Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
5 SILVER CREEK DRIVE
COLLINGWOOD, ONTARIO

Prepared For: **Huntingwood Trails (Collingwood) Ltd.**
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TABLE OF CONTENTS

FIGURES:

TABLES:

APPENDICES:

1.0 INTRODUCTION

Terraprobe was retained by Huntingwood Trails (Collingwood) Ltd. to complete a hydrogeological investigation for a proposed residential development consisting of a total of 69 residential units comprising of detached, semi-detached, and street townhouse residential units. The site is situated east of Silver Creek comprising an area of approximately 29.2 hectares (72.1 acres).

Silver Creek bisects the western extent of the site, which also contains environmental protection lands to the northern extent of the site including Provincially Significant Wetlands (PSW). Silver Creek flows from south to north to Nottawasaga Bay situated approximately 800 m north of the site. The site is proposed to be developed with 69 residential units consisting of detached, semi-detached and street townhouses and environmental protection lands. The development will be serviced with municipal water and sanitary servicing and internal access roadways. The site is located at the municipal address of 5 Silver Creek Drive, Collingwood, Ontario.

The purpose of the hydrogeological investigation was to assess the hydrogeological function of the site, including seasonal ground water elevations for two typical rainfall seasons and a feature-based water balance, to determine the function of ground water with respect to the identified PSW features. Field work included the completion of a sub-surface investigation across adjacent lands west of Silver Creek and the site to confirm shallow subsurface and ground water conditions.

2.0 SCOPE OF WORK

The following tasks were undertaken to address the requirements of the hydrogeological investigation:

- *Review of available background information*. A review of available geological and hydrogeological information for the site was conducted, including aerial photography, topographic mapping, geologic mapping, and a review of the Ministry of the Environment Conservation and Parks well record database.

- *Confirmation of Site Conditions*. A detailed visual inspection of the property and surrounding areas was completed to determine local topography and drainage. The presence of significant hydrogeological features, such as closed depressions (areas of ground water recharge), seeps or springs, was assessed.

- *Subsurface Investigation*. A subsurface investigation was completed across lands immediately west of the site, which consisted of a series of six boreholes completed to borehole refusal at depths between 0.9 m to 1.5 m below existing grades. A subsurface investigation was completed across the subject parcel, within areas proposed for development, which consisted of a series of three hand augured boreholes to verify overburden thickness.

- *Site Instrumentation and Ground Water Testing and Monitoring*. Due to shallow overburden thickness across both the site and lands immediately west, monitoring well instrumentation was not established across the property. Overburden depths across the site were observed at depths of 0.9 m to 1.5 m. Significant overburden soils are not expected within the noted PSW features and within the channel of Silver Creek to allow for instrumentation of monitoring wells/piezometers.

- *Feature-Based and Site Water Balance Assessment*. A feature-based water balance was completed for the identified PSW feature within the site boundaries. The feature-based water balance considered the existing and predicted post-development catchment areas for the PSW features and evaluated potential changes with development to the ground water influences to these features. A pre- and post-development water balance was completed for the site. Recommendations for mitigation measures were provided to maintain pre-development rates of infiltration following site development.

3.0 DESCRIPTION OF SITE CONDITIONS

3.1 Site Location and Description

The site is located at the municipal address of 5 Silver Creek Drive in the Town of Collingwood (Simcoe County). The site is currently undeveloped. The former residence at 5 Silver Creek Drive has been demolished. The site is bound by Highway 26 to the north, Georgian Trail (former CN railway) to the south and existing residential developments to the east and west. The existing residential developments consist of residential townhouses to the east, serviced with municipal water and sanitary servicing, and estate residential properties to the west, with municipal water and private sewage servicing. The site location is indicated on the attached **Figure 1**.

Lands north of Highway 26 form a significant portion of the identified PSW complex identified on the site. Silver Creek flows from south to north across the western extent of the site. Silver Creek and the associated wetland complex form part of the Environmental Protection Lands which cover an area of approximately 25.1 hectares of the total site area.

Silver Creek flows down from the Niagara Escarpment through the Town of Collingwood. It is a significant cold-water habitat according to the Ministry of Natural Resources. The Creek flows under Mountain Road and Highway 26 into the Provincially Significant Silver Creek Wetland at East Black Bass Bay of Nottawasaga Bay.

The PSW covers an area of approximately 166 hectares; it is under the jurisdiction of MNR and Nottawasaga Valley Conservation Authority (NVCA). The PSW is a Coastal Wetland consisting of four small, individual wetlands both in The Blue Mountains and Collingwood along the Nottawasaga Bay shoreline. According to MNR and NVCA, the wetland provides a habitat and spawning ground for a diverse variety of birds, fish, and plant species. Some are endangered or threatened.

The site does not fall within designated lands under the Niagara Escarpment Planning Act.

3.2 Topography and Drainage

Topographical relief for developable lands at the site is gently sloping with an overall grade change of about 7.5 m across the site. Grades slope to the north with a local topographic high at an elevation of approximately 187.0 m along the southern property limit north of the Georgian Trail (former CN

railway). The local topographic low falls along the northern property limit, south of Highway 26 at an elevation of approximately 179.5. Site topography is shown on the attached **Figure 2**.

Drainage across the site is directed to Silver Creek and the PSW features. Drainage is influenced by the Georgian Trail to the south and Highway 26 to the north. These areas represent infilled areas and block natural drainage to the north except through culvert crossings (Silver Creek) and corrugated steel pipes (CSP) conveying drainage across these anthropogenic features.

3.3 Physiography

The site is situated in the physiographic region identified as the Niagara Escarpment. The escarpment face lies approximately 2.8 km southwest of the site. The Niagara Escarpment provides a disconformity in the local bedrock with lower areas, including the site falling within areas underlain by shale bedrock of the Georgian Bay and Blue Mountain Formations. Higher elevations west of the escarpment are underlain by limestone of the Guelph Formation. Soils within the lower lands of the Niagara Escarpment are predominately silty till (Newmarket till) and localized glaciolacustrine sand deposits.

3.4 Local Geology and Hydrogeology

Based upon geologic mapping for the area, the near surface overburden soils at the site and surrounding vicinity consists predominately of sandy silt to silt till identified as Newmarket till. Areas south of the site are identified to consist of lacustrine and glaciolacustrine deposits of sand and gravelly sand (Karrow, 1986, OGS Map M2509). Surficial soils are underlain by bedrock consisting of blue-grey and green-grey shale with interbedded sandstone, green-grey siltstone, and grey fine-grained limestone of the Georgian Bay Formation (OGS Map M2544). Harder interbedded layers typically occur with increasing frequency toward the top of the Georgian Bay Formation. Bedrock at the site was observed at various depths between 0.9 to 1.5 m below existing grades based on the completed subsurface investigation.

Overburden is not expected to provide significant ground water storage given the limited thickness across the site. It is expected that excess precipitation will predominately runoff to low lying areas including Silver Creek and the identified PSW feature. Drainage will follow topography and will be directed north toward Nottawasaga Bay located approximately 800 m north of the site. Drainage north will be facilitated through the Silver Creek and other culvert crossings with the Georgian Trail (former CN railway) south of the site and with Highway 26 north of the site.

3.5 Simcoe County Official Plan Review

The Simcoe County Official Plan was reviewed for planning policy constraints for development consideration relating to ground water constraints. Relevant land use mapping, including locations of PSW features, are provided in **Appendix A**. The following Simcoe County Official Plan Map Schedules were reviewed:

- Schedule 5.1 – Land Use Designations – The site falls within an identified settlement area
- Schedule 5.2.2 – Streams and Evaluated Wetlands – Identifies PSW features
- Schedule 5.2.4 – Wellhead (WHPA) and Intake Protection (IPZ) Areas – The site is not located within an WHPA/IPZ
- Schedule 5.2.5 – Highly Vulnerable Aquifers (HVA) – The site is located within a HVA
- Schedule 5.2.6 – Significant Ground Water Recharge Area (SGRA) – The site is not within a SGRA
- Schedule 5.3.1 – Niagara Escarpment Plan Land Use Designations – The site is not located within the Niagara Escarpment planning area
- Schedule 5.6.1 – County Waste Disposal Sites – The site is located approximately 900 m northwest from active county Site #2, and approximately 150 northeast of closed county Site #33.

A Phase 1 ESA and a D-4 Investigation have been completed by Terraprobe under separate cover due to the proximity of the above noted landfill sites.

3.6 Private Well Review

A review of MECP well records was conducted for 500 m surrounding the site. A total of 31 well records were available for the study area summarized in the table below:

Summary of MECP Well Records

Total Number of wells	31
Overburden	1 (3 %)
Bedrock	30 (97 %)
Well Depth	
Less than 10 m	8 (26 %)
10 to 15 m	16 (52 %)
Greater than 15 m	7 (22 %)
Well Use	
Domestic/Livestock	26 (84 %)
Observation/Monitoring/Test Hole	5 (16 %)
Well Yield	
Less Than 18.9 L/min (5 GPM or less)	11 (35 %)
22.5 – 37.8 L/min (6 – 10 GPM)	9 (29 %)
41.6 L/min – 76 L/min (11 – 20 GPM)	6 (19 %)
No Data	5 (17 %)

Wells in the vicinity of the site are reported to be completed within shallow bedrock at depths not exceeding 18.9 m (62 feet) below grade. Stratigraphy was reported to consist of shallow overburden deposits between 0.3 to 3.6 m in thickness overlying shale and limestone bedrock. Ground water excavations within shallow bedrock was reported at depths ranging from 0.9 m to 3.6 m below existing grades.

Wells are utilized for domestic purposes except for monitoring wells installed with the identified closed landfill located southwest of the site. Well yields are typically reported to be less than 57 L/min (15 GPM). Wells were reported to have been completed primarily between 1982 to 1988 which is expected to correspond to development for residences along Silver Creek Drive, Forest Drive and Georgian Court subdivisions situated immediately west of the site. Municipal water servicing is available for these residences: it is expected that private wells are no longer used for potable water supply. A summary of well records within the study area are provided in the attached **Table 1**, and well record locations are shown on the attached. **Figure 3**.

3.7 Climate Conditions

The following general climate data was obtained from historical climate data available online through Environment Canada. Annual precipitation data was used from the Collingwood Weather Station located approximately 5 kilometers east from the site. Average precipitation values were used over the period of 1994 to 2021. Climate conditions expected for the site are summarized as follows:

- Precipitation 721 mm/a
- Evapotranspiration 604 mm/a
- Water Surplus 117 mm/a

Infiltration of precipitation at the site is expected to be controlled by soil type at the site which consists of thin sandy silt overlying shallow bedrock at depths typically less than 1.5 m. Infiltration rates were determined based on typical ground water recharge rates for various soil textures provided within the "MOEE Hydrogeological Technical Information Requirements for Land Development Application", (MOEE, 1995), Table 3 (page 4-63). Based on an annual water surplus of 117 mm per year the annual rates for infiltration and runoff at the site were estimated at 47 mm and 70 mm respectively.

Potential evapotranspiration (604 mm/a) was calculated following the Thornthwaite method as below:

$$\mathbf{PET\ (cm/month) = 1.6\ (L/12)\ (10T_a/I)^a}$$

Where: L is the average day length

T_a is the average daily temperature

$I = \Sigma (T_a/5)^{1.5}$

$a = (6.75x10^{-7}) I^3 – (7.71x10^{-5}) I^2 + (1.792x10^{-2}) I + 0.49$

Values for average day length and average daily temperature were obtained online from the Environment Canada climate normals for 1994 – 2021 for the Collingwood Weather Station. The climate reported above is typical for Southern Ontario with annual total precipitation exceeding the mean annual evapotranspiration.

It is noted that the above are average values, which are representative in a regional context. There will be seasonal and annual variations in these values. However, the average values will govern long-term ground water recharge and discharge rates at the site. Therefore, average values are considered appropriate for the assessment of the hydrogeological conditions at the site.

3.8 Results of Subsurface investigation

A subsurface investigation was completed at the site by Terraprobe, which consisted of six boreholes completed at the site in May 2022 to investigate the subsurface conditions present at the site. Additionally, three hand augured boreholes were completed across the eastern parcel (BH-H1 to BH-H3). Hand augured boreholes were completed since this area was not accessible for drilling equipment due to Silver Creek and tree cover. The results of the completed subsurface investigation are summarized in the borehole logs provided in the attached **Appendix C**. Borehole locations are indicated on the attached **Figure 2**.

Boreholes were completed to various depths between 0.5 to 1.5 m below grade. The subsurface conditions encountered at the site generally consisted of sand overlying bedrock. The following is a general description of the major stratigraphic units and ground water conditions observed in the boreholes completed at the site.

3.8.1 Topsoil

A surficial layer of topsoil was encountered with a thickness varying from approximately 140 to 200 mm within completed boreholes. It should be noted that topsoil thickness reported as part of the completed subsurface investigation should not be used to estimate volumes of topsoil for stripping from areas proposed for site development.

3.8.2 Sand

Native sand deposits were encountered underlying topsoil deposits which was observed to have brown colouration, with moisture content ranging from moist to wet and relative density varying from loose to dense, increasing with depth. Sand was encountered in all completed boreholes overlying bedrock. Sand thickness ranged from 0.5 m to 1.5 m across the site.

3.8.3 Bedrock

Auger refusal was encountered at various depths between 0.5 m to 1.5 m below grade on inferred bedrock. Bedrock is expected to slope to the north, with bedrock elevations ranging from 185.1 m to the south extent of the site to elevations of 181.0 m to the north extent of the site. Three additional hand augured boreholes were completed across the eastern development parcel to confirm bedrock depth consistent with depths ranging from 0.5 m to 1.5 m below existing grades.

3.8.4 Ground Water

Standing water within open boreholes upon completion of drilling was observed at a depth of approximately 0.6 m below grade, except for borehole BH4 which was observed to be dry upon completion at a depth of approximately 0.5 m below grade. Borehole depth was insufficient to allow for the proper installation of monitoring wells (insufficient soil cover to allow for grouting of well screens within overburden without direct contact to ground surface). Ground water within open boreholes was observed at a relatively consistent depth at 0.6 m below grade. Shallow ground water is considered as a perched system, with shallow soils underlain by relatively impervious shale bedrock.

It is expected during times of seasonal high-water conditions that soils will be waterlogged, draining to surface water features (i.e., Silver Creek, PSW). Shallow soils are expected to be seasonally dry during summer and fall months and frozen during winter months. Long term groundwater monitoring over three seasons was not feasible for the site given the shallow overburden depths encountered.

Ground water is expected to follow topography and be directed to the north toward Nottawasaga Bay. Brown colouration of soils indicate that soils are not expected to be water-logged and will be seasonally dry during the late summer and fall.

3.9 Water Balance

3.9.1 Development Water Balance

Based on the proposed development plan, as provided in the attached **Appendix A**, it is proposed to develop the portion of the site subject to the planning applications as a municipally serviced residential subdivision with a total of 69 residential units. The development will include detached, semi-detached, and street townhouse residential blocks. Soil conditions for the site were determined from a series of six boreholes completed by Terraprobe in May 2022 as summarized in Section 3.8 above. Regional climate conditions were based on historical weather records accessed online from Environment Canada and are summarized in Section 3.7 above.

Based on the proposed development plan it is expected that an increase in impervious areas at the site following development will result in an overall increase in the rate of runoff of precipitation at the site with a corresponding decrease in both infiltration and evapotranspiration. The following table provides a summary of the calculated water balance given the site conditions and the proposed plan of development:

Summary of Site Water Balance

	Precipitation (m^3/a)	Evapotranspiration (m^3/a)	Infiltration (m^3/a)	Runoff (m^3/a)
Pre-Development	210,316	176,187	13,652	20,477
Post-Development	210,316	157,621	12,018	40,676

An infiltration deficit of approximately 1,634 m^3 is expected following site development. It is expected that the pre-development water balance at the site can be maintained following a Best Management Practice approach utilizing various infiltration features where feasible. The detailed water balance for the site is provided in the attached **Table 2**.

3.9.2 Feature Based Water Balance

A feature-based water balance was competed for the PSW features identified. PSW limits are indicated on feature mapping provided in **Appendix D**. The PSW feature falls within the northern extent of the site. It is expected that runoff and ground water from lands located west of Silver Creek will not provide inputs to the PSW feature.

Surface runoff from lands south of the site would be conveyed through CSPs located under the Georgian Trail. Lands south of the site consist of undeveloped open space. The primary impacts to the catchment area for the PSW features would be due to development proposed for the eastern extent of the site. Given the expected capture area for the PSW feature, the feature-based water balance considered both the pre-

and post-development conditions for lands east of Silver Creek (excluding single detached residential dwellings) and is summarized in the following table:

Summary of Feature Based Water Balance

	Precipitation (m^3/a)	Evapotranspiration (m^3/a)	Infiltration (m^3/a)	Runoff (m^3/a)
Pre-Development	207,446	173,783	13,456	20,198
Post-Development	207,446	156,488	11,944	39,015

An infiltration deficit of approximately 1,522 m^3 is expected following site development. An increase in run-off of 18,871 m^3 is expected following the site development that would need to be managed through site servicing.

The detailed feature-based water balance for the site is provided in the attached **Table 3**.

4.0 DISCUSSION AND ANALYSIS

4.1 Summary of Hydrogeological Conditions

The results of investigations for the site and vicinity indicate the following hydrogeological features for the site:

1. Based on the completed subsurface investigation across the site, soils are expected to consist of topsoil overlying sand and bedrock. Sand thickness across the site varies between 0.5 m to 1.5 m. It is expected that the PSW feature will consist of peat overlying bedrock, and that the channel bed of Silver Creek would correspond with the top of bedrock.

2. Standing water within open boreholes upon completion of drilling was observed at a depth of approximately 0.6 m below grade, except for borehole BH4 which was observed to be dry upon completion at a depth of approximately 0.5 m below grade. Borehole depth was insufficient to allow for the proper installation of monitoring wells. Shallow ground water is considered as a perched system, with shallow soils underlain by relatively impervious shale bedrock.

3. Ground water is expected to follow topography and be directed to the north toward Nottawasaga Bay. Brown colouration of soils indicate that soils are not expected to be water-logged and will be seasonally dry during the late summer and fall.

4. A total of 31 wells were noted within the MECP well record database within a 500 m radius of the site. Wells in the vicinity of the site are reported to be completed within shallow bedrock at depths not exceeding 18.9 m (62 feet) below grade. Stratigraphy was reported to consist of shallow overburden deposits between 0.3 to 3.6 m in thickness overlying shale and limestone bedrock. Ground water excavations within shallow bedrock was reported at depths ranging from 0.9 m to 3.6 m below existing grades.

5. Wells are utilized for domestic purposes except for monitoring wells installed with the identified closed landfill located southwest of the Site. Wells were reported to have been completed primarily between 1982 to 1988 which is expected to correspond to construction for properties west of the site. Municipal water servicing is available for these residences; it is expected that private wells are no longer used for potable water supply.

6. Based on the proposed development plan it is expected that an increase in impervious areas across the site following development will result in an overall increase in the rate of runoff of precipitation at the site with a corresponding decrease in both infiltration and evapotranspiration. An infiltration

deficit of approximately 1,634 m^3 is expected following site development. It is expected that the pre-development water balance at the site can be maintained following a Best Management Practice approach utilizing various infiltration features where feasible.

7. Natural features including Silver Creek and the PSW features are expected to be runoff fed features. Low lying areas or areas in which drainage channels have been altered due to anthropogenic changes (i.e., Highway 26, Georgian Trail) are expected to form areas of ground water recharge to the underlying bedrock aquifer. Upwelling from the underlying bedrock aquifer to natural features is not expected, as head pressures within bedrock, as reported in MECP well records, is expected below grade (i.e., artesian ground water conditions not reported from within bedrock).

8. A feature-based water balance was competed for the PSW features identified. The PSW feature falls within the eastern development parcel, separate from the western development parcel by Silver Creek which bisects the site. The primary impacts to the catchment area for the PSW features would be due to development proposed for the eastern development parcel. An infiltration deficit of approximately 1,522 m^3 is expected due to the proposed development within areas of the site falling east of Silver Creek.

4.2 Ground Water Discharge

Potential ground water baseflow to natural features was assessed based on the completed background and subsurface investigation completed for the site. Potential impacts to baseflow contributions to natural features was assessed through the completed water balance analysis.

Given the limited thickness of the shallow sand overburden it is expected that ground water within shallow sands is primarily due to limited infiltration to the underlying shallow bedrock. Given the limited overburden thickness, it is expected that natural features would primarily be runoff fed features, and shallow sands would form a perched ground water system, providing seasonal ground water contributions to surface water features. Given the shallow overburden thickness significant thermal buffering is not expected to be provided because of ground water discharge. Shallow sands act to convey runoff from the top of shallow bedrock to low lying areas and areas with inadequate drainage. The functioning of overburden deposits is expected to be maintained following development. Development constraints to preserve the hydrogeological function of the site following development are further discussed under Section 5.0 below.

It is expected that the primary impact arising from site development is due to an increase in impervious cover across the site resulting in a decrease in infiltration volumes and an increase in run-off volumes that need to be managed under best management practices. To maintain ground water volumes, it is recommended to promote infiltration of runoff from building areas following site development. Infiltration measures feasible for the site are further discussed in Section 4.4 below.

4.3 Water Balance Targets

Based on the current proposed plan of development, the site is proposed to be developed for use as a residential subdivision consisting of detached, semi-detached, and street townhouses, including environmental protection lands.

Under the pre-development scenario the site is considered largely pervious, albeit with shallow bedrock conditions (bedrock is considered impervious). The predicted annual ground water infiltration volume at the site under current pre-development land use is estimated at 13,652 m^3. Volumes of infiltration, potentially contributing baseflow to the PSW features, is predicted at an annual volume of approximately 13,465 m^3. Under the post-development scenario rates of evapotranspiration and infiltration are expected to decrease and the rate of runoff of precipitation will increase due to the increase in impermeable surface across the project area. Under the current plan of development, the un-mitigated infiltration across the site is anticipated at 12,018 m^3 following site development with a post development annual infiltration deficit estimated at 1,634 m^3. Feature-based water balance post-development infiltration is estimated at 11,944 m^3, for a post-development infiltration deficit estimated at 1,522 m^3.

Given the hydrogeological function of the site to provide limited recharge and baseflow contributions to natural features, including Silver Creek and PSW features through perched ground water within sand overburden overlying shallow bedrock, the primary water balance consideration following site development for underlying ground water would be for the maintenance of the pre-development rates of infiltration across the site following a Best Management Practice approach.

4.4 Water Balance Mitigation Measures

Given that soil conditions at the site consist of sand, with the seasonal high ground water levels expected at depths of approximately 0.6 m below grade and bedrock at various depths between 0.5 m to 1.5 m below grade, it is expected that infiltration potential for any mitigation features will be limited. Seasonal high ground water conditions within developable lands are expected at depths of 0.6 m below existing

grades. Infiltration measures incorporating underdrains are not recommended as these would be expected to intercept ground water under seasonal high conditions.

It is recommended that any infiltration feature be designed such that overflow would be directed to open areas (i.e., environmental protection lands), or to storm sewers where present to limit ponding of runoff or localized flooding during significant rainfall events.

To meet the predicted infiltration deficit of 1,634 m^3 following development it is proposed to direct runoff from building areas to pervious areas. It is recommended to implement rear yard drainage swales as part of site grading to promote infiltration to the subsurface where feasible. Runoff from building areas following site development is estimated at a volume of 10,428 m^3 per year. It is predicted that approximately 16% of the volume of runoff from building areas would need to be directed to infiltration to meet the anticipated post-development infiltration deficit. Runoff from hard surfaces including roads would be directed to the storm water management block for retention and would not be directed to infiltration through overland flow due to potential sources of ground water contamination including road salt and hydrocarbons.

Under the feature-based water balance for the PSW features and to meet the predicted infiltration deficit of 1,522 m^3 it is recommended that lots be rear draining to environmental protection lands and side yard swales be incorporated into the site grading plan to limit localized flooding, promote infiltration, and direct runoff during large precipitation events to natural features. Runoff from building lands east of Silver Creek, is estimated at 9,137 m^3 per year. It is predicted that approximately 17% of the volume of runoff from building areas would need to be directed to infiltration to meet the anticipated post-development infiltration deficit.

Roof downspout disconnections as described in Section 4.3 of the TRCA Low Impact Development Stormwater Management Planning and Design Guide (2010) are recommended (applicable guideline materials under Conservation Ontario). Table 4.3.2 of the Design Guide suggests that approximately 50% of the runoff from the contributing roof areas may be infiltrated (Hydrologic Soil Group A and B). Given that it is estimated that approximately 16% of rooftop runoff volume would be required to meet the predicted post-development infiltration deficit, it is expected that through downspout disconnection pre-development infiltration rates can be maintained and enhanced following development. A design fact sheet for rooftop disconnection from the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide (2010) is provided in **Appendix E**.

The following table provides a summary of the mitigated water balance calculations summarized on the attached **Table 2**:

Summary of Mitigated Site Water Balance

	Precipitation (m^3/a)	Evapotranspiration (m^3/a)	Infiltration (m^3/a)	Runoff (m^3/a)
Pre-Development	210,316	176,187	13,652	20,477
Post-Development	210,316	157,621	17,342	15,153

The following table provides a summary of the mitigated feature-based water balance for the identified PSW features within the eastern development parcel as summarized in the attached **Table 3**:

Summary of Feature Based Water Balance

	Precipitation (m^3/a)	Evapotranspiration (m^3/a)	Infiltration (m^3/a)	Runoff (m^3/a)
Pre-Development	207,446	173,783	13,465	20,198
Post-Development	207,446	156,488	16,649	34,309

5.0 MONITORING, MITIGATION AND CONTINGENCY MEASURES

Based on the results of the hydrogeologic investigation, it is expected there will be no significant impacts to the hydrogeological function of the site. Through directing rooftop runoff to overland flow, it is expected that pre-development infiltration rates across the site, and in relation to the catchment areas for the identified PSW features, will be maintained and enhanced following site development.

The following recommendations are provided to preserve the existing hydrogeological function of the property and to assess and address potential impacts relating to site development:

- Excavation for below grade servicing should be backfilled with native materials or backfill material of similar permeability to native soils at the site (i.e., sand). Backfill has the potential to divert shallow ground water flow away from natural features if backfill material is of a lower hydraulic conductivity (i.e., silts and clays) than that of the existing native subgrade.

- Below grade foundations for residential lots will require permanent drainage, such as sump pumps, or water proofing, as the seasonal high ground water within native soils is expected at depths of 0.6 m below grade. It is expected that sumps would discharge to grade and would be directed to side yard drainage swales for runoff and infiltration away from building foundations.

- During site servicing it is important to maintain records of construction dewatering to ensure that any unforeseen impacts are properly identified and that appropriate contingency measures can be implemented. The following record keeping measures are recommended:

    - The location and extent (depth and approximate dimensions) of all excavations on the site should be recorded daily.

    - The requirements for ground water control including volumes and duration of pumping from each excavation should be recorded daily.

    - Ground water discharge from ground water control systems should be inspected frequently to ensure they are clear and free of visible sediment.

It is expected that servicing excavations will encounter ground water seepage. Given the limited duration and extent of open excavations it is expected that construction dewatering can be completed such that rates of dewatering will be maintained below 50,000 L/day, thereby not requiring permitting or EASR posting from the Ministry of the Environment Conservation and Parks.

Surrounding residential properties are expected to have been connected to municipal water supplies. There is potential for existing private water supply wells for residential properties west of the site. In the event of an interference claim it is recommended that a temporary source of potable water be provided to the impacted property and a well inspection be completed by a hydrogeologist. Given that dewatering activities are anticipated to be temporary it is expected that the impacted private well(s), if any, would be monitored over the duration and following completion of active dewatering to confirm recovery of water levels within the impacted well(s).

6.0 SUMMARY AND RECOMMENDATIONS

The results of investigations for the site and vicinity indicate the following hydrogeological features for the site:

1. Based on the completed subsurface investigation across the site soils are expected to consist of topsoil overlying sand and bedrock. Sand thickness across the site varies between 0.5 m to 1.5 m. It is expected that the PSW feature will consist of peat overlying bedrock, and that the channel bed of Silver Creek would correspond with the top of bedrock.

2. Standing water within open boreholes upon completion of drilling was observed at a depth of approximately 0.6 m below grade, except for borehole BH4 which was observed to be dry upon completion at a depth of approximately 0.5 m below grade. Borehole depth was insufficient to allow for the proper installation of monitoring wells. Shallow ground water is considered as a perched system, with shallow soils underlain by relatively impervious shale bedrock.

3. Ground water is expected to follow topography and be directed to the north toward Nottawasaga Bay. Brown colouration of soils indicate that soils are not expected to be water-logged and will be seasonally dry during the late summer and fall.

4. A total of 31 wells were noted within the MECP well record database within a 500 m radius of the site. Wells in the vicinity of the site are reported to be completed within shallow bedrock at depths not exceeding 18.9 m (62 feet) below grade. Stratigraphy was reported to consist of shallow overburden deposits between 0.3 to 3.6 m in thickness overlying shale and limestone bedrock. Ground water excavations within shallow bedrock was reported at depths ranging from 0.9 m to 3.6 m below existing grades.

5. Wells are utilized for domestic purposes except for monitoring wells installed with the identified closed landfill located southwest of the site. Wells were reported to have been completed primarily between 1982 to 1988 which is expected to correspond to construction for properties west of the site. Municipal water servicing is available for these residences. It is expected that private wells are no longer used for potable water supply.

6. Based on the proposed development plan it is expected that an increase in impervious areas across lands subject to the planning application, including Block 98 following development will result in an overall increase in the rate of runoff of precipitation at the site with a corresponding decrease in both infiltration and evapotranspiration. An infiltration deficit of approximately 1,634 m^3 is expected

following site development. It is expected that the pre-development water balance at the site can be maintained following a Best Management Practice approach utilizing various infiltration features where feasible.

7. Natural features including Silver Creek and the PSW features are expected to be runoff fed features. Low lying areas or areas in which drainage channels have been altered due to anthropogenic changes (i.e., Highway 26, Georgian Trail) are expected to form areas of ground water recharge to the underlying bedrock aquifer. Upwelling from the underlying bedrock aquifer to natural features is not expected, as head pressures within bedrock, as reported in MECP well records, is expected below grade (i.e., artesian ground water conditions not reported from within bedrock).

8. A feature-based water balance was competed for the PSW features identified. The PSW feature falls to the northern extent of the site. The primary impacts to the catchment area for the PSW features would be due to development proposed for the eastern extent of the site. An infiltration deficit of approximately 1,522 m^3 is expected due to the proposed development within lands located east of Silver Creek.

The following provides a summary of the conclusions and recommendations of analysis completed as part of the hydrogeological investigation:

1. It is expected that primary impact to potential ground water discharge volumes resulting from development is due to an increase in impervious cover across the site. To maintain ground water volumes, infiltration of runoff from building areas is recommended to be implemented following site development.

2. It is expected that rates of pre-development infiltration at the site can be maintained by directing runoff from rooftops to overland flow. This includes discharging runoff to rear and side yard swales where feasible implemented under the site grading plan under a Best Management Practice approach.

3. Seasonal high ground water conditions within developable lands are expected at depths of 0.6 m below existing grades. Infiltration measures incorporating underdrains are not recommended as these would be expected to intercept ground water under seasonal high conditions. It is recommended that any infiltration feature be designed such that overflow would be directed to

open areas (i.e., environmental protection lands), or to storm sewers where present to limit ponding of runoff or localized flooding during significant rainfall events,

4. To meet the predicted infiltration deficit of 1,634 m^3 following development it is recommended that runoff from building areas be directed to pervious areas. It is recommended that rear yard drainage swales be implemented as part of site grading to promote infiltration to the subsurface where feasible. Runoff from building areas following site development is estimated at a volume of 10,428 m^3 per year. It is predicted that approximately 16% of the volume of runoff from building areas would need to be directed to infiltration to meet the anticipated post-development infiltration deficit.

5. Within the eastern development parcel, to maintain the feature-based water balance for the PSW features and meet the predicted infiltration deficit of 1,522 m^3, it is recommended that lots be rear draining to environmental protection lands and side yard swales be incorporated into the site grading plan to limit localized flooding, promote infiltration, and direct runoff during large precipitation events to natural features. Runoff from building areas within the eastern development parcel is estimated at 9,137 m^3 per year. It is predicted that approximately 17% of the volume of runoff from building areas would need to be directed to infiltration to meet the anticipated post-development infiltration deficit

6. Roof downspout disconnections are described in Section 4.3 of the TRCA Low Impact Development Stormwater Management Planning and Design Guide (2010) (applicable guidelines under Conservation Ontario). Table 4.3.2 of the Design Guide suggests that approximately 50% of the runoff from the contributing roof areas may be infiltrated (Hydrologic Soil Group A and B). It is expected that through downspout disconnection pre-development infiltration rates can be maintained and enhanced following development.

7. Backfill for excavation for below grade servicing should be backfilled with native materials or backfill of similar permeability to native soils at the site (i.e., sand). Backfill has the potential to divert shallow ground water flow away from natural features if backfill is of a lower hydraulic conductivity (i.e., silts and clays) that the existing native subgrade.

8. Below grade foundations for residential lots will require permanent drainage such as sump pumps, or water proofing, as the seasonal high ground water within native soils is expected at depths of 0.6 m below grade. It is expected that sumps would discharge to grade and would be directed to side yard drainage swales for runoff and infiltration away from building foundations.

The site conditions were based upon completed borehole locations and sampling intervals during investigations. Groundwater elevations were based on physical measurements completed at the time of site investigations. Soil and groundwater conditions outside of investigated locations and times are inferred and should be regarded as such.

We trust this report satisfies your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

Terraprobe Inc.

Paul L. Raepple, P. Geo.
Senior Hydrogeologist

Shama M. Qureshi, P.Eng., P.Geo., $QP_{RA\text{-}ESA}$
Principal

FIGURES

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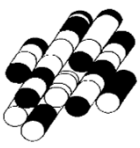

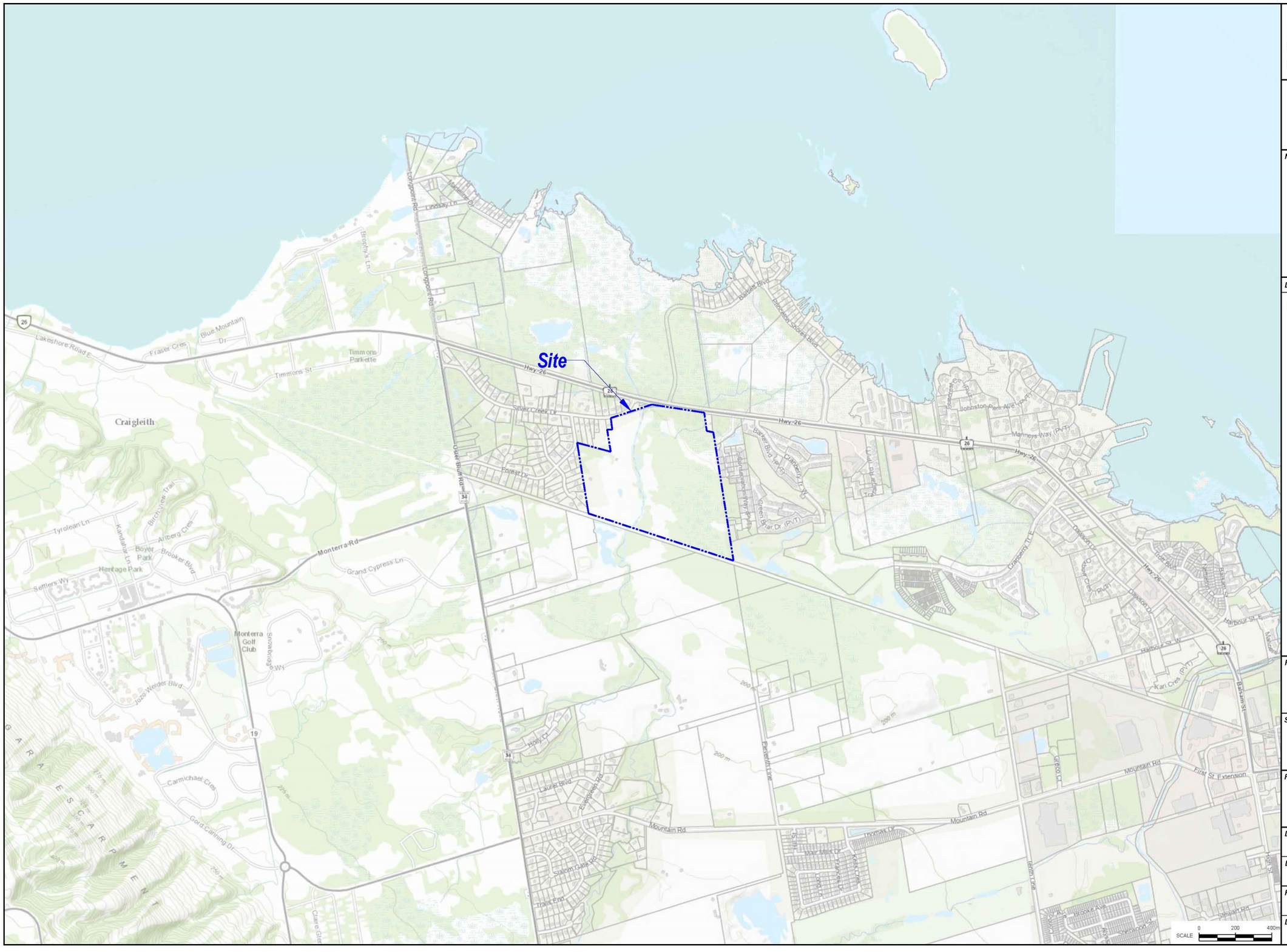

Terraprobe Inc.
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Simcoe Interactive Maps

Notes:

Legend:
Site Boundary

Project Title:
Hydrogeological Assessment

Site Location:
Lots 47, 48, and 49, Concession 12,
Town of Collingwood, Ontario

Figure Title:
Site Location Plan

Designed By: SA	***File No.:*** 3-21-0151-46
Drawn By: SSK	***Scale:*** As Shown
Reviewed By: BW	***Figure No.:*** 1
Date: July 2022	

Z:\1-Project Files\2021\Branch Folders\3-21-0151 - 5 Silver Creek Drive, Collingwood\04 - 04 Land\RA\ Dwgs\ Logs\AutoCAD\3-21-0151-46.dwg
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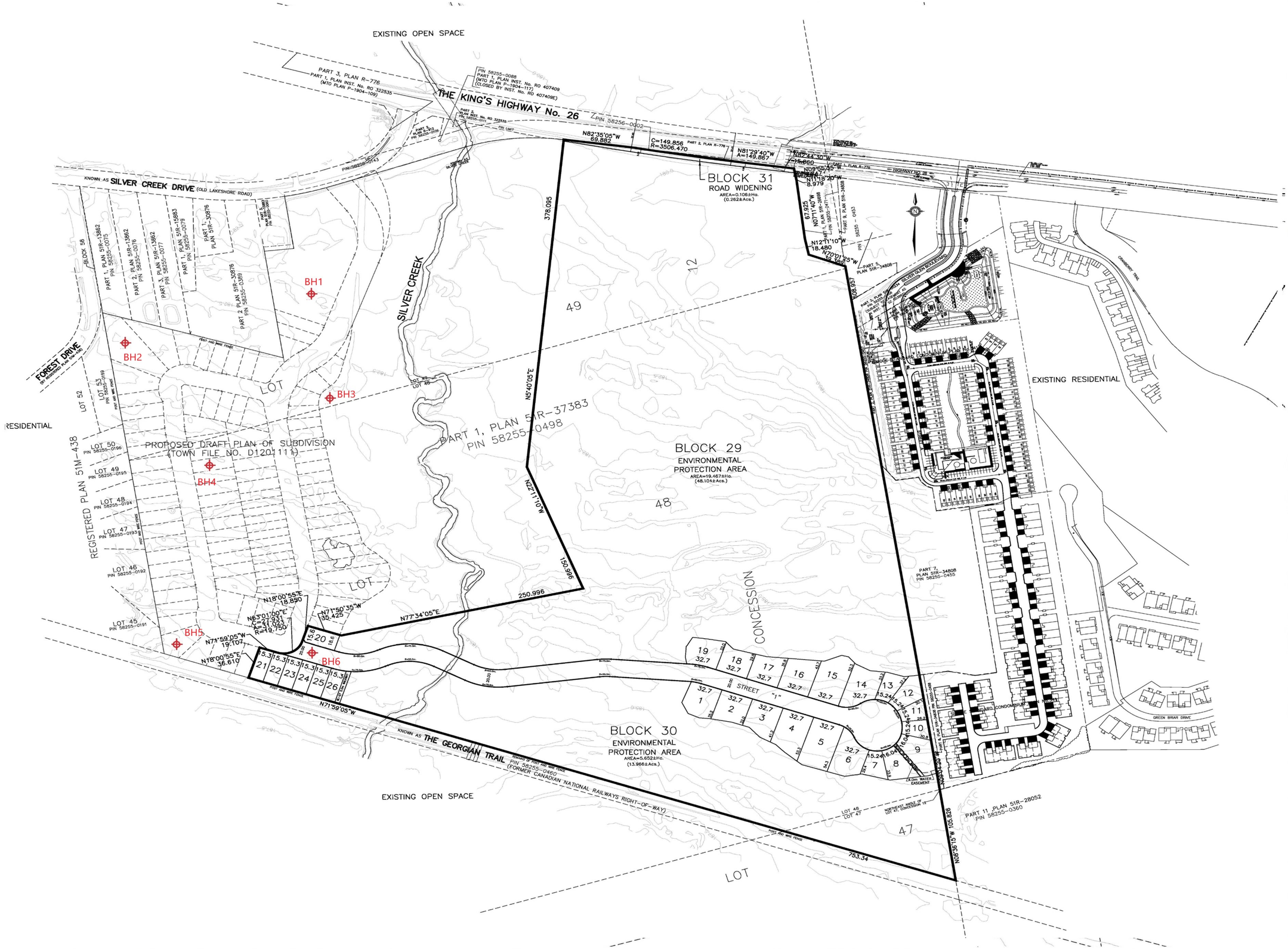

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Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Simcoe Interactive Maps

Notes:

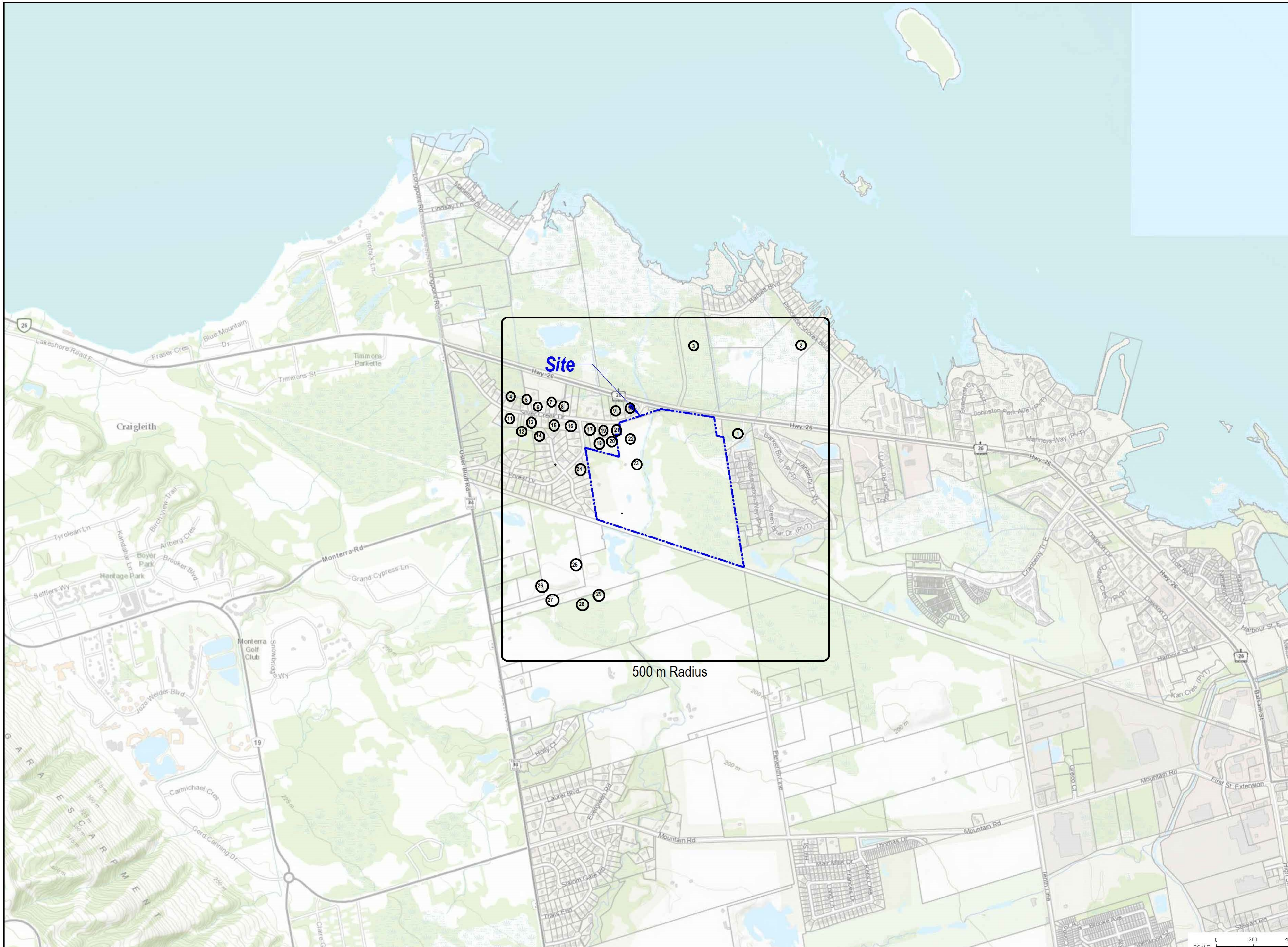
Legend:
Site Boundary

Project Title:
Hydrogeological Assessment

Site Location:
Lots 47, 48, and 49, Concession 12,
Town of Collingwood, Ontario

Figure Title:
Borehole Location Plan

Designed By: SA	*File No.:* 3-21-0151-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 2
Date: July 2022	



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Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing

11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

N

Reference: Simcoe Interactive Maps

Notes:

Legend:

- Site Boundary
- (9) Well Record Location

Project Title: Hydrogeological Assessment

Site Location: Lots 47, 48, and 49, Concession 12, Town of Collingwood, Ontario

Figure Title: Well Record Location Plan

Designed By:	SA	*File No.:*	3-21-0151-54
Drawn By:	SSK	*Scale:*	As Shown
Reviewed By:	BW	*Figure No.:*	3
Date:	July 2022		

TABLES

Terraprobe Inc.

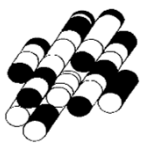

Table 1: Summary of MECP Well Records
Proposed Residential Development
5 Silver Creek Drive
Collingwood, Ontario

Map ID	Well ID	Easting	Northing	Year Completed	Well Use	Water Level (m)	Pump Rate (L/min)	Stratigraphy (Depth in metres)
1	5700376	557 925	4 929 669	1954	Domestic	3.6	37.8	Sand (1.2) Limestone (10.7)
2	5722901	558 268	4 930 034	1987	Domestic	0.7	18.9	Sand (1.2) Shale (18.3)
3	5700366	557 755	4 930 077	1950	Domestic	0.9	22.7	Clay (3.4) Limestone (8.2)
4	5708484	556 694	4 929 869	1971	Domestic	1.2	11.3	Sand (0.9) Clay/Stones (1.5) Limestone (6.7)
5	5723848	556 696	4 929 838	1988	Domestic	3.5	56.7	Sand (0.9) Sand/Clay (1.8) Shale (12.2)
6	5700369	566 774	4 929 845	1952	Domestic	1.2	18.9	Sand/Clay (2.1) Rock (11.0)
7	5706846	556 856	4 929 826	1969	Domestic	2.4	15.1	Topsoil (0.3) Rock (10.0)
8	5723847	556 925	4 929 809	1988	Livestock	3.6	56.7	Fill (1.8) Sand/Clay (3.0) Shale (12.2)
9	5720712	557 242	4 929 761	1984	Domestic	1.2	37.8	Topsoil (0.3) Clay (0.9) Limestone/Shale (18.9)
10	5725344	557 289	4 929 772	1989	Domestic	3.6	37.8	Topsoil (0.3) Clay/Stones (1.2) Shale (18.3)
11	5700378	556 643	4 929 778	1954	Domestic	1.2	11.3	Sand (1.8) Limestone (5.5)
12	5707236	556 738	4 929 725	1970	Domestic	3.6	45.4	Sand (1.2) Shale (2.1) Limestone (13.1)
13	5710449	556 801	4 929 734	1972	Domestic	0.9	11.3	Sand (0.9) Shale (6.1) Limestone (13.7)
14a	5720019	556 866	4 929 672	1985	Domestic	0.9	15.1	Topsoil (0.3) Sand/Stones (2.1) Limestone (15.2)
14b	5720153				Domestic	3	7.6	Clay /Stones (3.6) Limestone (18.0)
15	5714302	556 909	4 929 671	1977	Domestic	3	3.8	Topsoil (0.3) Sand/Clay (1.8) Shale (2.4) Limestone (13.1)
16	5700432	557 018	4 929 729	1966	Domestic	2.7	3.8	Sand (3.6) Shale (5.2) Limestone (9.8)
17	5720156	557 086	4 929 743	1985	Domestic	1.8	7.6	Topsoil (0.3) Clay /Stones (1.2) Shale (18.9)
18a	5722372	557 125	4 929 744	1987	Domestic	3.6	56.7	Topsoil (0.3) Sand (0.9) Shale (12.5)
18b	5722902				Domestic	3.6	18.9	Sand/Clay (0.9) Shale (12.2)
19	5724128	557 126	4 929 715	1988	Domestic	3.6	56.7	Fill (0.9) Sand/Clay (1.2) Shale (18.9)
20	5722373	557 175	4 929 723	1987	Domestic	3.5	18.9	Fill (0.6) Sand (1.2) Shale (11.3)
21	5723299	557 274	4 929 718	1988	Domestic	2.4	37.8	Fill (0.6) Sand/Clay (1.2) Shale (12.2)
22	5715276	557 316	4 929 672	1978	Domestic	2.4	15.1	Topsoil (0.3) Sand (0.9) Shale (17.7)
23	5719181	557 414	4 929 572	1984	Livestock	3	68.0	Topsoil (0.3) Clay/Stones (1.5) Shale (13.1)
24	5718657	557 115	4 929 570	1983	Domestic	1.8	11.3	Topsoil (0.3) Clay/Stones (1.5) Shale (12.2)
25	2516244	557 072	4 929 061	2004	Observation	-	-	Sand (1.5) Limestone (9.1)
26	7299085	556 967	4 928 936	2016	Monitoring	-	-	Fill (1.2) Waste (7.6)
27	7114866	556 958	4 928 888	2008	Monitoring	-	-	Refuse (9.8) Limestone (13.7)
28	5740523	557 062	4 928 787	2005	Test Hole	-	-	Topsoil (0.3) Sand (2.4) Limestone/Shale (3.8)
29	5740521	557 112	4 928 799	2005	Test Hole	-	-	Topsoil (0.3) Till (2.4) Limestone (3.8)

TABLE 2: DETAILED WATER BALANCE - 5 SILVER CREEK DRIVE, COLLINGWOOD, ONTARIO

1. Climate Information

Precipitation	721	mm/a
Evapotranspiration	604	mm/a
Water Surplus	117	mm/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors	
Flat and Rolling Land	0.15
Sandy Loam, Shallow Bedrock	0.1
Cover-Cultivated and Wooded Areas	0.15
TOTAL	0.4

Infiltration (0.45 x 271)	47	mm/a
Run-off (271 - 122)	70	mm/a

3. Property Statistics

Detached Residential	0.40	ha	3,980	m^2
Semi-Detached Residential	0.51	ha	5,140	m^2
Street Townhouses	1.57	ha	15,710	m^2
Walkway	0.03	ha	320	m^2
Roads + Widening	1.60	ha	16,030	m^2
Environmental Protection Lands	25.05	ha	250,520	m^2
TOTAL	29.17	ha	291,700	m^2

4. Lot Coverage

Detached Blocks				
Roof Coverage (50% of 3,980m^2)	0.20	ha	1,990	m^2
Driveway Coverage (10% of 3,980 m^2)	0.04	ha	398	m^2
Landscape (40% of 3,980 m^2)	0.16	ha	1,592	m^2
Semi-Detached Blocks				
Roof Coverage (60% of 5,140 m^2)	0.31	ha	3,084	m^2
Driveway Coverage (10% of 5,140 m^2)	0.05	ha	514	m^2
Landscape (30% of 5,140 m^2)	0.15	ha	1,542	m^2
Street Townhouse Blocks				
Roof Coverage (70% of 15,710 m^2)	1.10	ha	10,997	m^2
Driveway Coverage (10% of 15,710 m^2)	0.16	ha	1,571	m^2
Landscape (20% of 15,710 m^2)	0.31	ha	3,142	m^2
TOTAL	2.48	ha	24,830	m^2

TABLE 2: DETAILED WATER BALANCE - 5 SILVER CREEK DRIVE, COLLINGWOOD, ONTARIO

5. Annual Pre-Development Water Balance

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Undeveloped	291,700	210,316	176,187	13,652	20,477

6. Annual Post-Development Water Balance (Un-Mitigated)

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Coverage (Residential, Future Development)	16,071	11,587	1,159	nil	10,428
Hard surfaces (Roads, Driveways, Parking, SWM)	18,833	13,579	1,358	nil	12,221
Pervious Areas (Natural Heritage Area/Landscaped)	256,796	185,150	155,105	12,018	18,027
TOTAL	291,700	210,316	157,621	12,018	40,676

Evaporation from impervious areas assumed at 10%

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	210,316	176,187	13,652	20,477
Unmitigated Post-Development	210,316	157,621	12,018	40,676

8. Estimated Post-Development Infiltration Deficit

Volume of post-development infiltration	12,018
Volume of pre-development Infiltration	13,652
Deficit from pre to post-development infiltration	1,634

9. Mitigation Measures

Additional infiltration due to roof downspouts to grade and topsoil amendments	5,214
Additional infiltration due to rear yard dry swales	110

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	210,316	176,187	13,652	20,477
Mitigated Post-Development	210,316	157,621	17,342	15,153

TABLE 2: DETAILED WATER BALANCE - 5 SILVER CREEK DRIVE, COLLINGWOOD, ONTARIO

Evapotranspiration Calculations*

PET (cm/month) = $1.6\ (L/12)\ (10T_a/I)^{a}$

L	average day length (Collingwood Area)*
T_a	average daily temperature (Collingwood Weather Station)*
I	$\Sigma\ (T_a/5)^{1.5}$
a	$(6.75 \times 10^{-7})\ I^3 - (7.71 \times 10^{-5})\ I^2 + (1.792 \times 10^{-2})\ I + 0.49$

	L (hrs)	Ta (°C)	$(T_a/5)^{1.5}$	PET
January	9.2	-5.0		0
February	10.4	-3.6		0
March	11.9	-0.2		0
April	13.4	6.1	1.3	2.9
May	14.7	12.3	3.9	7.0
June	15.4	18.1	6.9	11.3
July	15.1	21.0	8.6	13.1
August	13.9	20.1	8.1	11.5
September	12.5	17.1	6.3	8.6
October	11.0	10.1	2.9	4.2
November	9.7	5.3	1.1	1.8
December	9.0	-1.2		0

I = 39.04791
a = 1.112369
PET = 604.7 mm/a

*Potential Evapotranspiration follows the Thornthwaite Equation as published in:
Thornthwaite, C. W. (1948). "An Approach Toward a Rational Classification of Climate". Geographical Review 38 (1): 55-94.
*Average day length data for Collingwood Area obtained online from timeanddate.com
*Average monthly temperature obtained online from Environment Canada (monthly averages from 1994-2022)

TABLE 3: FEATURE BASED WATER BALANCE - 5 SILVER CREEK DRIVE, COLLINGWOOD, ONTARIO

1. Climate Information

Precipitation	721	mm/a
Evapotranspiration	604	mm/a
Water Surplus	117	mm/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors	
Flat and Rolling Land	0.15
Sandy Loam, Shallow Bedrock	0.1
Cover-Cultivated and Wooded Areas	0.15
TOTAL	0.4

Infiltration (0.45 x 271)	47	mm/a
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TOTAL	29.17	ha	291,700	m^2

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Landscape (40% of 3,980 m^2)	0.16	ha	1,592	m^2
Semi-Detached Blocks				
Roof Coverage (60% of 5,140 m^2)	0.31	ha	3,084	m^2
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Roof Coverage (70% of 15,710 m^2)	1.10	ha	10,997	m^2
Driveway Coverage (10% of 15,710 m^2)	0.16	ha	1,571	m^2
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TOTAL	2.48	ha	24,830	m^2

TABLE 3: FEATURE BASED WATER BALANCE - 5 SILVER CREEK DRIVE, COLLINGWOOD, ONTARIO

5. Annual Pre-Development Water Balance

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Undeveloped	291,700	210,316	176,187	13,652	20,477

6. Annual Post-Development Water Balance (Un-Mitigated)

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Coverage (Residential, Future Development)	16,071	11,587	1,159	nil	10,428
Hard surfaces (Roads, Driveways, Walkways)	18,833	13,579	1,358	nil	12,221
Pervious Areas (Natural Heritage Area/Landscaped)	256,796	185,150	155,105	12,018	18,027
TOTAL	291,700	210,316	157,621	12,018	40,676

Evaporation from impervious areas assumed at 10%

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	210,316	176,187	13,652	20,477
Unmitigated Post-Development	210,316	157,621	12,018	40,676

8. Estimated Post-Development Infiltration Deficit

Volume of post-development infiltration	12,018 m^3
Volume of pre-development Infiltration	13,652 m^3
Deficit from pre to post-development infiltration	1,634 m^3

9. Mitigation Measures

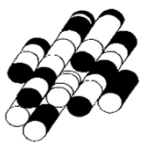
Additional infiltration due to roof downspouts to grade and topsoil amendments	4,569 m^3
Additional infiltration due to rear yard dry swales	137 m^3

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	210,316	176,187	13,652	20,477
Mitigated Post-Development	210,316	157,621	16,724	35,970

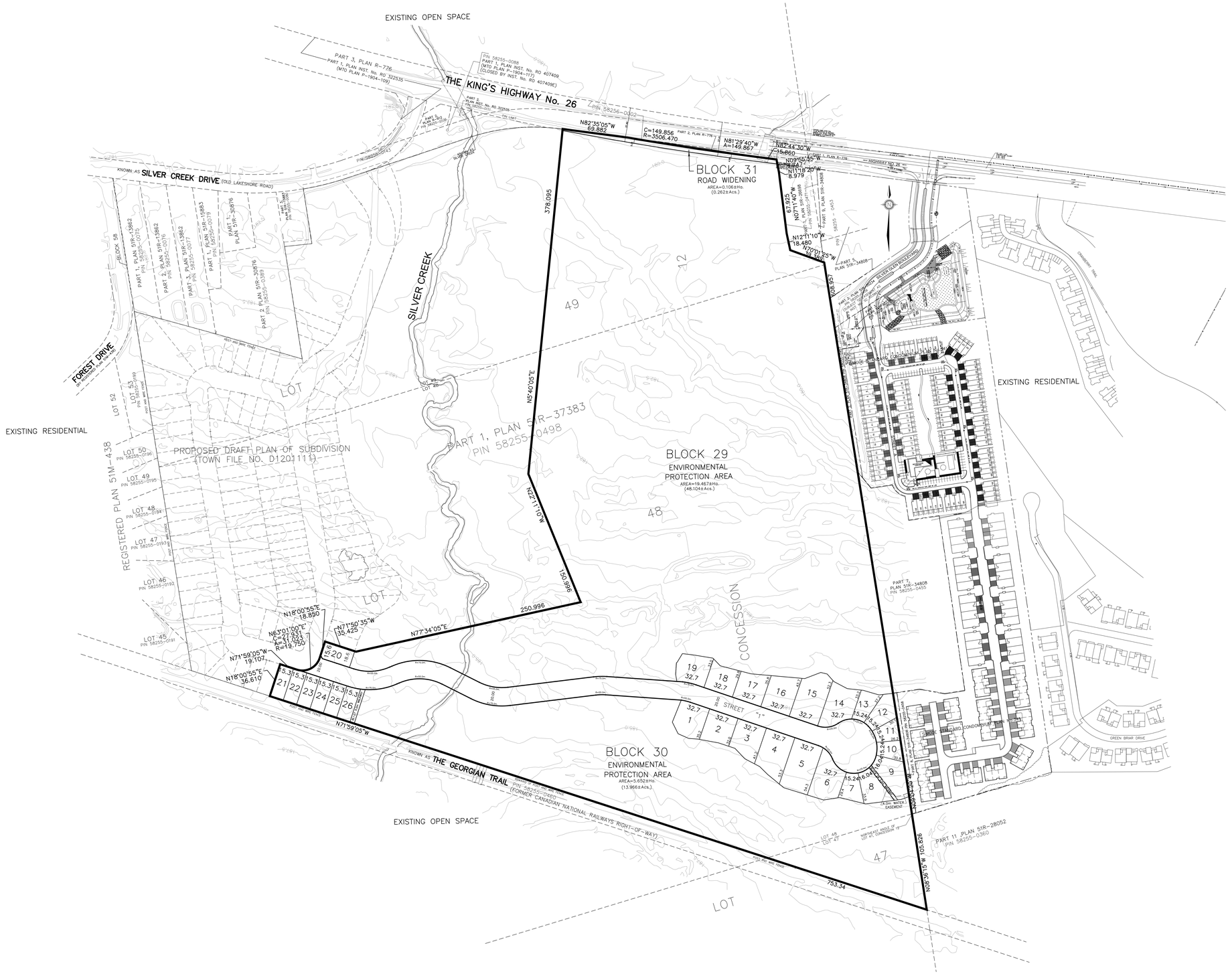
Site Plans

APPENDIX A

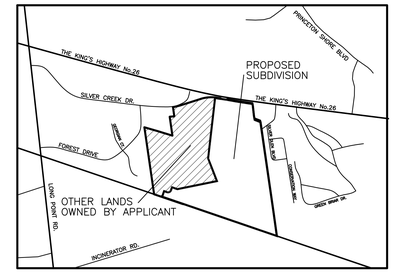
Terraprobe Inc.



DRAFT PLAN OF SUBDIVISION
PART OF LOTS 47, 48 AND 49, CONCESSION 12
TOWN OF COLLINGWOOD
(GEOGRAPHIC TOWNSHIP OF NOTTAWASAGA)
COUNTY OF SIMCOE



DRAFT PLAN T–



KEY PLAN SCALE: NTS

SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
F.1 NOT APPLICABLE
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE OCTOBER 6, 2022

DAN DZALDOV
SCHAEFFER DZALDOV PURCELL LTD.
ONTARIO LAND SURVEYORS
64 JARDIN DRIVE, UNIT 1
CONCORD, ONTARIO L4K 3P3
TEL: (416) 987-1070

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF COLLINGWOOD FOR APPROVAL.

OWNER

HUNTINGWOOD TRAILS (COLLINGWOOD) LTD.

152 DALEMOUNT AVENUE
TORONTO
ONTARIO
M6B 3C9

EDWARD WEISZ
A.S.O.

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED = 29.163±Ha. (72.063±Acs.)

	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
SINGLE DETACHED DWELLINGS					
LOTS 20–26 MIN. LOT FRONTAGE=15.3m. MIN LOT AREA=560sq.m.		7	7	0.400	0.988
SEMI–DETACHED DWELLINGS					
LOTS 7–13 MIN. LOT FRONTAGE=15.24m. MIN LOT AREA=528sq.m.		7	14	0.502	1.240
STREET TOWNHOUSES					
BLOCKS 1–6, & 14–19 MIN. FRONTAGE 8.1m. (END UNITS) MIN. FRONTAGE 6.7m. (INTERIOR UNITS)	12		48	1.571	3.882
SUBTOTAL	12	14	69	2.473	6.111
BLOCKS 27 and 28 – WALKWAY	2			0.043	0.106
BLOCKS 29 and 30 – ENVIRONMENTAL PROTECTION AREA	2			25.120	62.073
BLOCK 31 – ROAD WIDENING	1			0.106	0.262
STREET 20.0m. WIDE TOTAL LENGTH= 711±m. AREA= 1.421±Ha.				1.421	3.511
TOTAL	17	14	69	29.163	72.063

NOTE – ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM

PROJECT No. P-3083
SCALE 1:1500 JANUARY 10, 2023
(3083(E)DES7) X-REF: (3083MAS5 & 3083TOPO1)
DWG. No. - 23:7

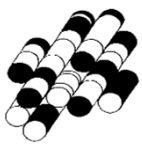
KLM PLANNING PARTNERS INC.
64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
TEL: (905) 669-4055 FAX: (905) 669-0097 design@klmplanning.com

Planning ● Design ● Development

Regulatory Mapping

APPENDIX B

Terraprobe Inc.



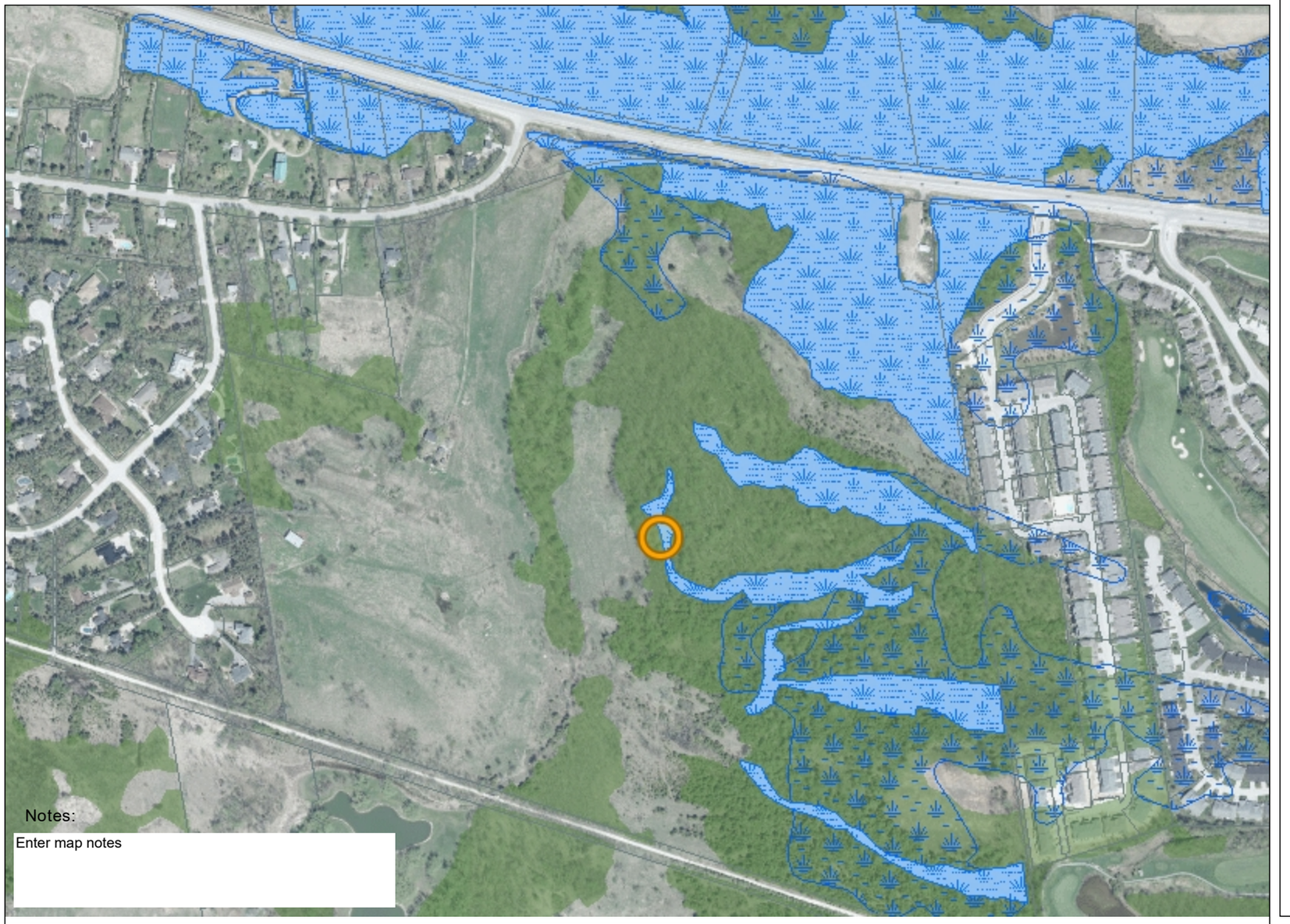
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Areas Mapping

Map created:3/14/2022



Notes:

Enter map notes

Legend

- Assessment Parcel
- Evaluated Wetland
- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale
- Unevaluated Wetland
- Woodland

0.3 0 0.16 0.3 Kilometres

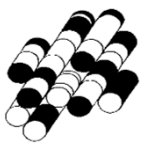
Absence of a feature in the map does not mean they do not exist in this area.

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

Borehole Logs

APPENDIX C

Terraprobe Inc.



LOG OF BOREHOLE 1

Terraprobe

Project No. : 3-21-0151-46	Client : Huntingwood Trails (Collingwood) LTD.	Originated by : C.B/R.S
Date started : May 30, 2022	Project : 5 Silver Creek Drive	Compiled by : G.O
Sheet No. : 1 of 1	Location : Collingwood, Ontario	Checked by :

Position :
Elevation Datum : Geodetic
Rig type : Track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**											
		180mm **TOPSOIL**		1	SS	3							
		SAND, very loose, moist ...becoming very dense, wet @ 0.8m		2	SS	50 / 150mm						▽	
	0.9	**END OF BOREHOLE**											

Penetration Test Values (Blows / 0.3m): × Dynamic Cone — 10 20 30 40
Undrained Shear Strength (kPa): ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane — 40 80 120 160
Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) — 10 20 30
Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

Borehole terminated on refusal. Probable bedrock @ 0.9m.

Unstabilized water level measured at 0.6 m below ground surface; borehole was open upon completion of drilling.

file: 3-21-0151-46 bh logs.gpj

LOG OF BOREHOLE 2

Terraprobe

Project No. : 3-21-0151-46	Client : Huntingwood Trails (Collingwood) LTD.	Originated by : C.B/R.S
Date started : May 30, 2022	Project : 5 Silver Creek Drive	Compiled by : G.O
Sheet No. : 1 of 1	Location : Collingwood, Ontario	Checked by :

Position :
Elevation Datum : Geodetic
Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**											
		170mm **TOPSOIL**		1	SS	5							
		SAND, trace to some gravel, loose, brown, moist											
	0.9	...becoming very dense, wet @ 0.8m		2	SS	50 / 150mm						▽	

Penetration Test Values (Blows / 0.3m): × Dynamic Cone; 10 20 30 40
Undrained Shear Strength (kPa): ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane; 40 80 120 160
Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL); 10 20 30
Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Borehole terminated on refusal. Probable bedrock @ 0.9m.

Unstabilized water level measured at 0.6 m below ground surface; borehole was open upon completion of drilling.

file: 3-21-0151-46 bh logs.gpj

LOG OF BOREHOLE 3

Terraprobe

Project No. : 3-21-0151-46	Client : Huntingwood Trails (Collingwood) LTD.	Originated by : C.B/R.S
Date started : May 30, 2022	Project : 5 Silver Creek Drive	Compiled by : G.O
Sheet No. : 1 of 1	Location : Collingwood, Ontario	Checked by :

Position :
Elevation Datum : Geodetic
Rig type : Truck-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**						Dynamic Cone 10 20 30 40; Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160	Plastic Limit, Natural Water Content, Liquid Limit PL MC LL 10 20 30				GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
		200mm **TOPSOIL**		1	SS	5							
1		**SAND**, trace gravel, loose, brown, moist ...becoming very dense, wet @ 0.8m		2	SS	50 / 150mm						▽	
	1.1	**END OF BOREHOLE**											

Borehole terminated on refusal. Probable bedrock @ 1.1m.

Unstabilized water level measured at 0.6 m below ground surface; borehole was open upon completion of drilling.

file: 3-21-0151-46 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 4

Project No. : 3-21-0151-46 | Client : Huntingwood Trails (Collingwood) LTD. | Originated by : C.B/R.S

Date started : May 30, 2022 | Project : 5 Silver Creek Drive | Compiled by : G.O

Sheet No. : 1 of 1 | Location : Collingwood, Ontario | Checked by :

Position : | Elevation Datum : Geodetic

Rig type : Truck-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**						Dynamic Cone 10 20 30 40; Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160	Plastic Limit, Natural Water Content, Liquid Limit PL MC LL 10 20 30				GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
		180mm **TOPSOIL**		1	SS	11							
	0.6	**SAND**, very dense, brown, moist											

END OF BOREHOLE

Borehole terminated on refusal. Probable bedrock @ 0.6m.

Borehole was dry and open upon completion of drilling.

file: 3-21-0151-46 bh logs.gpj

LOG OF BOREHOLE 5

Terraprobe

Project No. : 3-21-0151-46	Client : Huntingwood Trails (Collingwood) LTD.	Originated by : C.B/R.S
Date started : May 30, 2022	Project : 5 Silver Creek Drive	Compiled by : G.O
Sheet No. : 1 of 1	Location : Collingwood, Ontario	Checked by :

Position :
Elevation Datum : Geodetic
Rig type : Truck-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**											
		140mm **TOPSOIL**		1	SS	10							
		SAND, trace silt, trace gravel, compact, brown, moist											
	0.9	...becoming very dense, wet @ 0.8m		2	SS	50 / 125mm						▽	

Penetration Test Values (Blows / 0.3m): × Dynamic Cone; 10 20 30 40
Undrained Shear Strength (kPa): ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane; 40 80 120 160
Moisture / Plasticity: Plastic Limit | Natural Water Content | Liquid Limit; PL MC LL; 10 20 30
Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Borehole terminated on refusal. Probable bedrock @ 0.9m.

Unstabilized water level measured at 0.6 m below ground surface; borehole was open upon completion of drilling.

file: 3-21-0151-46 bh logs.gpj

LOG OF BOREHOLE 6

Terraprobe

Project No. : 3-21-0151-46	Client : Huntingwood Trails (Collingwood) LTD.	Originated by : C.B/R.S
Date started : May 30, 2022	Project : 5 Silver Creek Drive	Compiled by : G.O
Sheet No. : 1 of 1	Location : Collingwood, Ontario	Checked by :

Position :
Elevation Datum : Geodetic
Rig type : Truck-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0		**GROUND SURFACE**											
		160mm **TOPSOIL**		1	SS	9							
1		**SAND**, trace gravel, dense, brown, moist		2	SS	47							
	1.5			3	SS	50 / 75mm							

Penetration Test Values (Blows / 0.3m): × Dynamic Cone; 10 20 30 40
Undrained Shear Strength (kPa): ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane; 40 80 120 160
Moisture / Plasticity: Plastic Limit | Natural Water Content | Liquid Limit; PL MC LL; 10 20 30
Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Borehole terminated on refusal. Probable bedrock @ 1.5m.

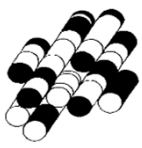
Unstabilized water level measured at 0.6 m below ground surface; borehole was open upon completion of drilling.

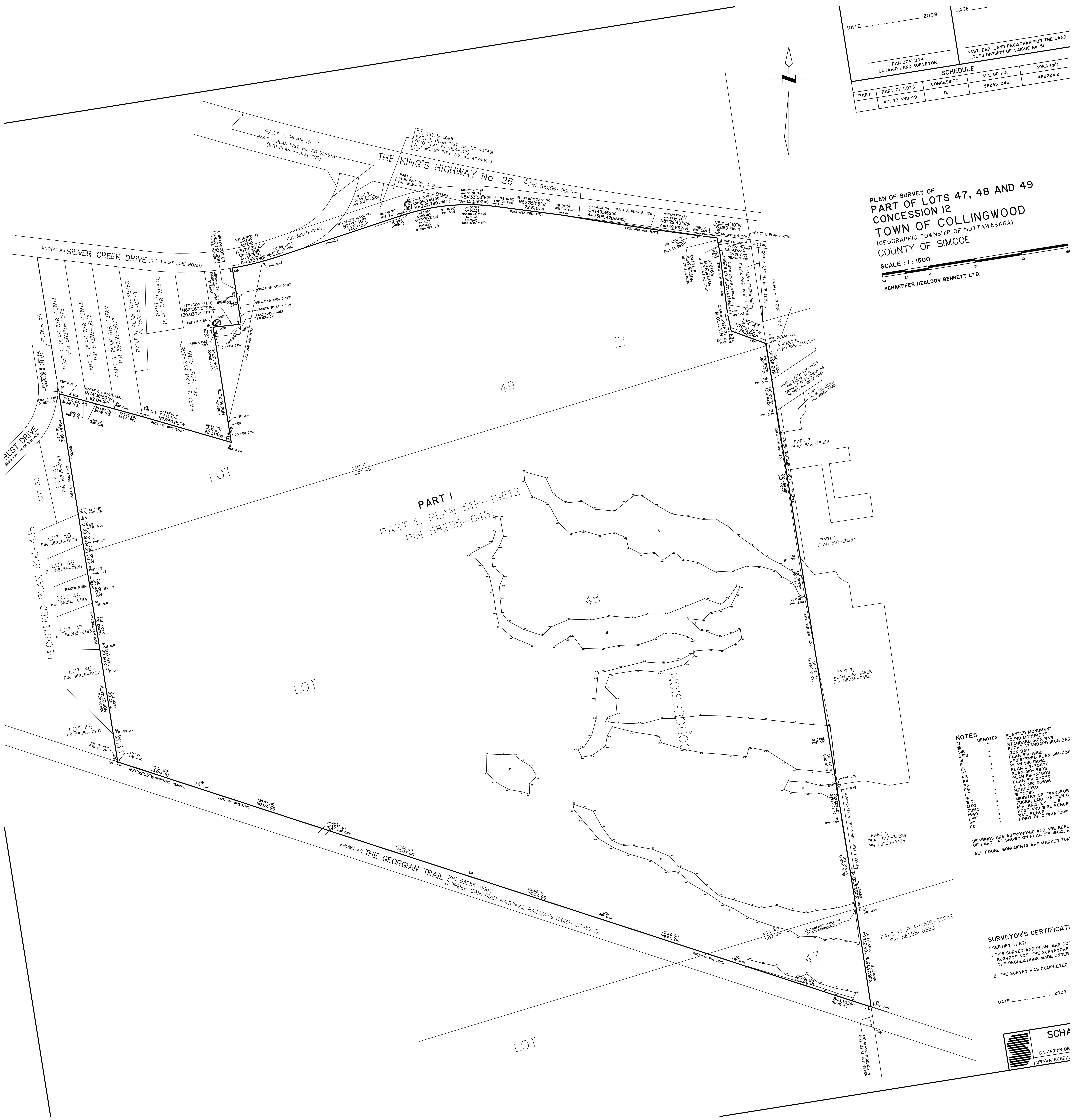
file: 3-21-0151-46 bh logs.gpj

Wetland Limits

APPENDIX D

Terraprobe Inc.

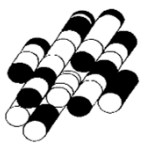



DATE ____________, 2009.
DAN DZALDOV
ONTARIO LAND SURVEYOR
DATE ____
ASST. DEP. LAND REGISTRAR FOR THE LAND TITLES DIVISION OF SIMCOE No. 51
SCHEDULE
PART | PART OF LOTS | CONCESSION | ALL OF PIN | AREA (m²)
1 | 47, 48 AND 49 | 12 | 58255-0451 | 489624.2
PLAN OF SURVEY OF
PART OF LOTS 47, 48 AND 49
CONCESSION 12
TOWN OF COLLINGWOOD
(GEOGRAPHIC TOWNSHIP OF NOTTAWASAGA)
COUNTY OF SIMCOE
SCALE : 1 : 1500
SCHAEFFER DZALDOV BENNETT LTD.
THE KING'S HIGHWAY No. 26
PIN 58256-0002
PART 3, PLAN R-776
PART 1, PLAN INST. No. RO 322535
(MTO PLAN P-1904-109)
PIN 28255-0088
PART 1, PLAN INST. No. RO 407409
(MTO PLAN P-1904-117)
(CLOSED BY INST. No. RO 407409E)
KNOWN AS SILVER CREEK DRIVE (OLD LAKESHORE ROAD)
PIN 58255-0143
PART I
PART 1, PLAN 51R-19612
PIN 58255-0451
REGISTERED PLAN 51M-438
KNOWN AS THE GEORGIAN TRAIL PIN 58255-0460
(FORMER CANADIAN NATIONAL RAILWAYS RIGHT-OF-WAY)
LOT 49
LOT 48
LOT 47
CONCESSION 12
N71°59'05"W (REFERENCE BEARING)
843.103 (M)
843.05 (P)
608.957 (M)
396.748 (M)
NORTHWEST ANGLE OF LOT 47, CONCESSION 12
PART 11, PLAN 51R-28052
PIN 58255-0360
PART 7, PLAN 51R-34808
PIN 58255-0455
PART 1, PLAN 51R-35234
PIN 58255-0468
PART 2, PLAN 51R-36522
NOTES
□ DENOTES PLANTED MONUMENT
■ " FOUND MONUMENT
SIB " STANDARD IRON BAR
SSIB " SHORT STANDARD IRON BAR
IB " IRON BAR
P " PLAN 51R-19612
P1 " REGISTERED PLAN 51M-438
P2 " PLAN 51R-13862
P3 " PLAN 51R-30876
P4 " PLAN 51R-15883
P5 " PLAN 51R-34808
P6 " PLAN 51R-28052
P7 " PLAN 51R-26698
M " MEASURED
WIT " WITNESS
MTO " MINISTRY OF TRANSPORT
ZUMO " ZUBEK, EMO, PATTEN &
1649 " M.W. KNISLEY, O.L.S.
PWF " POST AND WIRE FENCE
RF " RAIL FENCE
PC " POINT OF CURVATURE
BEARINGS ARE ASTRONOMIC AND ARE REFE
OF PART I AS SHOWN ON PLAN 51R-19612, H
ALL FOUND MONUMENTS ARE MARKED ZUM
SURVEYOR'S CERTIFICAT
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE COR
SURVEYS ACT, THE SURVEYORS
THE REGULATIONS MADE UNDER
2. THE SURVEY WAS COMPLETED
DATE ____________, 2009.
SCHA
64 JARDIN DR
DRAWN ACAD/

LID Fact Sheet

APPENDIX E

Terraprobe Inc.



GENERAL DESCRIPTION

Simple downspout disconnection involves directing flow from roof downspouts to a pervious area that drains away from the building. This prevents stormwater from directly entering the storm sewer system or flowing across a "connected" impervious surface, such as a driveway, that drains to a storm sewer. Simple downspout disconnection requires a minimum flow path length across the pervious area of 5 metres.

DESIGN GUIDANCE

Roof downspout disconnections should meet the following criteria:

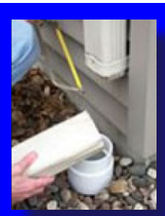
- Pervious areas used for downspout disconnection should be graded to have a slope of between 1 to 5%;
- Pervious areas should slope away from the building;
- The flow path length across the pervious area should be 5 metres or greater;
- The infiltration rate of soils in the pervious area should be 15 mm/hr or greater (i.e., hydraulic conductivity of 1x10-6 cm/s or greater);
- If infiltration rate of the soil in the pervious area is less than 15 mm/hr, it should be tilled to a depth of 300 mm and amended with compost to achieve a ratio of 8 to 15% organic content by weight or 30 to 40% by volume;
- If the flow path length across the pervious area is less than 5 metres and the soils are hydrologic soil group C or D, roof runoff should be directed to another LID practice (e.g., rainwater harvesting system, bioretention area, swale, soakaway, perforated pipe system);
- The total roof area contributing drainage to any single downspout discharge location should not exceed 100 square metres; and,
- A level spreading device (e.g., pea gravel diaphragm) or energy dissipating device (e.g., splash pad) should be placed at the downspout discharge location to distribute runoff as evenly as possible over the pervious area.

APPLICATIONS

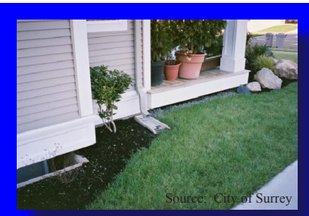
There are many options for keeping roof runoff out of the storm sewer system. Some of the options are as follows:

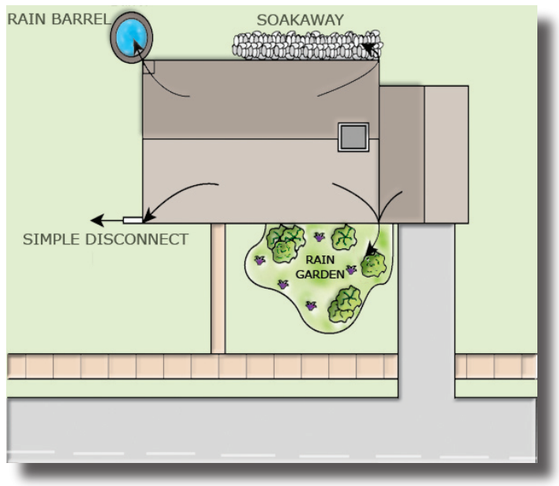
- Simple roof downspout disconnection to a pervious area or vegetated filter strip, where sufficient flow path length across the pervious area and suitable soil conditions exist;
- Roof downspout disconnection to a pervious area or vegetated filter strip that has been tilled and amended with compost to improve soil infiltration rate and moisture storage capacity;
- Directing roof runoff to an enhanced grass swale, dry swale, bioretention area, soakaway or perforated pipe system;
- Directing roof runoff to a rainwater harvesting system (e.g., rain barrel or cistern) with overflow to a pervious area, vegetated filter strip, swale, bioretention area, soakaway or permeable pavement.



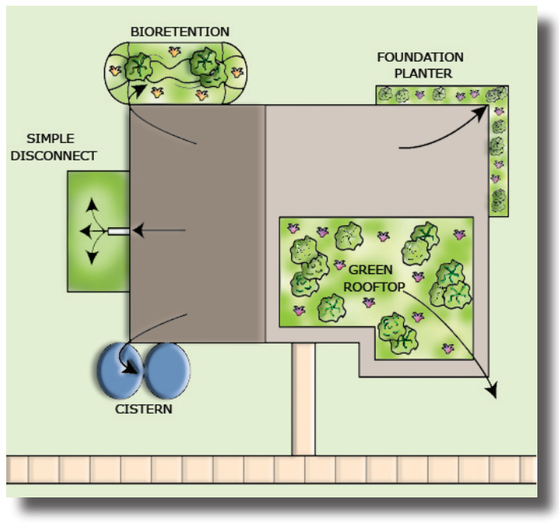



Source: City of Toronto

Source: Riversides

Source: City of Surrey

RESIDENTIAL



COMMERCIAL

CONSTRUCTION CONSIDERATIONS

SOIL DISTURBANCE AND COMPACTION

Only vehicular traffic necessary for construction should be allowed on the pervious areas to which roof downspouts will be discharged. If vehicle traffic is unavoidable, then the pervious area should be tilled to a depth of 300 mm to loosen the compacted soil.

EROSION AND SEDIMENT CONTROL

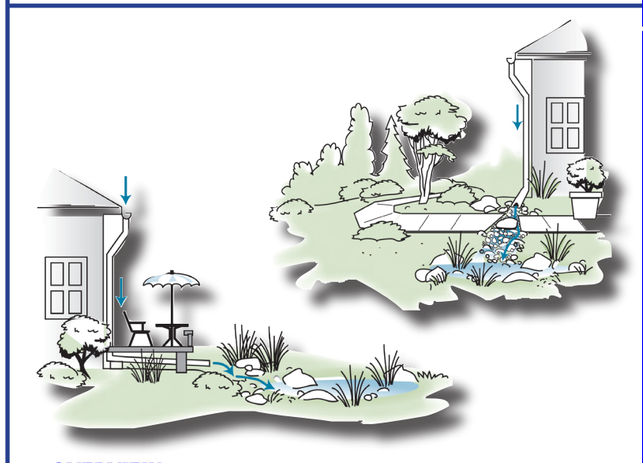
If possible, construction runoff should be directed away from the proposed downspout discharge location. After the contributing drainage area and the downspout discharge location are stabilized and vegetated, erosion and sediment control structures can be removed.

ABILITY TO MEET SWM OBJECTIVES

BMP	Water Balance Benfit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Downspout Disconnection	Partial - depends on soil infiltration rate and length of flow path over the pervious area	Partial - depends on soil infiltration rate and length of flow path over the pervious area	Partial - depends on combination with other practices

Downspout disconnection is primarily a practice used to help achieve water balance benefits, although it can also contribute to water quality improvement. Very limited research has been conducted on the runoff reduction benefits of downspout disconnection, so initial estimates are drawn from research on filter strips, which operate in a similar manner. The research indicates that runoff reduction is a function of soil type, slope, vegetative cover and filtering distance. A conservative runoff reduction rate is 25% for hydrologic soil group (HSG) C and D soils and 50% for HSG A and B soils.* These values apply to disconnections that meet the feasibility criteria outlined in this section, and do not include any further runoff reduction due to the use of compost amendments along the filter path.

*Hydrologic soil group (HSG) classifications are based on the ability of the soil to transmit water. Soil groups are ranked from A to D. Group A soils are sandy, loamy sand, or sandy loam types. Group B soils are silt loam or loam types, Group C soils are sandy clay loam types. Group D soils are clay loam, silty clay loam, sandy clay, silty clay or clay types


OVERVIEW

OPERATION AND MAINTENANCE

Maintenance of disconnected downspouts will generally be no different than for lawns or landscaped areas. A maintenance agreement with property owners or managers may be required to ensure that downspouts remain disconnected and the pervious area remains pervious. For long-term efficacy, the pervious area should be protected from compaction. One method is to plant shrubs or trees along the perimeter of the pervious area to prevent traffic. On commercial sites, the pervious area should not be an area with high foot traffic. If ponding of water for longer than 24 hours occurs, the pervious area should be dethatched and aerated. If ponding persists, regrading or tilling to reverse compaction and/or addition of compost to improve soil moisture retention may be required.

SITE CONSIDERATIONS

Site Topography

Disconnected downspouts should discharge to a gradual slope that conveys runoff away from the building. The slope should be between 1% and 5%. Grading should discourage flow from reconnecting with adjacent impervious surfaces.

Water Table

Roof downspouts should only be disconnected where the minimum depth to the seasonally high water table is at least one (1) metre below the surface.

Pollution Hot Spot Runoff

Downspout disconnection can be used where land uses or activities at ground-level have the potential to generate highly contaminated runoff (e.g., vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) as long as the roof runoff is kept separate from runoff from ground-level impervious surfaces.

COMMON CONCERNS

- ON PRIVATE PROPERTY
  Property owners or managers will need to be educated on its function and maintenance needs, and may be subject to a legally binding maintenance agreement. An incentive program such as a storm sewer user fee based on the area of impervious cover on a property that is directly connected to a storm sewer could be used to encourage property owners or managers to maintain existing practices.
- STANDING WATER AND PONDING
  Downspout disconnection is not intended to pond water, so any standing water should be infiltrated or evaporated within 24 hours of the end of each runoff event. If ponding for longer than 24 hours occurs, mitigation actions noted under Operation and Maintenance should be undertaken.

CVC/TRCA LOW IMPACT DEVELOPMENT
PLANNING AND DESIGN GUIDE - FACT SHEET

DOWNSPOUT DISCONNECTION

TORONTO AND REGION Conservation for The Living City

CVC CREDIT VALLEY CONSERVATION

FOR FURTHER DETAILS SEE SECTION 4.3 OF THE CVC/TRCA LID SWM GUIDE