo.

Qualifications

March 2026

Current Position

Principal, Senior Hydrogeologist

Groundwater Science Corp., Stratford, ON

- Providing hydrogeological consulting expertise to regulatory agencies, environmental consultants and industry. Services ranging from individual consulting and assessments to project support for larger study teams, including testimony at OMB (OLT) hearings.
- Over 35 years of hydrogeologic consulting experience.

Education

B.Sc. (1987) : University of Waterloo, Waterloo, ON

- General Science, including Geology courses (stratigraphy, quaternary geology and hydrogeology).

Professional memberships

Registered Professional Geoscientist in Ontario

Licenced MECP Contractor

Range of Experience

- Technical consultation for 8 Subwatershed Scale characterization studies (GRCA, CVC). Focus on assessing groundwater – surface water interaction (at rivers, streams, wetlands, ponds).
- Planning approval and environmental peer review, watershed planning support to Credit Valley Conservation on an as-needed basis from 2001 to 2014. Focus on protecting stream and wetland systems.
- Community Scale Septic System Impact studies for Alton, Cheltenham and Erin as part of Village Planning Assessments.
- Water supply development, testing and impact assessment, Permit To Take Water consulting, Source Water Protection characterization and water balance studies for municipal water supplies, golf courses, industrial supply (over 20 assessments).
- Aggregate Resource Act groundwater assessments, and associated Zoning and Official Plan amendment impact assessments, at over 50 above water and 30 below water extraction sites (pits and quarries). Extensive assessment and analysis of groundwater impact potential, private wells, groundwater-surface water interactions (most studies assessed, rivers, streams, wetlands, springs and/or ponds).
- Aggregate Resource Act compliance monitoring at over 70 above water or below water extraction sites. Includes measurement and analysis of water level, water quality, private well impact potential, thermal impact potential and groundwater-surface water interaction.